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Classified past paper Math Edexcel OL 4MA1

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IGCSE

EDEXCEL

PART I

1. **Algebraic representation and manipulation.**

2. **Equations and Inequalities.**

3. **Algebraic Indices.**

4. **Sequences.**

Prepared by:T.Abeer yousrallah

Algebraic representation and manipulation. Equations and Inequalities

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N7 3H $(x + 10) (x - 10), (x - 4) (x + 3), (3x + 1) (x + 2)$

13. Factorise

(a) $x^2 - 100$

.... (1)

(b) $x^2 - x - 12$

.... (2)

(c) $3x^2 + 7x + 2$

.... (2)

(Total 5 marks)

Jan14 3H

19 Factorise completely $(12x - y)^2 - (4x - 3y)^2$

$8 (4x + y) (4x - y)$

.... (Total for Question 19 is 2 marks)

N10 3H

$4c - 12, d^3 + 4d, x(3 - 2x)$

2. (a) Expand

(i) $4(c - 3)$

....

(1)

(ii) $d(d^2 + 4)$

....

(2)

(b) Factorise $3x - 2x^2$

....

(2)

(Total 5 marks)

5

N6 4H

$$6t + 15,\ y^3 - 3y^2,\ x^2 + 10x + 21,\ p^7 q^8$$

2. (a) Expand $3(2t + 5)$

....

(1)

(b) Expand $y(y^2 - 3y)$

....

(2)

(c) Expand and simplify $(x + 3)(x + 7)$

....

(2)

(d) Simplify $p^4q^2 \times p^3q^6$

....

(2)

J8 3H

$$5(2y - 3),\ 3pq(3p + 4q),\ (x + 8)(x - 2),\ x = 2, -8$$

14. (a) Factorise $10y - 15$

....

(1)

(b) Factorise completely $9p^2q + 12pq^2$

....

(2)

(c) (i) Factorise $x^2 + 6x - 16$

....

(ii) Solve $x^2 + 6x - 16 = 0$

....

(3)

(Total 6 marks)

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6

J5 3H

6. (a) Factorise $9p+15$

$\boxed{3(\,3p+5\,),\ q(\,q-4\,),\ (\,x-5\,)(\,x+2\,)}$

....
(1)

(b) Factorise q^2-4q

....
(1)

(c) Factorise $x^2-3x-10$

....
(2)

(Total 4 marks)

N7 4H

2. (a) Factorise $5x-20$

$\boxed{5(\,x-4\,),\ y(\,y+6\,)}$

....
(1)

(b) Factorise y^2+6y

....
(2)

(Total 3 marks)

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Jan14 4H

$$(x - 5) (4x - 17)$$

13 Factorise fully $4(x-5)^2 + 3(x-5)$

....

(Total for Question 13 is 2 marks)

J9 4H

16. (a) Factorise $2x^2 - x - 3$

$$(2x - 3) (x + 1), \quad 1.5 \quad -1$$

....

(2)

(b) Hence write down the solutions of $2x^2 - x - 3 = 0$

....

(1)

(Total 3 marks)

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N8 3H

7(p – 3), -2

2. (a) Factorise $7p - 21$

....
(1)

(b) Solve $4(x + 5) = 12$
You must show sufficient working.

$x =$ ....
(3)

(Total 4 marks)

N10 3H

18. Make x the subject of $P = \dfrac{100\,(y - x)}{x}$

<u>100 y</u>
P+100

$x =$ ....
(Total 4 marks)

J5 3H

$$\boxed{Ih^2}$$

11. Make W the subject of the formula $h = \sqrt{\dfrac{W}{I}}$

$W =$ ....

(Total 2 marks)

N7 3H

$$\boxed{\dfrac{(y+7)}{2}}$$

11. Make x the subject of $3x - y = x + 7$

$x =$ ....

(Total 3 marks)

Jan14 3H

$$\boxed{\sqrt{\dfrac{n}{1-a}}}$$

16 Given that y is positive, make y the subject of $y = \sqrt{ay^2 + n}$

Show clear algebraic working.

$y =$ ....

(Total for Question 16 is 5 marks)

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J13 3H

$$\boxed{\dfrac{3x\,(x + 4\,)}{3x + 4}}$$

22 Make y the subject of $\dfrac{y}{x} + \dfrac{2y}{x + 4} = 3$

Show your working clearly and give your answer as simply as possible.

$y =$ ....

(Total for Question 22 is 5 marks)

N9 4H 17

Make e the subject of the formula $T = \dfrac{n(1+e)}{(1-e)}$

$$\boxed{\dfrac{T-n}{T+n}}$$

$e =$ ....
(5)

N10 4H

22. Simplify fully $\quad 1 + \dfrac{x^2 + x - 6}{(x+4)(x-2)}$

$$\boxed{\dfrac{2x+7}{x+4}}$$

....
(Total 4 marks)

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12

N6 4H

23. Simplify fully $\dfrac{2x^2-5x-12}{4x^2-9}$

$$\boxed{\dfrac{X-4}{2x-3}}$$

....

(Total 3 marks)

J5 3H

22. Simplify fully $\dfrac{2}{x-1}+\dfrac{x-11}{x^2+3x-4}$

$$\boxed{\dfrac{3}{(x+4)}}$$

....

(Total 6 marks)

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N9 3H

$x/(x-2),\ 3/(2x-1)(x+1)$

19. (a) Simplify $\dfrac{x^2}{x^2-2x}$

....

(2)

(b) Simplify $\dfrac{2}{2x-1}-\dfrac{1}{x+1}$

....

(4)

(Total 6 marks)

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18. Simplify fully $\dfrac{5x^2 + 14x - 3}{50x^2 - 2}$

$$\boxed{\dfrac{X+3}{2(5x+1)}}$$

....

(Total 4 marks)

J7 3H

9. (a) Solve $5x - 4 = 2x + 7$

$x =$ ....
(2)

(b) Solve $\dfrac{7-2y}{4} = 2y + 3$

$y =$ ....
(4)

(Total 6 marks)

N8 3H

18. Simplify fully $\dfrac{2}{x+2} + \dfrac{x}{x^2+5x+6}$

$$\boxed{\dfrac{3}{x+3}}$$

....

(Total 5 marks)

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J9 4H

3. Work out the value of $\dfrac{a(b+1)}{16}$ when $a = 6$ and $b = -9$

-3

....

J13 3H

3 (a) Multiply out $6(n-2)$

6n – 12, p (p – 5), $\dfrac{3}{5}$

.... (1)

(b) Factorise $p^2 - 5p$

.... (2)

(c) Solve $\dfrac{7x-3}{2} = x$

Show clear algebraic working.

$x =$ .... (3)

(Total for Question 3 is 6 marks)

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Jan13 3H

12 Make h the subject of the formula $A = 2\pi r(r + h)$

$$\frac{A}{2\pi r} - r = h$$

$h = $ _____

(Total for Question 12 is 2 marks)

Jan13 3H

17 Simplify fully $\dfrac{4x^2 - 25}{6x^2 + 13x - 5}$

$$\frac{2x - 5}{3x - 1}$$

_____

(Total for Question 17 is 3 marks)

J13 4H

23 Solve $\dfrac{3}{(x+1)} + \dfrac{2}{(2x-3)} = 1$

X= 0.5 or 4

Show clear algebraic working.

....

(Total for Question 23 is 5 marks)

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20

Jan13 4H

8 (a) Factorise $n^2 + 8n$

$$n(n+8),\ 2x-27,\ y^2+9y+14$$

(2)

(b) Expand and simplify $3(2x - 5) - 4(x + 3)$

(2)

(c) Expand and simplify $(y + 7)(y + 2)$

(2)

(Total for Question 8 is 6 marks)

Jan13 4H

10 Solve $3x + 16 = 1 - 2x$
    Show clear algebraic working.

-3

$x =$ _____

(Total for Question 10 is 3 marks)

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Jan13 4H

14 Solve $\dfrac{2}{5x-2} = \dfrac{3}{6x+1}$

Show clear algebraic working.

2 2/3

$x = \underline{\hspace{4cm}}$

(Total for Question 14 is 4 marks)

J14 3H

4 (a) Simplify $8d \times 7d$

$56d^2$, $12e - 20$, $f(f - 2)$, 20

$\underline{\hspace{4cm}}$
(1)

(b) Expand $4(3e - 5)$

$\underline{\hspace{4cm}}$
(1)

(c) Factorise $f^2 - 2f$

$\underline{\hspace{4cm}}$
(2)

(d) $H = g^3 + 6g$
Work out the value of H when $g = 2$

$H = \underline{\hspace{3cm}}$
(2)

(Total for Question 4 is 6 marks)

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J14 3H

17 Make x the subject of $y = \sqrt{\dfrac{2x+1}{x-1}}$

$$X = \dfrac{y^2 + 1}{Y^2 - 2}$$

....

(Total for Question 17 is 4 marks)

Jan14 3H

11 Solve $\dfrac{6x-1}{4} - \dfrac{5-2x}{2} = 1$

Show clear algebraic working.

$$1.5$$

$x = $ ....

(Total for Question 11 is 4 marks)

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J14 3H

X= 5.5 or -1

23 Solve the equation $\dfrac{3}{(x+2)} + \dfrac{4}{(x-3)} = 2$

Show clear algebraic working.

(Total for Question 23 is 5 marks)

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J7 4H

X= 2 or 3

14. Solve $\dfrac{5x-7}{x-1} = x+1$

....

(Total 4 marks)

J9 4H

9. Solve $\dfrac{12-x}{3} = 7$

-9

$x =$ ....

(Total 3 marks)

J10 4H

1. Solve $6y - 9 = 3y + 7$

5 1/3

$y=$..............................

(Total 3 marks)

J9 4H

21. (a) Solve $2x^2 + 3x - 1 = 0$

    Give your solution(s) correct to 3 significant figures.

0.281 and -1.78, $\pm$ 1.41

....

(3)

(b) Solve $\dfrac{2}{x} - \dfrac{1}{x+1} = 1$

....

(4)

(Total 7 marks)

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N10 4H

-0.279, -2.39

18. Solve $3x^2 + 8x + 2 = 0$

Give your solutions correct to 3 significant figures.

....

(Total 3 marks)

J12 4H

X= -1, x= 8

21 Solve $\dfrac{5}{(x+2)} + \dfrac{9}{(x-2)} = 2$

Show clear algebraic working.

....

(Total for Question 21 is 5 marks)

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J8 4H

-1.5, 30

1. Solve

   (a) $6x + 13 = 2x + 7$

   $x =$ .... (3)

   (b) $\dfrac{y}{5} - 2 = 4$

   $y =$ .... (2)

   (Total 5 marks)

J5 3H

2. Solve $5(2x + 3) = 30$

   1.5

   $x =$ ....

   (Total 3 marks)

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J5 3H

14. Solve $\dfrac{x-1}{2} + \dfrac{2x+3}{4} = 1$

$x = \text{......................}$

(Total 4 marks)

J12 3H

1.5, -2

9 (a) Solve $3(2x - 1) = 6$
   Show clear algebraic working.

$x = \text{................................}$

(3)

(b) Solve $\dfrac{2y+1}{3} = \dfrac{y-2}{4}$

   Show clear algebraic working.

$y = \text{................................}$

(4)

(Total for Question 9 is 7 marks)

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N8 4H

X = -2.41 or 0.414, y= -3 1/3

13. (a) Solve $x^2 + 2x - 1 = 0$
Give your solutions correct to 3 significant figures.
You must show sufficient working.

....
(3)

(b) Solve $\dfrac{2}{y+4} = 3$

You must show sufficient working.

$y = $ ....
(2)

J10 4H

X= 6 or 2, -1.5   -3

13. (a) Solve $x^2 - 8x + 12 = 0$

....

(3)

(b) Solve the simultaneous equations

$$y = 2x$$
4 $$x - 5y = 9$$

$x=$......................................

$y=$......................................

(3)

(Total 6 marks)

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X= 2 x= 5, y= 4 y= 25

20. Solve the simultaneous equations

$$y = x^2$$
$$y = 7x - 10$$

....

(Total 5 marks)

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X= 0.6 x= -3, y= 5.8   y= -5

22. Solve the simultaneous equations

$$y - 3x = 4$$

$$x^2 + y^2 = 34$$

....

(Total 7 marks)

N7 3H

X= 0.5, y= 3

14. Solve the simultaneous equations

$$2x + 5y = 16$$
$$4x + 3y = 11$$

$x =$ ....

$y =$ ....

(Total 3 marks)

N9 3H

$$X = 1, y = \frac{-1}{3}$$

14. Solve the simultaneous equations

$$2x - 3y = 3$$
$$3x + 6y = 1$$

$x = $ ....

$y = $ ....

(Total 3 marks)

-3, 9 and 5, 25

18. Solve the simultaneous equations

$$y = x^2$$
$$y = 2x + 15$$

$x =$ .... , $y =$ ....

$x =$ .... , $y =$ ....

(Total 5 marks)

N10 3H

$$X = 1.5, y = -2$$

12. Solve the simultaneous equations

$$2x - 5y = 13$$
$$6x + 3y = 3$$

$x =$ ....

$y =$ ....

(Total 3 marks)

J11 3H

22 Solve the simultaneous equations

$$y = 2x - 3$$
$$x^2 + y^2 = 2$$

(Total for Question 22 is 6 marks)

Jan13 4H

X= 0.8, -2   y= 4.4, -4

26 Solve the simultaneous equations

$$y = 3x + 2$$

$$x^2 + y^2 = 20$$

Show clear algebraic working.

(Total for Question 26 is 6 marks)

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N6 3H

$$\boxed{X < 1.5}$$

7. Solve the inequality $\qquad$ $9x - 2 < 5x + 4$

....

(Total 3 marks)

Jan14 3H

$$\boxed{-1 < x \le 4, \; y \ge 3.5, \; 4}$$

7 (a)
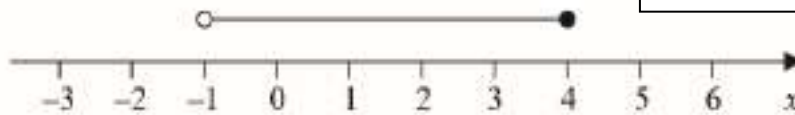
An inequality is shown on the number line.

Write down this inequality.

....

(2)

(b) (i) Solve the inequality $2(y - 3) \ge 1$

....

(ii) Write down the lowest **integer** which satisfies this inequality.

....

(4)

(Total for Question 7 is 6 marks)

J5 3H

X < 4, 1 2 3

9. (a) Solve the inequality $2x - 3 < 5$

....
(2)

(b) n is a positive integer.

Write down all the values of n which satisfy the inequality $2n - 3 < 5$

....
(2)

(Total 4 marks)

N7 4H

-1 0 1 2 3

8. (a) On the number line, show the inequality $-2 < x \leqslant 3$

(2)
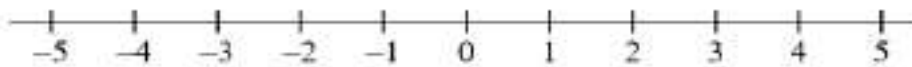
(b) n is an integer.

Write down all the possible values of n which satisfy the inequality

$$-1 \leqslant n < 4$$

....
(2)

(Total 4 marks)

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J11 4H

$$X \geq -3.5, \ -3 \ -2 \ -1$$

12 (i) Solve the inequality $2x + 13 \geqslant 6$

(ii) n is a **negative** integer.

Write down all the values of n which satisfy $2n + 13 \geqslant 6$

(Total for Question 12 is 4 marks)

J13 4H

$$-2 \leq x < 3, \ -2 \ -1 \ 0 \ 1 \ 2$$

9   (a) Solve the inequalities $-6 \leqslant 3x < 9$

(2)

(b) n is an integer.

Write down all the values of n which satisfy $-6 \leqslant 3n < 9$

(2)

(Total for Question 9 is 4 marks)

42

Jan13 3H

$-4 < x \le 3$

7 (i) Solve the inequalities $-2 < x + 2 \le 5$

(ii) On the number line, represent the solution to part (i).

-5 -4 -3 -2 -1 0 1 2 3 4 5
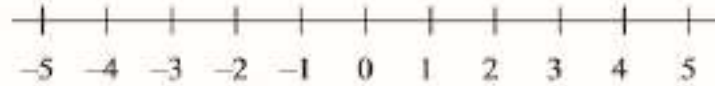
(Total for Question 7 is 4 marks)

J8 3H

1.33, $x \le 4$, 1 2 3 4

9. (a) Solve $7(x - 1) = 5 - 2x$
You must show sufficient working.

x = ...

(3)

(b) (i) Solve the inequality $4x + 5 \le 21$

(ii) n is a positive integer.

Write down all the values of n which satisfy $4n + 5 \le 21$

....

(4)

(Total 7 marks)

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J14 4H

$X > 9 \quad x < -9$

18 (a) Solve $5x^2 - 6x - 2 = 0$

Give your solutions correct to 3 significant figures.

Show your working clearly.

(3)

(b) Solve the inequality $\dfrac{m^2 + 3}{4} > 21$

Show clear algebraic working.

(4)

(Total for Question 18 is 7 marks)

Algebraic Indices and Surds

N7 4H

$6n^2, 3x^3y^2, t^{12}, \dfrac{p^6}{8}$

14. (a) Simplify $2n \times 3n$

....
(1)

(b) Simplify $\dfrac{3x^4y^5}{xy^3}$

....
(2)

(c) Simplify $(t^3)^4$

....
(1)

(d) Simplify $(2p^{-2})^{-3}$

....
(2)

(Total 6 marks)

N9 4H

$P^2 + 3p - 28,\ 12x^5y^6,\ 9q^4$

12. (a) Expand and simplify $(p + 7)(p - 4)$

....

(2)

(b) Simplify $4x^3y^5 \times 3x^2y$

....

(2)

(c) Simplify $(27q^6)^{\frac{2}{3}}$

....

(2)

(Total 6 marks)

J9 4H

$$3c^7d^5, 16x^{12}y^4, \underline{2}$$
$$X+3$$

15. (a) Simplify $3c^5d \times c^2d^4$

....

(2)

(b) Simplify $(2x^3y)^4$

....

(2)

(c) Simplify fully $\dfrac{2x-6}{x^2-3x}$

....

(2)

(Total 6 marks)

$X + \underline{y}, \underline{3}, n - m$
$10 \quad 4$

22. (a) Each of the numbers x, y and z is greater than 1 and less than 10

$x \times 10^5 + y \times 10^4 = z \times 10^5$

Find an expression for z in terms of x and y.
Give your answer as simply as possible.

$z = $ ....

(2)

(b) Each of the numbers 3×10^n, 4×10^m and $a \times 10^p$ is in standard form.

$$\frac{3 \times 10^n}{4 \times 10^m} = a \times 10^p$$

(i) Find the value of a.

$a = $ ....

(ii) Find an expression for p in terms of n and m.

$p = $ ....

(3)

(Total 5 marks)

J8 4H

$3^{14}, 7^3, n= 6$

7. (a) Write $3^8 \times 3^6$ as a power of 3

....
(1)

   (b) Write $\dfrac{7^5}{7^2}$ as a power of 7

....
(1)

   (c) $\dfrac{5^n \times 5^3}{5^7} = 5^2$

   Find the value of n.

$n = $ ....
(2)

   (d) $A = 2^3 \times 3^4 \times 5^{16}$
       $B = 2^5 \times 3 \times 7^{12}$

   Find the Highest Common Factor of A and B.

....
(2)
(Total 6 marks)

Jan12 4H

$$8y^6, p + 3q$$

21 (a) Simplify $(16y^8)^{\frac{3}{4}}$

....

(2)

(b) Given that $2^p \times 8^q = 2^n$

express n in terms of p and q.

$n =$ ....

(2)

(Total for Question 21 is 4 marks)

N8 4H

$$81, 25^{10}, 2^{1.5}$$

18. (a) Find the value of $\left(9^{\frac{1}{2}}\right)^4$

....
(1)

(b) Express 5^{20} as a power of 25

....
(2)

(c) Express $\sqrt{8}$ as a power of 2

....
(2)

(Total 5 marks)

$$11, ab, 1.44*10^{p+q+1}$$

12. (a) a, b and c are positive numbers such that $\quad 1 \leqslant ab < 10$ and $1 \leqslant c < 10$

$$(a \times 10^4) \times (b \times 10^7) = c \times 10^m$$

(i) Write down the value of m.

$m =$ ....

(ii) Find an expression for c in terms of a and b.

$c =$ ....

(2)

(b) $N = (3.2 \times 10^p) \times (4.5 \times 10^q)$, where p and q are integers.
Express N in terms of p and q.
Give your answer in standard form.

$N =$ ....

(2)

(Total 4 marks)

N6 3H

13. Evaluate the following.
Give your answers as fractions.

$$\frac{1}{8}, \frac{3}{7}, \frac{9}{64}$$

(a) 2^{-3}

.... (1)

(b) $\left(\dfrac{27}{343}\right)^{\frac{1}{3}}$

.... (1)

(c) $\left(\sqrt{\dfrac{3}{8}}\right)^{4}$

.... (1)

(Total 3 marks)

Jan14 3H

4 (a) Write $2^3 \times 2^4$ as a single power of 2

$$2^7, 3$$

.... (1)

(b) $280 = 2^n \times 5 \times 7$

Find the value of n.

$n =$ ....
(2)

(Total for Question 4 is 3 marks)

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J12 3H

3 (a) Write $2^3 \times 2^6$ as a single power of 2

....

(1)

(b) Write $\dfrac{3^9}{3^4}$ as a single power of 3

....

(1)

(c) $\dfrac{5^n}{5^4 \times 5^6} = 5^3$

Find the value of n.

$n =$ ....

(2)

(Total for Question 3 is 4 marks)

J7 3H

5. (a) Simplify, leaving your answers in index form,

(i) $7^5 \times 7^3$

....

(ii) $5^9 \div 5^3$

....

(2)

(b) Solve $\dfrac{2^9 \times 2^4}{2^n} = 2^8$

$n =$ ....

(2)

J7 4H

$a^5, x^3, 0.5(x + 1)$

12. Simplify

(a) $\dfrac{a^3 \times a^4}{a^2}$

....

(2)

(b) $(\sqrt{x})^6$

....

(1)

(c) $\dfrac{3(x+1)^2}{6(x+1)}$

....

(2)

J13 3H

14 (a) Simplify $4p^3q^5 \times 6p^2q$

....

(2)

(b) Simplify $(5x^2y^4)^3$

....

(2)

(c) Factorise $9a^2 - b^2$

....

(2)

Jan13 4H

15 (a) Simplify $\dfrac{5x^5y^6}{x^2y^4}$

....

(2)

(b) Simplify $(2n^4)^3$

....

(2)

3, -1.5

25. (a) $(\sqrt{a})^7 = k\sqrt{a}$, where $k = a^n$
   Find the value of n.

$n =$ ....

(2)

(b) Express $\dfrac{1}{2\sqrt{2}}$ as a power of 2

....

(2)

J10 3H

16. Show that $(3-\sqrt{5})^2 = 14 - 6\sqrt{5}$

(Total 2 marks)

J5 3H

2, 28 + 10

15. (a) Express $\dfrac{10}{\sqrt{5}}$ in the form $k\sqrt{5}$ where k is an integer.

....

(2)

(b) Express $(5+\sqrt{3})^2$ in the form $a+b\sqrt{3}$ where a and b are integers.

....

(2)

(Total 4 marks)

J11 4H

23 Express $\sqrt{48} + \sqrt{108}$ in the form $k\sqrt{6}$ where k is a surd.

(Total for Question 23 is 3 marks)

J12 4H

20 Show that $(6-\sqrt{8})^2 = 44 - 24\sqrt{2}$

Show each stage of your working clearly.

(Total for Question 20 is 3 marks)

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Jan13 4H

5, 7

19 $(3+\sqrt{a})(4+\sqrt{a}) = 17 + k\sqrt{a}$ where a and k are positive integers.

Find the value of a and the value of k.

$a =$ ....

$k =$ ....

(Total for Question 19 is 3 ....)

Jan14 3H

8, 33

17 Given that $(5 - \sqrt{x})^2 = y - 20\sqrt{2}$ where x and y are positive integers, find the value of x and the value of y.

$x =$ ....

$y =$ ....

(Total for Question 17 is 3 marks)

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$$\boxed{4 + 2, 2^{0.5}}$$

20. (a) Expand $(1+\sqrt{3})^2$

Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.

....

(2)

(b)

2 cm

60°

Q $(1+\sqrt{3})$ cm R

P

Diagram **NOT** accurately drawn

Calculate the exact length of PR.
Give your answer as a surd.

.... cm

(4)

(Total 6 marks)

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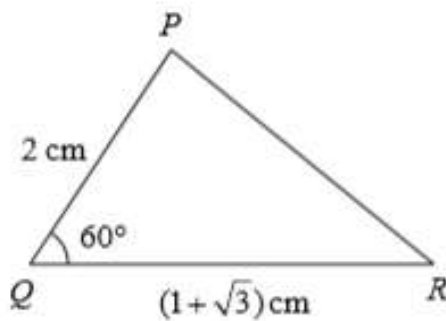
J8 3H

19. Show that $\dfrac{12}{\sqrt{8}} = 3\sqrt{2}$

(Total 2 marks)

Jan12 3H

24

19 Show that $\dfrac{\sqrt{3} + \sqrt{27}}{\sqrt{2}}$ can be expressed in the form $\sqrt{k}$ where k is an integer.

State the value of k.

$k = \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$

(Total for Question 19 is 3 marks)

$$2^{-4}, 8^{0.5}, a^{0.5} + 1$$

20. (a) Write $\frac{1}{16}$ as a power of 2

....

(2)

(b) Write 2 as a power of 8

....

(2)

(c) Rationalise the denominator of $\frac{a + \sqrt{a}}{\sqrt{a}}$ where a is a prime number.

Simplify your answer as much as possible.

....

(2)

22
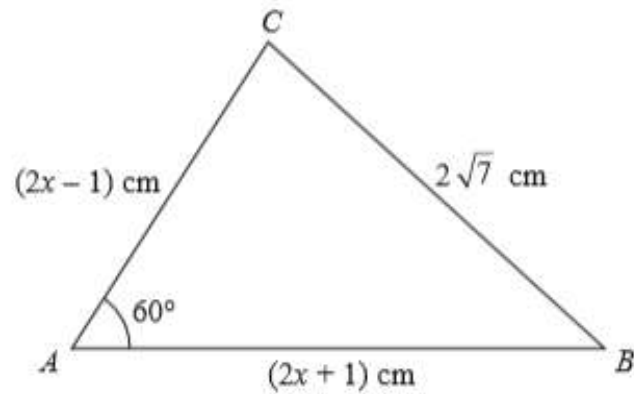
Diagram **NOT**
accurately drawn

$(2x - 1)$ cm

$2\sqrt{7}$ cm

60°

A

$(2x + 1)$ cm

B

C

The diagram shows a triangle ABC.
$AB = (2x + 1)$ cm, $AC = (2x - 1)$ cm and $BC = 2\sqrt{7}$ cm.
Angle $BAC = 60°$

Work out the value of x.
Show clear algebraic working.

$x = $ ....

(Total for Question 22 is 3 marks)

J14 3H

18 A trapezium *ABCD* has an area of $5\sqrt{6}$ cm².
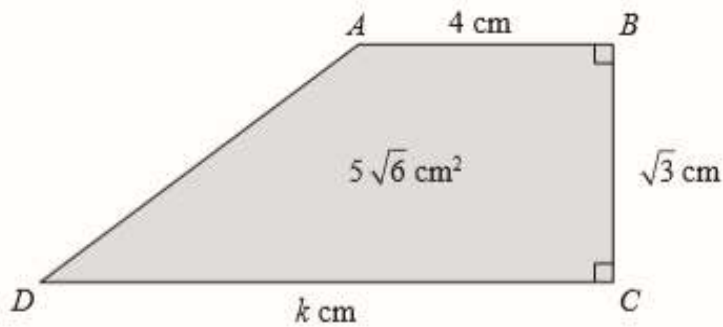
Diagram **NOT** accurately drawn

$AB = 4$ cm.
$BC = \sqrt{3}$ cm.
$DC = k$ cm.

Calculate the value of k, giving your answer in the form $a\sqrt{b} - c$ where a, b and c are positive integers.
Show each step in your working.

$k =$ ....

(Total for Question 18 is 3 marks)

J13 3HR

6, 24

22 $\left(\sqrt{a} + \sqrt{8a}\right)^2 = 54 + b\sqrt{2}$

a and b are positive integers.
Find the value of a and the value of b.
Show your working clearly.

$a = $ ....

$b = $ ....

(Total for Question 22 is 3 marks)

Jan14 3HR

5, 8

19 Given that x and y are positive integers such that $(1 + \sqrt{x})(3 + \sqrt{x}) = y + 4\sqrt{5}$
find the value of x and the value of y.

$x = $ ....

$y = $ ....

(Total for Question 19 is 3 marks)

J14 3HR

$$43 + 30\ 2^{0.5}, 120$$

16 (a) Expand $(5 + 3\sqrt{2})^2$

Give your answer in the form $(a + b\sqrt{2})$, where a and b are integers.
Show your working clearly.

(2)

(b) $(5 + 3\sqrt{2})^2 = p + \dfrac{q}{\sqrt{8}}$, where p and q are integers.

Find the value of q.

$q =$ ....

(3)

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$$5x - 2, \; 3a(2 + a)$$

20 (a) Simplify fully $\dfrac{50x^2 - 8}{10x - 4}$

Show clear algebraic working.

(3)

(b) Given that a is a positive integer, show that

$$\sqrt{3a}\left(\sqrt{12a} + a\sqrt{3a}\right)$$

is always a multiple of 3

(3)

Jan15 4H

$$2^{-5}$$

22 (a) Write $\frac{1}{32}$ as a power of 2

(2)

(b) Show that $(4 + \sqrt{12})(5 - \sqrt{3}) = 14 + 6\sqrt{3}$
Show each stage of your working clearly.

(3)

(Total for Question 22 is 5 marks)

J16 4H

$$-5 + 2 \cdot 18^{0.5}$$

19 Simplify $(7 + 2\sqrt{50})(5 - 2\sqrt{2})$

Give your answer in the form $a + b\sqrt{18}$ where a and b are integers.
Show your working clearly.

(Total for Question 19 is 3 marks)

J15 4H

19 (a) Show that $\left(5 - \sqrt{8}\right)\left(7 + \sqrt{2}\right) = 31 - 9\sqrt{2}$

Show each stage of your working.

(3)

Given that c is a prime number,

(b) rationalise the denominator of $\dfrac{3c - \sqrt{c}}{\sqrt{c}}$

Simplify your answer.

$$\boxed{3\ c^{0.5} - 1}$$

....

(2)

Jan15 4HR

17 (a) Show that $(3 + 2\sqrt{2})(4 - \sqrt{2}) = 8 + 5\sqrt{2}$

Show your working clearly.

(2)

(b) Rationalise the denominator and simplify fully $\dfrac{10 + 3\sqrt{2}}{\sqrt{2}}$

Show your working clearly.

$$5 \; 2^{0.5} + 3$$

(2)

(Total for Question 17 is 4 marks)

19

$$\frac{1}{5^3} = 5^p \qquad 1 = 5^q \qquad \sqrt{5^3} = 5^r$$

(a) Write down the value of

(i) p

p = ...

(ii) q

q = ...

(iii) r

r = ...

(3)

(b) Show that $\dfrac{14}{\sqrt{245}} = \dfrac{2\sqrt{5}}{5}$

You must write down each stage of your working.

(2)

$\left(e - 2\sqrt{3}\right)^2 = f - 20\sqrt{3}$ where e and f are integers.

(c) Find the value of e and the value of f

e = ...

f = ...

(3)

Jan16 4HR

6 13

22 $(a + \sqrt{b})^2 = 49 + 12\sqrt{b}$ where a and b are integers, and b is prime.

Find the value of a and the value of b

$a =$ ....

$b =$ ....

(Total for Question 22 is 3 marks)

Jan17 3HR

$\dfrac{2 - p^{1.5}}{P \quad p}$

18 Given that p is a prime number, rationalise the denominator of $\dfrac{7\sqrt{p} - p^2}{\sqrt{p^3}}$

Simplify your answer.

....

(Total for Question 18 is 3 marks)

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Jan17 4H

$2^4 \times 3^2 \times 7^5$, 2 0 -1

16        $g = 2^3 \times 3 \times 7^2$ $h = 2 \times 3 \times 7^3$

(a) Express gh as a product of powers of its prime factors.
   Simplify your answer.

....

(2)

$\dfrac{g}{h} = 2^a \times 3^b \times 7^c$

(b) Find the value of a, the value of b and the value of c.

$a = $ ....

$b = $ ....

$c = $ ....

(2)

(c) Show that $(7 - 2\sqrt{5})(7 + 2\sqrt{5}) = 29$
   Show your working clearly.

(2)

Jan17 4H

$$\frac{1}{\sqrt[3]{9^4}} = 3^n$$

(d) Work out the exact value of n.

....

(3)

(Total for Question 16 is 9 marks)

$$\boxed{\begin{array}{c} \text{-8} \\ \hline 3 \end{array}}$$

Jan17 4HR

20 $(3 + \sqrt{c})(2\sqrt{c} - 3) = 1 + k\sqrt{c}$
where c and k are prime numbers.

(a) Find the value of c and the value of k.

$$\boxed{\begin{array}{c} \text{C= 5 k= 3, } \underline{\text{-5}} \\ 3 \end{array}}$$

$c = $ .... $k = $ ....

(3)

$$p^m = \frac{1}{p \times \sqrt[3]{p^2}}$$

(b) Find the value of m.

$m = $ ....

(3)

(Total for Question 20 is 6 marks)

Sequence

J8 3H

8. Here are some patterns made from sticks.

Pattern
number 1
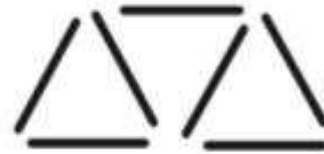
Pattern
number 2

Pattern
number 3

This rule can be used to find the number of sticks in one of these patterns.

Multiply the pattern number by 2 and then add 1

(a) n is the number of sticks in Pattern number p.
Write down a formula for n in terms of p.

....

(3)

(b) Make p the subject of your formula.

$p = $ ....

(2)

(Total 5 marks)

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1 + 4n, 5+ 4n

3   The first four terms of an arithmetic sequence are

                    5   9   13   17

(a) Write down an expression, in terms of n, for the nth term.

....

(2)

(b) Write down an expression, in terms of n, for the $(n + 1)$th term.

....

(1)

(Total for Question 3 is 3 marks)

J14 4HR

1 + 3n, 29

3 Here is a sequence of patterns made from centimetre squares.
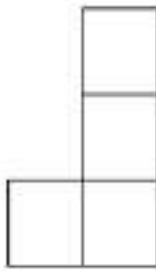
Pattern
number 1
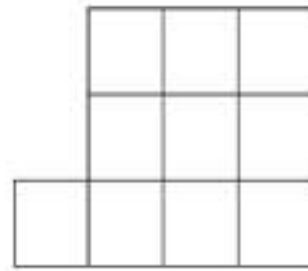
Pattern
number 2

Pattern
number 3

(a) Find an expression, in terms of n, for the total number of centimetre squares in Pattern number n.

(2)

A pattern in this sequence has 88 centimetre squares.

(b) Work out the Pattern number of this pattern.

(2)

(Total for Question 3 is 4 marks)

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Jan15 4HR

$$25, \ n(n+2)+1, \ (n+1)^2$$

5 Here are some rows of a number pattern.

Row number	Column 1	Column 2	Column 3
1	$1 \times 3 + 1$	4	2^2
2	$2 \times 4 + 1$	9	3^2
3	$3 \times 5 + 1$	16	4^2
⋮			
		676	
⋮			
n			

(a) Write down the Row number of the row that has 676 in Column 2

....

(1)

(b) For Row number n,

(i) write down an expression, in terms of n, that should go in Column 1

....

(ii) write down an expression, in terms of n, that should go in Column 3

....

(2)

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N6 4H

$$2(n+1), \frac{p-2}{2}$$

4. Here is a pattern of shapes made from centimetre squares.

Shape
number 1

Shape
number 2
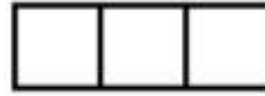
Shape
number 3

This rule can be used to find the perimeter of a shape in this pattern.

Add 1 to the Shape number and then multiply your answer by 2

P cm is the perimeter of Shape number n.

(a) Write down a formula for P in terms of n.

....

(3)

(b) Make n the subject of the formula in part (a).

$n =$ ....

(3)

(Total 6 marks)

J19 1HR

26.5

19 The 25th term of an arithmetic series is 44.5
    The sum of the first 30 terms of this arithmetic series is 765

    Find the 16th term of the arithmetic series.
    Show your working clearly.

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16 Here are the first five terms of an arithmetic sequence.

$$7 \quad 10 \quad 13 \quad 16 \quad 19$$

Find the sum of the first 100 terms of this sequence.

(Total for Question 16 is 2 marks)

4 + 6n, 46

3   Here are the first five terms of a number sequence S.

$$10 \qquad 16 \qquad 22 \qquad 28 \qquad 34$$

(a) Find an expression, in terms of n, for the nth term of this sequence.

(2)

The nth term of a sequence T is given by $n^2 - 3$

There are numbers that are terms in both the sequence S and the sequence T.

(b) Find one of these numbers.

(2)

(Total for Question 3 is 4 marks)

Jan19 2HR

23 The 10th term of an arithmetic series, S, is 66
The sum of the first 20 terms of S is 1290

Find the 5th term of S.
Show your working clearly.

(Total for Question 23 is 4 marks)

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Jan19 1HR

12 Here are the first four terms of a sequence of fractions.

$$\frac{1}{1} \qquad \frac{2}{3} \qquad \frac{3}{5} \qquad \frac{4}{7}$$

The numerators of the fractions form the sequence of whole numbers 1 2 3 4 ...
The denominators of the fractions form the sequence of odd numbers 1 3 5 7 ...

(a) Write down an expression, in terms of n, for the nth term of this sequence of fractions.

(2)

(b) Using algebra, prove that when the square of any odd number is divided by 4 the remainder is 1

(3)

(Total for Question 12 is 5 marks)

Jan19 2H

$4n + 3$

2 Here are the first five terms of an arithmetic sequence.

$$7 \qquad 11 \qquad 15 \qquad 19 \qquad 23$$

Write down an expression, in terms of n, for the nth term of this sequence.

....

(Total for Question 2 is 2 marks)

Jan19 1H

21 $(2x + 23)$, $(8x + 2)$ and $(20x - 52)$ are three consecutive terms of an arithmetic sequence.

Prove that the common difference of the sequence is 12

(Total for Question 21 is 4 marks)

4n + 2, 4n + 6

7 Here are the first four terms of an arithmetic sequence.

$$6 \qquad 10 \qquad 14 \qquad 18$$

(a) Find an expression, in terms of n, for the nth term of this sequence.

....

(2)

(b) Write down an expression, in terms of n, for the $(n + 1)$th term of this sequence.

....

(1)

(Total for Question 7 is 3 marks)

Sample Assessment 1H

23 The 4th term of an arithmetic series is 17
The 10th term of the same arithmetic series is 35

Find the sum of the first 50 terms of this arithmetic series.

(Total for Question 23 is 5 marks)

Specimen Papers 2H

4   Here are the first five terms of a number sequence.

<div align="center">

7   11   15   19   23

</div>

(a) Find an expression, in terms of n, for the nth term of this sequence.

(2)

The nth term of a different number sequence is given by $80 - 2n$

(b) Write down the first 3 terms of this sequence.

(2)

Yuen says there are no numbers that are in both of the sequences.
Yuen is correct.

(c) Explain why.

(1)

(Total for Question 4 is 5 marks)

22 The 3rd term of an arithmetic series, A, is 19
    The sum of the first 10 terms of A is 290

    Find the 10th term of A.

(Total for Question 22 is 5 marks)

IGCSE

EDEXCEL

PART II

1. Angle Properties.

2. Trigonometry.

3. Mensuration.

4. Similarity.

Prepared by:T.Abeer yousrallah

Mrs. Abeer Yousrallah (IGCSE Math) 00966563065252

Angle Properties

J13 3H

4
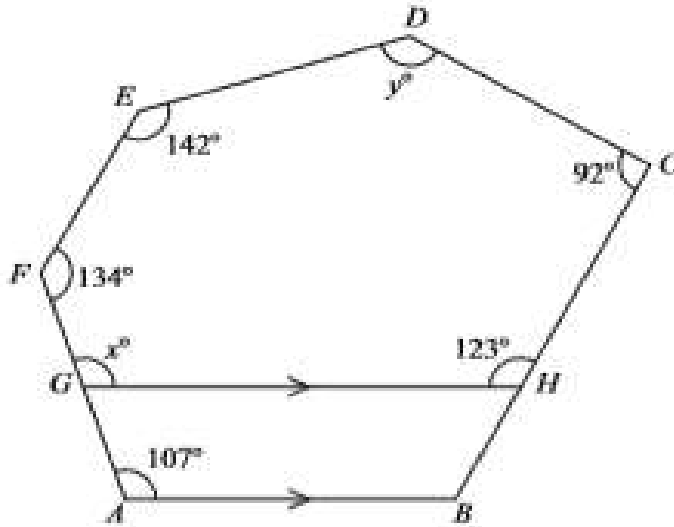
Diagram NOT
accurately drawn

ABCDEF is a hexagon.
G is a point on *AF*.
H is a point on *BC*.
GH is parallel to *AB*.

(a) Give a reason why $x = 107$

....

(1)

(b) Work out the value of *y*.

$y = $ _____

(4)

(Total for Question 4 is 5 marks)

3

J11 3H

118

2

Diagram NOT accurately drawn

127°

84°

114°

97°
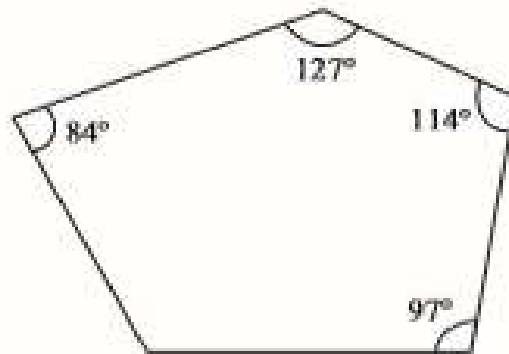
Four of the angles of a pentagon are 97°, 114°, 127° and 84°.

Work out the size of the fifth angle.

(Total for Question 2 is 4 marks)

Jan14 4H

16

19

Diagram NOT accurately drawn

The diagram shows part of a regular polygon.
The interior angle and the exterior angle at a vertex are marked.
The size of the interior angle is 7 times the size of the exterior angle.

Work out the number of sides of the polygon.

(Total for Question 19 is 3 marks)

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4

16
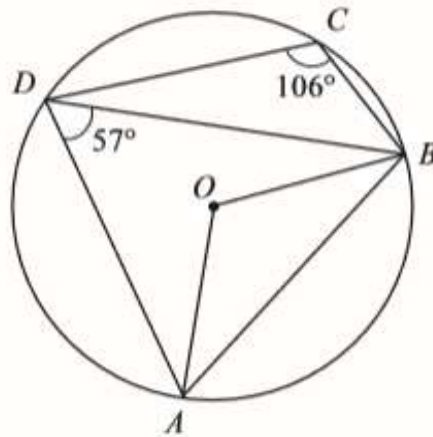
Diagram **NOT** accurately drawn

A, B, C and D are points on a circle, centre O.
Angle $ADB = 57°$.
Angle $BCD = 106°$.

(a) (i) Calculate the size of angle AOB.

.... °

(ii) Give a reason for your answer.

....

....

(2)

(b) Calculate the size of angle BAD.

.... °

(1)

(Total for Question 16 is 3 marks)

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Jan12 3H

41, Same segment, 75, angle at middle double angle at circumference

13
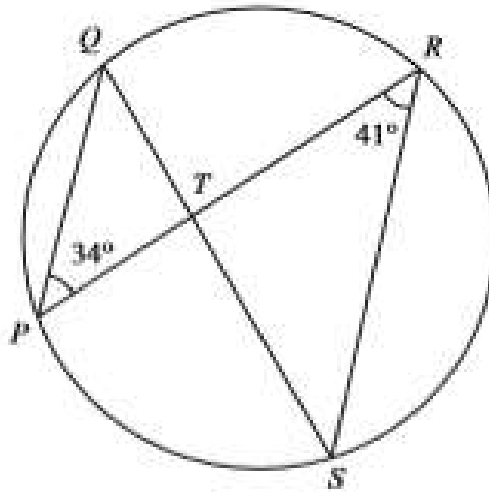
Diagram **NOT**
accurately drawn

P, Q, R and *S* are points on the circumference of a circle.
PR and *QS* intersect at *T*.
Angle *QPR* = 34° and angle *PRS* = 41°

(a) (i) Find the size of angle *PQS*.

....................................°

(ii) Give a reason for your answer.

....

....

(2)

(b) (i) Find the size of angle *PTS*.

....................................°

(ii) Explain why *T* cannot be the centre of the circle.

....

....

(2)

(Total for Question 13 is 4 marks)

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Nov9 3H

3. (a) The diagram shows a regular octagon, with centre O.
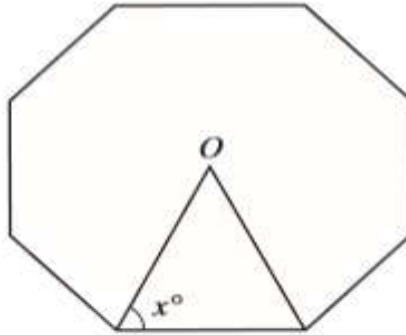
Diagram **NOT**
accurately drawn

Work out the value of x.

$x =$ ....

(3)

(b) A regular polygon has an exterior angle of 30°.
Work out the number of sides of the polygon.

....

(2)

(Total 5 marks)

J8 3H

12

13.

regular hexagon

square

square

A
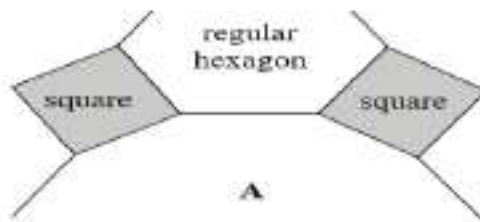
Diagram **NOT** accurately drawn

The diagram shows part of a tiling pattern.
The tiling pattern is made from three shapes.
Two of the shapes are squares and regular hexagons.
The third shape is a regular *n*-sided polygon **A**.

Work out the value of *n*.

$n =$ ....

(Total 5 marks)

N10 4H

24

13. The size of each interior angle of a regular polygon is 11 times the size of each exterior angle.

Work out the number of sides the polygon has.

....

(Total 4 marks)

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8

J10 3H

13.
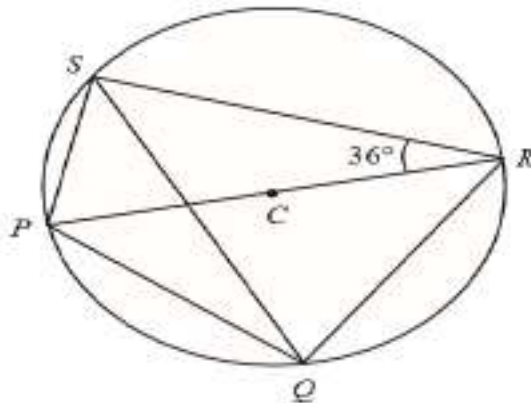
Diagram **NOT**
accurately drawn

P, *Q*, *R* and *S* are points on a circle, centre *C*.
PCR is a straight line.
Angle *PRS* = 36°.

Calculate the size of angle *RQS*.
Give a reason for each step in your working.

.... °

(Total 4 marks)

J8 3H

20.
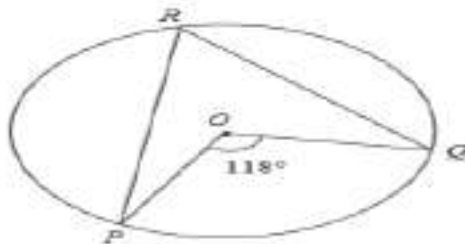
Diagram **NOT**
accurately drawn

P, *Q* and *R* are points on a circle, centre *O*.

(a) (i)   Find the size of angle *PRQ*.

.... °

(ii) Give a reason for your answer.

....

....

(2)

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J8 3H

22.
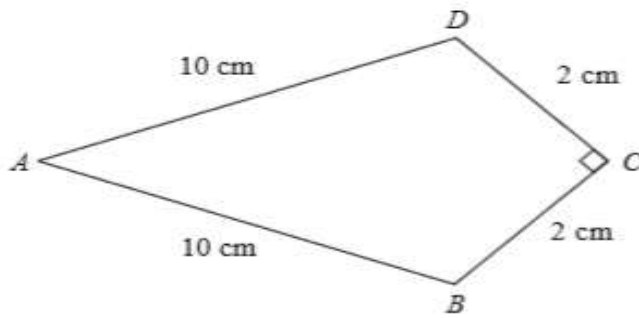
Diagram **NOT**
accurately drawn

The diagram shows a kite *ABCD*.
AB = *AD* = 10 cm.
CB = *CD* = 2 cm.
Angle *BCD* = 90°.

Calculate the area of the kite.

.... cm^2

(Total 6 marks)

J8 3H
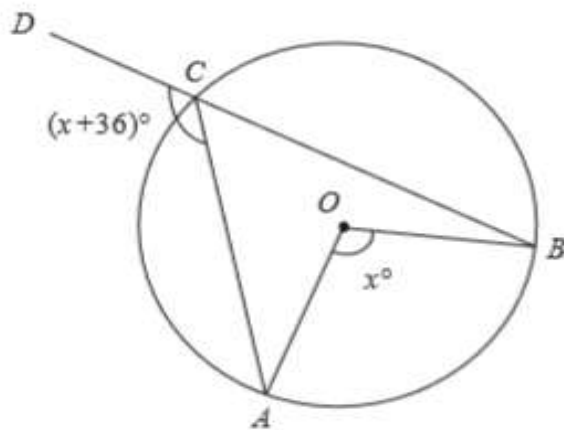
Diagram **NOT**
accurately drawn

A, B and C are points on a circle, centre O.
BCD is a straight line.

(b) Find the value of x.

$x =$ ....
(5)

(Total 7 marks)

N10 3H

3. *ABC* is an isosceles triangle.
    BA = *BC*.
    PA is parallel to *BC*.
    Angle *ACB* = 70°.
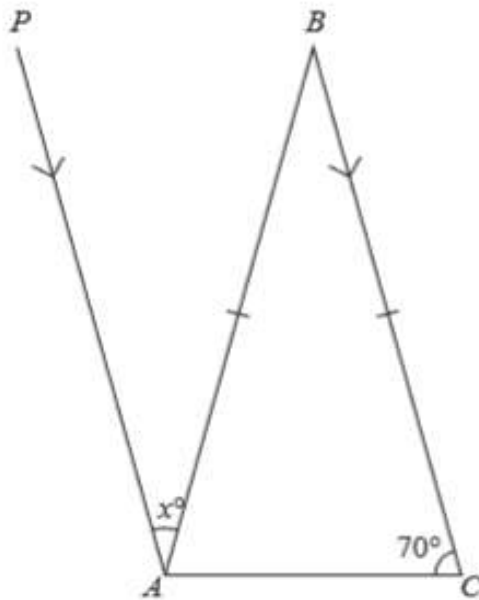
Diagram **NOT**
accurately drawn

Find the value of *x*.
Give a reason for each step in your working.

$x =$ ....

(Total 4 marks)

Nov7 4H

6.
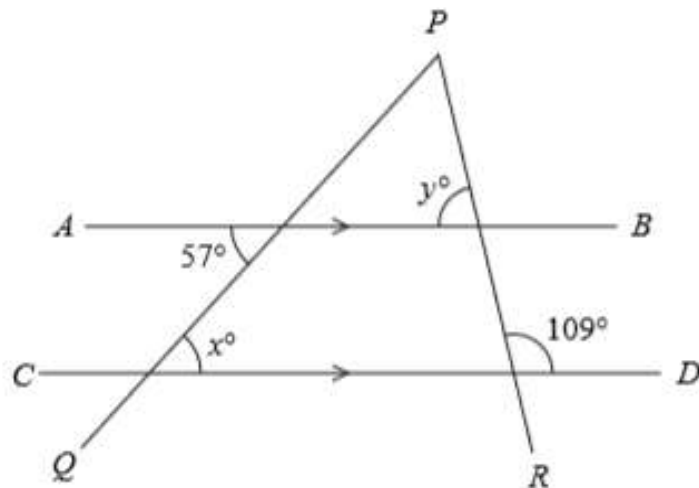
Diagram **NOT** accurately drawn

AB and *CD* are parallel straight lines.
PQ and *PR* are straight lines.

(a) (i) Find the value of *x*.

$x =$ ....

(ii) Give a reason for your answer.

....

(2)

(b) Find the value of *y*.
Give a reason for each step in your working.

$y =$ ....

(2)

(Total 4 marks)

Nov6 4H

15.
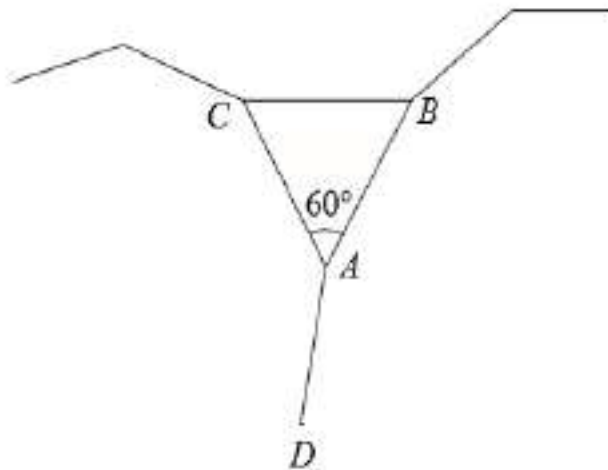
Diagram **NOT**
accurately drawn

The sides of an equilateral triangle *ABC* and two **regular** polygons meet at the point *A*.
AB and *AD* are adjacent sides of a regular 10-sided polygon.
AC and *AD* are adjacent sides of a regular *n*-sided polygon.

Work out the value of *n*.

$n = $ ....

(Total 5 marks)

Nov7 4H

38, same segment, 52

22.
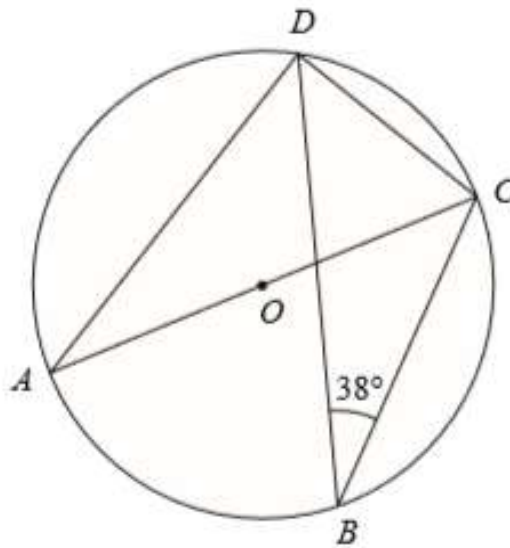
Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle, centre *O*.
AC is a diameter of the circle.
Angle *CBD* = 38°.

(a) (i) Find the size of angle *DAC*.

..............................°

(ii) Give a reason for your answer.

....

....

(2)

(b) Find the size of angle *ACD*.

..............................°

(2)

(Total 4 marks)

Nov10 4H

19.

D
5 cm
E
A   B
4 cm
16 cm
C
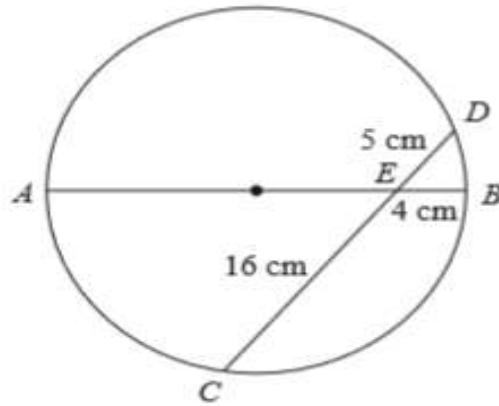
Diagram **NOT**
accurately drawn

AB is a diameter of a circle.
CD is a chord of the circle.
AB and *CD* intersect at *E*.
BE = 4 cm, *CE* = 16 cm and *DE* = 5 cm.

(a) Calculate the length of *AE*.

.... cm

(2)

(b) (i) Find the radius of the circle.

.... cm

(ii) Calculate the size of angle *AED*.
Give your answer correct to 1 decimal place.

....................................°

(5)

(Total 7 marks)

Nov8 3H

54, alternative segment, 102, cyclic quad

16.
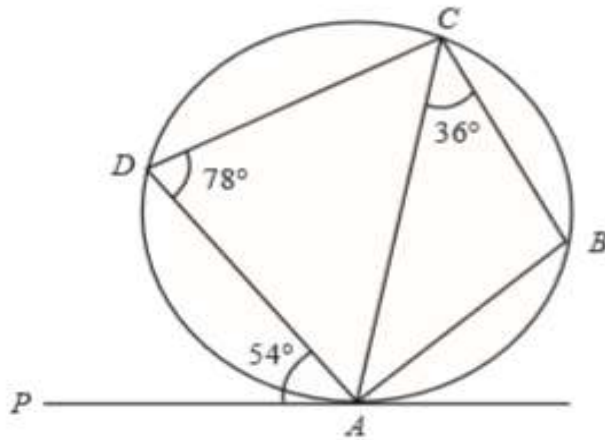
Diagram **NOT** accurately drawn

A, *B*, *C* and *D* are points on a circle.
PA is the tangent to the circle at *A*.
Angle *PAD* = 54°, angle *ACB* = 36° and angle *ADC* = 78°.

(a) (i) Find the size of angle *ACD*.

..................°

(ii) Give a reason for your answer.

....

....

(2)

(b) Explain why *BD* is a diameter of the circle.

....

....

(2)

(c) (i) Work out the size of angle *ABC*.

..................°

(ii) Give a reason for your answer.

....

....

(2)

(Total 6 marks)

Nov7 3H

1. The diagram shows a regular 5-sided polygon, with centre O.
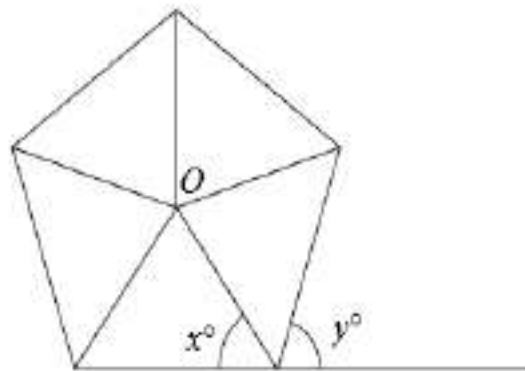
Diagram **NOT** accurately drawn

Work out the value of

(a) x,

$x = $ ....

(3)

(b) y.

$y = $ ....

(2)

(Total 5 marks)

J10 3H

62, alternate, 71, corresponding

2.
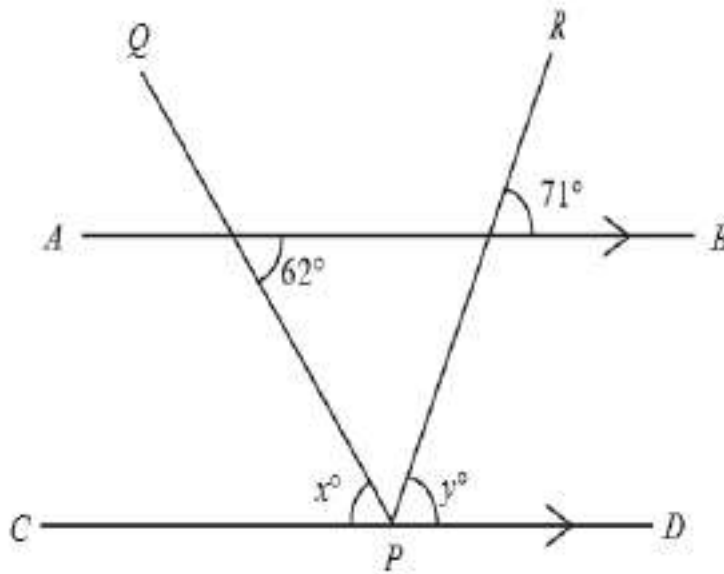
Diagram **NOT** accurately drawn

AB and *CPD* are parallel straight lines.
PQ and *PR* are straight lines.

(a) (i) Find the value of *x*.

$x = $ ....

(ii) Give a reason for your answer.

....

(2)

(b) (i) Find the value of *y*.

$y = $ ....

(ii) Give a reason for your answer.

....

(2)

(Total 4 marks)

J12 4H

15
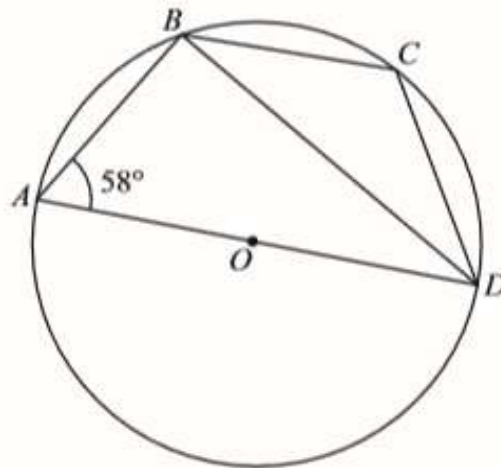
Diagram **NOT** accurately drawn

A, B, C and D are four points on a circle, centre O.
AD is a diameter of the circle.
Angle $BAD = 58°$

(a) Calculate the size of angle ADB.

..............................°

(2)

(b) (i) Calculate the size of angle BCD.

..............................°

(ii) Give a reason for your answer.

....

....

(2)

(Total for Question 15 is 4 marks)

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20

J13 4H

18

13 The diagram shows an incomplete regular polygon.

Diagram **NOT** accurately drawn

The size of each interior angle is 140 degrees greater than the size of each exterior angle.

Work out the number of sides the regular polygon has.

....

(Total for Question 13 is 4 marks)

J14 4H

24

5 Work out the size of each exterior angle of a regular polygon with 15 sides.

..............................°

(Total for Question 5 is 2 marks)

2

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J14 4H

16
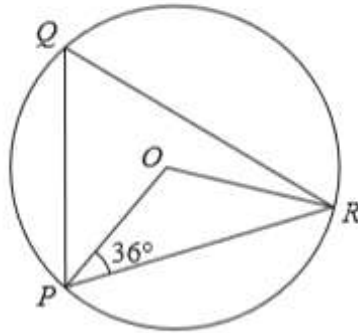
Diagram **NOT**
accurately drawn

(a) P, Q and R are points on a circle, centre O.
Angle $OPR = 36°$

Work out the size of angle PQR.

.... °

(2)
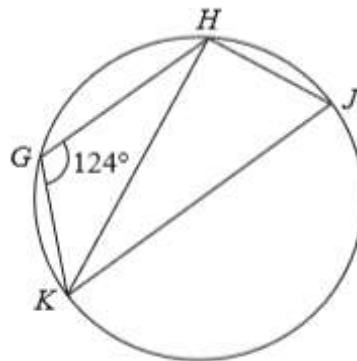
Diagram **NOT**
accurately drawn

(b) G, H, J and K are points on a circle.
KJ is a diameter of the circle.
Angle $KGH = 124°$

Work out the size of angle HKJ.

.... °

(3)

(Total for Question 16 is 5 marks)

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J15 3HR

16 *ABCD* is a kite.

D

Diagram **NOT**
accurately drawn

A

C

3 cm   110°

8 cm

B
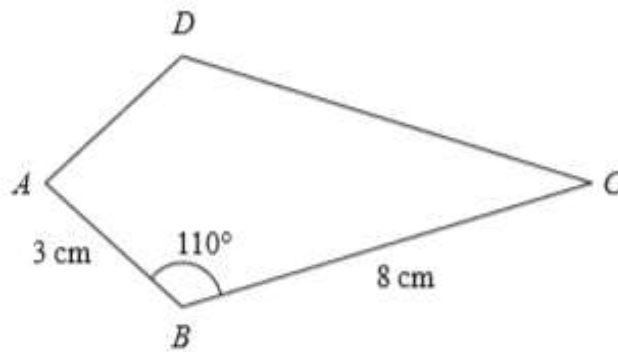
AB = 3 cm
BC = 8 cm
Angle ABC = 110°

Calculate the area of the kite *ABCD*.
Give your answer correct to 3 significant figures.

.... cm²

(Total for Question 16 is 3 marks)

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J15 4HR

21, 62, 58

17 *J, K, L* and *M* are points on the circumference of a circle.
    GJH is the tangent to the circle at *J*.
    MK and *JL* intersect at the point *P*.
    GML is a straight line.

Angle *HJK* = 62°, angle *JKM* = 21° and angle *JGL* = 78°
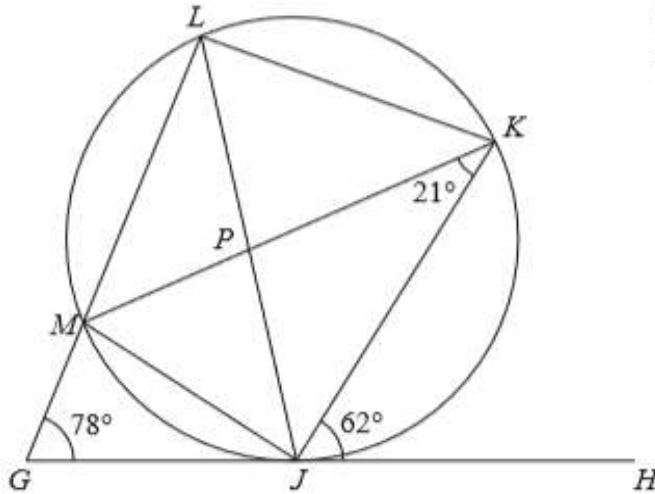
Diagram **NOT**
accurately drawn

(a) Write down the size of angle *MLJ*.

.... °

(1)

(b) Write down the size of angle *JLK*.

.... °

(1)

(c) Work out the size of angle *KPL*.

.... °

(3)

(Total for Question 17 is 5 marks)

Jan15 3H

900, 25.7

9 (a) Find the sum of the interior angles of a polygon with 7 sides.

.... °

(2)
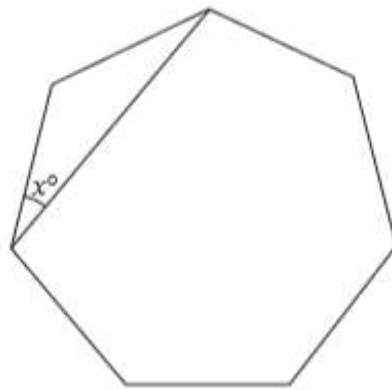
Diagram **NOT** accurately drawn

The diagram shows a regular polygon with 7 sides.

(b) Work out the value of *x*.
Give your answer correct to 1 decimal place.

....

(2)

(Total for Question 9 is 4 marks)

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J16 3H

19
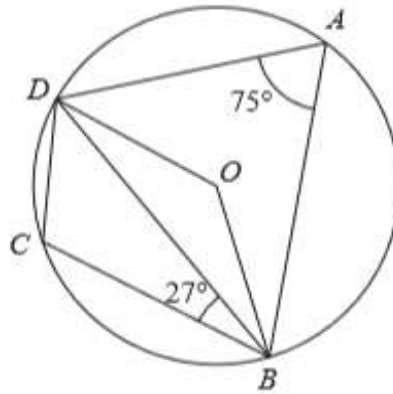
Diagram **NOT** accurately drawn

A, B, C and D are points on a circle, centre O.

Angle $DAB = 75°$
Angle $DBC = 27°$

Work out the size of angle ODC.

....°

(Total for Question 19 is 4 marks)

J16 4H
4

63, 50, 41
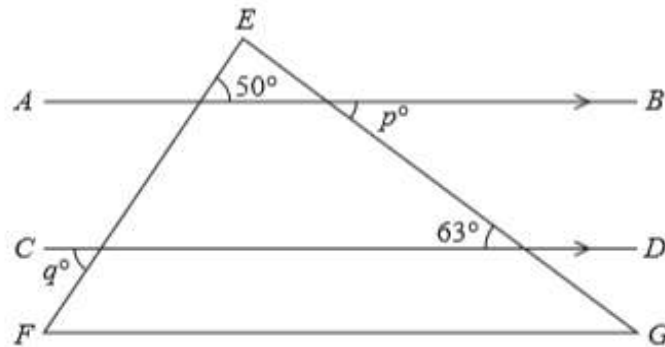
Diagram **NOT** accurately drawn

EFG is a triangle.
AB is parallel to *CD*.

(a) Write down the value of *p*

$p =$ ....
(1)

(b) Write down the value of *q*

$q =$ ....
(1)

Here is a hexagon.
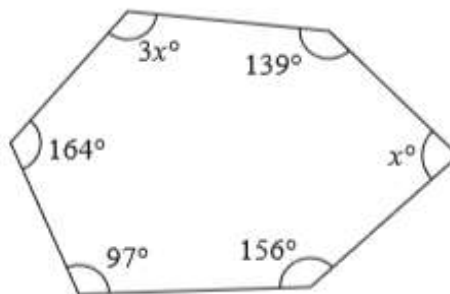
Diagram **NOT** accurately drawn

(c) Work out the value of *x*

$x =$ ....
(3)

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Jan16 3H

96, angle at centre double angle at circumference

17

M

48°

O

L

P
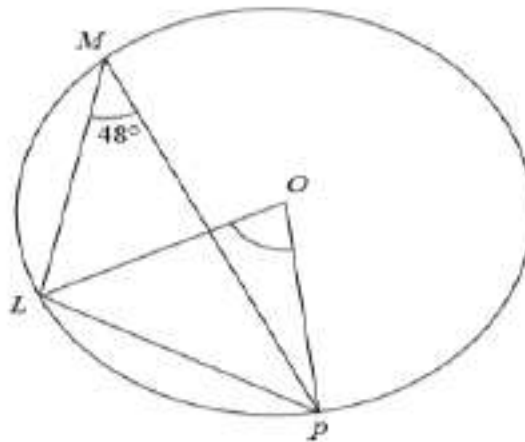
Diagram **NOT**
accurately drawn

L, M and P are points on a circle, centre O
Angle LMP = 48°

(a) (i) Write down the size of angle LOP

.... °

(ii) Give a reason for your answer.

....

....

....

(2)
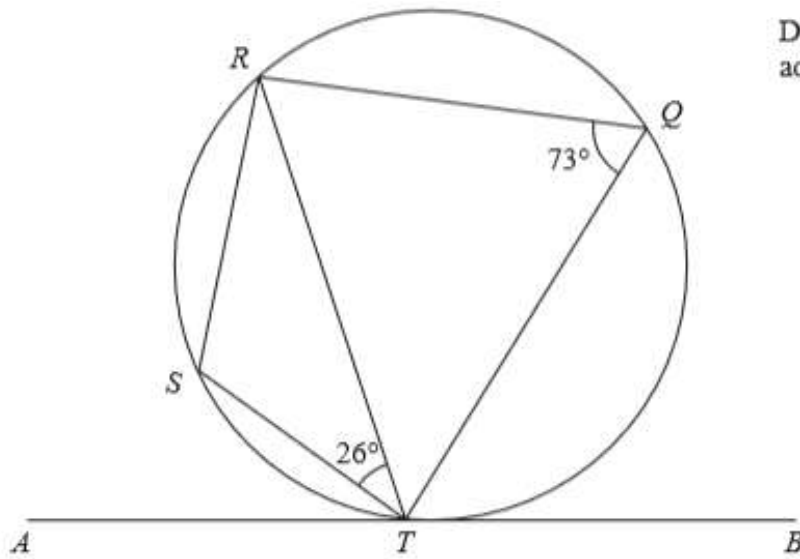
Diagram **NOT**
accurately drawn

Q, R, S and T are points on a circle.
ATB is the tangent to the circle at T

Angle $STR = 26°$
Angle $RQT = 73°$

(b) Work out the size of angle STA
   Give a reason for each stage in your working.

.... °

(3)

(Total for Question 17 is 5 marks)

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Trigonometry

48.2

J10 3H

20.
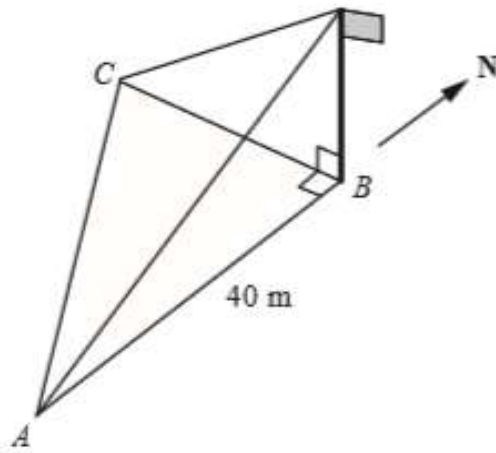
Diagram **NOT** accurately drawn

A, B and *C* are points on horizontal ground.
C is due West of *B*.
A is due South of *B* and *AB* = 40 m.
There is a vertical flagpole at *B*.
From *A*, the angle of elevation of the top of the flagpole is 13°.
From *C*, the angle of elevation of the top of the flagpole is 19°.

Calculate the distance *AC*.
Give your answer correct to 3 significant figures.

.... m

(Total 6 marks)

J5 3H

J5 3H

16.
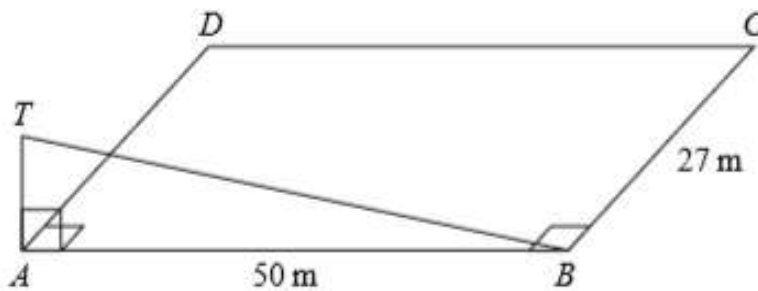
Diagram **NOT**
accurately drawn

ABCD is a horizontal rectangular field.
AB = 50 m.
BC = 27 m.
AT is a vertical mast.

(a) The angle of elevation of *T* from *B* is 19°.
Calculate the length of *AT*.
Give your answer correct to 3 significant figures.

.... m
(3)

(b) Calculate the distance from *C* to *T*.
Give your answer correct to 3 significant figures.

.... m
(3)

(Total 6 marks)

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J5 3H

6.43, 11.3

18.

A

123°

Diagram **NOT**
accurately drawn

35°

B   9.4 cm   C
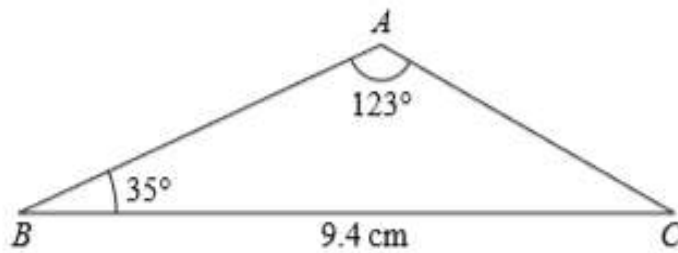
$BC = 9.4$ cm.
Angle $BAC = 123°$.
Angle $ABC = 35°$.

(a) Calculate the length of AC.
     Give your answer correct to 3 significant figures.

.... cm
(3)

(b) Calculate the area of triangle ABC.
     Give your answer correct to 3 significant figures.

.... cm^2
(3)

(Total 6 marks)

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Jan14 4H

23 A pyramid has a horizontal square base *ABCD* with sides of length 230 metres.
M is the midpoint of *AC*.
The vertex, *T*, is vertically above *M*.
The slant edges of the pyramid are of length 218 metres.

Calculate the height, *MT*, of the pyramid.
Give your answer correct to 3 significant figures.

Diagram **NOT**
accurately drawn

218 m

230 m

230 m

.... m
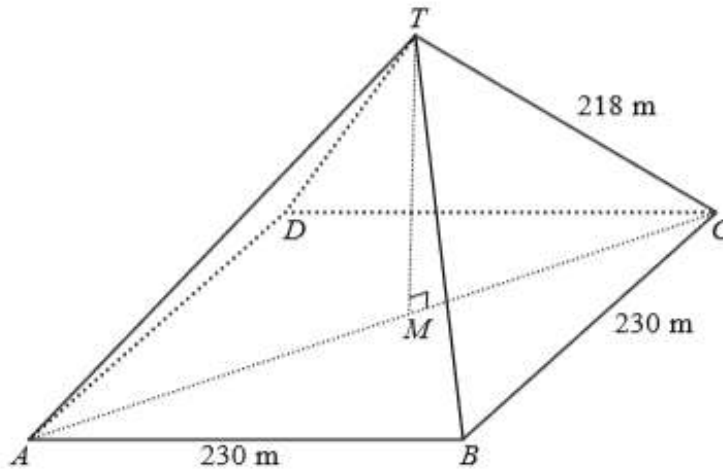
(Total for Question 23 is 5 marks)

Jan12 4H

48, 7.21

9

B

4 cm

C ——— 6 cm —— □ — 6 cm —— A

E

4 cm

D
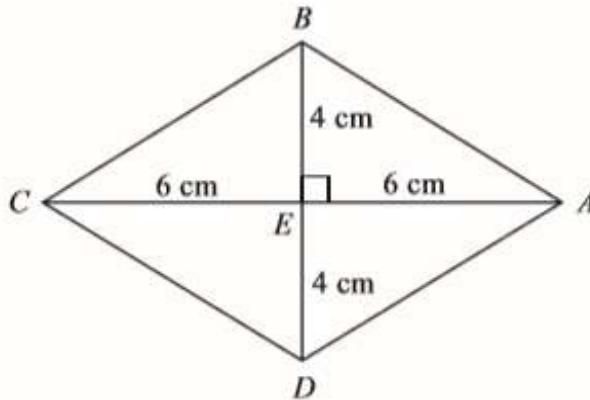
Diagram **NOT**
accurately drawn

ABCD is a rhombus.
The diagonals *AC* and *BD* cross at the point *E*.
AE = *CE* = 6 cm.
BE = *DE* = 4 cm.
Angle *AEB* = 90°

(a) Work out the area of the rhombus.

.... cm²

(3)

(b) Work out the length of *AB*.
Give your answer correct to 3 significant figures.

.... cm

(3)

(Total for Question 9 is 6 marks)

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J8 3H

4.34

18.

a cm   6.8 cm

64°   35°
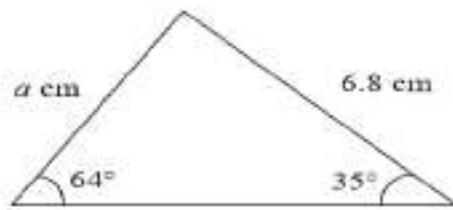
Diagram **NOT** accurately drawn

Calculate the value of *a*.
Give your value correct to 3 significant figures.

a = ...

(Total 3 marks)

J8 4H

192

8. The diagram shows a prism with length 15 cm.
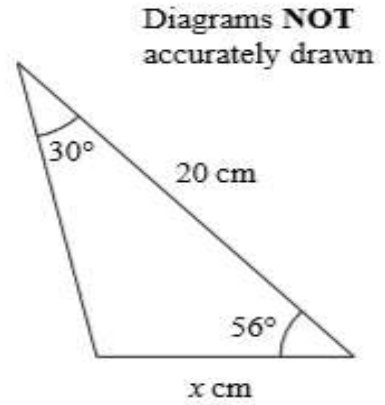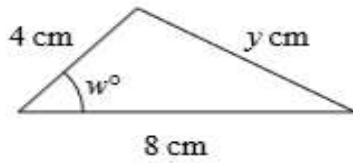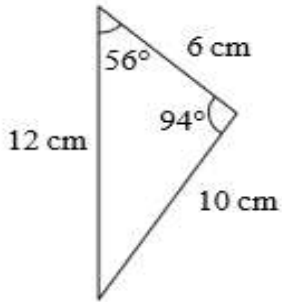The cross section of the prism is a right-angled triangle with sides 3 cm, 4 cm and 5 cm.

3 cm   5 cm

4 cm

15 cm
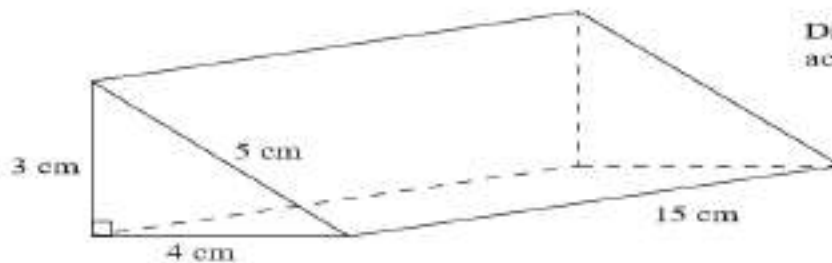
Diagram **NOT** accurately drawn

Calculate the total surface area of the prism.

.... cm^2

(Total 4 marks)

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J07 4H

56, 10, 6.6- 6.7

11. Here are three similar triangles.

Diagrams **NOT** accurately drawn

Find the value of

(a) w,

w = ...
(1)

(b) x,

x = ...
(2)

(c) y.

y = ...
(2)

(Total 5 marks)
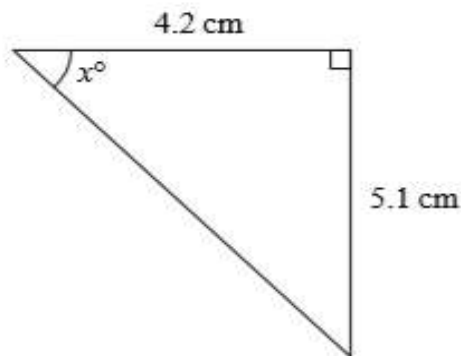
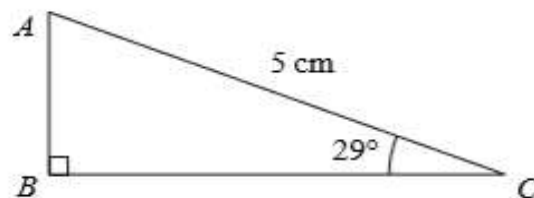**Mrs. Abeer Yousrallah (IGCSE Math)** 00966563065252

J07 4H

50.5, 2.42

7. (a)

4.2 cm

$x°$

5.1 cm

Diagram **NOT**
accurately drawn

Calculate the value of x.
Give your answer correct to 3 significant figures.

$x =$ ....
(3)

(b)

A

5 cm

29°

B C

Diagram **NOT**
accurately drawn

Calculate the length of AB.
Give your answer correct to 3 significant figures.
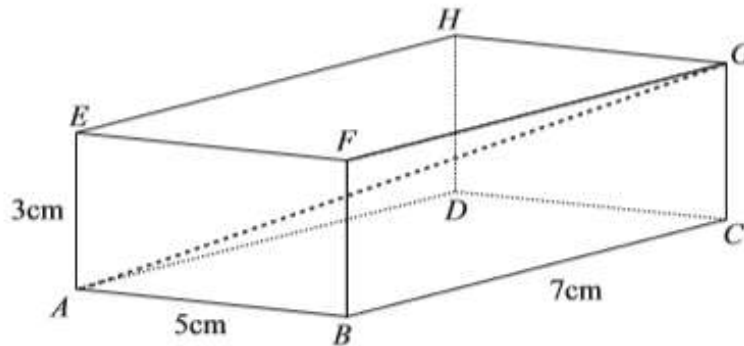
.... cm
(3)

(Total 6 marks)

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J11 4H

22

Diagram **NOT**
accurately drawn

The diagram shows a cuboid *ABCDEFGH*.
$AB = 5$cm
$BC = 7$cm
$AE = 3$cm

(a) Calculate the length of *AG*.
    Give your answer correct to 3 significant figures.

.... cm
(3)

(b) Calculate the size of the angle between *AG* and the plane *ABCD*.
    Give your answer correct to 1 decimal place.

.... °
(2)

(Total for Question 22 is 5 marks)

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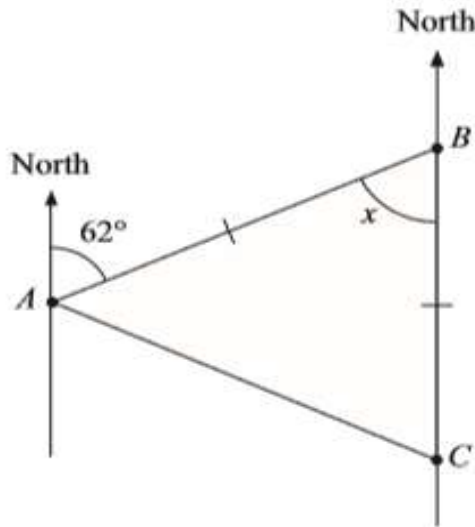
Nov9 4H

62, alternate, 121

3.

Diagram **NOT** accurately drawn

The bearing of *B* from *A* is 062°.
C is due south of *B*.
AB = *CB*.

(a) (i) Find the size of angle *x*.

.... °

(ii) Give a reason for your answer.

....

(2)

(b) Work out the bearing of *C* from *A*.

.... °

(2)

(Total 4 marks)

Nov9 4H

46.6

18.

Diagram **NOT** accurately drawn

8.3 cm

7.2 cm

3.9 cm

A   *D*   *B*   *C*
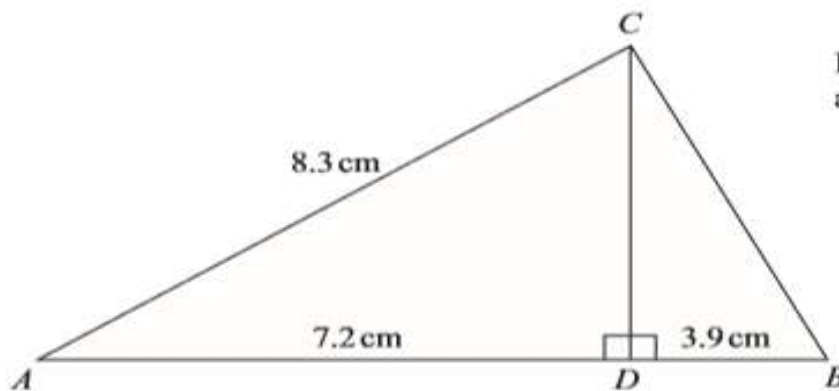
ABC is a triangle.
D is a point on *AB*.
CD is perpendicular to *AB*.
AD = 7.2 cm, *DB* = 3.9 cm, *AC* = 8.3 cm.

Calculate the size of angle *DBC*.
Give your answer correct to 1 decimal place.

°
....

(Total 5 marks)

7.55

Nov9 3H

22. The diagram shows the positions of two ships, *A* and *B*, and a lighthouse *L*.
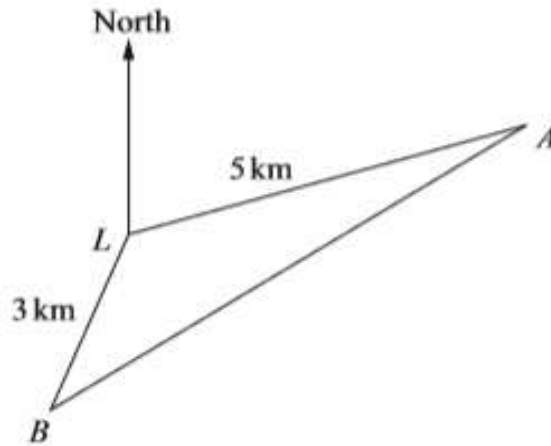

Diagram **NOT** accurately drawn

Ship *A* is 5 km from *L* on a bearing of 070° from *L*.
Ship *B* is 3 km from *L* on a bearing of 210° from *L*.
Calculate the distance between ship *A* and ship *B*.
Give your answer correct to 3 significant figures.

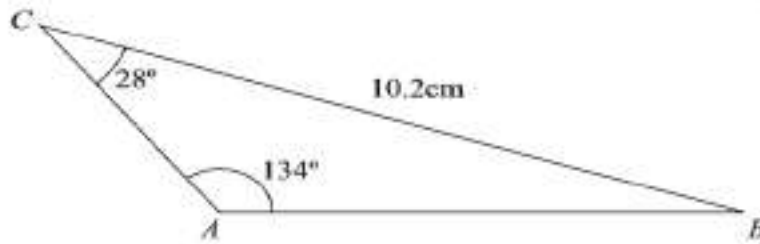.................................. km

(Total 3 marks)

42

J11 4H

6.66

19 The diagram shows triangle *ABC*.

Diagram **NOT**
accurately drawn

Angle *BCA* = 28°
Angle *CAB* = 134°
BC = 10.2 cm.

Calculate the length of *AB*.
Give your answer correct to 3 significant figures.

.... cm

(Total for Question 19 is 3 marks)

J8 3H

20.6

6.

3 cm

Diagram **NOT**
accurately drawn

8 cm
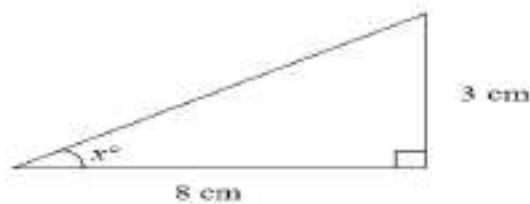
Work out the value of *x*.
Give your value correct to 1 decimal place.

x = ...

(Total 3 marks)

Nov8 4H

$$\text{Sin } x, \ 2\sin x, \ 2-2\cos 2x, \ \cos 2x = 1 - 2(\sin x)^2$$

22.
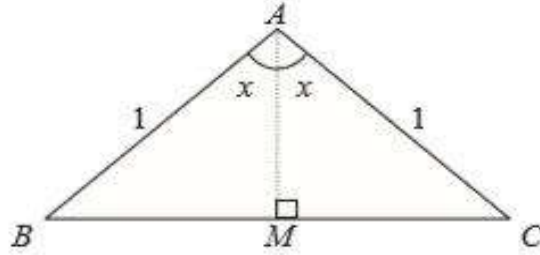
Diagram **NOT** accurately drawn

ABC is an isosceles triangle.
$AB = AC = 1$
M is the midpoint of *BC*.

(a) (i) Use trigonometry to find an expression, in terms of *x*, for *BM*.

....

(ii) Hence write down an expression, in terms of *x*, for *BC*.

....

(2)

(b) Use the cosine rule to find an expression, in terms of cos (2*x*), for BC^2.

....

(1)

(c) Hence show that $\cos (2x) = 1 - 2(\sin x)^2$

(2)

(Total 5 marks)

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Jan14 4H

16.4

17 A circular clock face, centre O, has a minute hand OA and an hour hand OB.
$OA = 10$ cm.
$OB = 7$ cm.

Calculate the length of AB when the hands show 5 o'clock.
Give your answer correct to 3 significant figures.
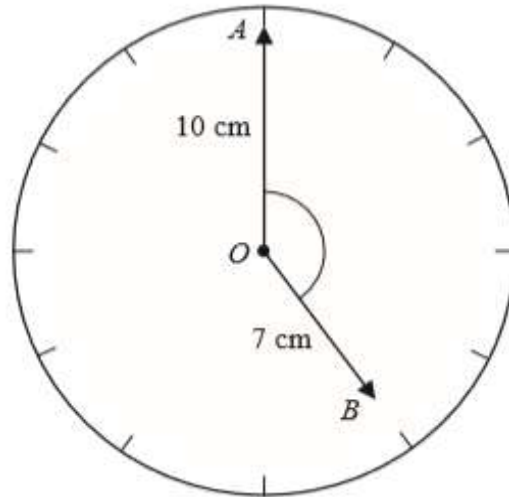
Diagram **NOT** accurately drawn

.... cm

(Total for Question 17 is 4 marks)

45

J8 4H

250±2, 305± 3

2. The diagram shows two towns, *A* and *B*, on a map.

North

A

B
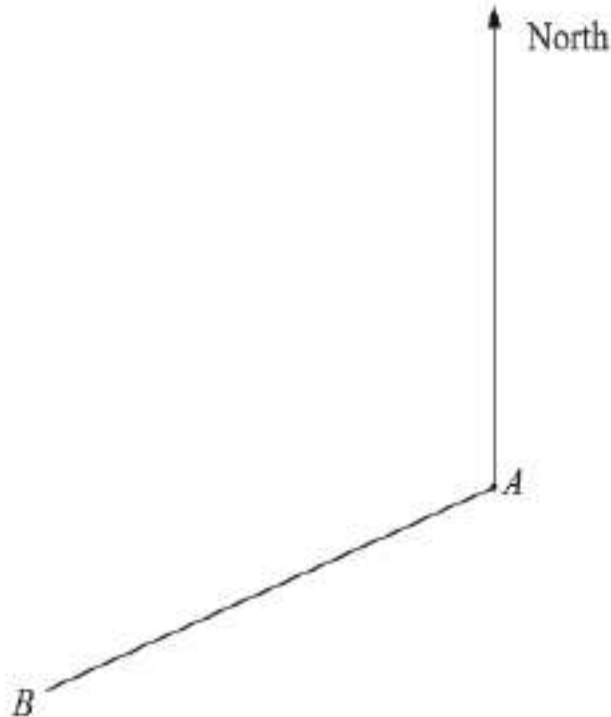
(a) Measure the bearing of *B* from *A*.

.... °

(2)

(b) *C* is another town.
The bearing of *C* from *A* is 125°.
Find the bearing of *A* from *C*.

.... °

(2)

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46

J10 4H

248-252, 230

2. The diagram shows two towns, *A* and *B*, on a map.

North

A

B
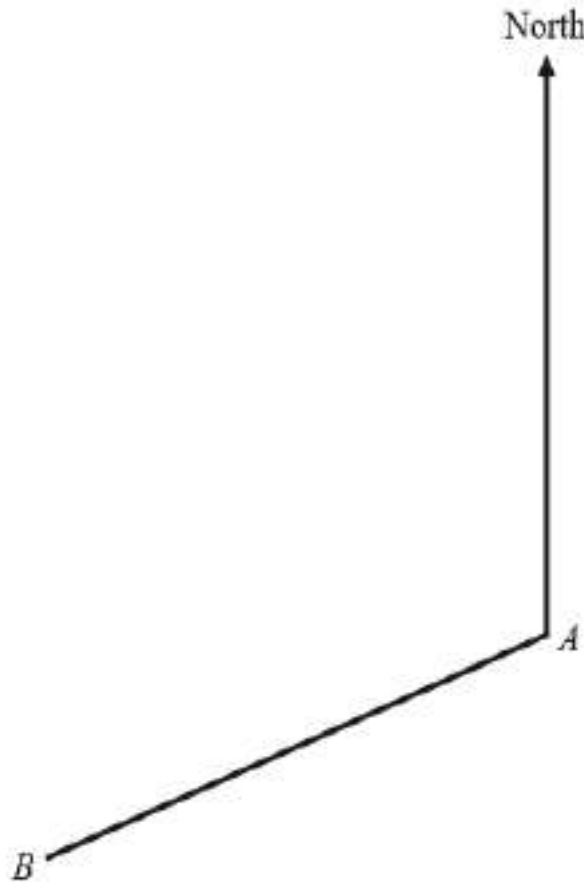
(a) By measurement, find the bearing of *B* from *A*.

.... °

(2)

(b) *C* is another town.
The bearing of *C* from *A* is 050°.
Find the bearing of *A* from *C*.

.... °

(2)

(Total 4 marks)

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Nov7 3H

4+ 2 /3 , /6

20. (a) Expand $(1+\sqrt{3})^2$

Give your answer in the form $a + b\sqrt{3}$ where a and b are integers.

....
(2)

(b)

2 cm

60°

Q $(1+\sqrt{3})$ cm R

P
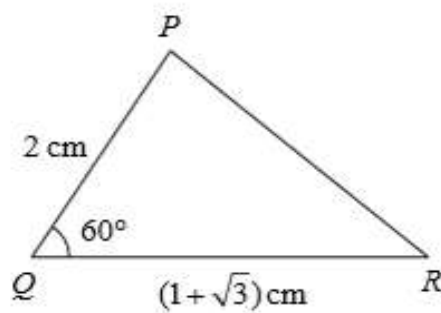
Diagram **NOT** accurately drawn

Calculate the exact length of PR.
Give your answer as a surd.

.... cm
(4)

(Total 6 marks)

Nov9 3H

920

10. The diagram shows a prism.
The cross section of the prism is a right-angled triangle.
The lengths of the sides of the triangle are 8 cm, 15 cm and 17 cm.
The length of the prism is 20 cm.
Work out the total surface area of the prism.
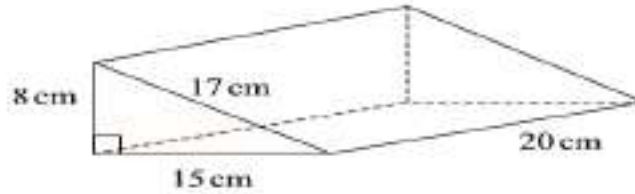
Diagram **NOT**
accurately drawn

.... cm²

(Total 3 marks)

J10 4H

18.
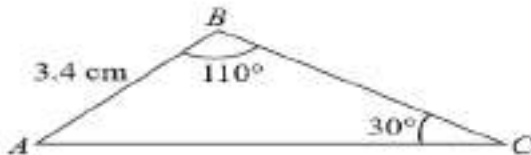
6.39

Diagram **NOT**
accurately drawn

Calculate the length of   *AC*.
Give your answer correct to 3 significant figures.

.... cm

(Total 3 marks)

Nov8 4H

7.08, 9.52

14. (a)
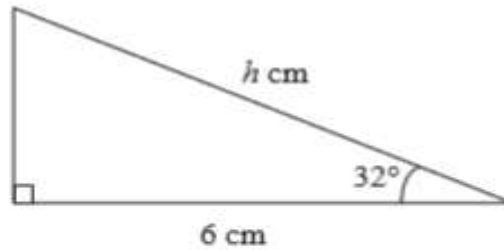
Diagram **NOT** accurately drawn

Calculate the value of h.
Give your answer correct to 3 significant figures.

$h = $ ....
(3)

(b)
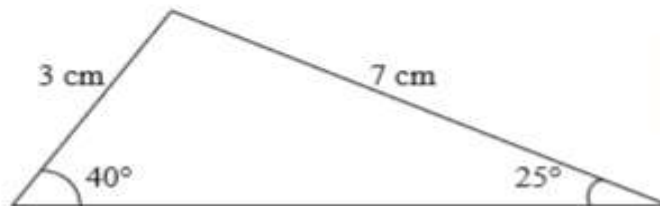
Diagram **NOT** accurately drawn

Calculate the area of the triangle.
Give your answer correct to 3 significant figures.
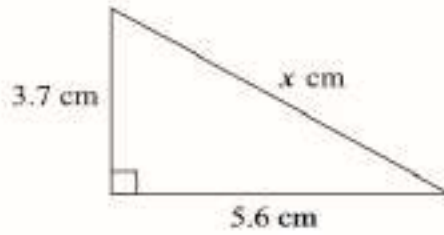
.... cm²
(3)

(Total 6 marks)

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J12 3H

6.71

4

3.7 cm | *x* cm

5.6 cm

Diagram **NOT**
accurately drawn

Work out the value of *x*.
Give your answer correct to 3 significant figures.

x = ...

(Total for Question 4 is 3 marks)

Nov7 3H

6.

20.6
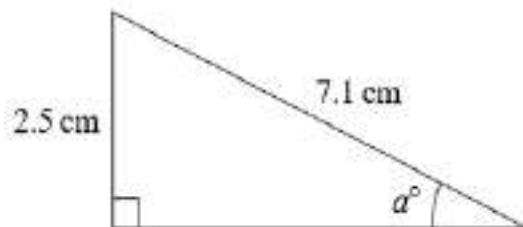
2.5 cm | 7.1 cm

a°

Calculate the value of *a*.
Give your answer correct to 3 significant figures.

Diagram **NOT**
accurately drawn

a = ...

(Total 3 marks)

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J12 3H

15
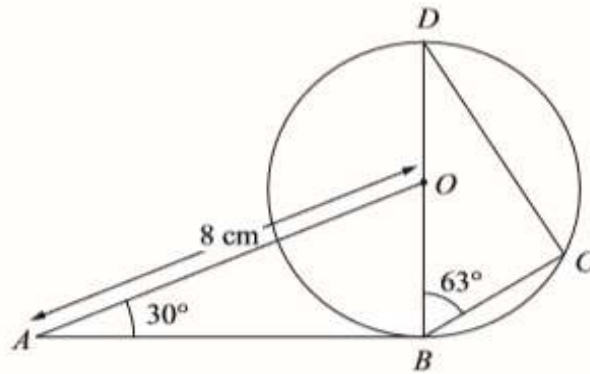
Diagram **NOT**
accurately drawn

B, C and D are points on a circle, centre O.
BOD is a diameter of the circle.
AB is the tangent to the circle at B.
AO = 8 cm.   Angle BAO = 30°   Angle CBD = 63°

Calculate the length of BC.
Give your answer correct to 3 significant figures.

.... cm

(Total for Question 15 is 4 marks)

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J11 3H

18

20.2
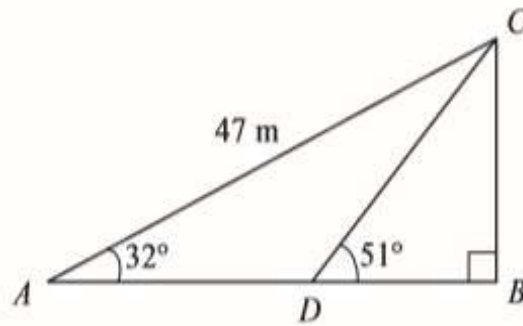
Diagram **NOT**
accurately drawn

Triangle *ABC* is right-angled at *B*.
Angle *BAC* = 32°
AC = 47 m.
D is the point on *AB* such that angle *BDC* = 51°

Calculate the length of *BD*.
Give your answer correct to 3 significant figures.

.... m

(Total for Question 18 is 5 marks)

53

Jan15 3H

11.2, 38.7

8

B

15 cm   10 cm

A   D   12.5 cm   C
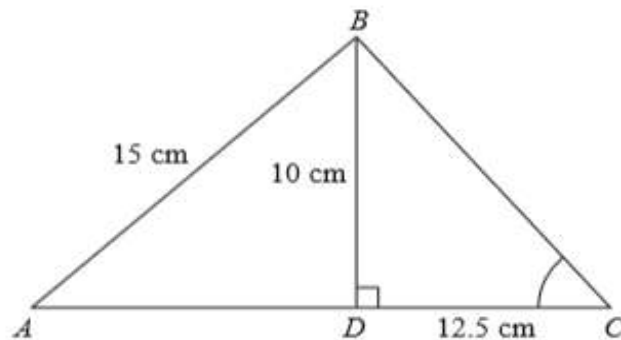
Diagram **NOT** accurately drawn

ABC is a triangle.
The point *D* lies on *AC*.
Angle *BDC* = 90°
BD = 10 cm, *AB* = 15 cm and *DC* = 12.5 cm.

(a) Calculate the length of *AD*.
    Give your answer correct to 3 significant figures.

.... cm

(3)

(b) Calculate the size of angle *BCD*.
    Give your answer correct to 1 decimal place.

.... °

(3)

(Total for Question 8 is 6 marks)
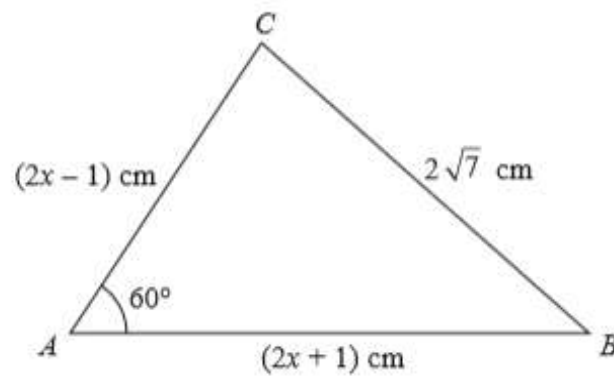
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Jan15 3H

22

Diagram **NOT** accurately drawn

The diagram shows a triangle ABC.
$AB = (2x + 1)$ cm, $AC = (2x - 1)$ cm and $BC = 2\sqrt{7}$ cm.
Angle $BAC = 60°$

Work out the value of x.
Show clear algebraic working.

$x =$ ....

(Total for Question 22 is 3 marks)

Jan15 4H

6.5

8 The diagram shows a triangle.

Diagram **NOT**
accurately drawn
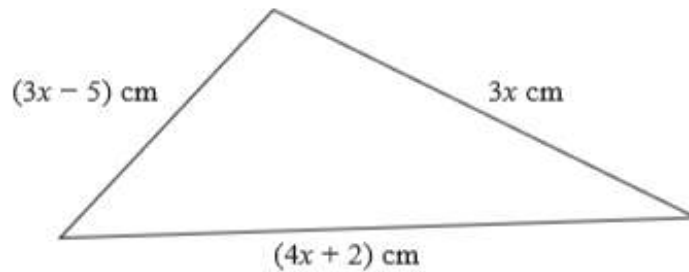
$(3x - 5)$ cm

$3x$ cm

$(4x + 2)$ cm

The lengths of the sides of the triangle are $3x$ cm, $(3x - 5)$ cm and $(4x + 2)$ cm.

The perimeter of the triangle is 62 cm.

Work out the value of x.
Show clear algebraic working.

$x =$ ....

(Total for Question 8 is 4 marks)

J16 3H

10.7

8
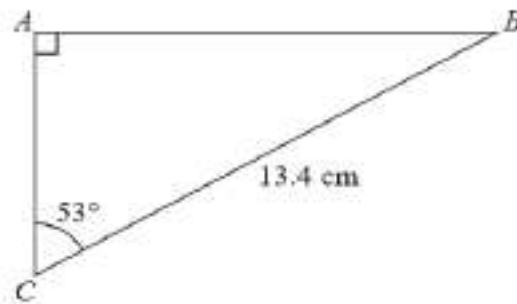
Diagram **NOT**
accurately drawn

13.4 cm

53°

Work out the length of *AB*.
Give your answer correct to 1 decimal place.

.... cm

(Total for Question 8 is 3 marks)

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J16 3H

16 *ABCDEFGH* is a cuboid.
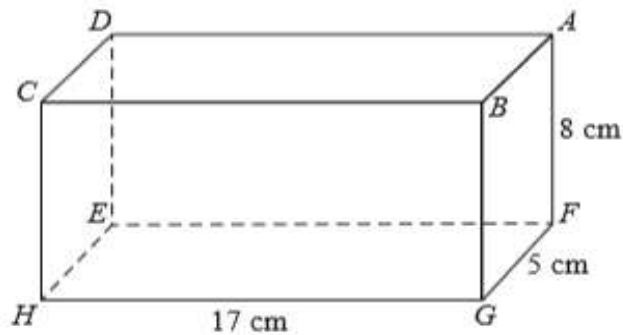
Diagram **NOT** accurately drawn

The cuboid has

length 17 cm
width 5 cm
height 8 cm

Work out the size of the angle that *AH* makes with the plane *EFGH*.
Give your answer correct to 1 decimal place.

.... °

(Total for Question 16 is 4 marks)

J16 4H

135

9

Diagram NOT accurately drawn

60 cm

13.5 cm

A   13.5 cm   *B*
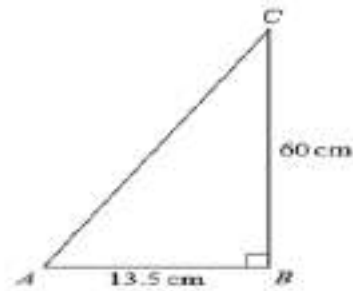
Work out the perimeter of the triangle.

.... cm

(Total for Question 9 is 4 marks)

Jan16 3H

25.1

11

A   4.5 cm   *B*

Diagram NOT accurately drawn

9.6 cm

C
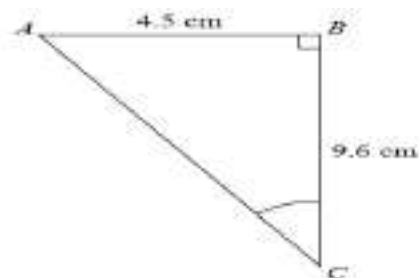
Work out the size of angle *ACB*.
Give your answer correct to 1 decimal place.

.... °

(Total for Question 11 is 3 marks)

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J15 4HR

7   The diagram shows two points S and T.
     The bearing of T from S is 043°

North

Diagram **NOT**
accurately drawn

T

43°

S

Work out the bearing of S from T.

.... °

(Total for Question 7 is 2 marks)

Mensuration

J12 4H

22

r cm
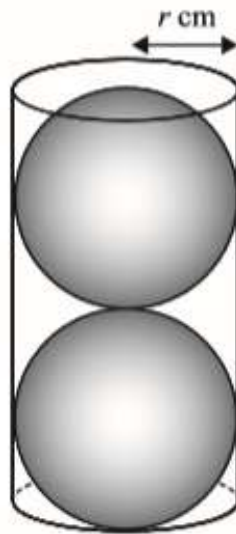
Diagram **NOT**
accurately drawn

Two solid spheres, each of radius r cm, fit exactly inside a hollow cylinder.
The radius of the cylinder is r cm.
The height of the cylinder is equal to $4r$ cm.

The volume of the space inside the cylinder, not occupied by the spheres, is $\frac{125}{6}\pi$ cm³

Calculate the value of r.

Show your working clearly.

$r = $ ....

(Total for Question 22 is 5 marks)

62

J11 4H

35, 5.39

6 The diagram shows a trapezium *PQRS*.
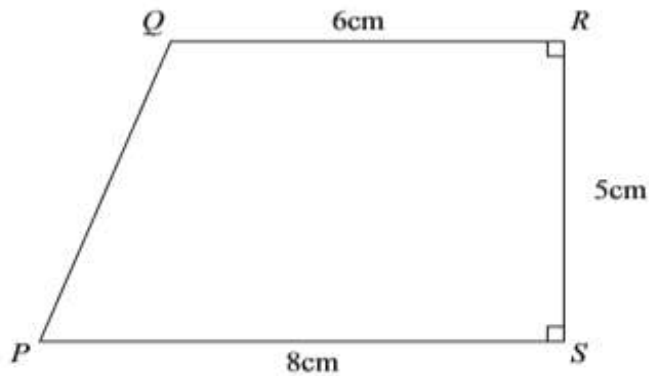
Diagram **NOT** accurately drawn

(a) Calculate the area of the trapezium *PQRS*.

.... cm²

(2)

(b) Calculate the length *PQ*.
Give your answer correct to 3 significant figures.

.... cm

(4)

(Total for Question 6 is 6 marks)

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Jan14 4H

2

Diagram **NOT** accurately drawn

11 cm

10 cm

12 cm

7 cm
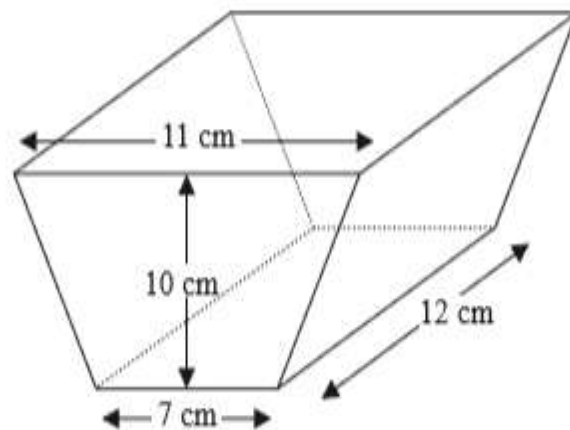
The diagram shows a solid prism.

The cross section of the prism is a trapezium.

The lengths of the parallel sides of the trapezium are 11 cm and 7 cm.

The perpendicular distance between the parallel sides of the trapezium is 10 cm.

The length of the prism is 12 cm.

(a) Work out the area of the trapezium.

.... cm²

(2)

(b) Work out the volume of the prism.

.... cm³

(2)

(Total for Question 2 is 4 marks)
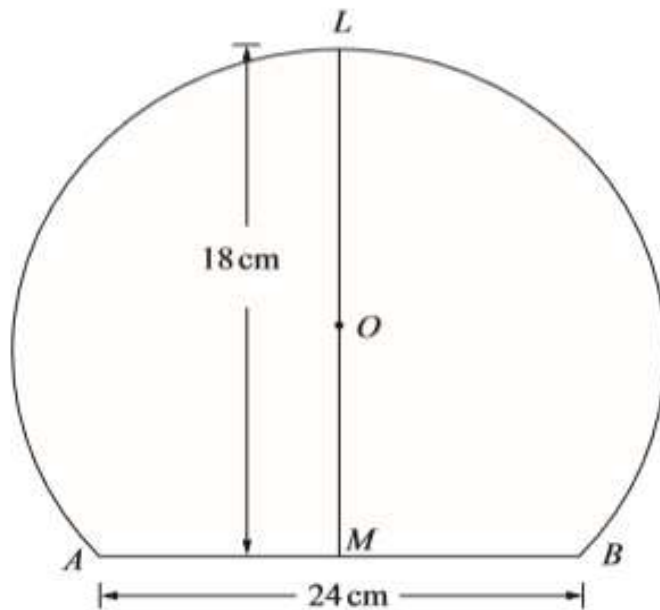
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21.

Diagram **NOT** accurately drawn

A, B and L are points on a circle, centre O.
AB is a chord of the circle.
M is the midpoint of AB.
LOM is a straight line.
AB = 24 cm.
LM = 18 cm.

Calculate the diameter of the circle.

.... cm

(Total 4 marks)

J9 4H

5. (a) Calculate the circumference of a circle of radius 40 m.
        Give your answer correct to 3 significant figures.

.... m

(2)

(b)

10 cm

Diagram **NOT**
accurately drawn

8 cm   3cm
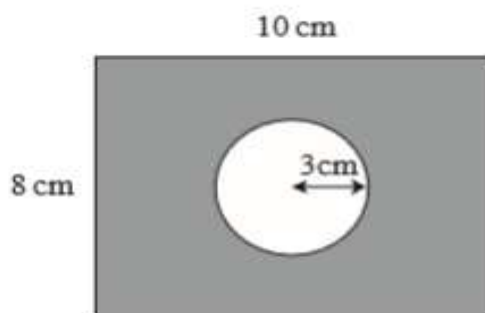
The diagram shows a circle inside a rectangle.
The rectangle has length 10 cm and width 8 cm.
The radius of the circle is 3 cm.

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

.... cm²

(4)

(Total 6 marks)

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J7 4H

10.8, 15.4

19. (a) Calculate the area of an equilateral triangle of side 5 cm.
Give your answer correct to 3 significant figures.

5 cm   5 cm

5 cm
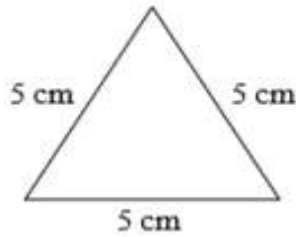
Diagram **NOT**
accurately drawn

.... cm²
(2)

(b) The diagram shows two overlapping circles.
The centre of each circle lies on the circumference of the other circle.
The radius of each circle is 5 cm.
The distance between the centres is 5 cm.
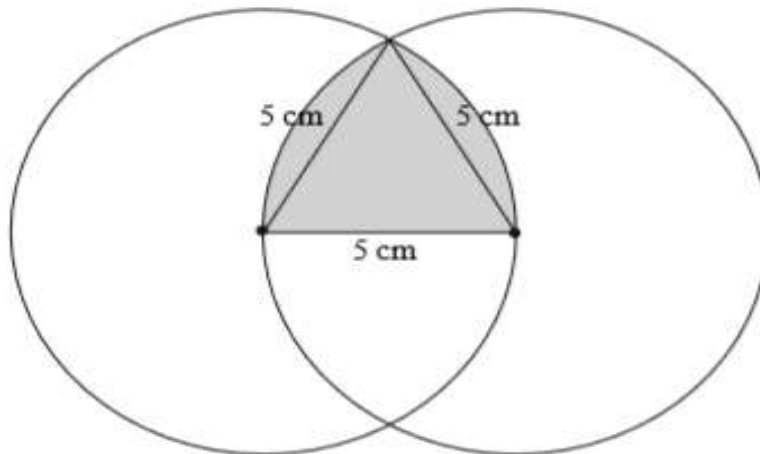
5 cm   5 cm

5 cm

Diagram **NOT**
accurately drawn

Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

.... cm²
(3)

(Total 5 marks)

J5 4H

15. A fan is shaped as a sector of a circle, radius 12 cm, with angle 110° at the centre.

Diagram **NOT**
accurately drawn

12 cm   110°
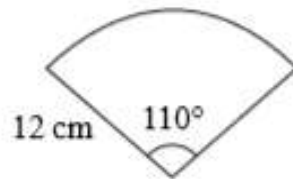
(a) Calculate the area of the fan.

.... cm²

(2)

Another fan is shaped as a sector of a circle, radius r cm, with angle 120° at the centre.

Diagram **NOT**
accurately drawn

r cm   120°
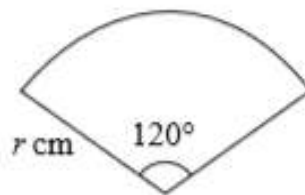
(b) Show that the total perimeter of this fan is $\frac{2}{3}r(3 + \pi)$ cm.

(3)

(Total 5 marks)

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68.3

Jan14 4H

7 A square hole is cut from a circular piece of card.
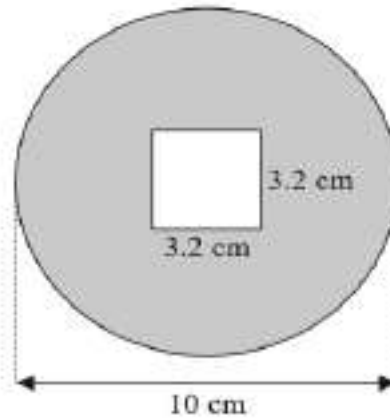
Diagram **NOT**
accurately drawn

3.2 cm

3.2 cm

10 cm

The square has sides of length 3.2 cm.
The diameter of the circular piece of card is 10 cm.

Work out the area of the shaded region.
Give your answer correct to 3 significant figures.

.... cm²

(Total for Question 7 is 4 marks)

J5 4H

261

9. The formula for the curved surface area, A, of a cylinder is

$$A = 2\pi rh$$

where r is the radius and h is the height.

Calculate the value of r when $A = 19.8$ and $h = 2.1$
Give your answer correct to one decimal place.

$A = $ ....

(Total 2 marks)

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Nov8 4H

3. The diagram shows a wall.

1.2 m

2 m

1.5 m
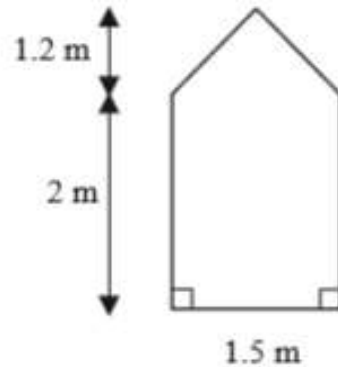
Diagram **NOT** accurately drawn

(a) Calculate the area of the wall.

.... m²

(3)

(b) 1 litre of paint covers an area of 20 m².
Work out the volume of paint needed to cover the wall.
Give your answer in millilitres.

.... ml

(3)

(Total 6 marks)

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J8 3H

24.5

7. The diameter of a circle is 7.8 cm.

    Calculate the circumference of the circle.
    Give your answer correct to 3 significant figures.

    .... cm

    (Total 2 marks)

J8 4H

10. The diagram shows a circle with centre O and radius 5 cm.
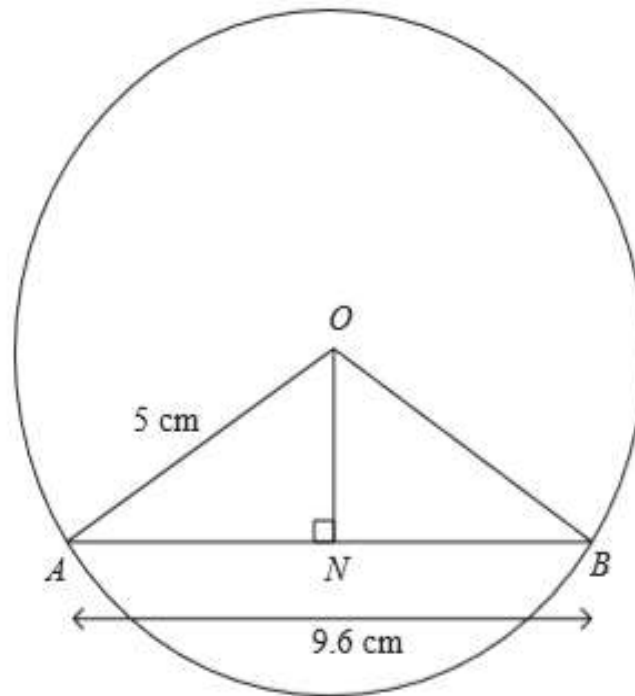
Diagram **NOT** accurately drawn

ANB is a chord of the circle.
$AB = 9.6$ cm.
Angle $ONA = 90°$.

(a) Write down the length of AN.

.... cm

(1)

(b) Calculate the length of ON.

.... cm

(3)

(Total 4 marks)

Nov7 4H

$4/3 \text{ pi } r^3, > 4\text{pi } r^2$

26.
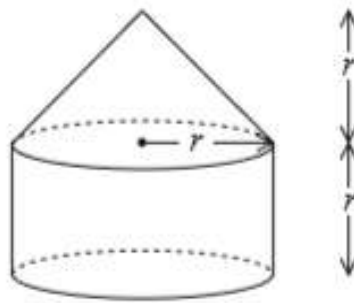
The diagram shows a solid made from a cone and a cylinder.
The cylinder has radius r and height r.
The cone has base radius r and height r.

(a) Show that the total volume of the solid is equal to the volume of a sphere of radius r.

(2)

The curved surface area of a cylinder with base radius r and height h is $2\pi rh$.
The curved surface area of a cone with base radius r and slant height l is πrl.

(b) Show that the **total** surface area of the above solid is greater than the surface area of a sphere of radius r.

(3)

(Total 5 marks)

Nov8 3H

19.
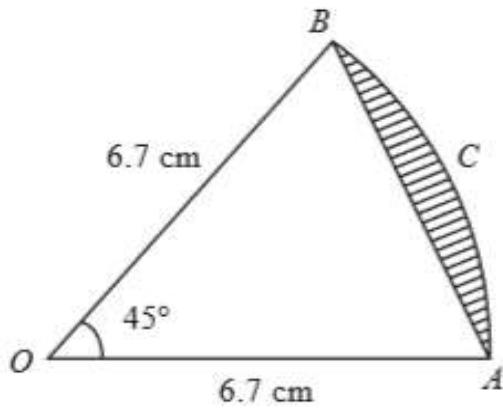
Diagram **NOT** accurately drawn

AB is a chord of a circle, centre *O*.
ACB is an arc of the circle.
OA = OB = 6.7 cm.
Angle *AOB* = 45°.

Calculate the area of the shaded segment.
Give your answer correct to 3 significant figures.

.... cm²

(Total 5 marks)

J12 3H
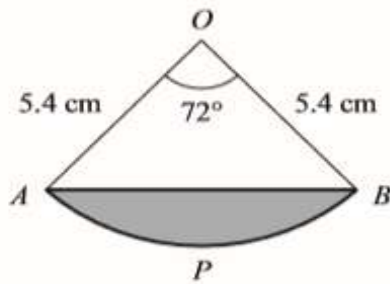
19

O

5.4 cm 72° 5.4 cm

Diagram **NOT**
accurately drawn

A   B

P

The diagram shows a sector *OAPB* of a circle, centre *O*.
AB is a chord of the circle.
OA = *OB* = 5.4 cm.
Angle *AOB* = 72°

Calculate the area of the shaded segment *APB*.
Give your answer correct to 3 significant figures.

.... cm^2

(Total for Question 19 is 5 marks)

75

Nov7 3H

389-390

15. Work out the area of the shaded sector of the circle.
Give your answer correct to 3 significant figures.

Diagram **NOT**
accurately drawn

12 cm

50°
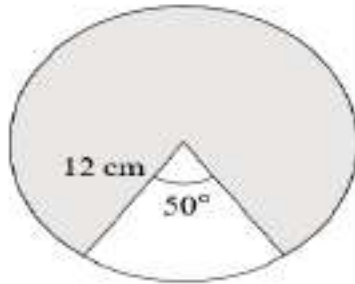
.... cm²

(Total 4 marks)

J13 3H

282

8
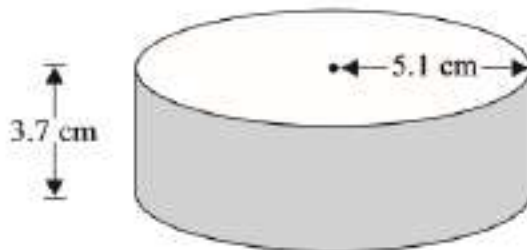
5.1 cm

3.7 cm

Diagram **NOT**
accurately drawn

A solid cylinder has a radius of 5.1 cm and a height of 3.7 cm.

Work out the **total** surface area of the cylinder.
Give your answer correct to 3 significant figures.

.... cm²

(Total for Question 8 is 3 marks)

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J7 3H

18.

A
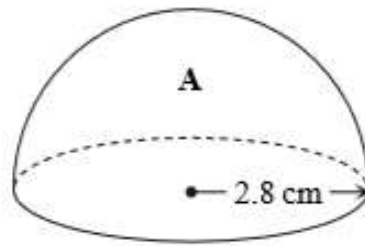
←— 2.8 cm —→

Diagram **NOT**
accurately drawn

A solid hemisphere **A** has a radius of 2.8 cm.

(a) Calculate the **total** surface area of hemisphere **A**.
Give your answer correct to 3 significant figures.

.... cm²

(3)

A larger solid hemisphere **B** has a **volume** which is 125 times the volume of hemisphere **A**.

(b) Calculate the **total** surface area of hemisphere **B**.
Give your answer correct to 3 significant figures.

.... cm²

(3)

(Total 6 marks)

Nov 3H

12.6, 15.7-15.8, 18.8

5. (a) Calculate the area of a circle of radius 2 m.
        Give your answer correct to 3 significant figures.

        ....m²
        (2)

    (b) A circular pond has a radius of 2 m.
        There is a path of width 1 m around the pond.
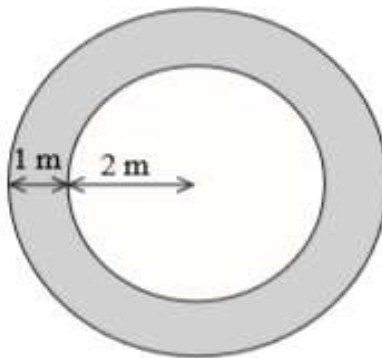
Diagram **NOT**
accurately drawn

        Calculate the area of the path.
        Give your answer correct to 3 significant figures.

        ....m²
        (2)

    (c) Calculate the outer circumference of the path.
        Give your answer correct to 3 significant figures.

        ....m
        (2)

        (Total 6 marks)

Nov10 3H

35.3

15. A solid is made from a cylinder and a hemisphere.
The cylinder has radius 1.5 cm and height 4 cm.
The hemisphere has radius 1.5 cm.

Diagram **NOT**
accurately drawn

4 cm

1.5 cm
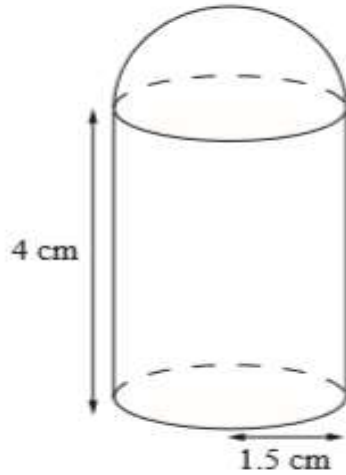
Work out the total volume of the solid.
Give your answer correct to 3 significant figures.

.... cm³

(Total 5 marks)

Nov9 3H

18. In the diagram, a sector of a circle of radius 12 cm is shaded.
The area of the sector is 112π cm^2.
Calculate the value of x.
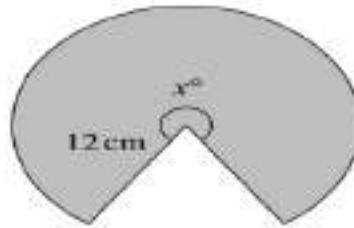
Diagram **NOT**
accurately drawn

12 cm

$x =$ ....

(Total 4 marks)

Jan 12 3H

3
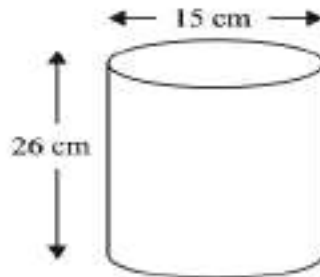
15 cm

26 cm

Diagram **NOT**
accurately drawn

A cylinder has a diameter of 15 cm and a height of 26 cm.

Work out the volume of the cylinder.
Give your answer correct to 3 significant figures.

.... cm^3

(Total for Question 3 is 3 marks)

J9 3H

19.
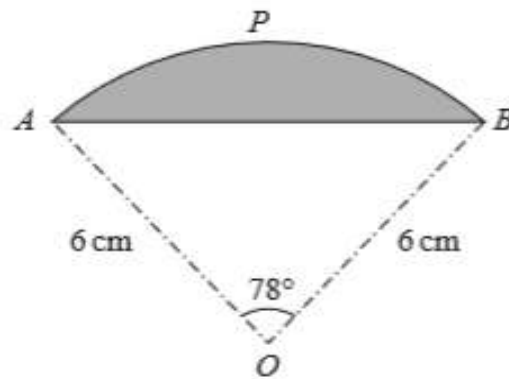
P

Diagram **NOT**
accurately drawn

A   B

6 cm   6 cm

78°

O

The diagram shows a sector $OAPB$ of a circle, centre O.
AB is a chord of the circle.
The radius of the circle is 6 cm.
Angle $AOB = 78°$.

Calculate the perimeter of the shaded **segment** APB.
Give your answer correct to 3 significant figures.

.... cm

(Total 6 marks)

Nov9 3H

188, 3.79

7. (a) Calculate the circumference of a circle of radius 30 cm.
Give your answer correct to 3 significant figures.

.... cm

(2)

(b) The diagram shows a circle with radius 2.1 cm inside a square.
The circle touches the sides of the square.

2.1 cm
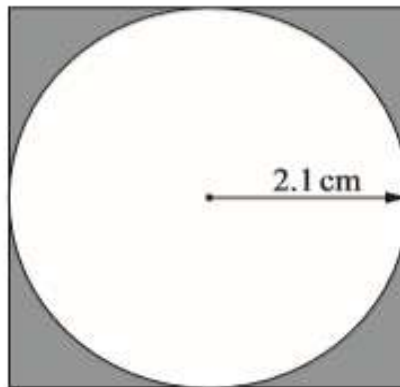
Diagram **NOT**
accurately drawn

Work out the shaded area.
Give your answer correct to 3 significant figures.
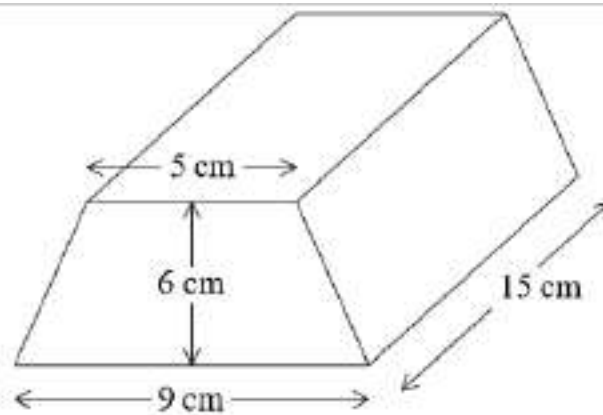
.... cm²

(4)

(Total 6 marks)

82

J5 3H

42, 630

7.

Diagram **NOT** accurately drawn

5 cm

6 cm

15 cm

9 cm

The diagram shows a prism.
The cross section of the prism is a trapezium.
The lengths of the parallel sides of the trapezium are 9 cm and 5 cm.
The distance between the parallel sides of the trapezium is 6 cm.
The length of the prism is 15 cm.

(a) Work out the area of the trapezium.

.... cm^2

(2)

(b) Work out the volume of the prism.

.... cm^3

(2)

(Total 4 marks)

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J15 3HR

$$9(8x+4)= 28(10-x)$$

11 The diagram shows a right-angled triangle and a rectangle.

9 cm

$(8x + 4)$ cm

7 cm

$(10 - x)$ cm
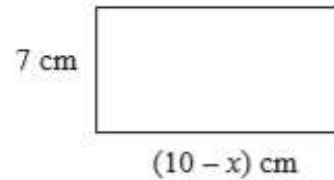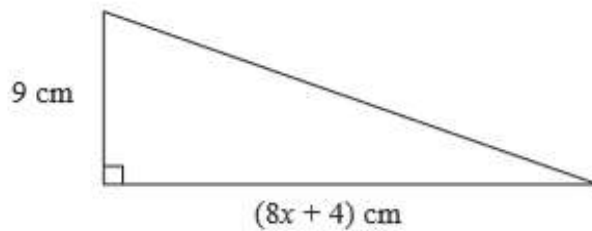
Diagram **NOT** accurately drawn

The area of the triangle is twice the area of the rectangle.

(i) Write down an equation for x.

(ii) Find the area of the rectangle.
     Show clear algebraic working.

.... cm²

(Total for Question 11 is 7 marks)

J15 3HR

19 The diagram shows a circular pond, of radius r metres, surrounded by a circular path.
The circular path has a constant width of 1.5 metres.

Diagram **NOT**
accurately drawn

r m

1.5 m
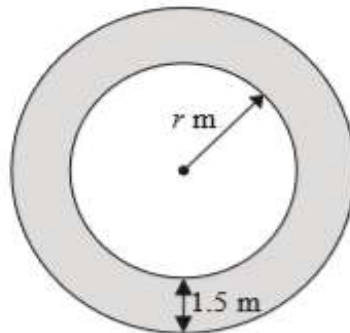
The area of the path is $\dfrac{1}{10}$ the area of the pond.

(a) Show that $2r^2 - 60r - 45 = 0$

(3)

(b) Calculate the area of the pond.
Show your working clearly.
Give your answer correct to 3 significant figures.

.... m^2

(5)

(Total for Question 19 is 8 marks)

Jan16 3H

9
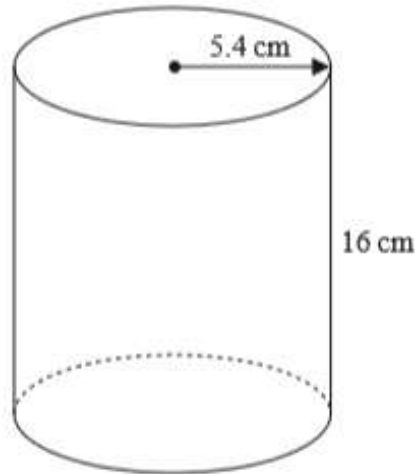
5.4 cm

Diagram **NOT**
accurately drawn

16 cm

A cylinder has radius 5.4 cm and height 16 cm.

(a) Work out the volume of the cylinder.
Give your answer correct to the nearest whole number.

.... cm³

(2)

The radius 5.4 cm is correct to 2 significant figures.

(b) (i) Write down the upper bound of the radius.

.... cm

(ii) Write down the lower bound of the radius.

.... cm

(2)

(Total for Question 9 is 4 marks)

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Jan16 3H

19 The diagram shows a sphere and a cone.

Diagram **NOT** accurately drawn

h cm
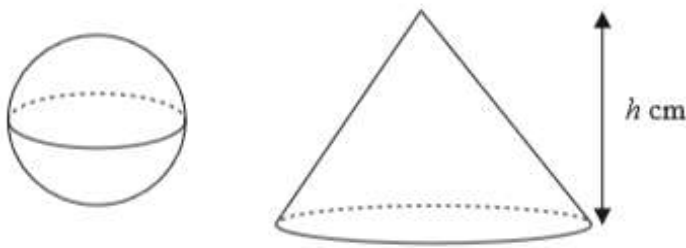
The cone has height h cm.
The radius of the base of the cone is 3 times the radius of the sphere.

Given that the volume of the sphere is equal to the volume of the cone, find an expression for the radius of the sphere in terms of h.
Give your expression in its simplest form.

(Total for Question 19 is 3 marks)

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J16 4H

20
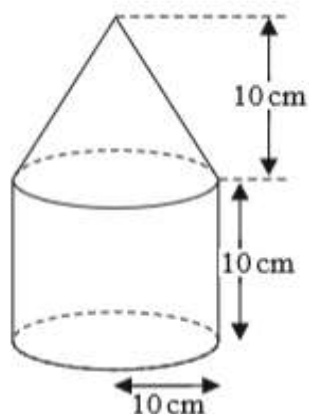
Diagram **NOT** accurately drawn

10 cm

10 cm

10 cm

The diagram shows a solid shape made from a cone on top of a cylinder.

The cone has a radius of 10 cm and a height of 10 cm.
The cylinder has a radius of 10 cm and a height of 10 cm.
The centre of the base of the cone coincides with the centre of the top face of the cylinder.

The total surface area of the solid is A cm^2

Show that $A = (300 + 100\sqrt{2})\pi$

(Total for Question 20 is 4 marks)

J16 3H

85.2

10 The diagram shows a circle inside a rectangle.
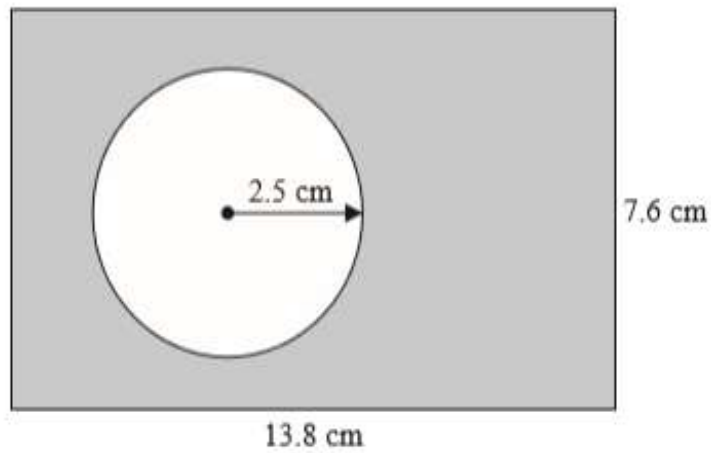
Diagram **NOT**
accurately drawn

2.5 cm

7.6 cm

13.8 cm

Work out the area of the shaded region.
Give your answer correct to 3 significant figures.

.... cm²

(Total for Question 10 is 3 marks)

J16 3H

17 The diagram shows a trapezium.
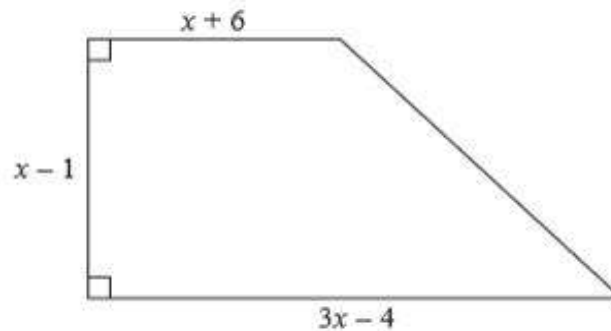
Diagram **NOT**
accurately drawn

All measurements on the diagram are in centimetres.

The area of the trapezium is 119 cm^2

(i) Show that $2x^2 - x - 120 = 0$

(ii) Find the value of x.
Show your working clearly.

$x = $ ....

(Total for Question 17 is 6 marks)

J15 4HR

20

Diagram **NOT** accurately drawn

B

C

8 cm

120°

O

8 cm

A
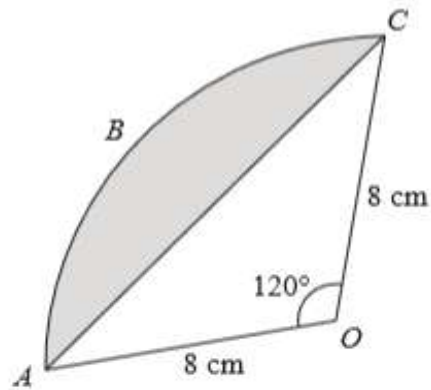
ABC is an arc of a circle with centre *O* and radius 8 cm.
AC is a chord of the circle.
Angle *AOC* = 120°

Calculate the perimeter of the shaded segment.
Give your answer correct to 3 significant figures.

.... cm

(Total for Question 20 is 5 marks)

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Similarity

92

J10 4H

3.25, 52

10. Quadrilaterals *ABCD* and *PQRS* are similar.

Diagrams **NOT** accurately drawn

4 cm
x cm
52°

6.4 cm
5.2 cm
y°

AB corresponds to *PQ*.
BC corresponds to *QR*.
CD corresponds to *RS*.

Find the value of

(a) *x*

x = ...
(2)

(b) *y*

y = ...
(1)

(Total 3 marks)

J9 4H

60, 6, 3.75

13. *ABCD* and *PQRS* are two similar quadrilaterals.
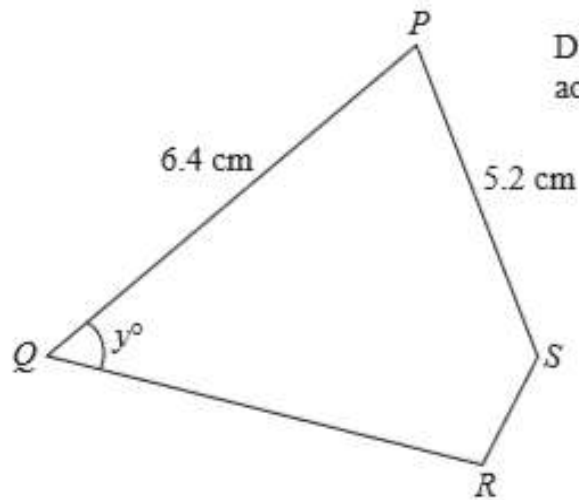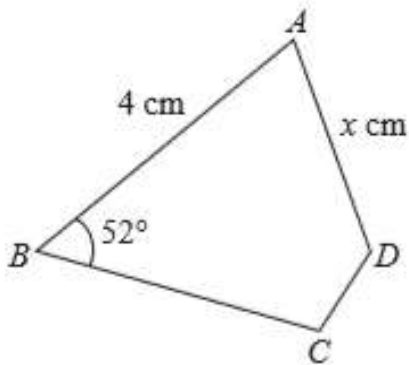
Diagrams **NOT** accurately drawn
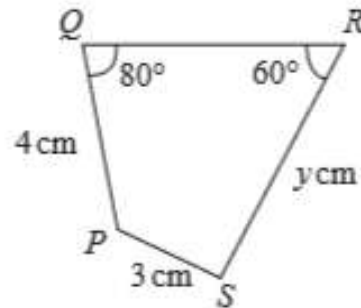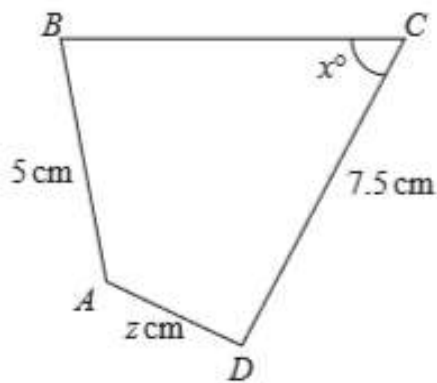
AB corresponds to *PQ*.
BC corresponds to *QR*.
CD corresponds to *RS*.

Find the value of

(a) x,

$x =$ ....
(1)

(b) y,

$y =$ ....
(2)

(c) z.

$z =$ ....
(2)

(Total 5 marks)

Nov7 4H

15.

10 cm

D →→→ E

6.8 cm

C

12.3 cm

A →→ B
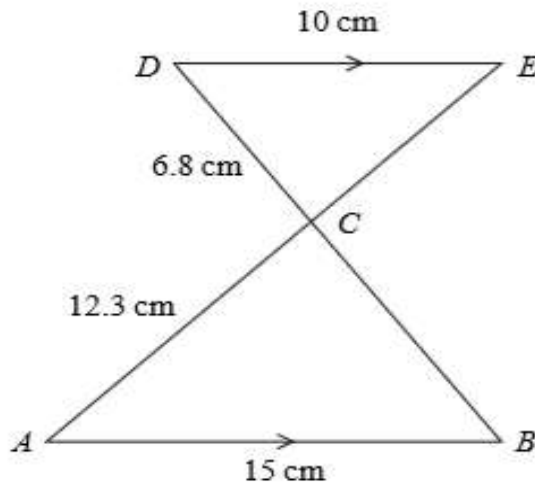
15 cm

Diagram **NOT** accurately drawn

AB is parallel to DE.
The lines AE and BD intersect at the point C.
$AB = 15$ cm, $AC = 12.3$ cm, $CD = 6.8$ cm, $DE = 10$ cm.

(a) Work out the length of BC.

.... cm

(2)

(b) Work out the length of CE.

.... cm

(2)

(c) $\dfrac{\text{Area of triangle } ABC}{\text{Area of triangle } CDE} = k$

Work out the value of k.

$k=$ ....

(2)

(Total 6 marks)

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J8 4H

12. Here are two similar triangles.
AB corresponds to PQ.
BC corresponds to QR.

y cm

A

$x°$

B

Q

63°

Diagrams **NOT**
accurately drawn

5 cm

6 cm

4 cm

z cm

C

P

20°

R

8 cm

Find the value of

(a) x

$x =$ ....
(1)

(b) y

$y =$ ....
(2)

(c) z

$z =$ ....
(2)

(Total 5 marks)

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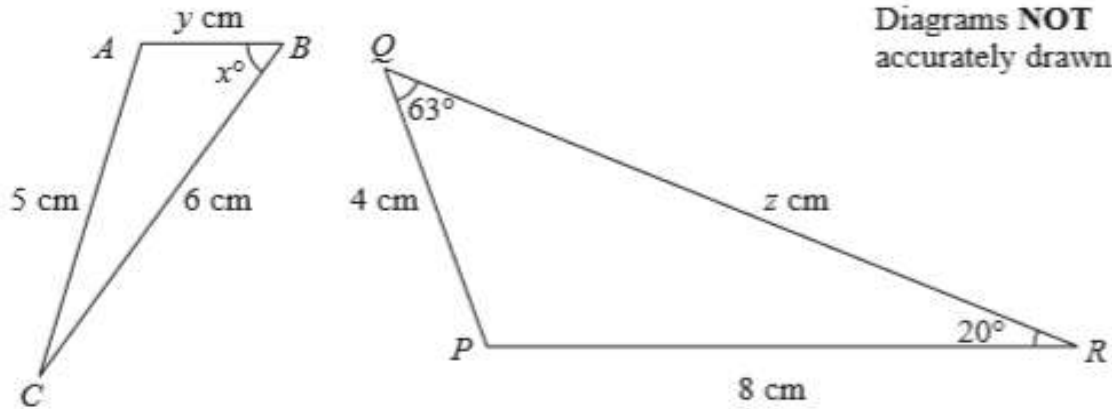
Jan12 3H

8, 7.5, 40

12 *ABCD* and *APQR* are two similar quadrilaterals.

$PQ = 9$ cm.
$BC = 6$ cm.
$AD = 5$ cm.
$QR = 12$ cm.
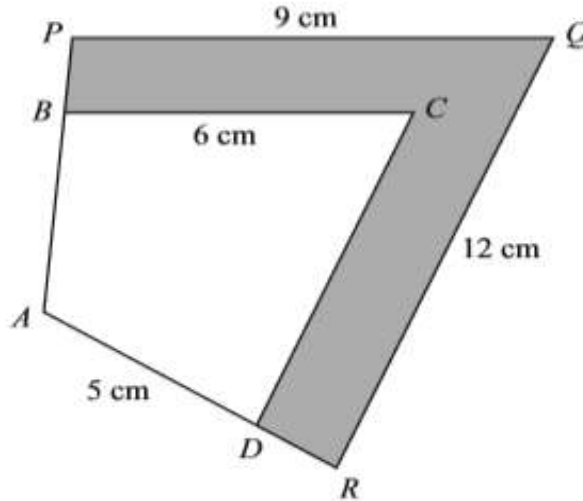
Diagram **NOT** accurately drawn

(a) Find the length of *DC*.

.... cm

(2)

(b) Find the length of *AR*.

.... cm

(2)

The area of the quadrilateral *ABCD* is 32 cm².

(c) Calculate the area of the shaded region.

.... cm²

(3)

(Total for Question 12 is 7 marks)

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J14 4H

12 The diagram shows triangle *ADC*.
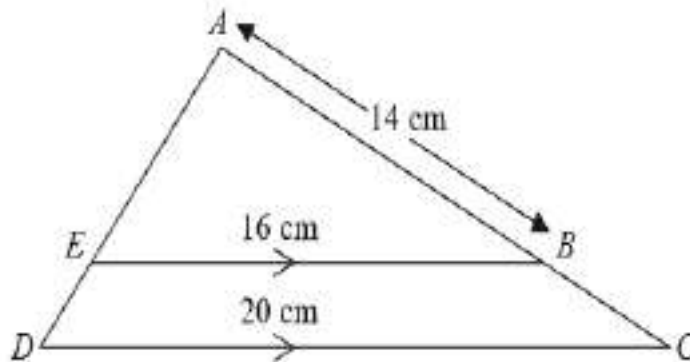
Diagram **NOT**
accurately drawn

E is a point on *AD* and *B* is a point on *AC* so that *EB* is parallel to *DC*.
AB = 14 cm.
EB = 16 cm.
DC = 20 cm.

Calculate the length of *BC*.

.... cm

(Total for Question 12 is 3 marks)

J11 3H

23
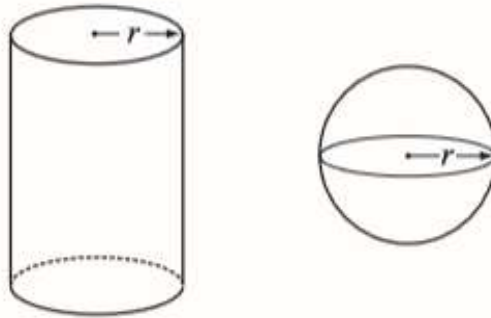
Diagram **NOT**
accurately drawn

The diagram shows a solid cylinder and a solid sphere.
The cylinder has radius r.
The sphere has radius r.

Given that $\dfrac{\textbf{Total} \text{ surface area of cylinder}}{\text{Surface area of sphere}} = 2$

find the value of $\dfrac{\text{Volume of cylinder}}{\text{Volume of sphere}}$

(Total for Question 23 is 5 marks)

7.8, 4.8

J11 3H

12

6 cm

D → E

Diagram **NOT** accurately drawn

5.2 cm

C

7.2 cm

A → B

9 cm

AB is parallel to *DE*.
ACE and *BCD* are straight lines.
AB = 9 cm.
AC = 7.2 cm.
CD = 5.2 cm.
DE = 6 cm.

(a) Calculate the length of *BC*.

.... cm

(2)

(b) Calculate the length of *CE*.

.... cm

(2)

(Total for Question 12 is **14, 3.8**

J12 3H

11

Diagram **NOT** accurately drawn
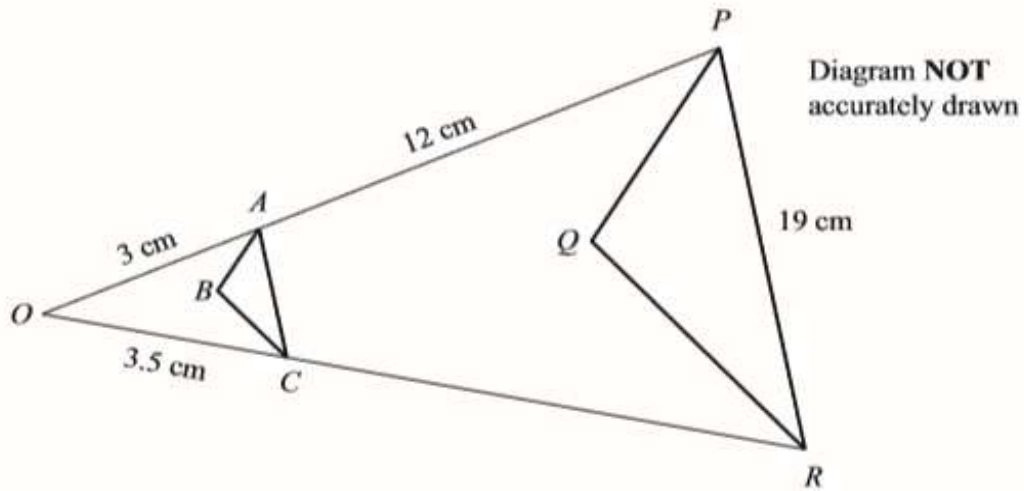
Triangle *PQR* is an enlargement, centre *O*, of triangle *ABC*.
OAP and *OCR* are straight lines.
OA = 3 cm.
AP = 12 cm.
OC = 3.5 cm.
PR = 19 cm.

(a) Work out the length of *CR*.

.... cm

(2)

(b) Work out the length of *AC*.

.... cm

(3)

The area of triangle *ABC* is 2 cm²

(c) Work out the area of triangle *PQR*.

.... cm²

(2)

(Total for Question 11 is 7 marks)

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J9 3H

16.

Diagram **NOT** accurately drawn

9 cm

P

◄ 4 cm →
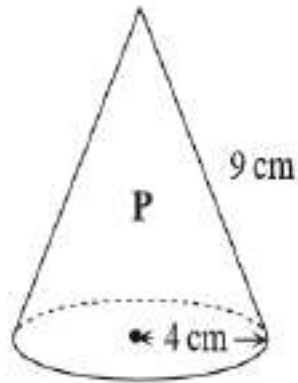
A solid cone, **P**, has a base radius of 4 cm and a slant height of 9 cm.

(a) Calculate the total surface area of the cone.
Give your answer correct to 3 significant figures.

.... cm²

(2)

Another solid cone, **Q**, is similar to **P**.
The base radius of **Q** is 6 cm.
The volume of **Q** is k times the volume of **P**.

(b) Calculate the value of k.

$k =$ ....

(2)

(Total 4 marks)

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J8 3H

12.
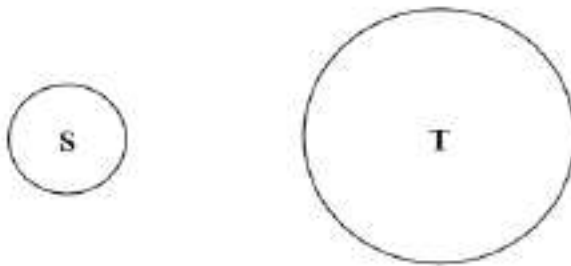
Diagram **NOT**
accurately drawn

The area of circle **S** is 4 cm².
The radius of circle **T** is 3 times the radius of circle **S**.

Work out the area of circle **T**.

.... cm²

(Total 2 marks)

103

J16 3H

15 The diagram shows two mathematically similar vases, **A** and **B**.

Diagram **NOT**
accurately drawn

A

B
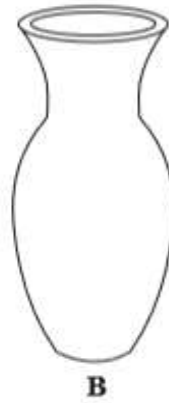
Vase **A** has a surface area of 120 cm^2
Vase **B** has a surface area of 750 cm^2 and a volume of 1600 cm^3

Work out the volume of vase **A**.

.... cm^3

(Total for Question 15 is 3 marks)

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J16 4H

12

Diagram **NOT**
accurately drawn
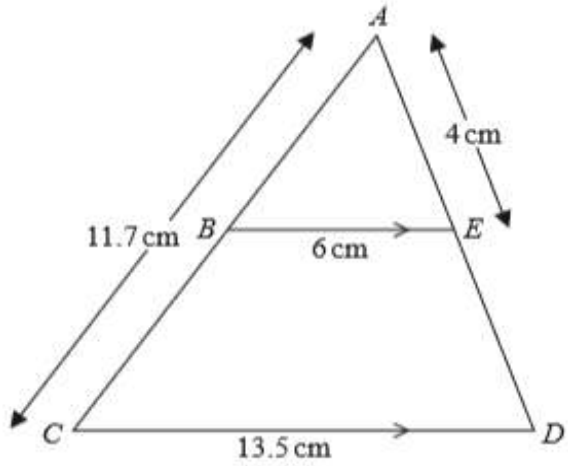
The diagram shows triangle ACD.
B is a point on AC and E is a point on AD so that BE is parallel to CD.

$AE = 4\,cm$
$AC = 11.7\,cm$
$BE = 6\,cm$
$CD = 13.5\,cm$

(a) Calculate the length of AB.

.... cm

(2)

(b) Calculate the length of ED.

.... cm

(2)

(Total for Question 12 is 4 marks)

Jan15 3H

15
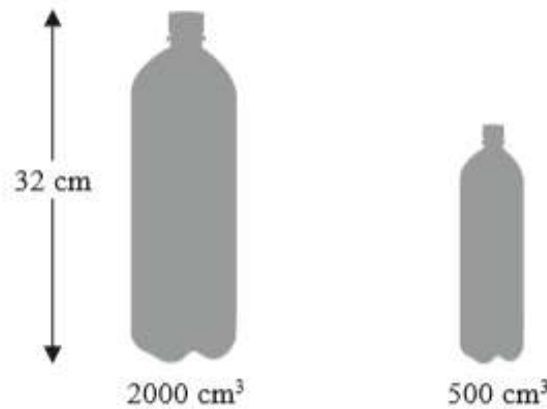
Diagram **NOT** accurately drawn

Zane buys mineral water in large bottles and in small bottles.
The large bottles are mathematically similar to the small bottles.
Large bottles have a height of 32 cm and a volume of 2000 cm^3
Small bottles have a volume of 500 cm^3

Work out the height of a small bottle.
Give your answer correct to 3 significant figures.

.... cm

(Total for Question 15 is 3 marks)

J15 4HR

13 *PQRS* and *PLMN* are similar quadrilaterals.

$PN = 12$ cm, $NS = 8$ cm, $PL = 9$ cm and $RS = 13.5$ cm.

LM is parallel to *QR* and *MN* is parallel to *RS*.
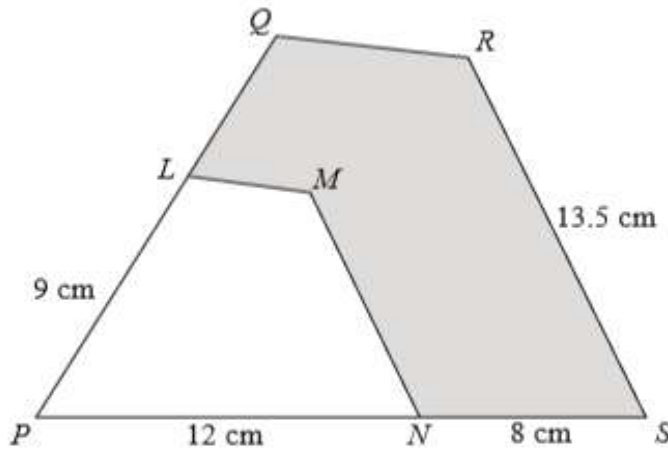
Diagram **NOT**
accurately drawn

(a) Work out the length of *MN*.

.... cm

(2)

(b) Work out the length of *LQ*.

.... cm

(2)

The area of *PLMN* is A cm²
The area of *PQRS* is kA cm²

(c) Find the value of k.

$k = $ ....

(1)

59.4

The area of the shaded region is 105.6 cm^2

(d) Work out the value of A.

$A = $ ....

(3)

(Total for Question 13 is 8 marks)

IGCSE

EDEXCEL

PART III

1. Straight Line Graphs.

2. Linear Programming.

3. Functions.

4. Graphs of Functions.

5. Differentiation.

Prepared by:7.Abeer yousrallah

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Straight Line Graph

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J7 4H

Y = 2*x* + 1, Y = -2*x* + c, (0, -4)

10. (a)
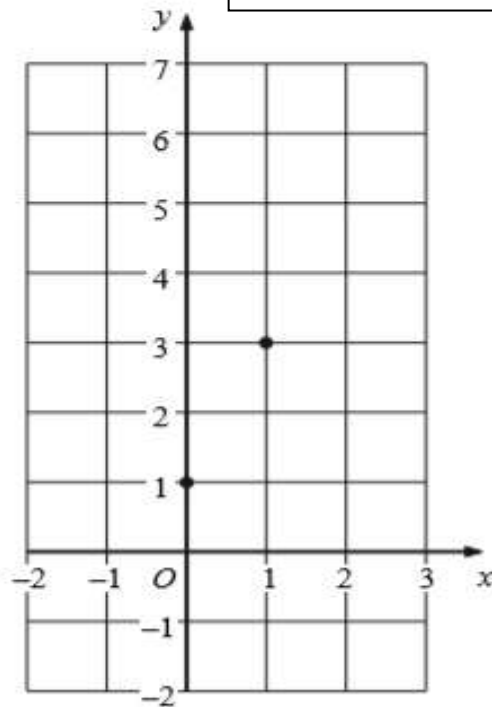
Find the equation of the straight line that passes through the points (0, 1) and (1, 3).

....

(4)

(b) Write down the equation of a line parallel to the line whose equation is $y = -2x + 5$

....

(1)

(c) Write down the coordinates of the point of intersection of the two lines whose equations are $y = 3x - 4$ and $y = -2x - 4$

(................., ...)

(1)

(Total 6 marks)

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Jan12 4H

13 (a) Find the gradient of the line with equation $3x + 4y = 10$

$$4Y = 10 - 3x, \ -\frac{3}{4}$$

....

(3)

(b) Find the coordinates of the point of intersection of the line with equation $3x + 4y = 10$
and the line with equation $5x - 6y = 23$
Show your working clearly.

(......................... , ...)

(5)

(Total for Question 13 is 8 marks)

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N10 4H

(7, 6), C (3, 10) D (11, 2)

3.
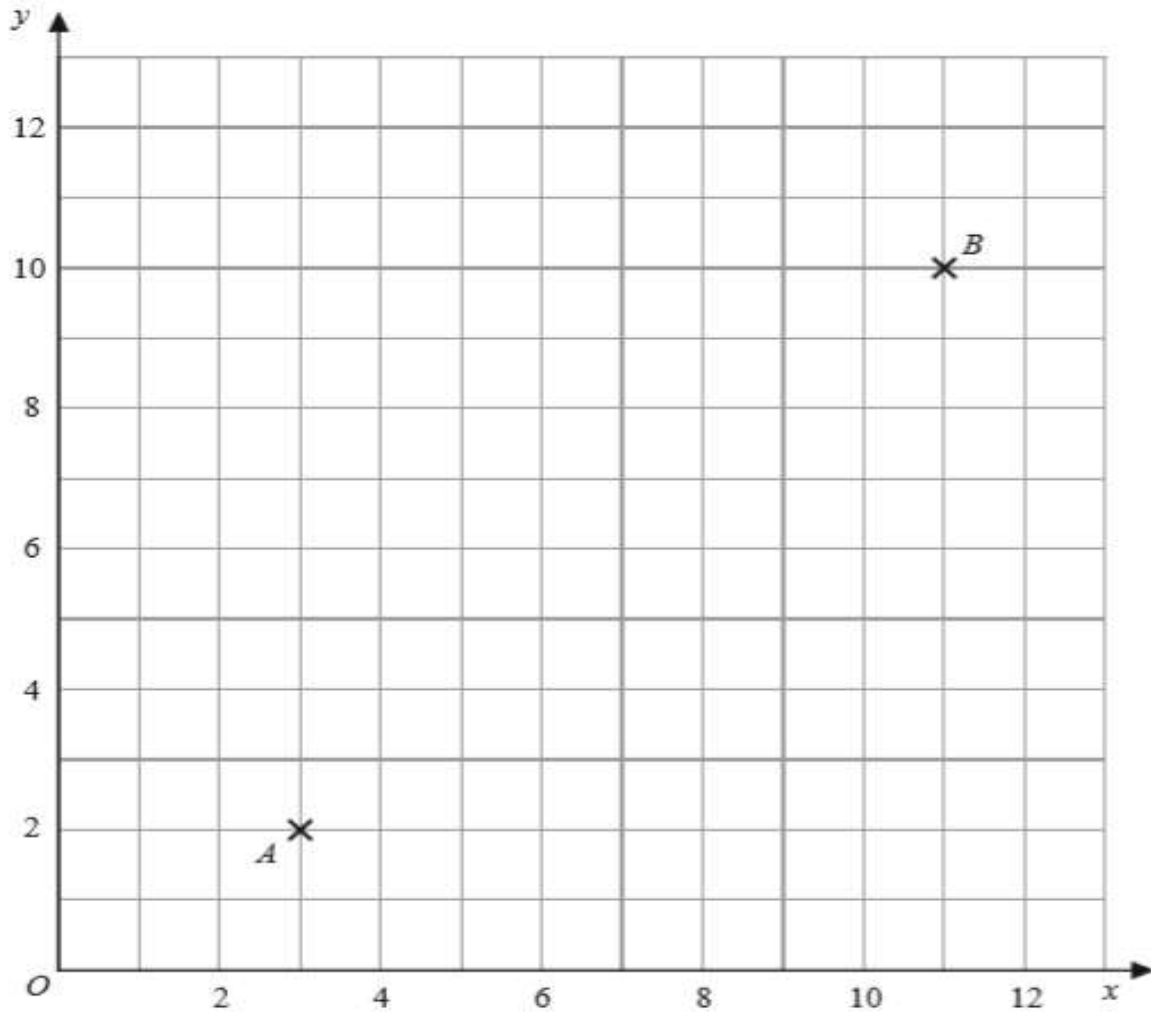
The point A has coordinates (3, 2) and the point B has coordinates (11, 10).

(a) Find the coordinates of the midpoint of AB.

(................. , ...)

(2)

AB is a diameter of a circle.
CD is another diameter of this circle.
CD is perpendicular to AB.

(b) Find the coordinates of C and the coordinates of D.

C (................. , ...)

D (................. , ...)

(2)

(Total 4 marks)

J13 4H

(4.5, 3), 7.28

7 Two points, *A* and *B*, are plotted on a centimetre grid.
   A has coordinates (1, 4) and *B* has coordinates (8, 2).
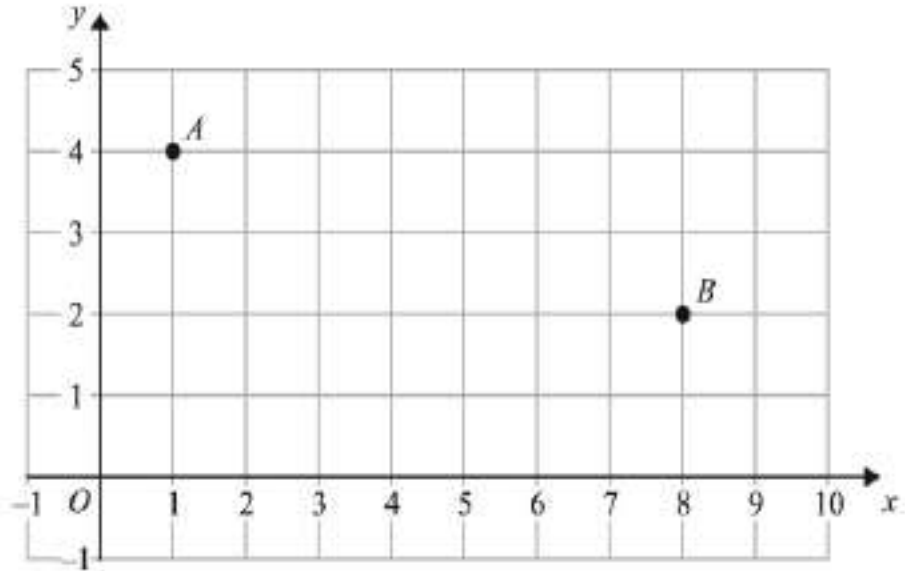
(a) Work out the coordinates of the midpoint of *AB*.

(.............. , ...)

(2)

(b) Use Pythagoras' Theorem to work out the length of *AB*.
    Give your answer correct to 3 significant figures.

.... cm

(4)

(Total for Question 7 is 6 marks)

N8 3H

$(2, 7), Y = 2x + 7$

10. The point A has coordinates (5, 13) and the point B has coordinates (−1, 1).

    (a) Work out the coordinates of the midpoint of AB.

    (.............. , ...)

    (2)

    The point C has coordinates (0, 7).
    The line L passes through C and is parallel to the line AB.

    (b) Find an equation of the line L.

    ....

    (4)

    (Total 6 marks)

Jan15 3HR

6   A is the point with coordinates (4, 1)
    B is the point with coordinates (1, 9)

    (2.5, 5)

    Find the coordinates of the midpoint of AB.

    (.............. , ...)

    (Total for Question 6 is 2 marks)

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N6 3H

Y = 2*x* − 4

12.
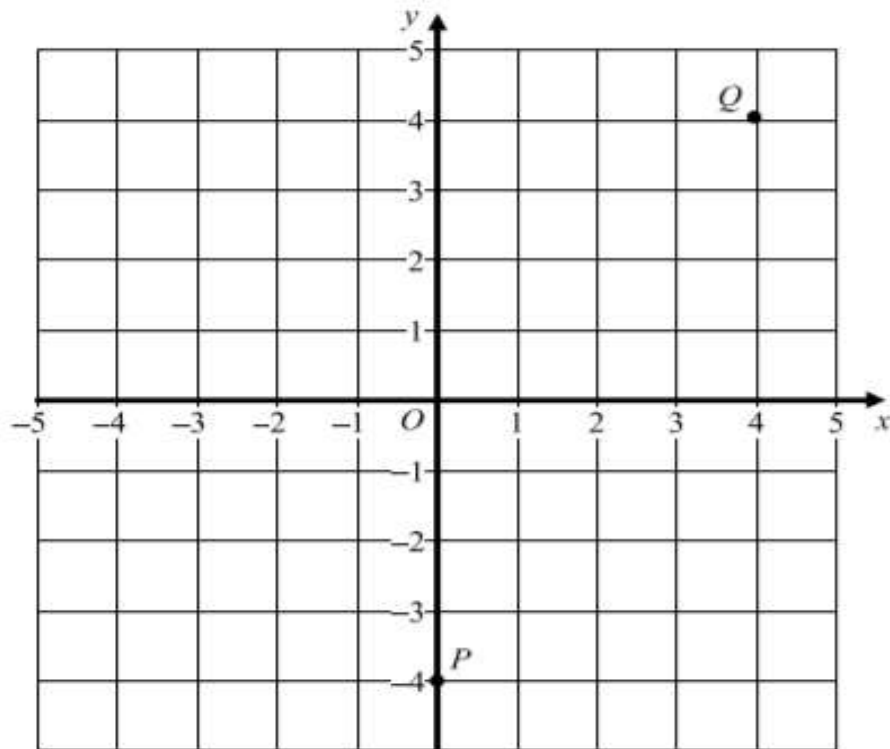
(a) *P* and *Q* are points with coordinates (0, −4) and (4, 4).
Find the equation of the straight line which passes through *P* and *Q*.

....

(4)

(b) On the grid, draw the line with equation $y = -\frac{1}{2}x + 1$

(3)

(Total 7 marks)

Mrs. Abeer Yousrallah (IGCSE Math) 00966563065252

J9 4H

0.5, Y = 0.5x +2, Y = 0.5x + c

12. The straight line, **L**, passes through the points (0, 2) and (2, 3).
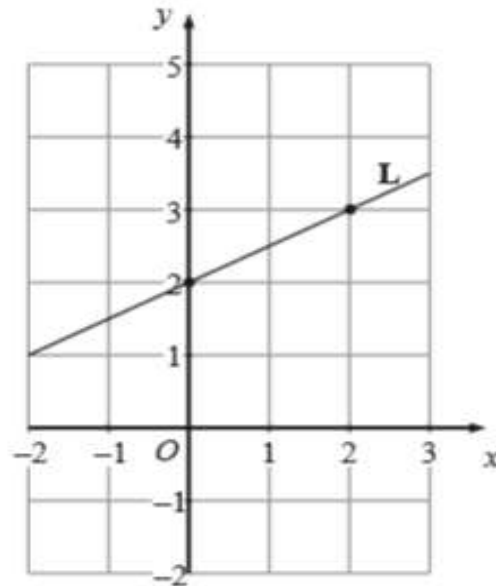
(a) Work out the gradient of **L**.

....

(2)

(b) Find the equation of **L**.

....

(2)

(c) Write down the equation of a line parallel to **L**.

....

(1)

(Total 5 marks)

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N10 4H

$Y = 5 - 2x,\ Y = 6 - 2x$

12. The line **L** cuts the *y*-axis at (0, 5).
    L also passes through the point (2, 1).

    (a) Find the equation of the line **L**.

    ....
    (3)

    (b) Find the equation of the line which is parallel to **L** and which passes through the point (3, 0).

    ....
    (2)

    (Total 5 marks)

N7 4H

-0.5, $Y = 5 - 0.5x$

18. (a) The equation of a line **L** is $x + 2y = 6$
    Find the gradient of **L**.

    ....
    (3)

    (b) Write down the equation of the line which is parallel to **L** and which passes through the point (0, 5).

    ....
    (1)

    (Total 4 marks)

Jan12 4H

5 On the grid, draw the graph of $y = 4x - 1$ from $x = -2$ to $x = 4$

(Total for Question 5 is 4 marks)

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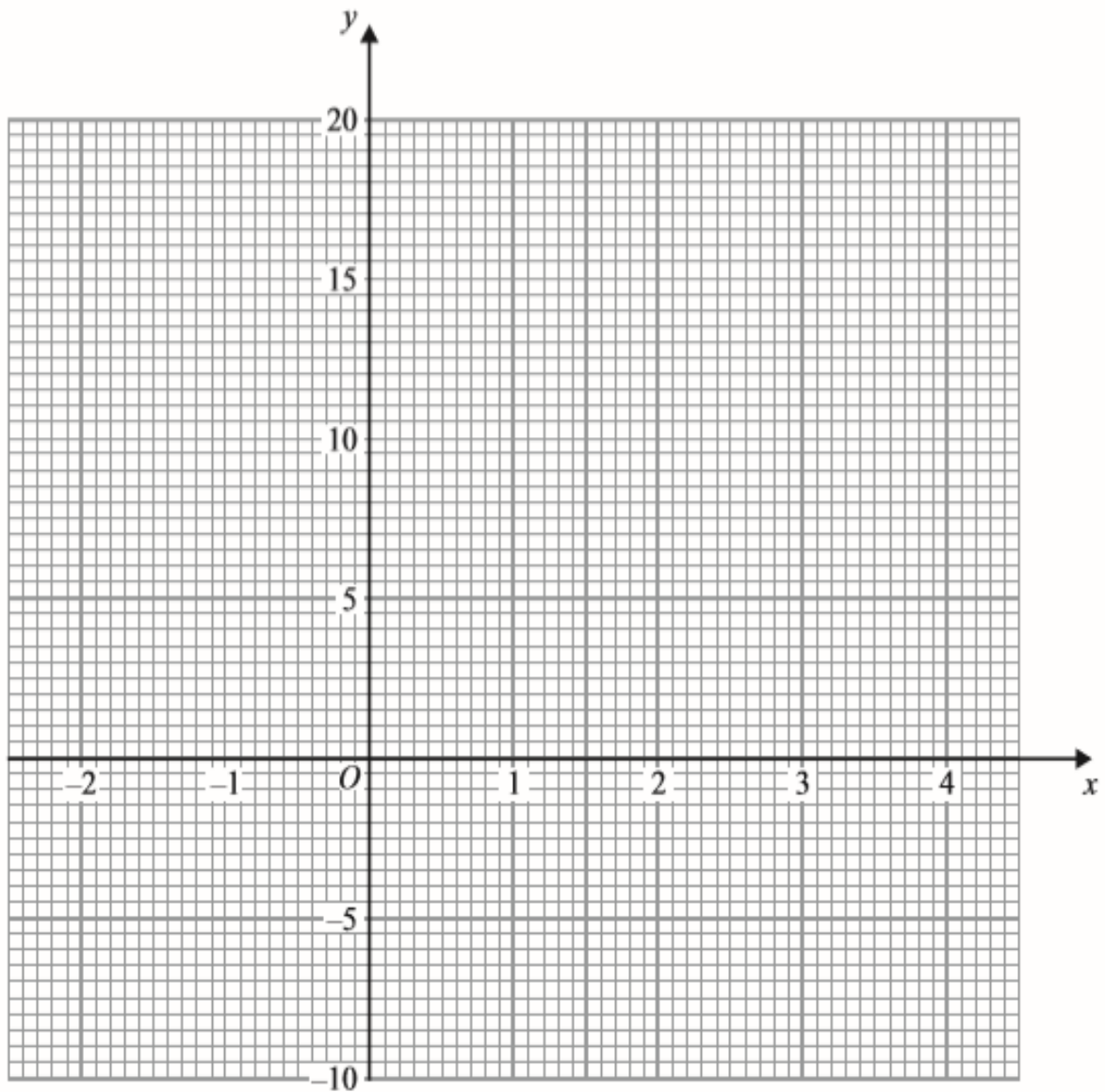
J10 4H

$Y = 4 - 0.5x$

12. (a)
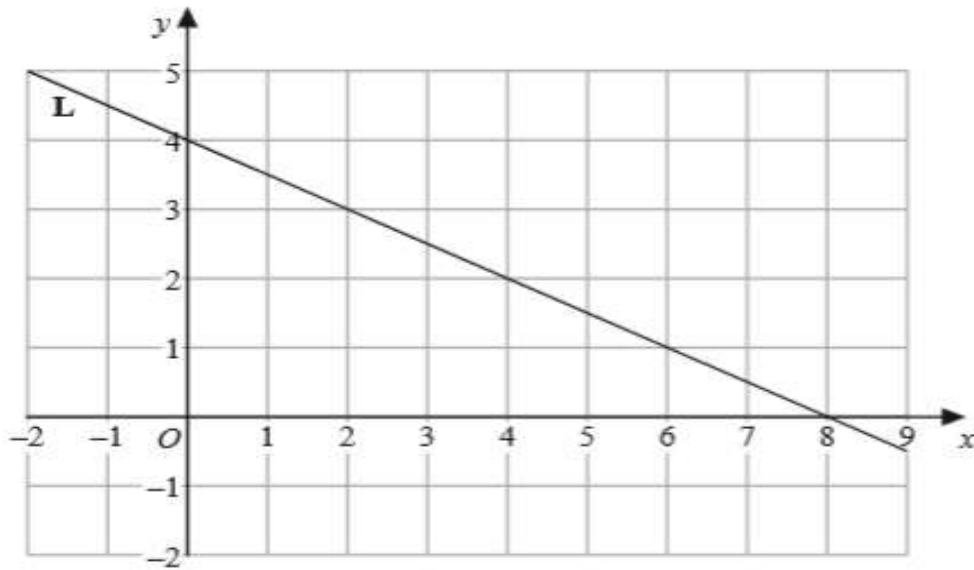
Find the equation of the line   **L.**

....

(3)

Jan16 4H

(3.5, 6.5)

6   *B* is the point with coordinates (1, 4)
    C is the point with coordinates (6, 9)

Find the coordinates of the midpoint of *BC*.

(.................................. , ...)

(Total for Question 6 is 2 marks)

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12

J14 4H

13 The line **L** passes through the points $(0, -2)$ and $(6, 1)$

(a) Find an equation of the line **L**.

....

(3)

(b) Find an equation of the line that is parallel to **L** and which passes through the point $(4, -2)$

....

(2)

(Total for Question 13 is 5 marks)

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J8 4H

$$0.5, Y = 0.5x + 1$$

14. A line **L** passes through the points $(0, 1)$ and $(4, 3)$.
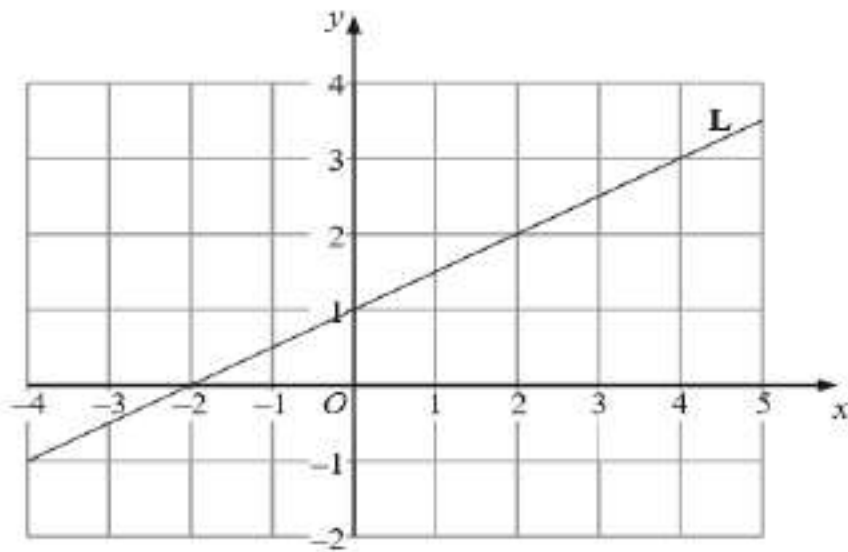
(a) (i) Find the gradient of the line **L**.

....

(ii) Find the equation of the line **L**.

....

(4)

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Jan15 3H

$\underline{2}$, y = -3x + 11
3

10 (a) Find the gradient of the line with equation $3y - 2x = 6$

....

(2)

(b) Find an equation of the line with gradient -3 that passes through the point $(2, 5)$.

....

(2)

(Total for Question 10 is 4 marks)

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Jan15 4H

4 On the grid, draw the graph of $y = 3x - 4$ for values of x from -2 to 3
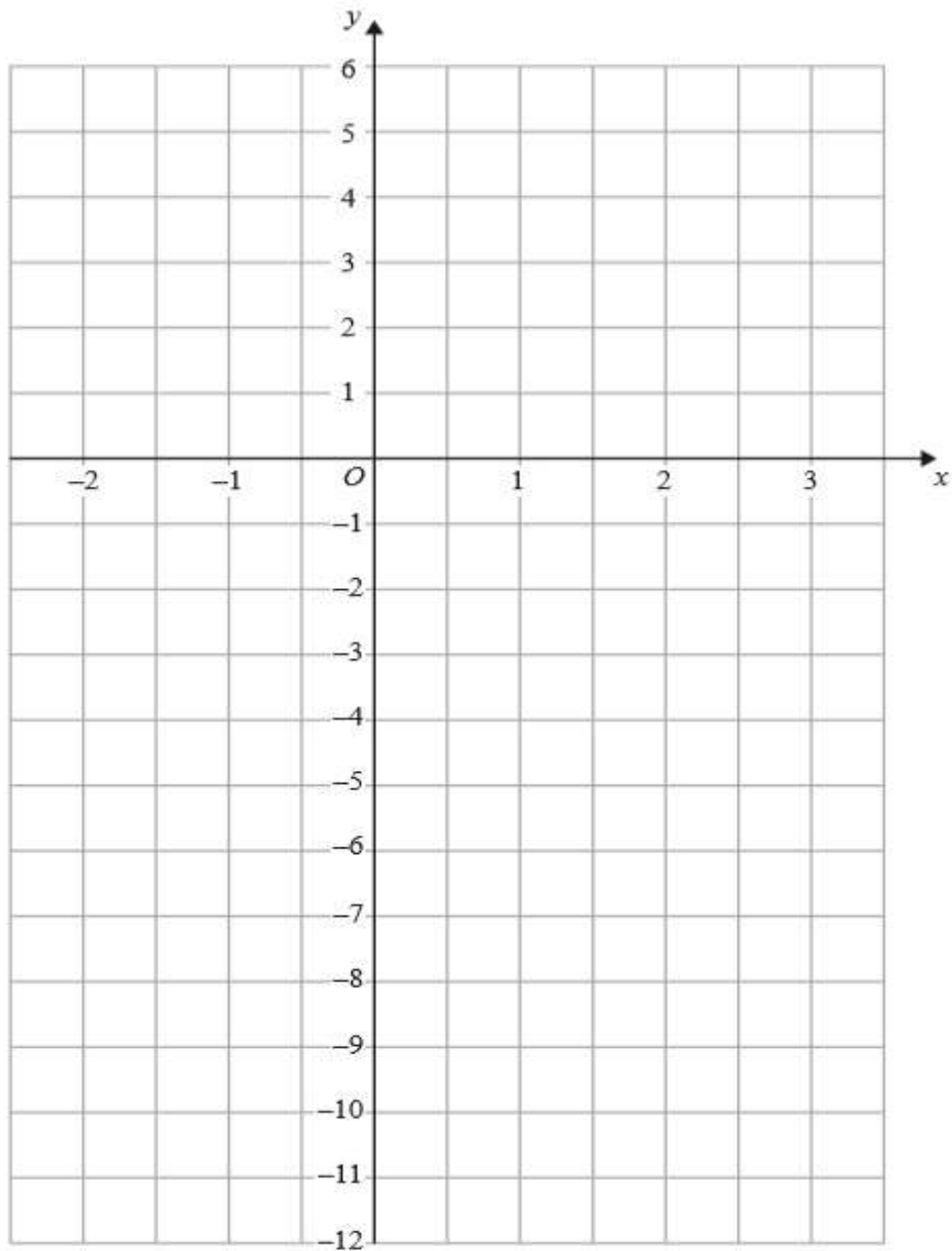
(Total for Question 4 is 4 marks)

J16 3H

$4y - 3x = -19$

13 The straight line L passes through the points $(-2, 3)$ and $(6, 9)$

Find an equation of the line that is parallel to L and passes through the point $(5, -1)$
Give your answer in the form $ax + by = c$ where a, b and c are integers.

(Total for Question 13 is 5 marks)

Jan16 3H

18 A is the point with coordinates $(1, 3)$
    B is the point with coordinates $(-2, -1)$

The line **L** has equation $3y = 4 - 2x$

Is line **L** parallel to AB?
Show your working clearly.

(Total for Question 18 is 3 marks)

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Linear Programming

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N10 4H

$$X \geq 1, y \geq 2, x + y \leq 8$$

9.
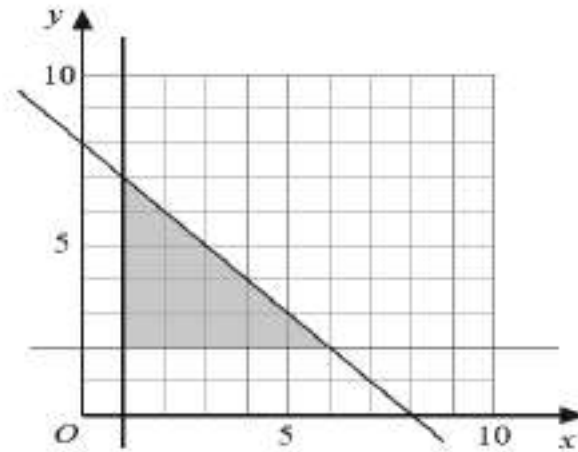
Write down the 3 inequalities that define the shaded region.

....

....

....

(Total 3 marks)

J8 4H

$$X \leq 4, y \geq -1, y \leq 0.5x + 1$$

(b)
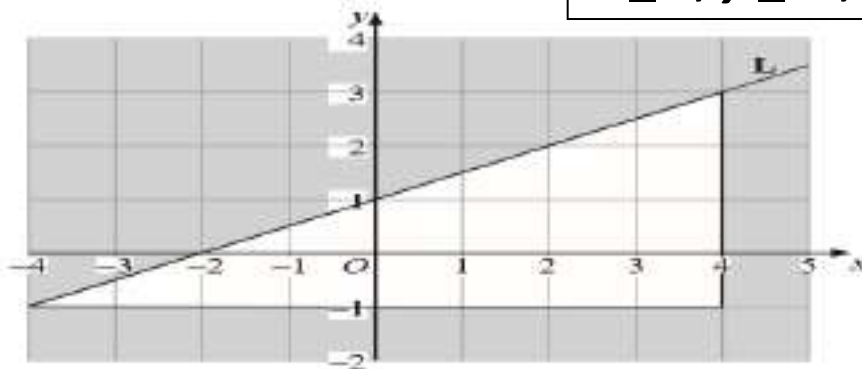
Write down the three inequalities that define the **unshaded** region.

....

....

....

(3)

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J10 4H

$Y \geq x, x \geq -1, y \leq 4 - 0.5x$

(b) Find the three inequalites that define the **unshaded** region shown in the diagram below.

....

....

....

(3)

J13 3H

15
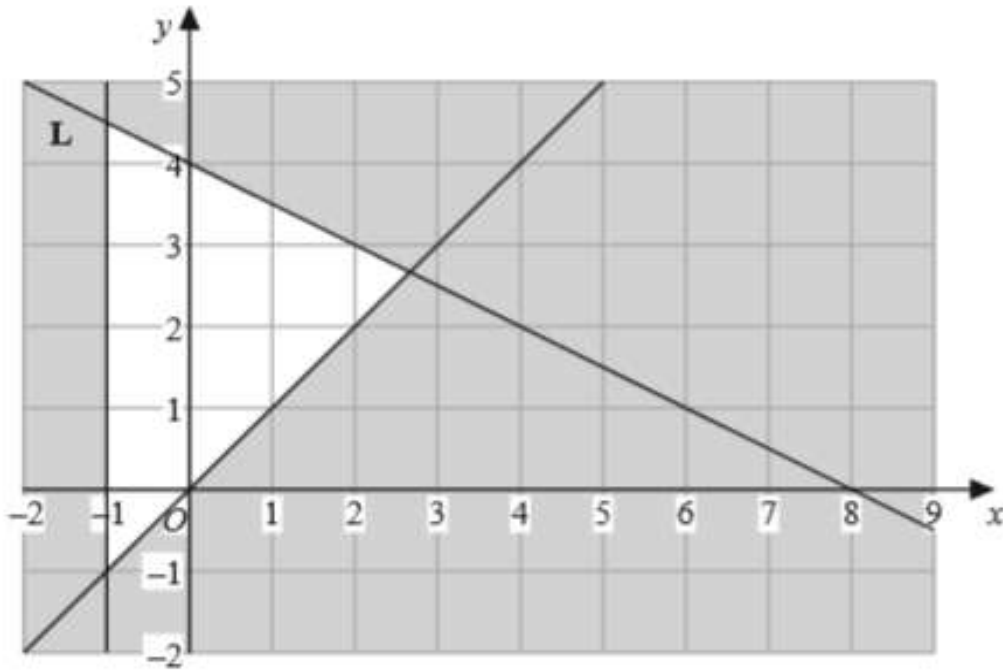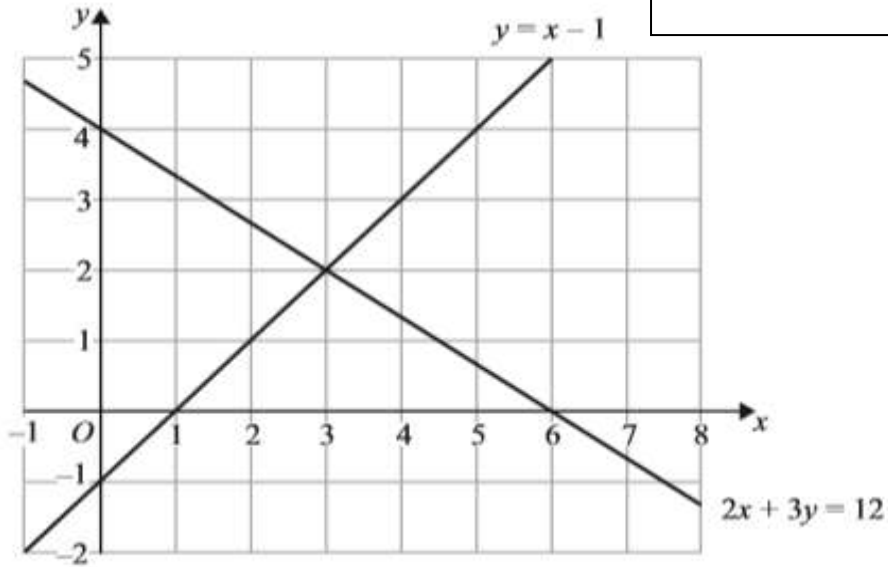
The diagram shows two straight lines.
The equations of the lines are $y = x - 1$ and $2x + 3y = 12$

(a) Write down the solution of the simultaneous equations

$$y = x - 1$$
$$2x + 3y = 12$$

x = ... , y = ...

(1)

(b) Find an equation of the line which is parallel to the line with equation $2x + 3y = 12$
and passes through the point (0, 10)

....

(4)

(c) On the grid, mark with a cross (×) each point which satisfies both these inequalities
$y > x - 1$ and $2x + 3y < 12$ and whose coordinates are **positive integers**.

(2)

(Total for Question 15 is 7 marks)

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J7 3H

13. Show, by shading on the grid, the region which satisfies all three of these inequalities.

$$y \leqslant 5 \qquad y \leqslant 2x \qquad y \geqslant x + 1$$

Label your region **R**.

(Total 4 marks)

23
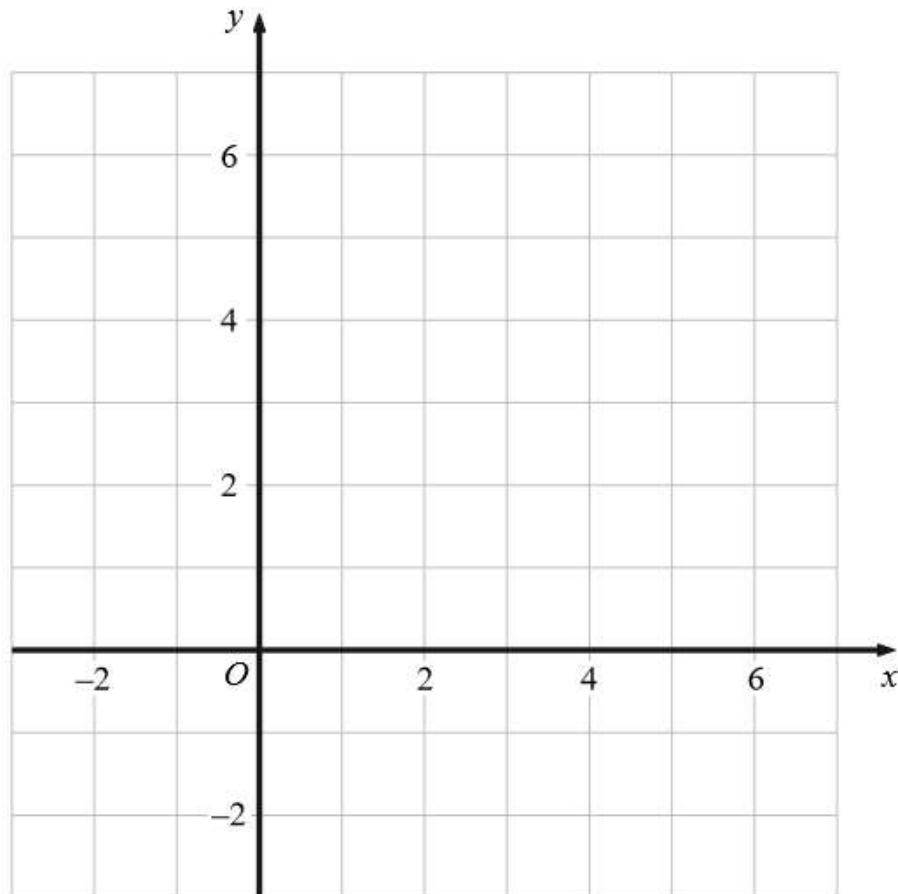
J12 3H

6 Show, by shading on the grid, the region defined by all three of the inequalities

$x \leqslant 5$

$y \geqslant 3$

$y \leqslant x$

Label your region **R**.
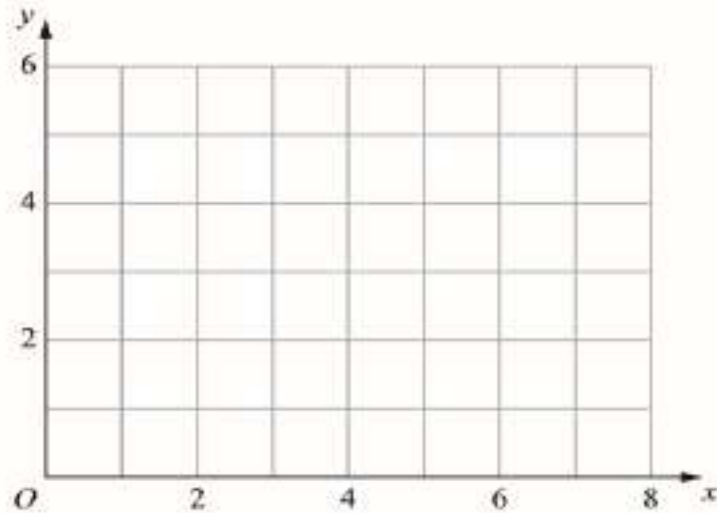
(Total for Question 6 is 3 marks)

N9 4H

(b) On the grid, show by shading the region which satisfies the inequalities

$3 \leqslant x \leqslant 6$

and

$2 \leqslant y \leqslant 4$

Label your region **R**.
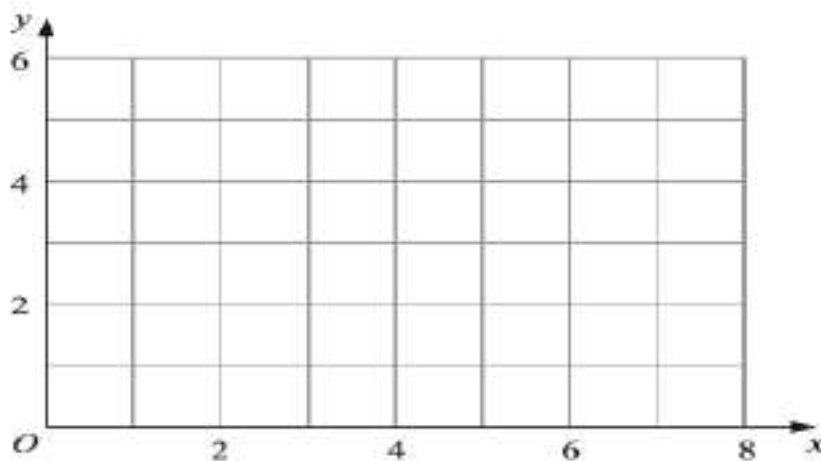
(3)

N9 4H

9. (a) On the grid, draw the graph of $2x - 3y = 6$ from $x = 0$ to $x = 9$
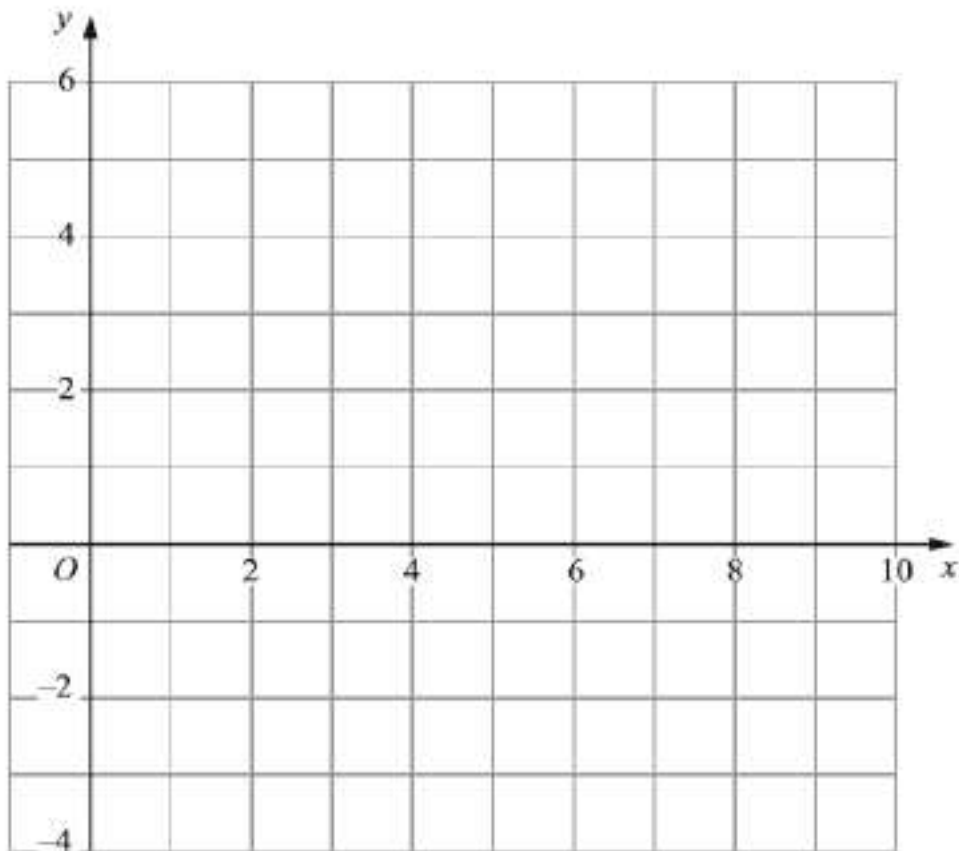
(2)

Jan16 3H

10 (a) On the grid, draw the graph of $y = 2x + 3$ for values of x from -2 to 4
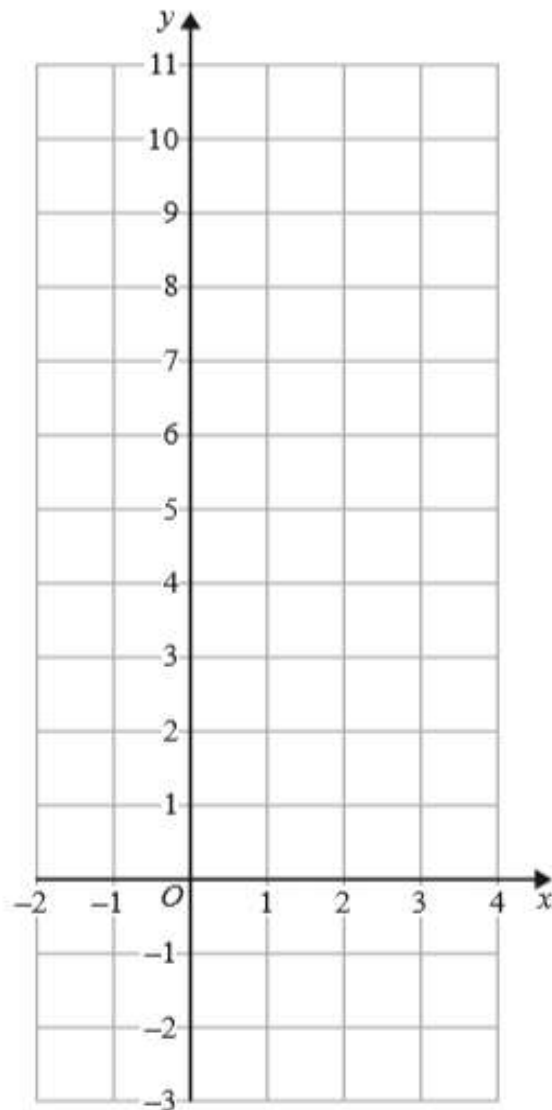
(3)

(b) Show, by shading on the grid, the region that satisfies **all three** of the inequalities

$$x \leqslant 3 \quad \text{and} \quad y \geqslant 2 \quad \text{and} \quad y \leqslant 2x + 3$$

Label your region **R**.

(2)

(Total for Question 10 is 5 marks)

J15 4HR

$$Y = -0.6 x + 3$$

12 The straight line **L** is shown on the grid.
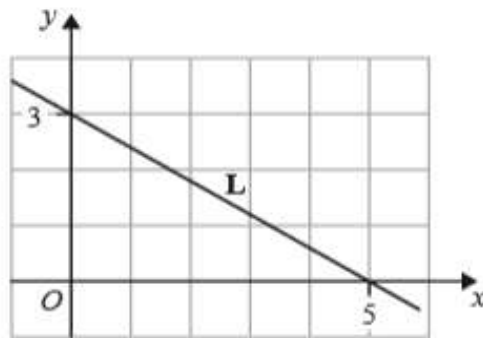
Find an equation of **L**.

....

(Total for Question 12 is 3 marks)

Functions

J5 4H

$$-11, 4, 4, x < 0, y = (x - 1)^2$$

13. f and g are functions.

$$f : x \mapsto 2x - 3$$
$$g : x \mapsto 1 + \sqrt{x}$$

(a) Calculate f (−4)

....

(2)

(b) Given that f (a) = 5, find the value of a.

a = ...

(2)

(c) Calculate gf (6)

....

(2)

(d) Which values of x cannot be included in the domain of g?

....

(1)

(e) Find the inverse function g^{-1} in the form $g^{-1} : x \mapsto \ldots$

....

(3)

(Total 10 marks)

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J7 4H

-2, x < 1, 0.2, y = x^2 +1

17. The functions f and g are defined as follows.

$$f(x) = \frac{1}{x+2}$$

$$g(x) = \sqrt{x-1}$$

(a) (i) State which value of x cannot be included in the domain of f.

....

(ii) State which **values** of x cannot be included in the domain of g.

....

(3)

(b) Calculate fg(10)

....

(3)

(c) Express the inverse function g^{-1} in the form g^{-1}(x) = ...

....

(4)

(Total 10 marks)

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N8 4H

$$1, \ -3, \ 7, \ \frac{(\ 2x + 7 \ )}{(\ x + 3 \ )}$$
$$5$$

21. The function f is defined as

$$f(x) = \frac{1}{x+3}$$

(a) Find the value of f(2)

....

(1)

(b) State which value(s) of x must be excluded from the domain of f.

....

(1)

(c) Given that $f(a) = \frac{1}{10}$, find the value of a.

$a =$ ....

(1)

(d) The function g is defined as

$$g(x) = x + 2$$

Express the function gf in the form $gf(x) = \ldots$
Give your answer as a single algebraic fraction in its simplest form.

$gf(x) =$ ....

(2)

(Total 5 marks)

J10 4H

49, y ≥ 36, 6, $\dfrac{x}{x-1}$, x

20. $f(x) = (x - 1)^2$

(a) Find f(8)

....

(1)

(b) The domain of f is all values of $\quad x$ where $x \geqslant 7$
Find the range of f.

....

(2)

$$g(x) = \frac{x}{x - 1}$$

(c) Solve the equation g($\quad x$) = 1.2

....

(2)

(d) (i) Express the inverse function g $\quad ^{-1}$ in the form $g^{-1}(x) =$ ....

$g^{-1}(x) =$ ....

(ii) Hence write down gg($\quad x$) in terms of x.

$gg(x) =$ ....

(6)

(Total 11 marks)

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J11 4H

20   $f(x) = \dfrac{2}{x}$

$g(x) = \dfrac{x+1}{x}$

$X = 0, 4, \underline{1}$

$x - 1$

(a) State which value of x cannot be included in the domain of f or g.

....
(1)

(b) Solve $gf(a) = 3$

$a =$ ....
(3)

(c) Express the inverse function g^{-1} in the form $g^{-1}(x)$

$g^{-1}(x) =$ ....
(3)

(Total for Question 20 is 7 marks)

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Jan14 3H

11, $\dfrac{x-5}{2}$**,** $4x^2 + 20x$**,** $x = -5$**,** $x = 0$

20 f is the function $f(x) = 2x + 5$

(a) Find f(3)

....
(1)

(b) Express the inverse function f^{-1} in the form $f^{-1}(x) =$

$f^{-1}(x) =$ ....
(2)

g is the function $g(x) = x^2 - 25$

(c) Find g(−3)

....
(1)

(d) (i) Find gf(x)
        Give your answer as simply as possible.

$gf(x) =$ ....

(ii) Solve gf(x) = 0

....
(5)

(Total for Question 20 is 9 marks)

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34

N6 3H

17. The function f is defined as $f(x) = \dfrac{x}{x-1}$.

    (a) Find the value of

        (i) f(3),

        ....

        (ii) f(–3).

        ....

        (2)

    (b) State which value(s) of *x* must be excluded from the domain of f.

        ....

        (1)

    (c) (i) Find ff(*x*).
             Give your answer in its most simple form.

        ff(*x*) = ...

        (ii) What does your answer to (c)(i) show about the function f?

        ....

        ....

        (4)

        (Total 7 marks)

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N7 4H

$$6x - 13, \ \frac{x-2}{3}$$

23. $f : x \longmapsto 3x + 2$ $g : x \longmapsto 2x - 5$

(a) Express the composite function fg in the form $fg : x \longmapsto ...$
Give your answer as simply as possible.

fg $: x \longmapsto$ ....

(2)

(b) Express the inverse function f^{-1} in the form $f^{-1} : x \longmapsto ...$

$f^{-1} : x \longmapsto$ ....

(2)

(Total 4 marks)

N9 3H

$x^2 - 3, x + 3, x = 3 \ x = 2$

24.

$$f(x) = x^2$$
$$g(x) = x - 3$$

(a) (i) Find gf(x)

....

(ii) Find $g^{-1}(x)$

....
(2)

(b) Solve the equation $gf(x) = g^{-1}(x)$

....
(3)

(Total 5 marks)

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J12 4H

19        $f(x) = 3x - 2$

$g(x) = \dfrac{10}{x+2}$

(a) Express the inverse function f^{-1} in the form $f^{-1}(x) = ...$

$f^{-1}(x) = $ ....

(2)

(b) Find gf(x)
   Simplify your answer.

gf(x) = ...

(2)

(Total for Question 19 is 4 marks)

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N10 3H

$$Y = \frac{(x - 1)}{2}, \quad x = -1$$

21. (a) $f(x) = 2x + 1$

Express the inverse function f^{-1} in the form $f^{-1}(x) = \dots$

$f^{-1}(x) = \dots\dots\dots\dots\dots\dots\dots$

(2)

(b) $g(x) = 2 + x$
$h(x) = x^2$

Solve the equation $hg(x) = h(x)$.

$x = \dots\dots\dots\dots\dots\dots\dots$

(3)

(Total 5 marks)

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J16 4H

7, 0.5(x + 5), x = 1, 4

17 f is the function such that $f(x) = 2x - 5$

g is the function such that $g(x) = x^2 - 10$

(a) Find f(4)

(1)

(b) Find fg(−4)

(2)

(c) Express the inverse function f^{-1} in the form $f^{-1}(x) = ...$

$f^{-1}(x) =$ ....

(2)

(d) Solve gf(x) = −1

(4)

(Total for Question 17 is 9 marks)

Jan15 3H

20 $f : x \longmapsto 2x^2 + 1$ $g : x \longmapsto \dfrac{2x}{x-1}$ where $x \neq 1$

$$(2x^2 + 1), \frac{x}{x+2}$$
$$X^2$$

(a) Express the composite function gf in the form $gf : x \longmapsto \ldots$
Give your answer as simply as possible.

$gf : x \longmapsto$ ....

(2)

(b) Express the inverse function g^{-1} in the form $g^{-1} : x \longmapsto \ldots$

$g^{-1} : x \longmapsto$ ....

(3)

(Total for Question 20 is 5 marks)

Jan15 3HR

-1, 2.5, x + 4, 5 x
3   2x+3 2x-1

21 The functions g and h are defined as

$$g(x) = \frac{x}{2x - 5}$$

$$h(x) = x + 4$$

(a) Find the value of g(1)

....

(1)

(b) State which value of x must be excluded from any domain of g

....

(1)

(c) Find gh(x)
Simplify your answer.

gh(x) = ...

(2)

(d) Express the inverse function g⁻¹ in the form g⁻¹(x) =...

g⁻¹(x) = ...

(3)

(Total for Question 21 is 7 marks)

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Graphs of Functions

N7 4H

7, 2, -2, -1, 2 , 7

10. (a) Complete the table of values for $y = x^2 - 2$

x	-3	-2	-1	0	1	2	3
y			-1				

(2)

(b) On the grid, draw the graph of $y = x^2 - 2$

(2)

(Total 4 marks)
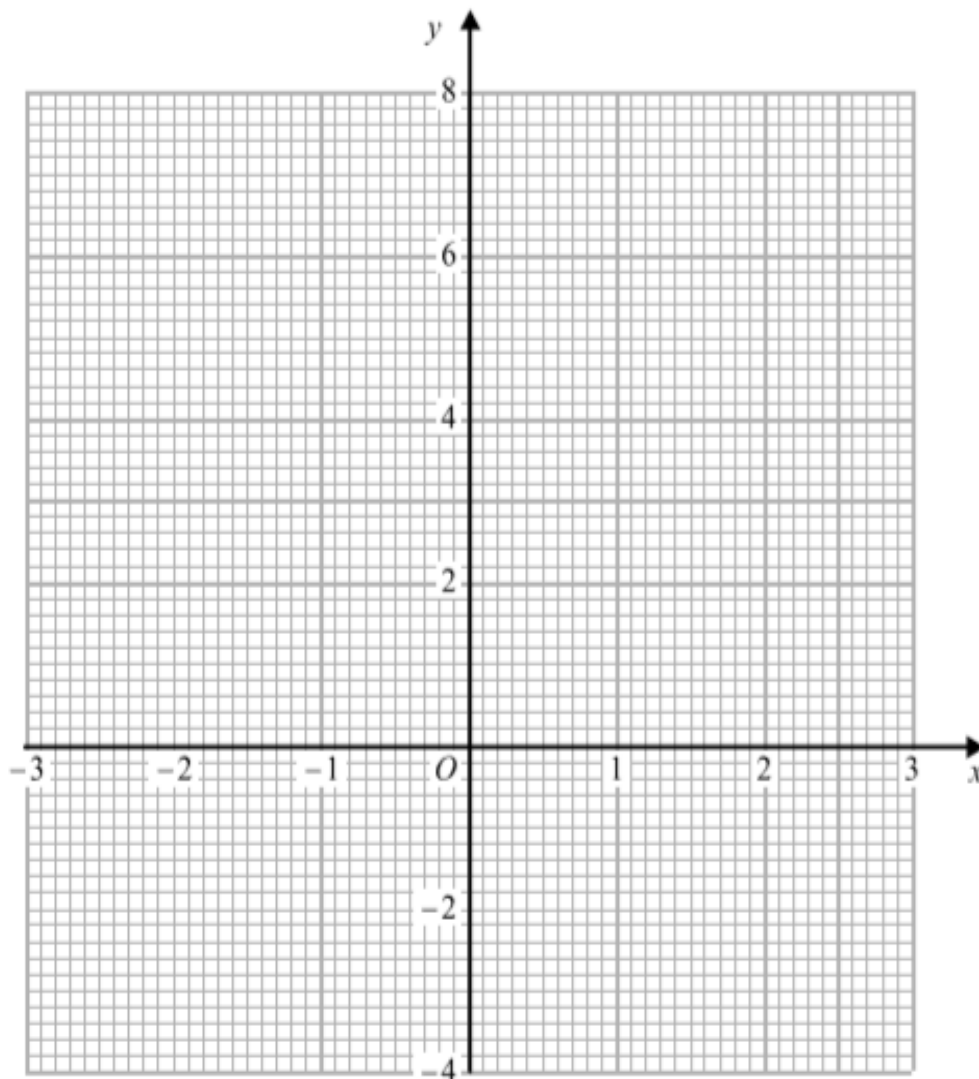
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N9 4H

14. (a) Complete the table of values for $y = x^3 - 3x^2 + 12$

x	-2	-1	0	1	2	3
y		8				

(2)

(b) On the grid, draw the graph of $y = x^3 - 3x^2 + 12$

(2)

(Total 4 marks)

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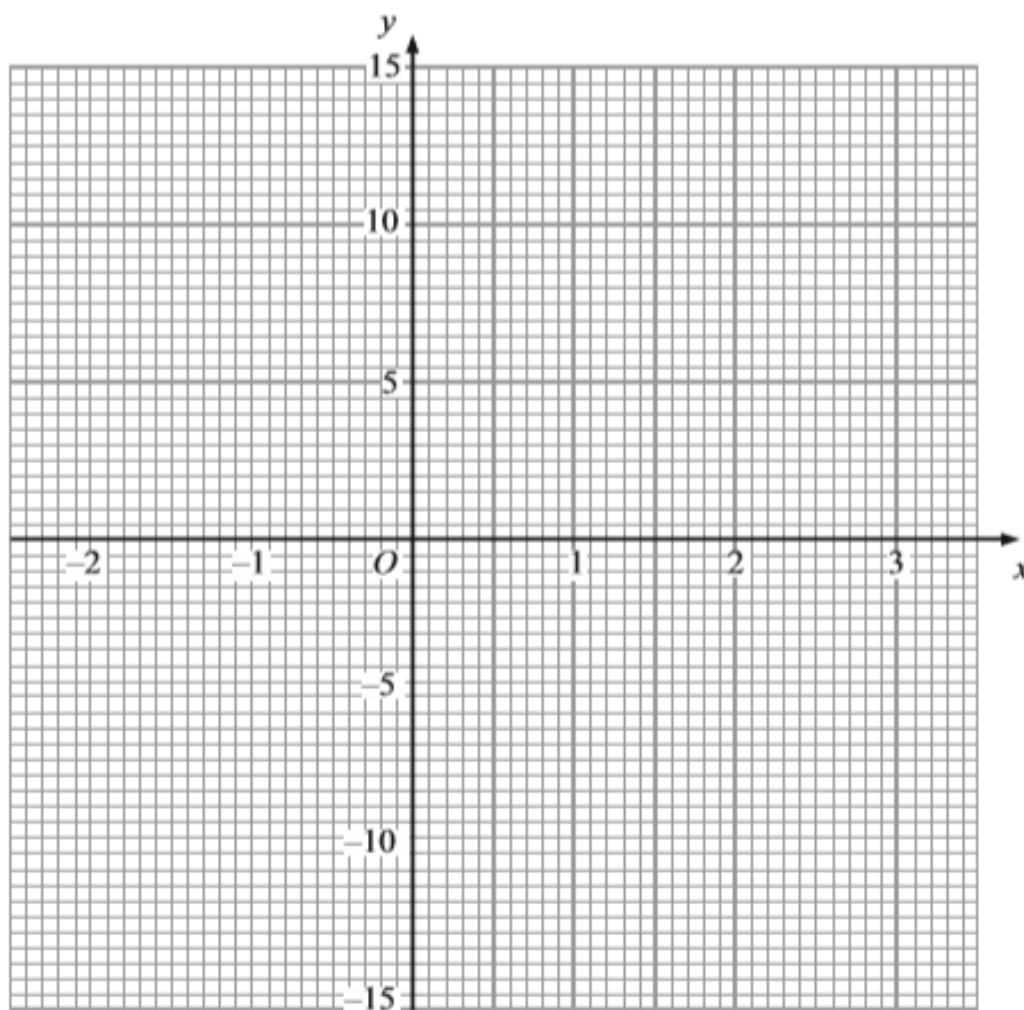
N8 3H

13. (a) Complete the table of values for $y = x + \dfrac{1}{x^2}$

x	0.5	1	1.5	2	3	4	5
y		2		2.3			5.0

(2)

(b) On the grid, draw the graph of $y = x + \dfrac{1}{x^2}$ for $0.5 \leqslant x \leqslant 5$
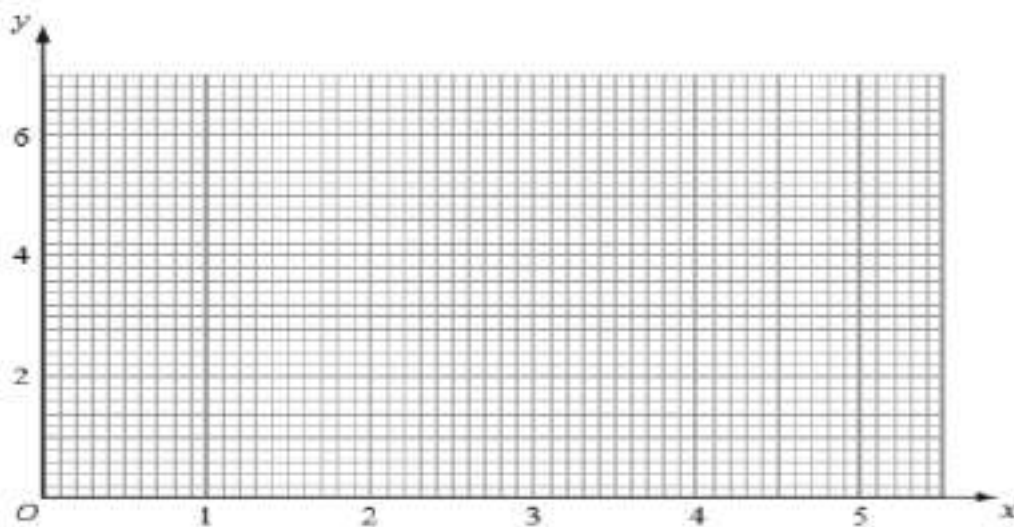
(2)

(c) $x = 1$ is a solution of the equation $x + \dfrac{1}{x^2} = k$ where k is a number.

(i) Find the value of k.

$k =$ ....

(ii) Use your graph to find an estimate for another solution of the equation

$$x + \frac{1}{x^2} = k$$

Give your estimate correct to 1 decimal place.

$x =$ ....

(2)

(Total 6 marks)

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N6 4H

0.25, 2.5, 8, 15.25

18. (a) Complete the table of values for $y = x^2 - \dfrac{3}{x}$

x	0.5	1	1.5	2	3	4	5
y	−5.75	−2					24.4

(2)

(b) On the grid, draw the graph of $y = x^2 - \dfrac{3}{x}$ for $0.5 \leqslant x \leqslant 5$

(2)

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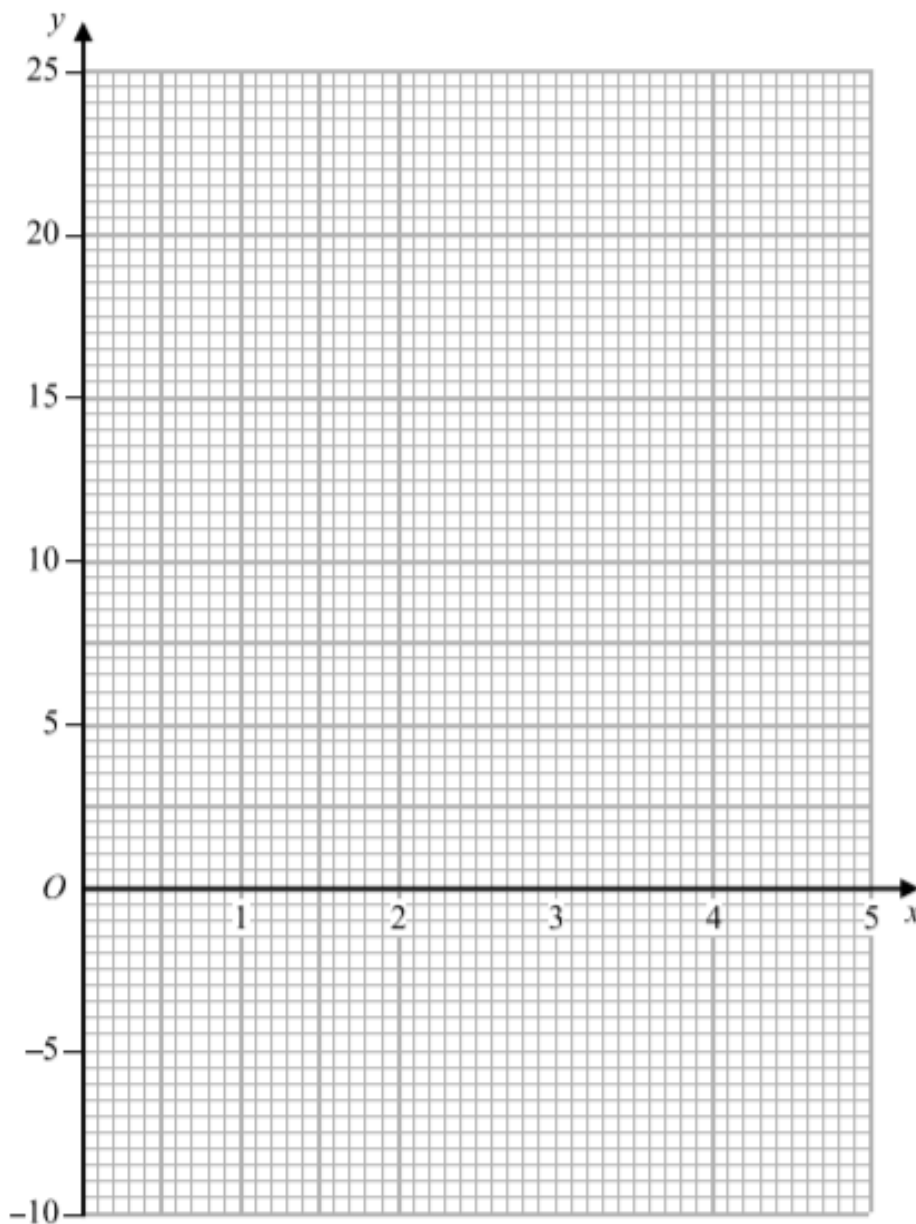
N6 4H

(c) Use your graph to find an estimate for a solution of the equation

$$x^2 - \frac{3}{x} = 0$$

x = ...

(1)

(d) Draw a suitable straight line on your graph to find an estimate for a solution of the equation

$$x^2 - 2x - \frac{3}{x} = 0$$

x = ...

(2)

(Total 7 marks)

N10 3H

0.2 – 0.3, 3.7 – 3.8

14. The diagram shows the graph of $y = x^2 - 4x + 3$ for $-1 \leqslant x \leqslant 5$
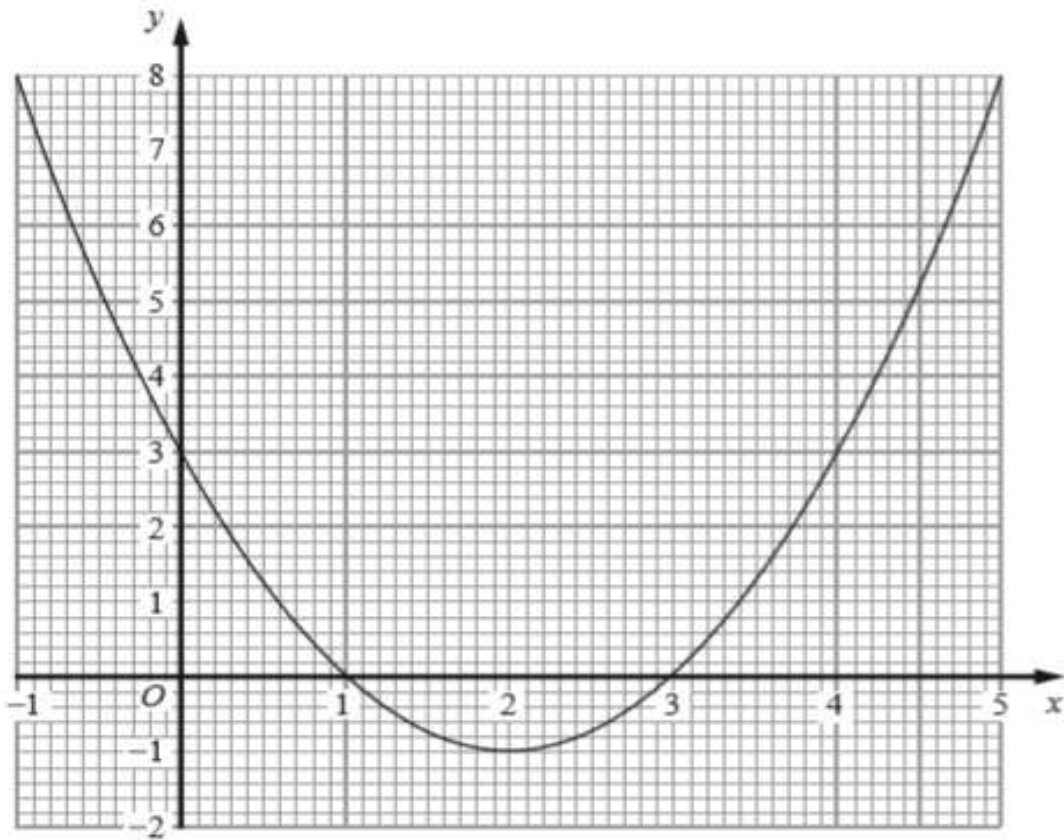
(a) Use the graph to solve the equation $x^2 - 4x + 3 = 2$

....

(2)

(b) By drawing a suitable straight line on the diagram,
solve the equation $x^2 - 4x + 3 = x + 1$

....

(3)

(Total 5 marks)

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49

J8 3H

2.5 – 6.5, -1.7, 12, 4

21. The diagram shows part of the graph of $y = f(x)$.
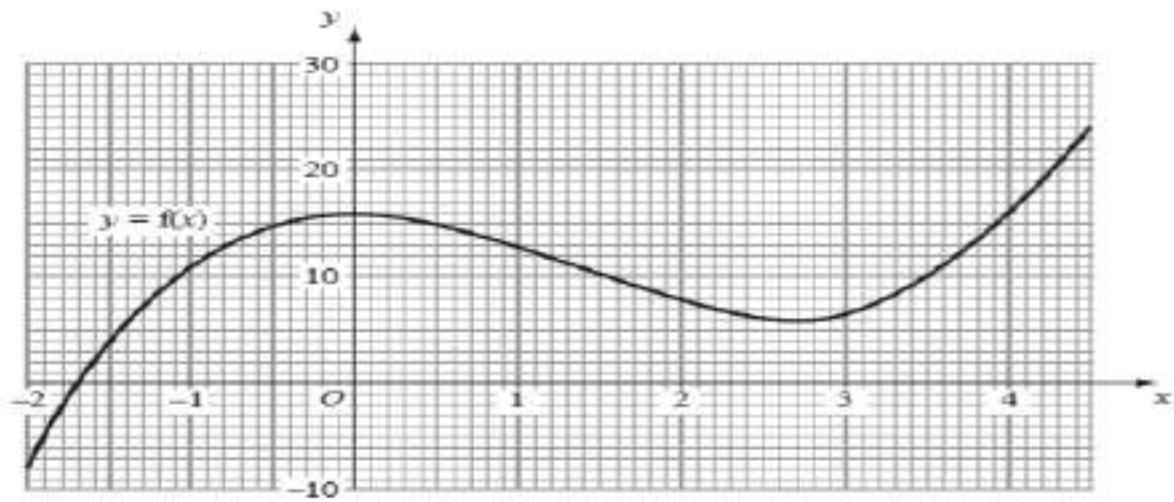
(a) Calculate an estimate for the gradient of the curve at the point where $x = 3$

(3)

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(b) Find an estimate for the solution of the equation $f(x) = 0$

$x = $ ....

(1)

The equation $f(x) = mx + c$ where m and c are numbers, has three solutions.
Two of the solutions are $x = -1$ and $x = 1$

(c) (i)   Find the value of c.

$c = $ ....

(ii) Find the third solution of the equation $f(x) = mx + c$.

$x = $ ....

(4)

(Total 8 marks)

J5 3H

20. Part of the graph of $y = x^3 - 7x + 9$ is shown on the grid.
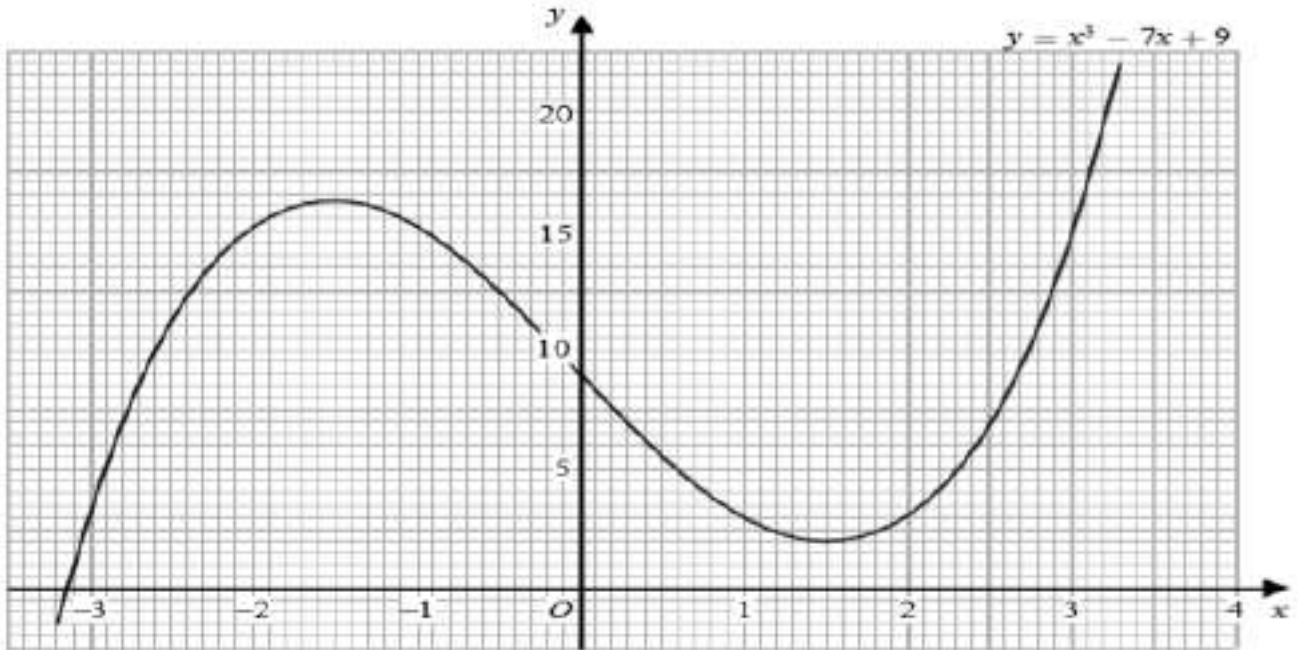
The graph of $y = x^3 - 7x + 9$ and the line with equation $y = k$, where k is an integer, have 3 points of intersection.

(a) Find the greatest possible value of the integer k.

$k = $ ....

(1)

(b) By drawing a suitable straight line on the grid, find estimates of the solutions of the equation $x^3 - 6x - 2 = 0$.
Give your answers correct to 1 decimal place.

....

(3)

(Total 4 marks)

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Jan 12 4H

17 $f(x) = \sqrt{x-6}$

(a) Find f(10)

....
(1)

(b) State which values of *x* must be excluded from a domain of f

....
(2)

The diagram shows part of the graph of $y = g(x)$
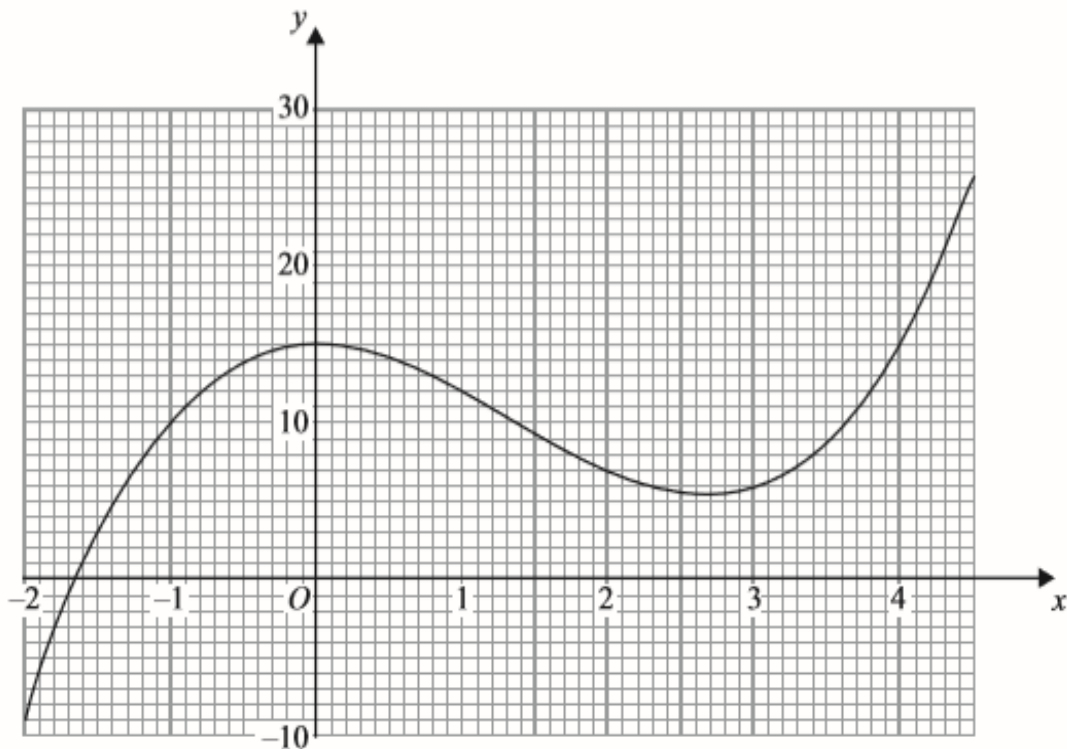
(c) Find g(2)

....
(1)

Jan12 4H

3, 3.8, -0.7 or -0.8, 6.5 - 11

(d) Find fg(0)

....

(2)

(e) One of the solutions of g(x) = k, where k is a number, is x = 1

Find the other solutions.
Give your answers correct to 1 decimal place.

....

(3)

(f) Find an estimate for the gradient of the curve at the point where x = 3.5
Show your working clearly.

....

(3)

(Total for Question 17 is 12 marks)

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J9 3H

15. The diagram shows part of the graph of $y = f(x)$ and part of the graph of $y = g(x)$.
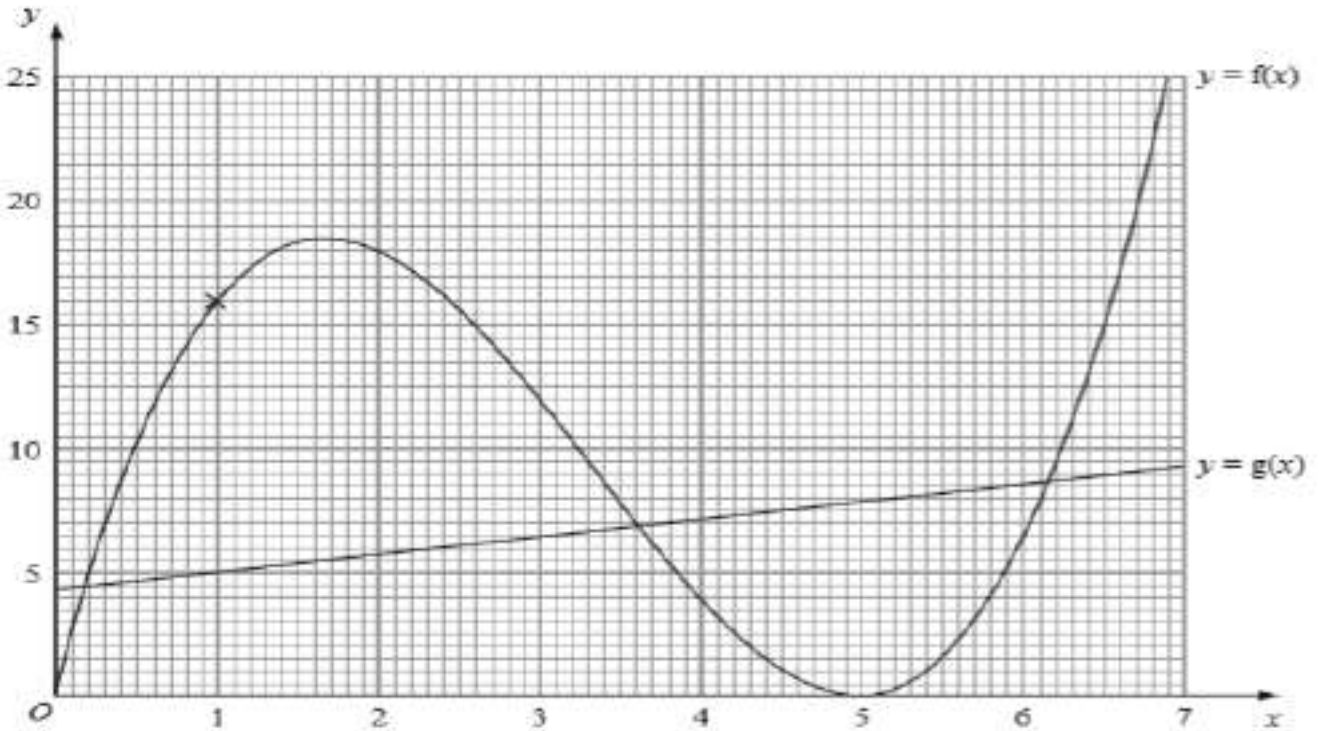
(a) Find f(3).

....

(1)

(b) Solve $f(x) = g(x)$.
Give your answers correct to 1 decimal place.

....

(2)

(c) Find fg(1).

....

(2)

(d) Find an estimate for the gradient of the graph of $y = f(x)$ at the point (1, 16).

....

(3)

(Total 8 marks)

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J16 4H

7, -1, 2, 7

7 (a) Complete the table of values for $y = x^2 - 4x + 2$

x	−1	0	1	2	3	4	5
y		2		−2	−1		

(2)

(b) On the grid, draw the graph of $y = x^2 - 4x + 2$ for all values of x from −1 to 5

(2)

(Total for Question 7 is 4 marks)

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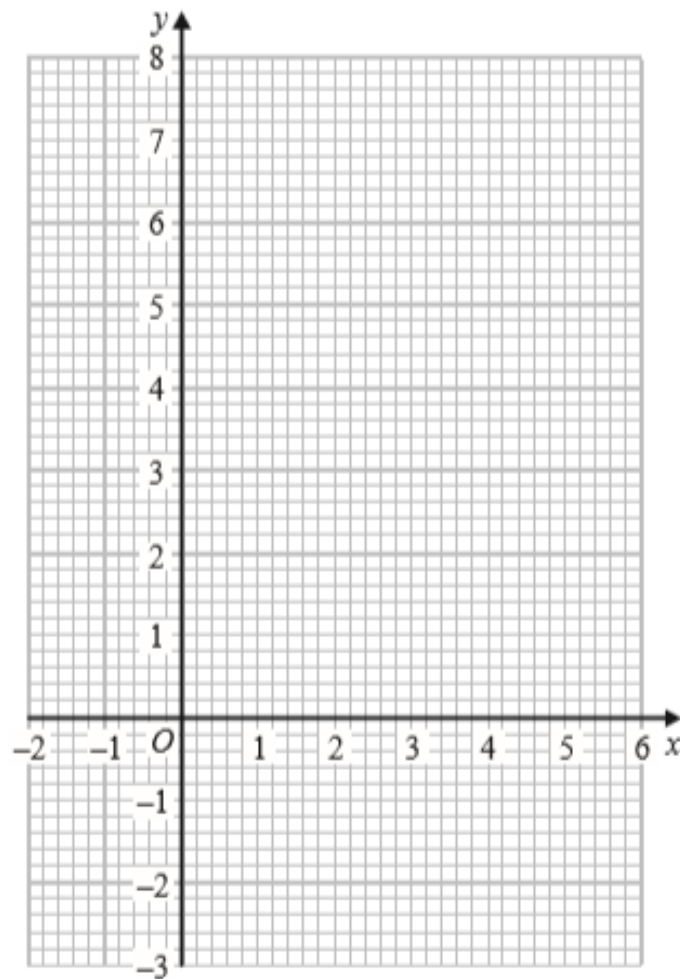
Jan15 4H

-1 3, -7 6

15 Here is the graph of $y = x^2 - 2x - 1$
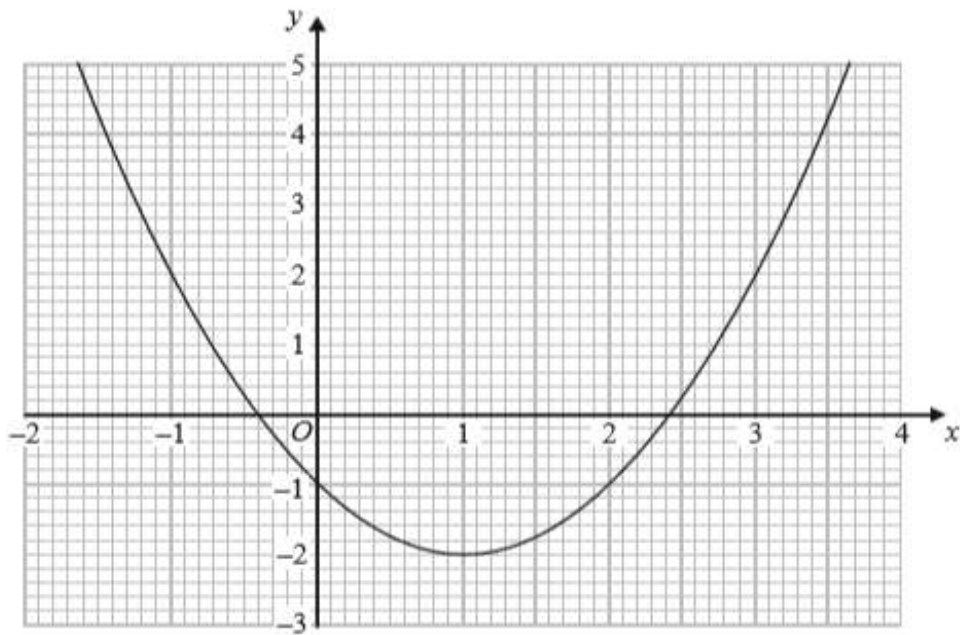
(a) Use the graph to solve the equation $x^2 - 2x - 1 = 2$

....

(2)

The equation $x^2 + 5x - 7 = 0$ can be solved by finding the points of intersection of the line $y = ax + b$ with the graph of $y = x^2 - 2x - 1$

(b) Find the value of a and the value of b.

$a =$ ....

$b =$ ....

(2)

(Total for Question 15 is 4 marks)

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J15 3HR

2, -2, -1

20 The diagram shows parts of the graphs of $y = f(x)$ and $y = g(x)$.
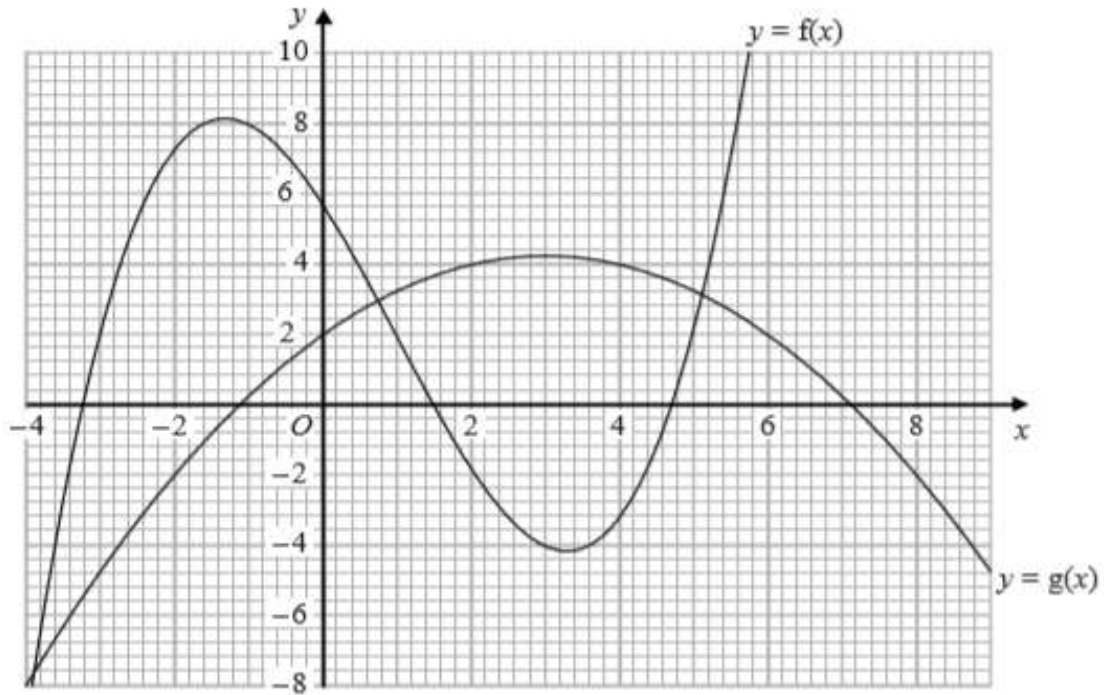
(a) Find g(0)

....

(1)

(b) Find gf(−1)

....

(2)

(c) Calculate an estimate for the gradient of the curve $y = f(x)$ at the point on the curve where $x = 3$

....

(3)

(Total for Question 20 is 6 marks)

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J15 4HR

1, 5, 21

15 (a) Complete the table of values for $y = x^3 - 3x^2 + 5$

x	-2	-1	0	1	2	3	4
y	-15	1	5	3			

(1)

(b) On the grid, complete the graph of $y = x^3 - 3x^2 + 5$ for $-2 \leqslant x \leqslant 4$

(1)

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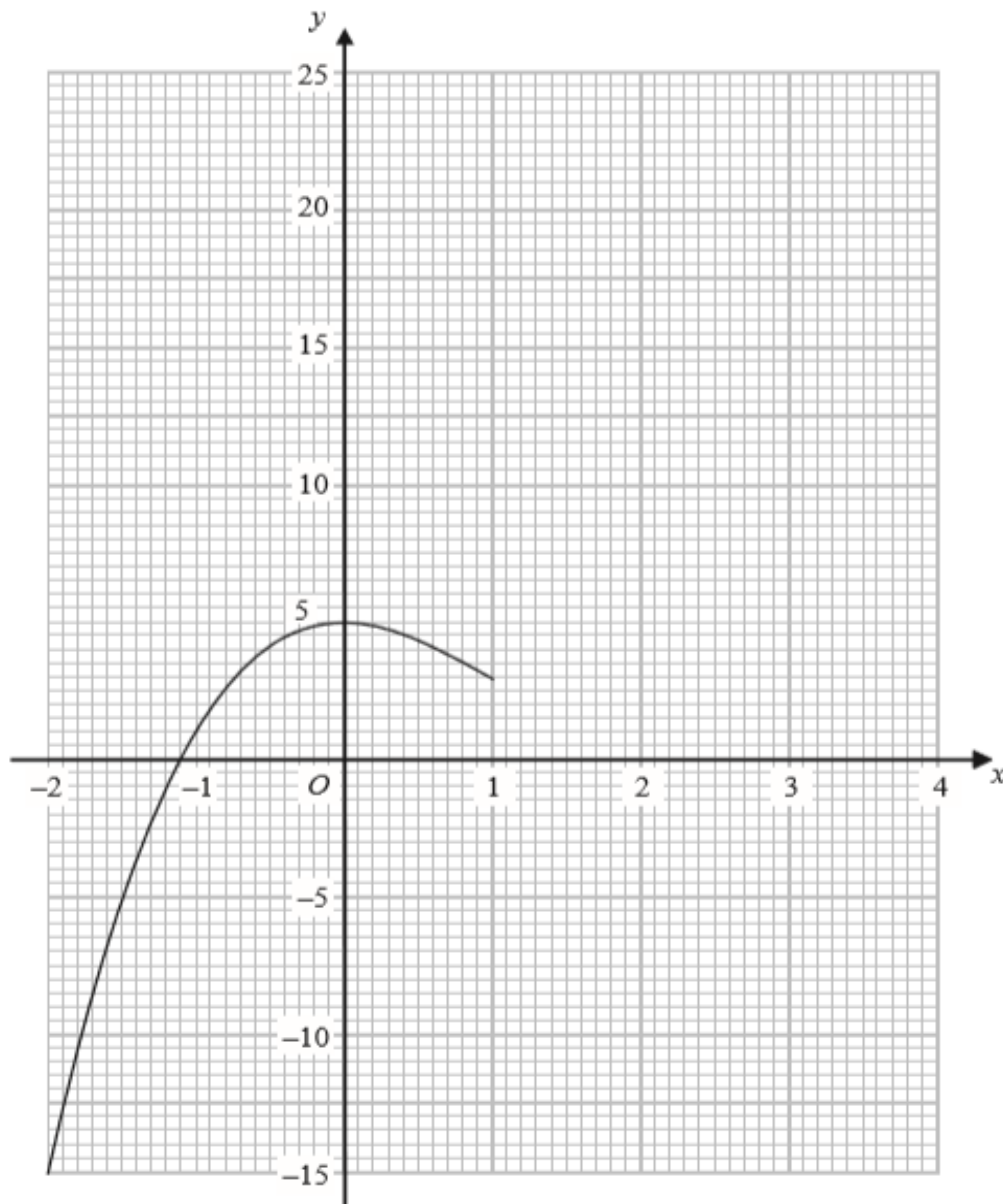
J15 4HR

-1.1, -0.8

(c) Use the graph to find an estimate for the solution of the equation $x^3 - 3x^2 + 5 = 0$

$x = $ ....

(1)

(d) By drawing a suitable straight line on the grid, find an estimate for the solution of the equation $x^3 - 3x^2 + 2x + 4 = 0$

$x = $ ....

(3)

(Total for Question 15 is 6 marks)

Differentiation

61

N6 3H

5000 – 1250*x*, 4   10000, max, -1250 < 0, 4, max profit

14. (a) For the equation $y = 5000x - 625x^2$, find $\frac{dy}{dx}$.

....
(2)

(b) Find the coordinates of the turning point on the graph of $y = 5000x - 625x^2$.

(............ , ...)
(3)

(c) (i) State whether this turning point is a maximum or a minimum.

....

(ii) Give a reason for your answer.

....
....
(2)

(d) A publisher has to set the price for a new book.
The profit, £*y*, depends on the price of the book, £*x*, where

$$y = 5000x - 625x^2$$

(i) What price would you advise the publisher to set for the book?

£ ....

(ii) Give a reason for your answer.

....
....
(2)
(Total 9 marks)

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N8 4H

$6x - 1,\ -x^{-2},\ (\,-2,\,-8\,)\ \ (\,2,\,8\,)$

20. (a) Differentiate with respect to x

    (i) $3x^2 - x$

....

    (ii) $\dfrac{1}{x}$

....

(4)

(b) Find the coordinates of the points on the curve $y = x^3$ where the gradient is 12

(.................... , ...)

(.................... , ...)

(3)

(Total 7 marks)

Jan12 3H

$X(36-x),\ 36-2x,\ 324$

14
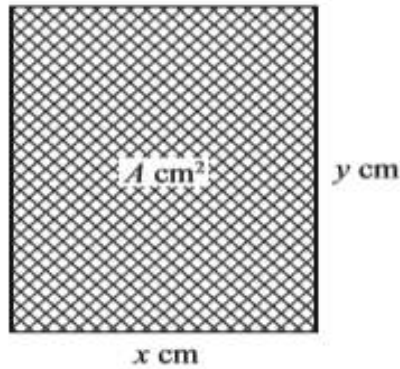
The diagram shows a rectangular photo frame of area A cm².
The width of the photo frame is x cm.
The height of the photo frame is y cm.
The perimeter of the photo frame is 72 cm.

(a) Show that $A = 36x - x^2$

(3)

(b) Find $\dfrac{dA}{dx}$

....

(2)

(c) Find the maximum value of A.

$A = $ ....

(3)

(Total for Question 14 is 8 marks)

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J7 3H

(2, 12)

17. A curve has equation $y = x^2 + \dfrac{16}{x}$

The curve has one turning point.

Find $\dfrac{dy}{dx}$ and use your answer to find the coordinates of this turning point.

....

(Total 4 marks)

J11 3H

$4x - 18, 4.5, 4 > 0$

(b) For $A = 2x^2 - 18x + 80$

(i) find $\dfrac{dA}{dx}$.

....

(ii) find the value of x for which A is a minimum.

$x =$ ....

(iii) Explain how you know that A is a minimum for this value of x.

....

....

(5)

(Total for Question 21 is 8 marks)

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N10 3H

$3x^2 + 6x - 24, (-4, 80) (2, -28)$

16. A curve has equation $y = x^3 + 3x^2 - 24x$

(a) Find $\dfrac{dy}{dx}$

....

(3)

(b) Find the coordinates of the turning points of the curve.

....

(5)

(Total 8 marks)

> 0, stationary point tangent parallel to x-axis and turning point

N7 4H

20. A curve has equation $y = x^3 - 5x^2 + 8x - 7$

(a) Find the gradient of the curve at $(2, -3)$.

....

(4)

(b) What does your answer to part (a) tell you about the point $(2, -3)$?

....

(1)

(Total 5 marks)

J10 3H

18 13 2 -9 -14, $3x^2 - 12$, 63

12. (a) Complete the table of values for $y = x^3 - 12x + 2$

x	−3	−2	−1	0	1	2	3	4
y	11						−7	18

(2)

(b) On the grid, draw the graph of $y = x^3 - 12x + 2$ for values of x from −3 to 4
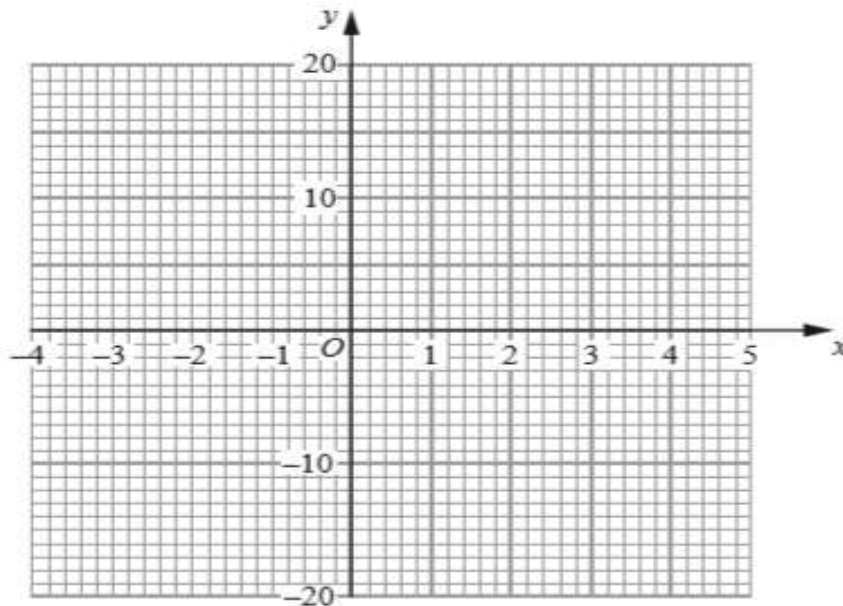
(2)

(c) For the curve with equation $y = x^3 - 12x + 2$

   (i) find $\dfrac{dy}{dx}$

....

   (ii) find the gradient of the curve at the point where $x = 5$

....

(4)

(Total 8 marks)

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68

J13 4H

11 For $y = x^3 - 6x^2 + 20$

    (a) (i) show that $y = 4$ when $x = 2$

       (ii) complete the table of values

x	-1	0	1	2	3	4	5	6
y		20	15		-7	-12		20

(2)

    (b) On the grid, draw the graph of $y = x^3 - 6x^2 + 20$ for values of x from -1 to 6
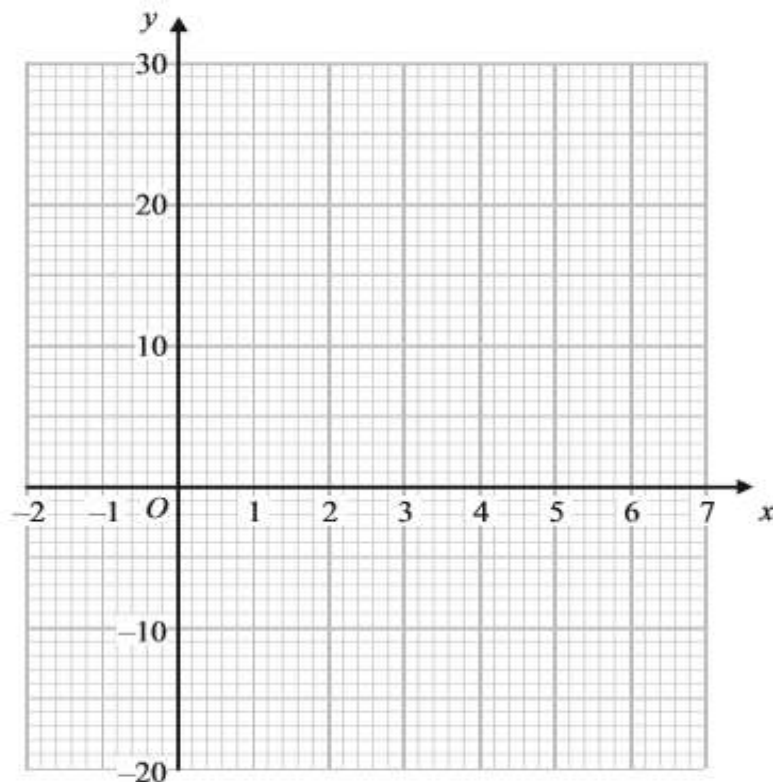
(2)

J13 4H

$3x^2 - 12x, 63$

(c) For the curve with equation $y = x^3 - 6x^2 + 20$

    (i) find $\dfrac{dy}{dx}$

....

    (ii) find the gradient of the curve at $x = -3$

....

(4)

(Total for Question 11 is 8 marks)

J5 4H

$28 - 4x, 7, -4 < 0, 98$

14. A farmer wants to make a rectangular pen for keeping sheep.
He uses a wall, AB, for one side.
For the other three sides, he uses 28 m of fencing.
He wants to make the area of the pen as large as possible.
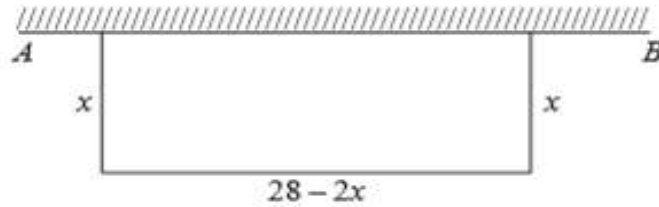
Diagram **NOT** accurately drawn

The width of the pen is x metres.
The length parallel to the wall is $(28 - 2x)$ metres.

(a) The area of the pen is $y\,\text{m}^2$.
Show that $y = 28x - 2x^2$.

(1)

(b) For $y = 28x - 2x^2$

(i) find $\dfrac{dy}{dx}$.

....

(ii) find the value of x for which y is a maximum.

$x =$ ....

(iii) Explain how you know that this value gives a maximum.

....

....

(5)

(c) Find the largest possible area of the pen.

.... m^2

(2)

(Total 8 marks)

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J9 4H

2x + 3, -5, (- 1.5, - 2.25)

17. A curve has equation $y = x^2 + 3x$

(a) Find $\dfrac{dy}{dx}$

....

(2)

(b) Find the gradient of the curve at the point where $x = -4$

....

(1)

(c) The curve has a minimum point.
Find the coordinates of this minimum point.

....

(3)

(Total 6 marks)

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Jan14 4H

$$60 - 3x, \ 600$$

15 A farmer has 120 metres of fencing.
He is going to make a rectangular enclosure *PQRS* with the fencing.
He is also going to divide the enclosure into two equal parts by fencing along *MN*.
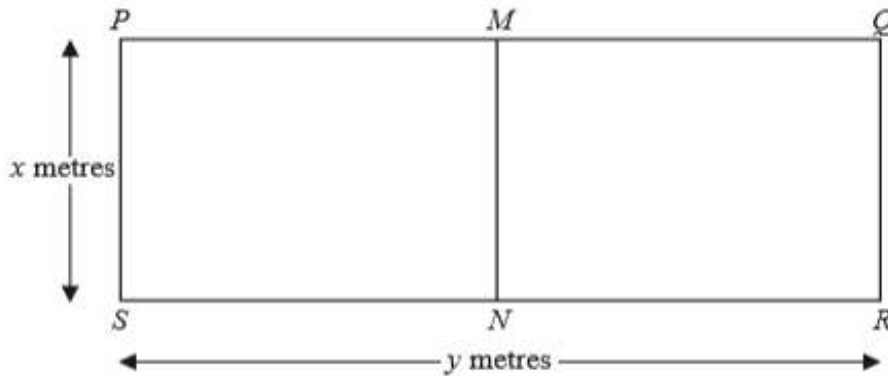
The width of the enclosure is *x* metres.
The length of the enclosure is *y* metres.

(a) (i) Show that $y = 60 - 1.5x$

The area of the enclosure *PQRS* is A m^2

(ii) Show that $A = 60x - 1.5x^2$

(3)

(b) Find $\dfrac{dA}{dx}$

....

(2)

(c) Find the maximum value of A.

$A = $ ....

(3)

(Total for Question 15 is 8 marks)

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J8 4H

$2t - 6, 4, 2$

19. A particle moves in a straight line through a fixed point O.
    The displacement of the particle from O at time t seconds is s metres, where

$$s = t^2 - 6t + 10$$

(a) Find $\dfrac{ds}{dt}$

....

(2)

(b) Find the velocity of the particle when $t = 5$

.... m/s

(2)

(c) Find the acceleration of the particle.

.... m/s²

(2)

(Total 6 marks)

J12 4H

-3, -1, -3, 1, 17, 2.2 – 2.5

13 (a) Complete the table of values for $y = x^3 - 3x - 1$

x	-2	-1	0	1	2	3
y		1				

(2)

(b) On the grid, draw the graph of $y = x^3 - 3x - 1$ for $-2 \leqslant x \leqslant 3$
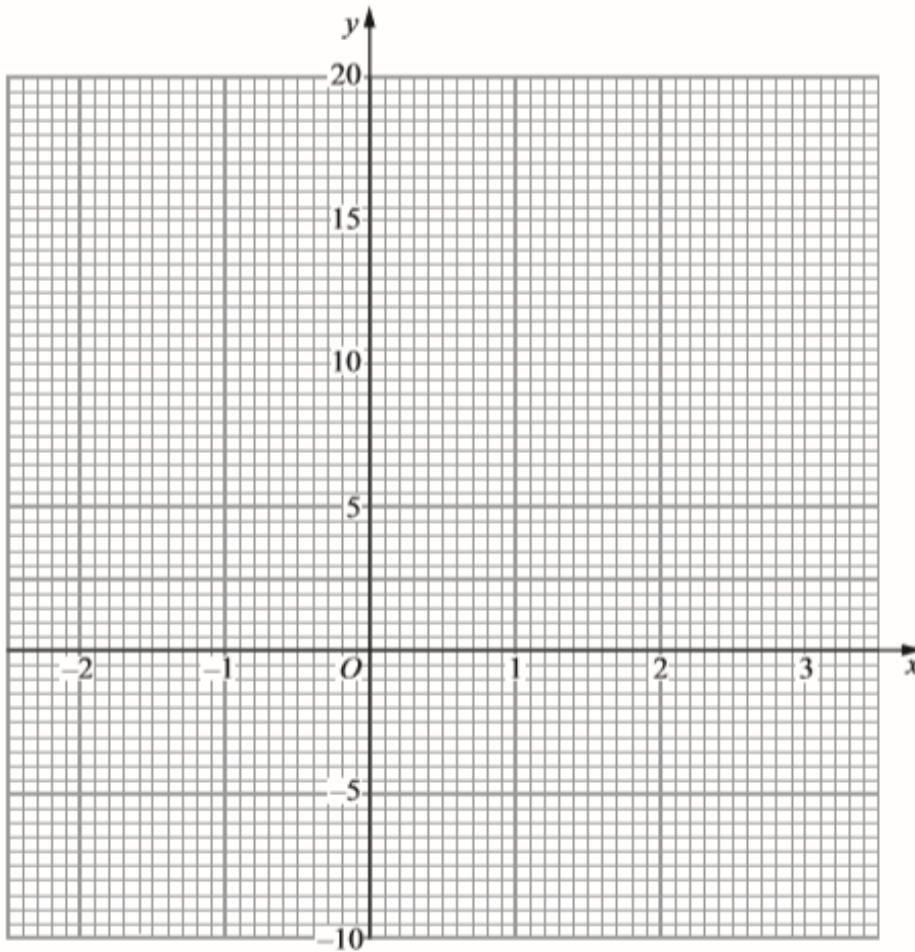
(2)

(c) By drawing a suitable straight line on the grid, find an estimate for the solution of
the equation $x^3 - 3x - 6 = 0$
Give your answer correct to 1 decimal place.

....

(2)

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J12 4H

$3x^2 - 3, 45$

(d) For the curve with equation $y = x^3 - 3x - 1$

(i) find $\dfrac{dy}{dx}$

....

(ii) find the gradient of the curve at the point where $x = 4$

....

(4)

(Total for Question 13 is 10 marks)

J16 3H

$6t^2 - 24t + 7, 2$

14 A particle is moving along a straight line.
The fixed point O lies on this line.
The displacement of the particle from O at time t seconds is s metres where

$$s = 2t^3 - 12t^2 + 7t$$

(a) Find an expression for the velocity, v m/s, of the particle at time t seconds.

$v = $ ....

(2)

(b) Find the time at which the acceleration of the particle is instantaneously zero.

.... seconds

(2)

(Total for Question 14 is 4 marks)

Jan15 3H

18 $y = x^3 - 4x^2 + 4x + 3$

$$3x^2 - 8x + 4, \; (2, 3), \; \underline{2} < x < 2$$
$$3$$

(a) Find $\dfrac{dy}{dx}$

....

(2)
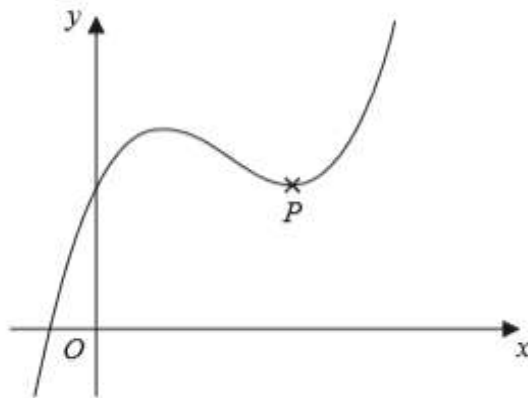
The diagram shows a sketch of the curve with equation $y = x^3 - 4x^2 + 4x + 3$
The point P is a turning point on the curve.

(b) Work out the coordinates of P.
   Show clear algebraic working.

(..................... , ...)

(4)

(c) Write down the range of values of x for which the curve has a negative gradient.

....

(2)

(Total for Question 18 is 8 marks)

J15 4HR

$$2x + \frac{16}{x^2}, \ (-2, 12)$$

21 $y = x^2 - \dfrac{16}{x}$

(a) Find $\dfrac{dy}{dx}$

$$\dfrac{dy}{dx} = \text{..}$$

(3)
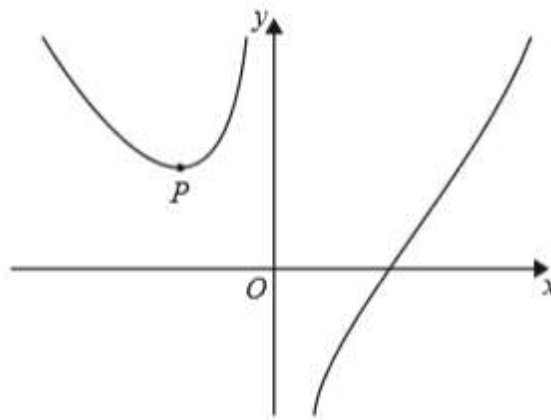
The graph shows part of the curve with equation $y = x^2 - \dfrac{16}{x}$

The point P is the turning point of the curve.

(b) Work out the coordinates of P.

(.............. , ...)

(4)

(Total for Question 21 is 7 marks)

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Jan15 3HR

$$56x - 6x^2, \frac{28}{3}$$

17

x cm

x cm

y cm
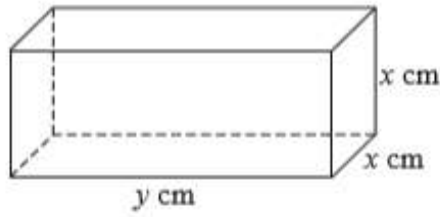
Diagram **NOT** accurately drawn

The diagram shows a cuboid of volume V cm^3
The length of the cuboid is y cm
The width and height of the cuboid are both x cm

The total length of all the edges of the cuboid is 112 cm

(a) Show that $V = 28x^2 - 2x^3$

(3)

(b) Find $\dfrac{\mathrm{d}V}{\mathrm{d}x}$

$\dfrac{\mathrm{d}V}{\mathrm{d}x} = \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$

(2)

(c) Find the maximum value of V
    Give your answer correct to 3 significant figures.

$V = \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$

(3)

(Total for Question 17 is 8 marks)

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IGCSE

EDEXCEL

PART IV

1. Loci.

2. Vectors.

3. Transformation.

4. Graphs in Practical Situations.

Prepared by:T.Abeer yousrallah

Mrs. Abeer Yousrallah (IGCSE Math) ⓢ 00966563065252

Loci

Mrs. Abeer Yousrallah (IGCSE Math) 00966563065252

N7 4H

9. Use ruler and compasses to construct the bisector of angle *ABC*.
You must show all construction lines.
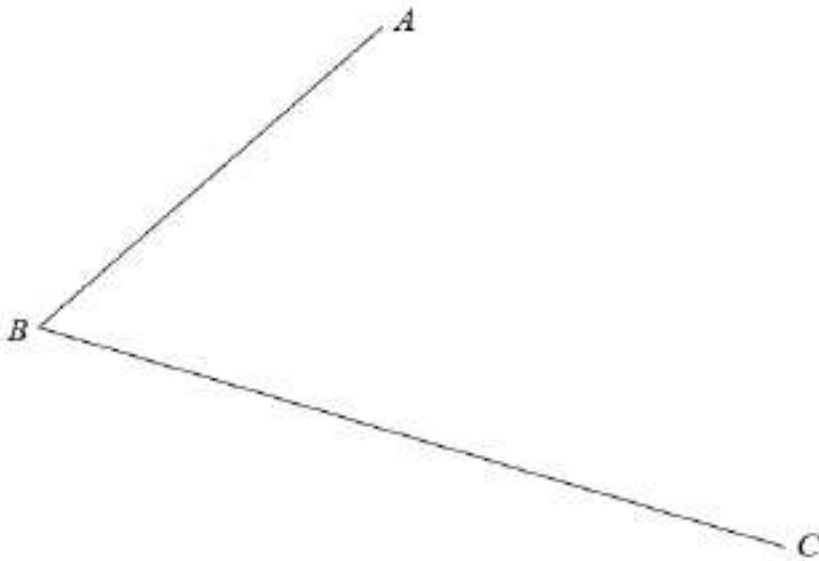
(Total 2 marks)

J14 4H

7 Use ruler and compasses to construct the bisector of angle *ABC*.
You must show all your construction lines.

(Total for Question 7 is 2 marks)

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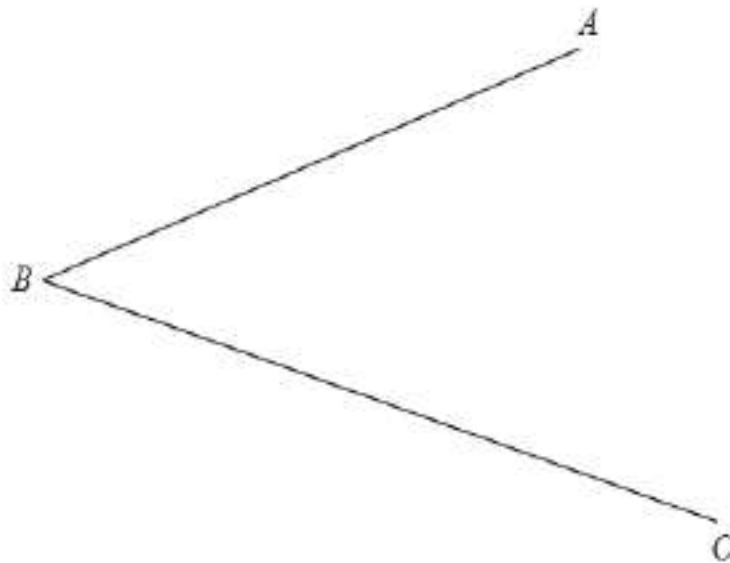
J11 4H

8 Use compasses and a ruler only to construct the perpendicular bisector of the line *PQ*.
You must show all construction lines.

P ——————————————————————————— Q

Jan12 3H

4 The lengths of the sides of a rhombus are 6 cm.
The length of the longer diagonal of the rhombus is 10 cm.
AB is a side of the rhombus.

Construct an accurate, full-size drawing of the rhombus.
You must show all construction lines.

A ——————————————— *B*
6 cm
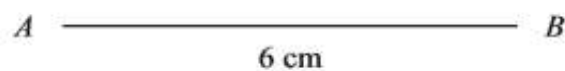
(Total for Question 4 is 4 marks)

N9 4H

8. Use ruler and compasses to construct the perpendicular bisector of the line *AB*.
You must show all construction lines.

B

A

(Total 2 marks)

Vectors

Jan14 3H

12a – 3b, 4a – b, 4a + 2b

21
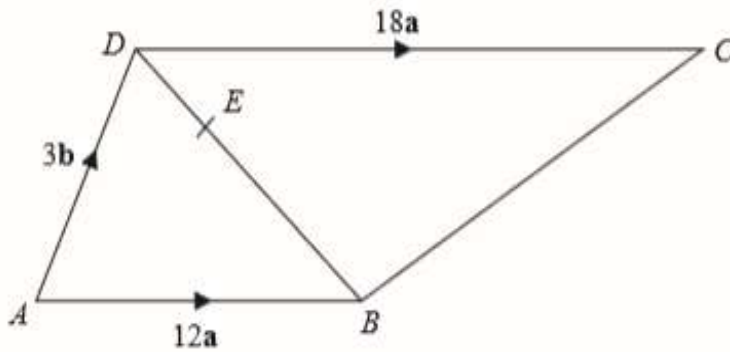
Diagram **NOT** accurately drawn

ABCD is a trapezium.
AB is parallel to *DC*.

$\overrightarrow{AB} = 12\mathbf{a}$

$\overrightarrow{AD} = 3\mathbf{b}$

$\overrightarrow{DC} = 18\mathbf{a}$

E is the point on the diagonal *DB* such that $DE = \frac{1}{3}DB$.

(a) Find, in terms of **a** and **b**,

(i) $\overrightarrow{DB}$

(ii) $\overrightarrow{DE}$

(iii) $\overrightarrow{AE}$

(3)

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Jan14 3H

BC = 1.5 AE

(b) Show by a vector method that *BC* is parallel to *AE*.

(2)

(Total for Question 21 is 5 marks)

Jan12 4H

3a + 3b, 2a + 2b, a + 2b

22
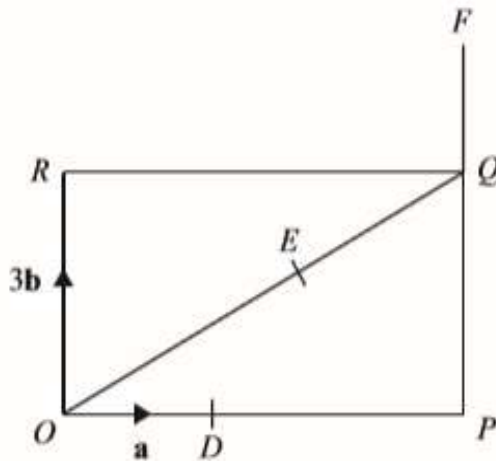
Diagram **NOT**
accurately drawn

OPQR is a rectangle.

D is the point on *OP* such that $OD = \frac{1}{3} OP$.

E is the point on *OQ* such that $OE = \frac{2}{3} OQ$.

PQF is the straight line such that $QF = \frac{1}{3} PQ$.

$\overrightarrow{OD} = \mathbf{a}$ $\overrightarrow{OR} = 3\mathbf{b}$

(a) Find, in terms of **a** and **b**,

   (i) $\overrightarrow{OQ}$

   ....

   (ii) $\overrightarrow{OE}$

   ....

   (iii) $\overrightarrow{DE}$

   ....

   (3)

Jan12 4H

DF = 2 DE

(b) Use a vector method to prove that *DEF* is a straight line.

(2)

(Total for Question 22 is 5 marks)

J7 3H

16. PQR is a triangle.
E is the point on PR such that $PR = 3PE$.
F is the point on QR such that $QR = 3QF$.

$$\boxed{3b,\ 3b-a,\ \tfrac{2}{3}a + b,\ k= \tfrac{2}{3}}$$
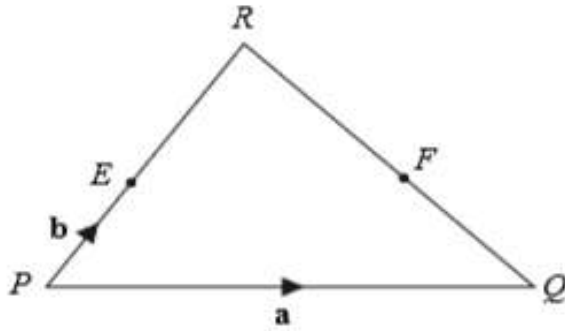
Diagram **NOT** accurately drawn

$\overrightarrow{PQ} = \mathbf{a}, \qquad \overrightarrow{PE} = \mathbf{b}.$

(a) Find, in terms of **a** and **b**,

(i) $\overrightarrow{PR}$

....

(ii) $\overrightarrow{QR}$

....

(iii) $\overrightarrow{PF}$

....

(3)

(b) Show that $\overrightarrow{EF} = k\,\overrightarrow{PQ}$ where k is an integer.

(2)

(Total 5 marks)

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J11 4H

24

| 4b, a + b, 3b – a, 4 |
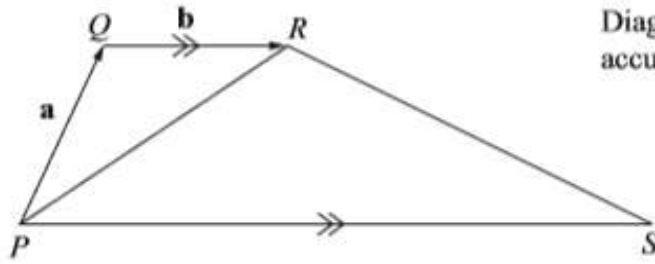
Diagram **NOT**
accurately drawn

The diagram shows a trapezium *PQRS*.
PS is parallel to *QR*.
PS = 4*QR*.

$\overrightarrow{PQ}$ = **a** $\overrightarrow{QR}$ = **b**

(a) Find, in terms of **a** and/or **b**,

   (i) $\overrightarrow{PS}$

....

   (ii) $\overrightarrow{PR}$

....

   (iii) $\overrightarrow{RS}$.

....
(3)

The point *T* lies on the line *PR* such that *PT* : *TR* = 4 : 1
(b) Given that $\overrightarrow{TS}$ = k $\overrightarrow{QT}$, find the value of *k*.

$k =$ ....
(3)

(Total for Question 24 is 6 marks)

N10 4H

a + b, 3a – b, ¾ (3a – b), collinear in straight line, 3/4

21.
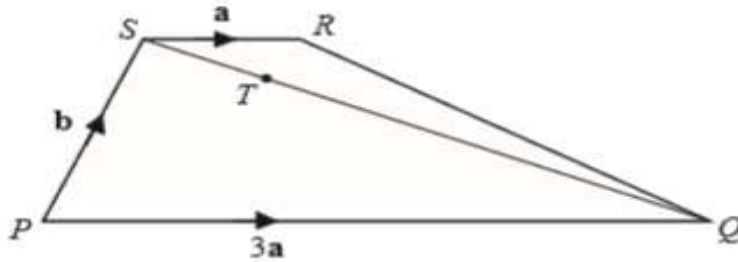
Diagram **NOT** accurately drawn

PQRS is a trapezium with *PQ* parallel to *SR*.

$\overrightarrow{SR}$ = **a** $\overrightarrow{PQ}$ = 3**a** $\overrightarrow{PS}$ = **b**

T is the point on *SQ* such that $ST = \frac{1}{4}SQ$.

(a) Find, in terms of **a** and **b**,

  (i) $\overrightarrow{PR}$

  ....

  (ii) $\overrightarrow{SQ}$

  ....

  (iii) $\overrightarrow{PT}$

  ....

  (3)

(b) $\overrightarrow{PT} = k \overrightarrow{PR}$ where *k* is a fraction.

  (i) What does this result tell you about the points *P*, *T* and *R*?

  ....

  (ii) Find the value of *k*.

  k = ...

  (2)

  (Total 5 marks)

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J9 4H

-x, x + y, -0.5x -2y

18. The diagram shows a parallelogram, *ABCD*.
    M is the midpoint of *BC*.
    N is the midpoint of *AD*.
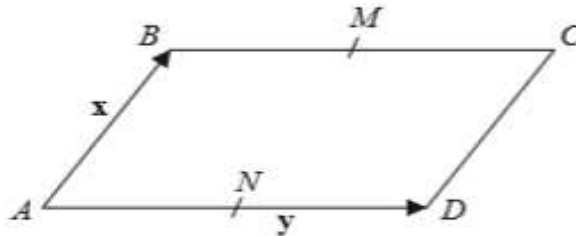
Diagram **NOT**
accurately drawn

$\overrightarrow{AB} = \mathbf{x}$

$\overrightarrow{AD} = \mathbf{y}$

Find, in terms of **x** and/or **y**, the vectors

(a) $\overrightarrow{MN}$

....
(1)

(b) $\overrightarrow{AC}$

....
(1)

P is the point such that $\overrightarrow{CP} = \mathbf{y} - \frac{1}{2}\mathbf{x}$

(c) Find, in terms of **x** and/or **y**, the vector $\overrightarrow{PA}$
    Simplify your answer as much as possible.

....
(3)

(Total 5 marks)

N8 4H

x + y, x+ 2y, EC = AD

19. The diagram shows a trapezium *ABCD*.
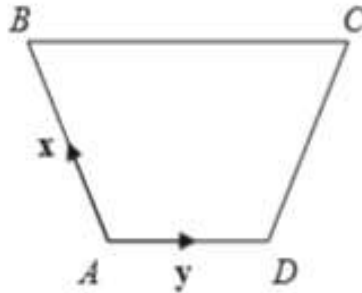
$\overrightarrow{BC} = 2\overrightarrow{AD}$.

$\overrightarrow{AB} = \mathbf{x}$. $\overrightarrow{AD} = \mathbf{y}$.

(a) Find, in terms of **x** and **y**,

   (i) $\overrightarrow{AC}$

....

   (ii) $\overrightarrow{DC}$

....

(2)

(b) The point *E* is such that $\overrightarrow{AE} = \mathbf{x} + \mathbf{y}$.
Use your answer to part (a)(ii) to explain why *AECD* is a parallelogram.

....

....

(2)

(Total 4 marks)

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J5 4H

b – a, 2a, 2b- 2a, QR = 2MN

16. PQR is a triangle.
M and N are the midpoints of PQ and PR respectively.
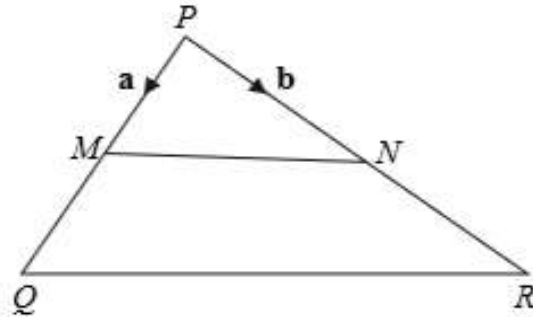
Diagram **NOT** accurately drawn

$\overrightarrow{PM} = \mathbf{a}$ $\overrightarrow{PN} = \mathbf{b}$.

(a) Find, in terms of **a** and/or **b**,

(i) $\overrightarrow{MN}$

....

(ii) $\overrightarrow{PQ}$

....

(iii) $\overrightarrow{QR}$

....

(3)

(b) Use your answers to (a)(i) and (iii) to write down two geometrical facts about the lines MN and QR.

....

....

(2)

(Total 5 marks)

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J8 4H

a + b, -a, b – a, 5

21. *PQRSTU* is a regular hexagon, centre *O*.
The hexagon is made from six equilateral triangles of side 2.5 cm.
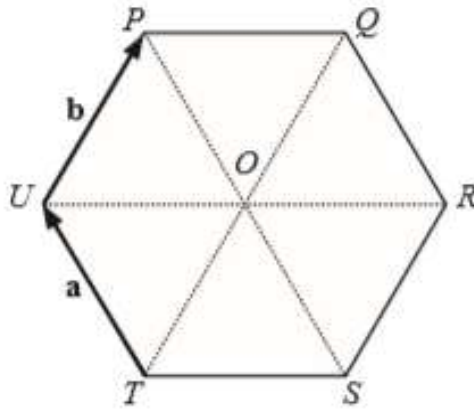
$\overrightarrow{TU}$ = **a**. $\overrightarrow{UP}$ = **b**.

(a) Find, in terms of **a** and/or **b**, the vectors

(i) $\overrightarrow{TP}$

....
(1)

(ii) $\overrightarrow{PO}$

....
(1)

(iii) $\overrightarrow{UO}$

....
(1)

(b) Find the modulus (magnitude) of $\overrightarrow{UR}$.

.... cm
(1)

(Total 4 marks)

J10 4H

a – c, trapezium, k = 1, a = c

21.
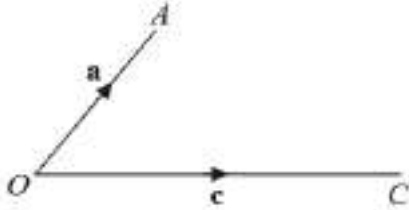
Diagram **NOT** accurately drawn

In the diagram $\overrightarrow{OA}$ = **a** and $\overrightarrow{OC}$ = **c**.

(a) Find $\overrightarrow{CA}$ in terms of **a** and **c**.

....

(1)

(b) The point B is such that $\overrightarrow{AB} = \frac{1}{2}$ **c**.

Give the mathematical name for the quadrilateral $OABC$.

....

(1)

(c) The point P is such that $\overrightarrow{OP} =$ **a** + k**c**, where $k \geqslant 0$

State the two conditions relating to **a** + k**c** that must be true for $OAPC$ to be a rhombus.

(2)

(Total 4 marks)

Jan15 4H

19 $a = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$ $b = \begin{pmatrix} 1 \\ 7 \end{pmatrix}$ $c = \begin{pmatrix} -7 \\ 0 \end{pmatrix}$

(a) Write, as a column vector, $2a$

$\underline{\hspace{3cm}} \begin{pmatrix} \\ \end{pmatrix}$

(1)

(b) Write, as a column vector, $3b - c$

$\underline{\hspace{3cm}} \begin{pmatrix} \\ \end{pmatrix}$

(2)

(c) Work out the magnitude of a
     Give your answer as a surd.

$\underline{\hspace{5cm}}$

(2)

J16 4H

2q – 4p, q – 0.5p, OP = 2QR or QR = 0.5 OP

22
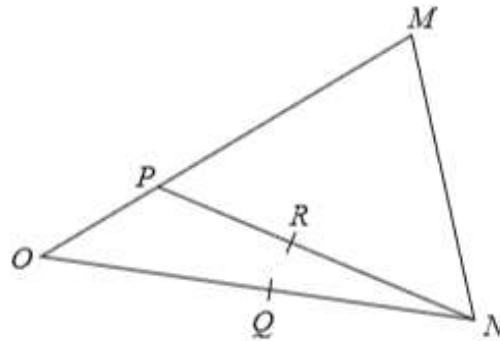
Diagram **NOT**
accurately drawn

OMN is a triangle.

P is the point on *OM* such that $OP = \frac{1}{4} OM$

Q is the midpoint of *ON*

R is the midpoint of *PN*

$\overrightarrow{OP} = \mathbf{p}$ $\overrightarrow{OQ} = \mathbf{q}$

(a) Find, in terms of **p** and **q**,

(i) $\overrightarrow{MN}$

....

(ii) $\overrightarrow{PR}$

....

(2)

(b) Use a vector method to prove that *QR* is parallel to *OP*

(2)

(Total for Question 22 is 4 marks)

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J15 3HR

18

b − 2a, $\dfrac{2}{3}$b − $\dfrac{4}{3}$a, $\dfrac{2}{3}$b − $\dfrac{1}{3}$a, XY = $\dfrac{2}{3}$WY

NOT
ly drawn
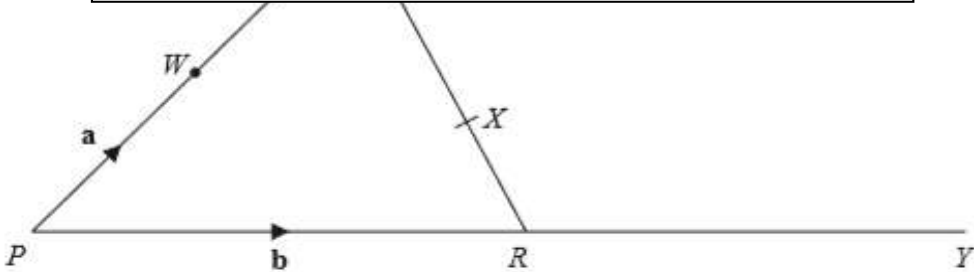
PQR is a triangle.
The midpoint of *PQ* is *W*.
X is the point on *QR* such that *QX* : *XR* = 2 : 1
PRY is a straight line.

$\overrightarrow{PW} = \mathbf{a}$ $\overrightarrow{PR} = \mathbf{b}$

(a) Find, in terms of **a** and **b**,

(i) $\overrightarrow{QR}$

....

(ii) $\overrightarrow{QX}$

....

(iii) $\overrightarrow{WX}$

....

(3)

R is the midpoint of the straight line *PRY*.

(b) Use a vector method to show that *WXY* is a straight line.

(2)

(Total for Question 18 is 5 marks)

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Transformation

J11 3H

Rotation 90 clockwise (0, 0)

6
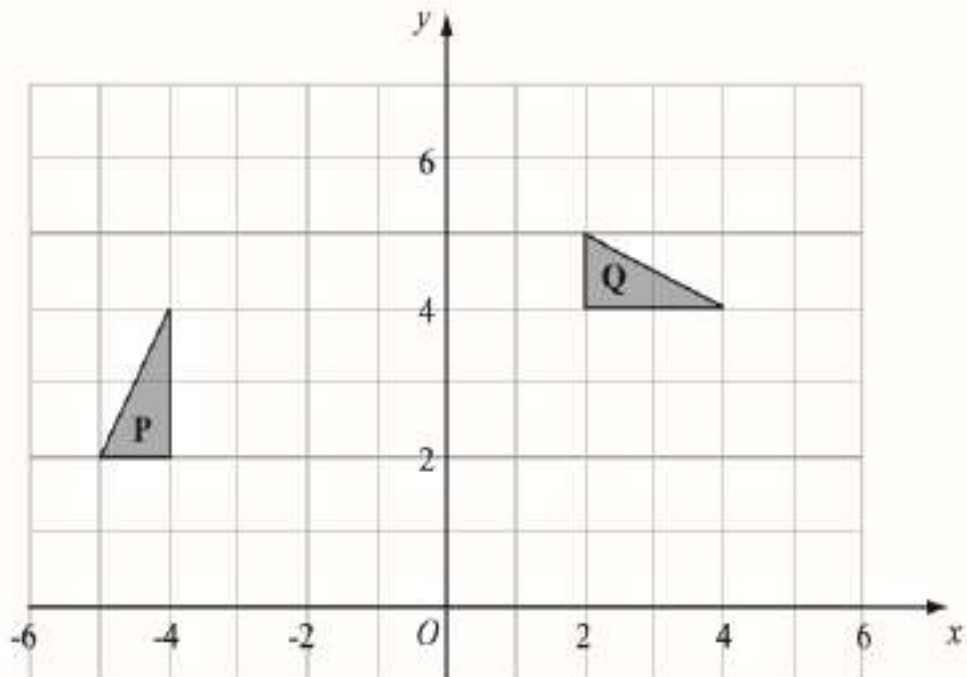
(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

....

(3)

(b) Reflect triangle **Q** in the line $y = x$.

Label the new triangle **R**.

(2)

(Total for Question 6 is 5 marks)

J10 3H

9.
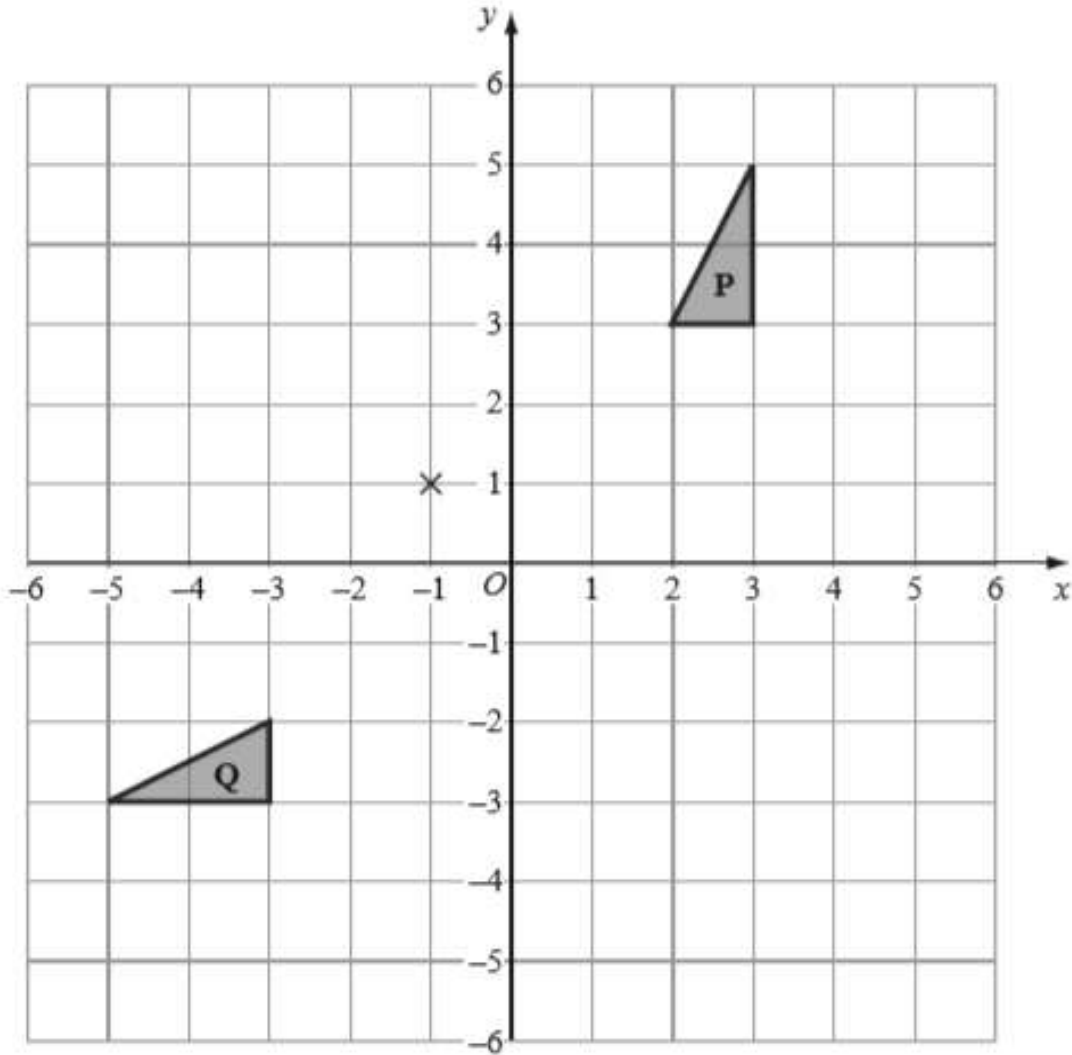
(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

....

(2)

(b) Rotate triangle **Q** through 90° anti-clockwise about the point (−1, 1).
Label the new triangle **R**.

(2)

(c) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

....

(2)

(Total 6 marks)

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Jan14 3H

Enlargement scale = 3 (4, 3), large scale 1/3 (8, 2)

9
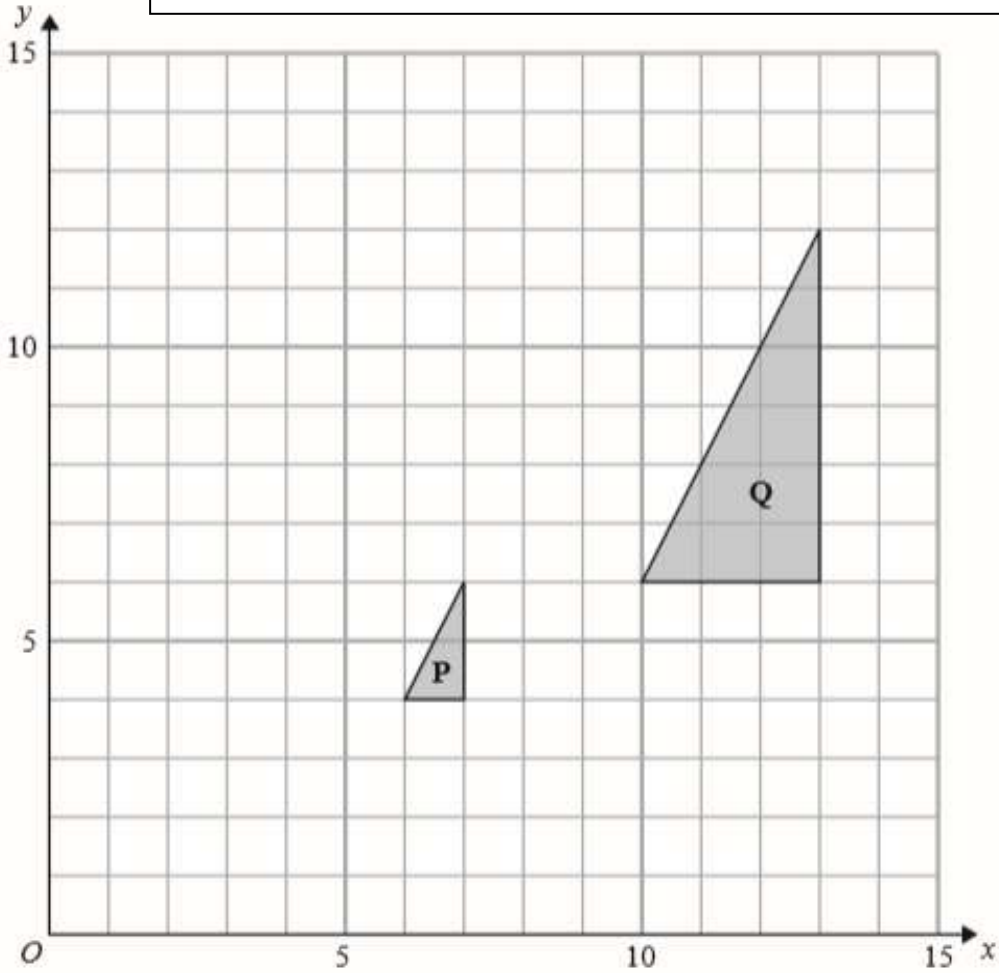
(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

....

....

(3)

(b) On the grid, translate triangle **Q** by the vector $\begin{pmatrix} -8 \\ 2 \end{pmatrix}$

Label the new triangle **R**.

(1)

(c) Describe fully the single transformation which maps triangle **R** onto triangle **P**.

....

....

(2)

(Total for Question 9 is 6 marks)

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26

J5 3H

4.
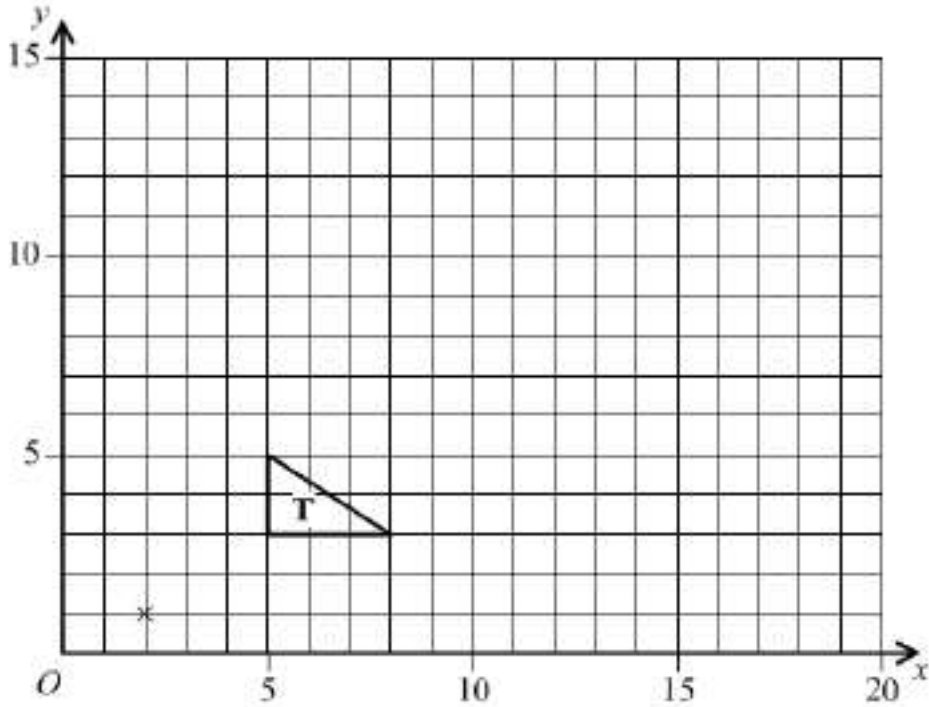
On the grid, enlarge triangle **T** with a scale factor of 3 and centre (2, 1).

(Total 3 marks)

N7 4H

4.

Reflection x = 4
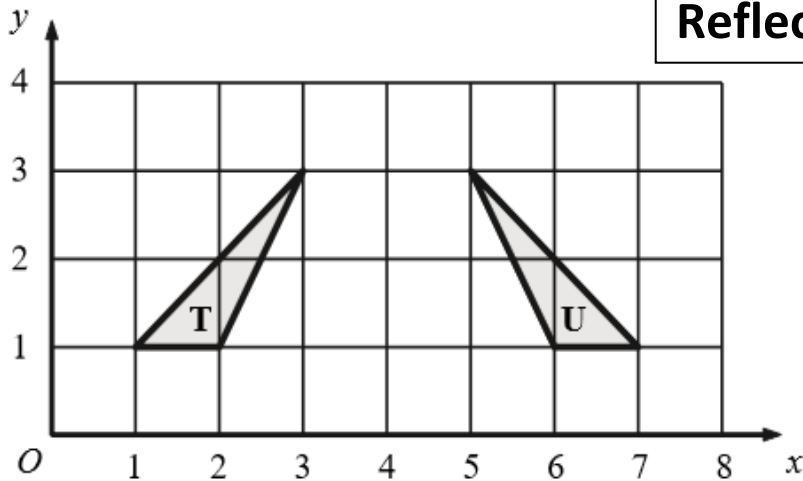
Describe fully the single transformation which maps triangle **T** onto triangle **U**.

....

(Total 2 marks)

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N10 4H

Enlargement scale 3 centre (1, 8)

7.
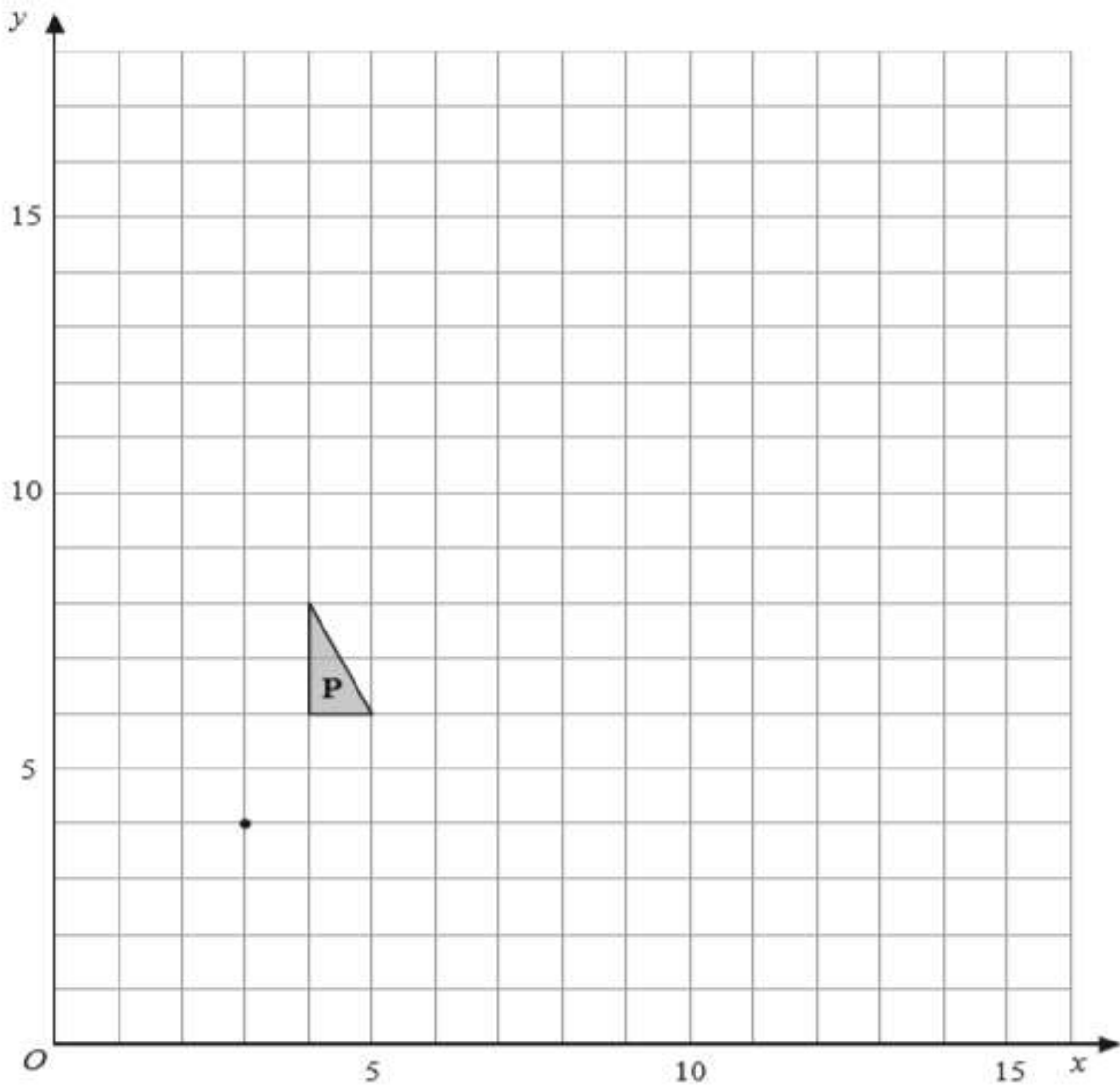
(a) On the grid, enlarge triangle **P** with scale factor 3 and centre (3, 4).
Label the new triangle **Q**.

(3)

(b) On the grid, translate triangle **Q** by the vector $\begin{pmatrix} 4 \\ -8 \end{pmatrix}$

Label the new triangle **R**.

(2)

(c) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

....

....

(2)

(Total 7 marks)

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J9 4H

7. The diagram shows a parallelogram.

(a) On the grid, rotate the parallelogram through 90° anticlockwise about the point O.

(2)

(b)
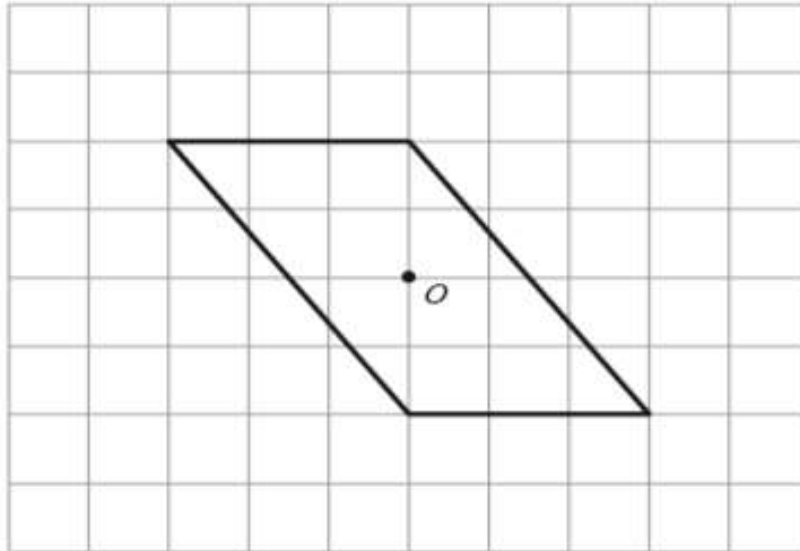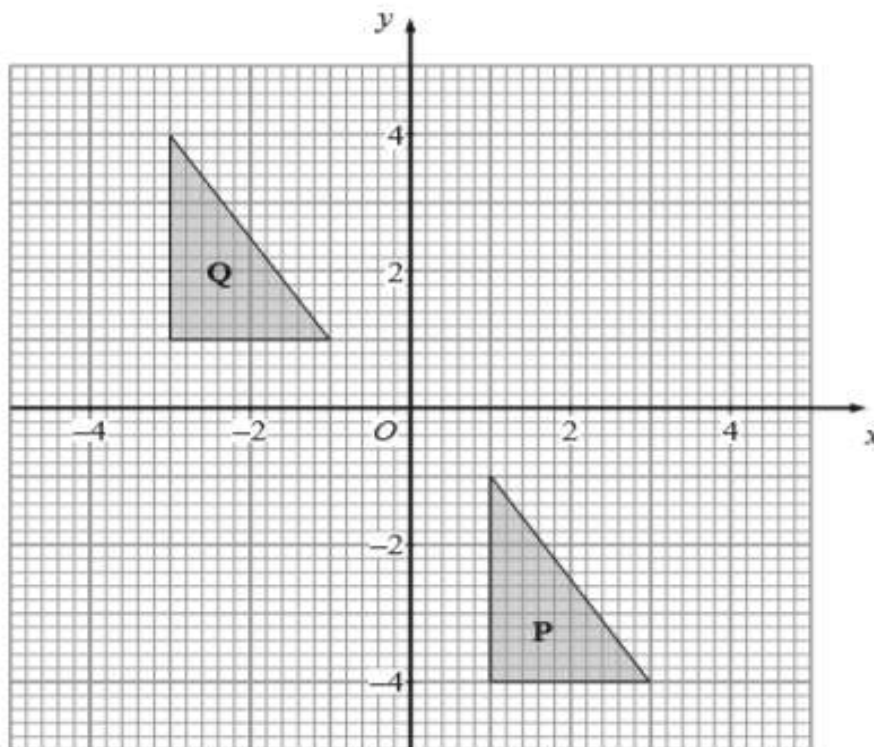
Describe fully the single transformation that maps triangle **P** onto triangle **Q**.

....

(2)

(Total 4 marks)
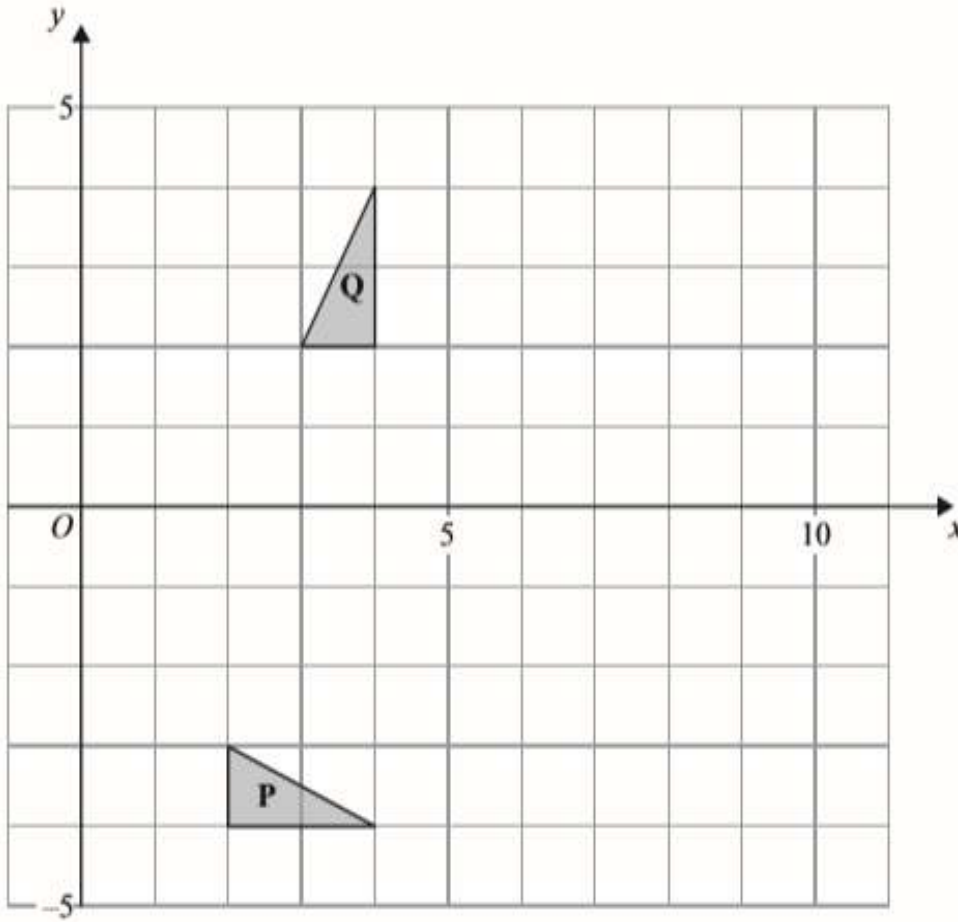
Jan12 4H

Rotation 90 9 0, 0), rotation 90 (3, 1)

12

(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

....

....

(3)

(b) On the grid, translate triangle **Q** by the vector $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$

Label the new triangle **R**.

(1)

(c) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

....

....

(2)

(Total for Question 12 is 6 marks)

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J7 3H

4.

| Translation 3 right 1 down, rotation 90 clock (2, -1) |
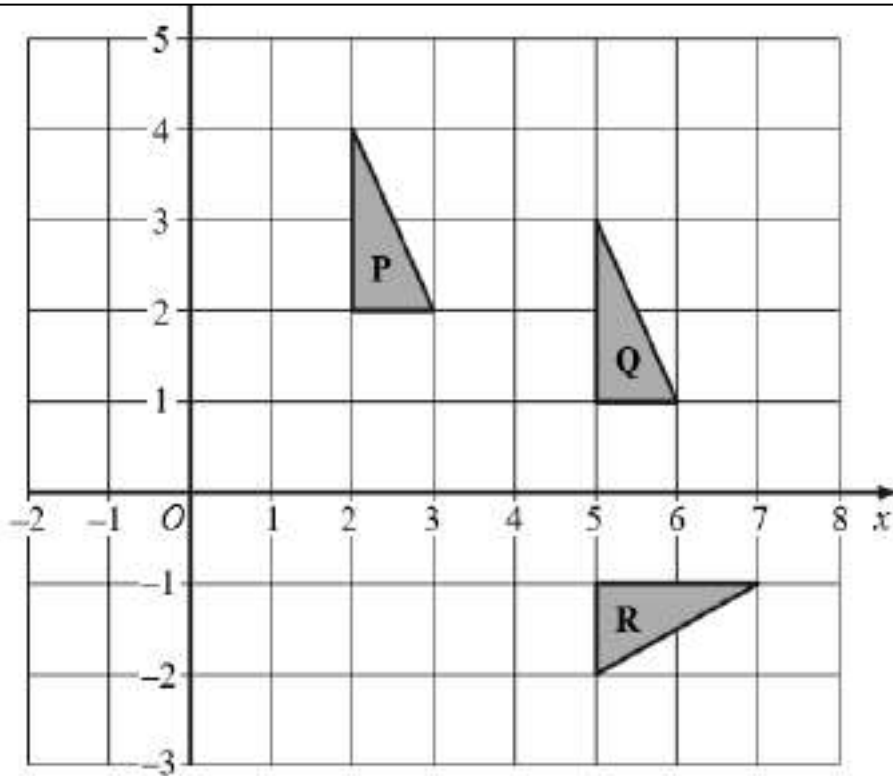
(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

....

....

(2)

(b) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

....

....

(3)

(Total 5 marks)

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N9 4H

Reflection y = 4, Enlargement 1.5 centre (1, 6)

6.
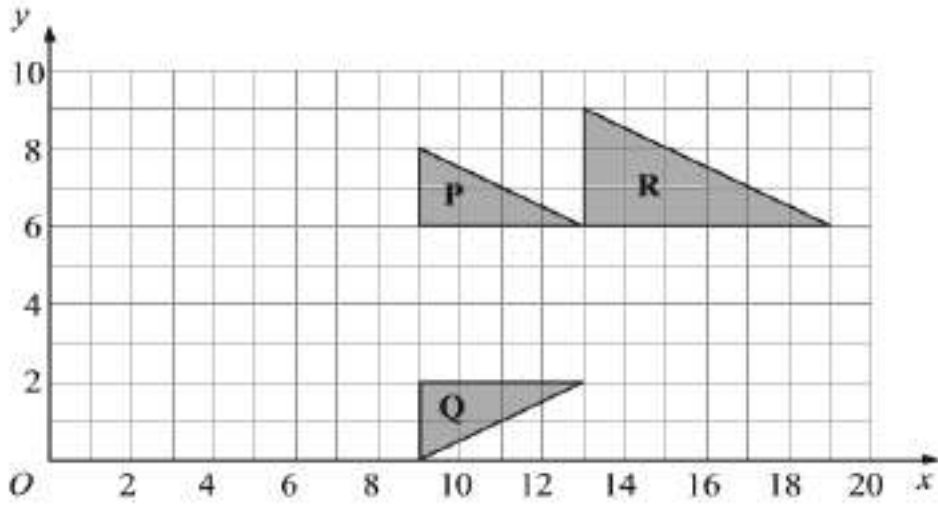
(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

....

(2)

(b) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

....

....

(3)

(Total 5 marks)

J8 3H

Enlargement 2 centre (1, 3), Reflection y = x

3.
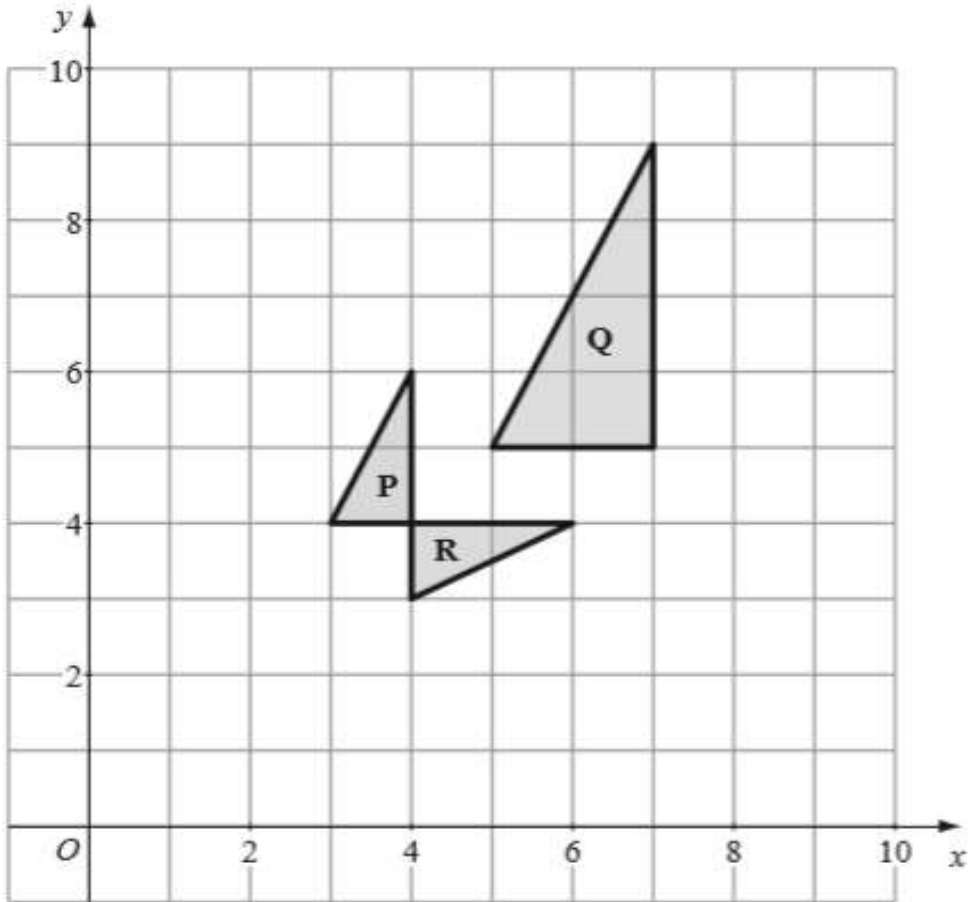
(a) Describe fully the single transformation that maps triangle **P** onto triangle **Q**.

....

(3)

(b) Describe fully the single transformation that maps triangle **P** onto triangle **R**.

....

(2)

(Total 5 marks)

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Jan14 4H

Rotation 90 clock (0, 0)

5 The diagram shows a shape **P**, and a shape **Q**.
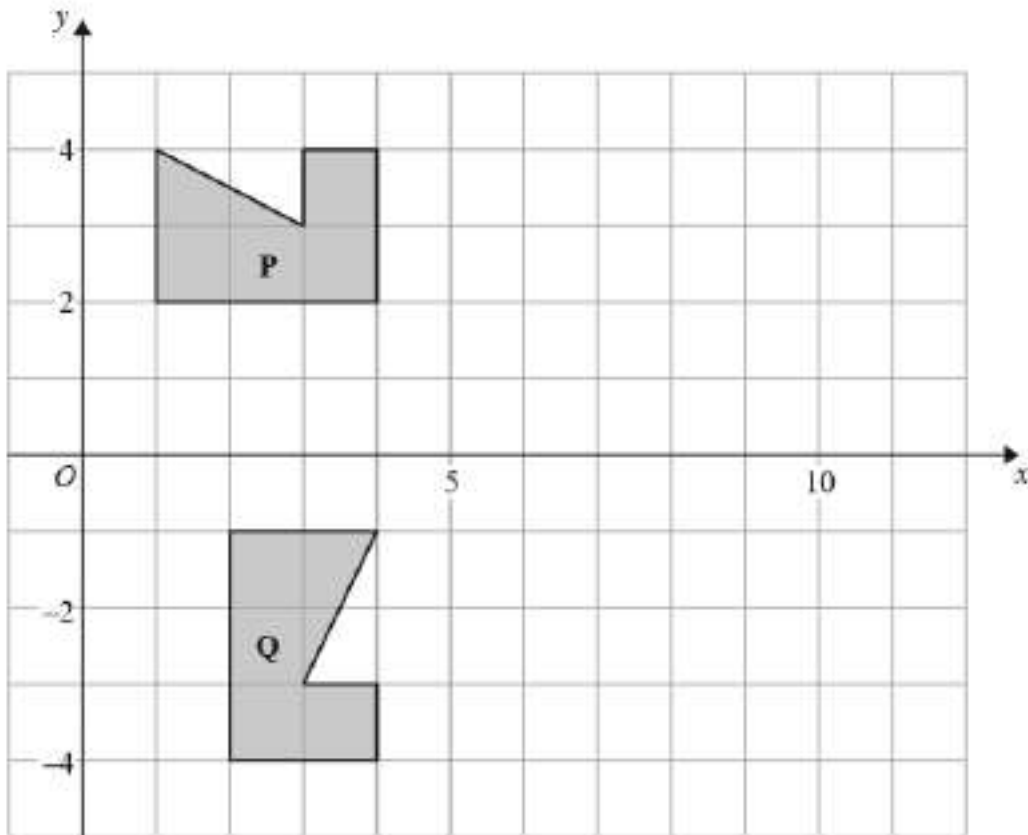
Describe fully the single transformation which maps shape **P** onto shape **Q**.

....

....

(Total for Question 5 is 3 marks)

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J13 4H

Rotation 90 anti (0, 0)

4
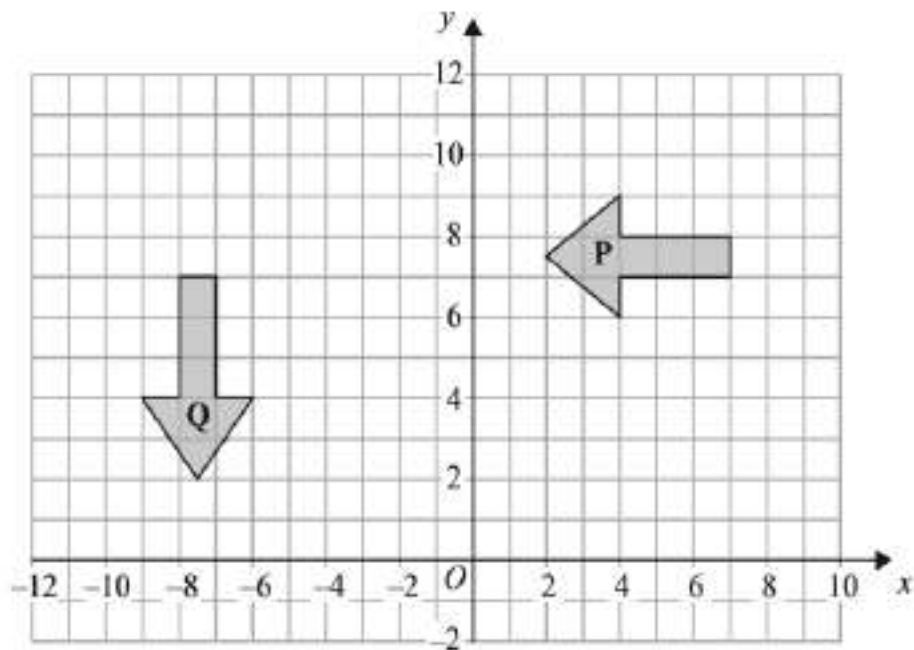
(a) Describe fully the single transformation that maps shape **P** onto shape **Q**.

....

....

(3)

(b) On the grid, translate shape **P** by the vector $\begin{pmatrix} -6 \\ 2 \end{pmatrix}$
Label the new shape **R**.

(2)

(Total for Question 4 is 5 marks)

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N6 4H

Enlargement 3 (1, 2)

11.
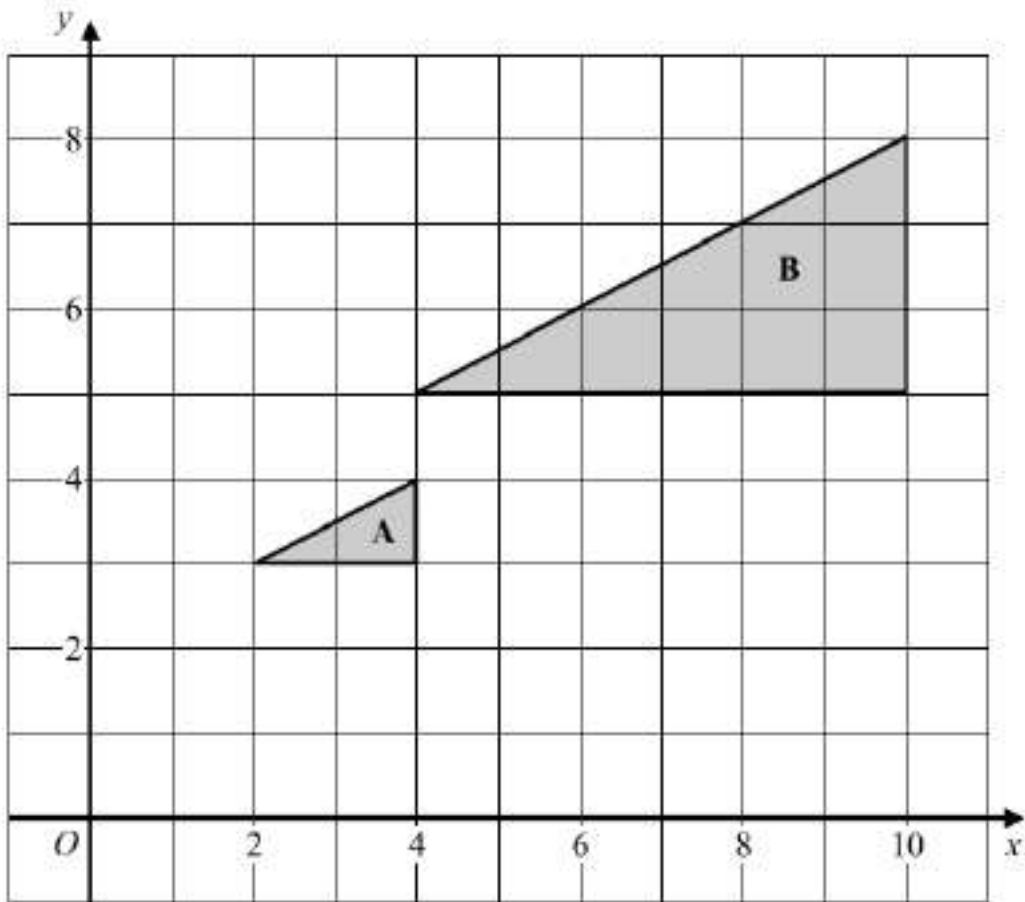
(a) Describe fully the **single** transformation which maps triangle A onto triangle B.

....

....

(3)

(b) On the grid, translate triangle A by the vector $\begin{pmatrix} -1 \\ 3 \end{pmatrix}$.

Label the new triangle C.

(2)

(Total 5 marks)

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N8 3H

Translation 7 left 1 down, Rotation 90 (0, 0)

4.
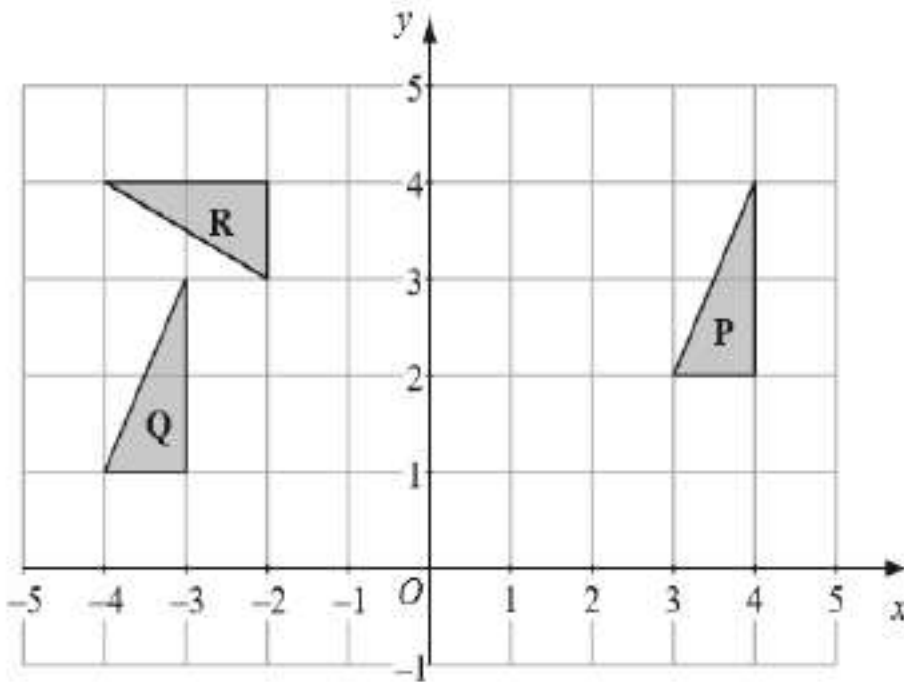
(a) Describe fully the single transformation which maps triangle **P** onto triangle **Q**.

....

....

(2)

(b) Describe fully the single transformation which maps triangle **P** onto triangle **R**.

....

....

(3)

(Total 5 marks)

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J9 3H

3.
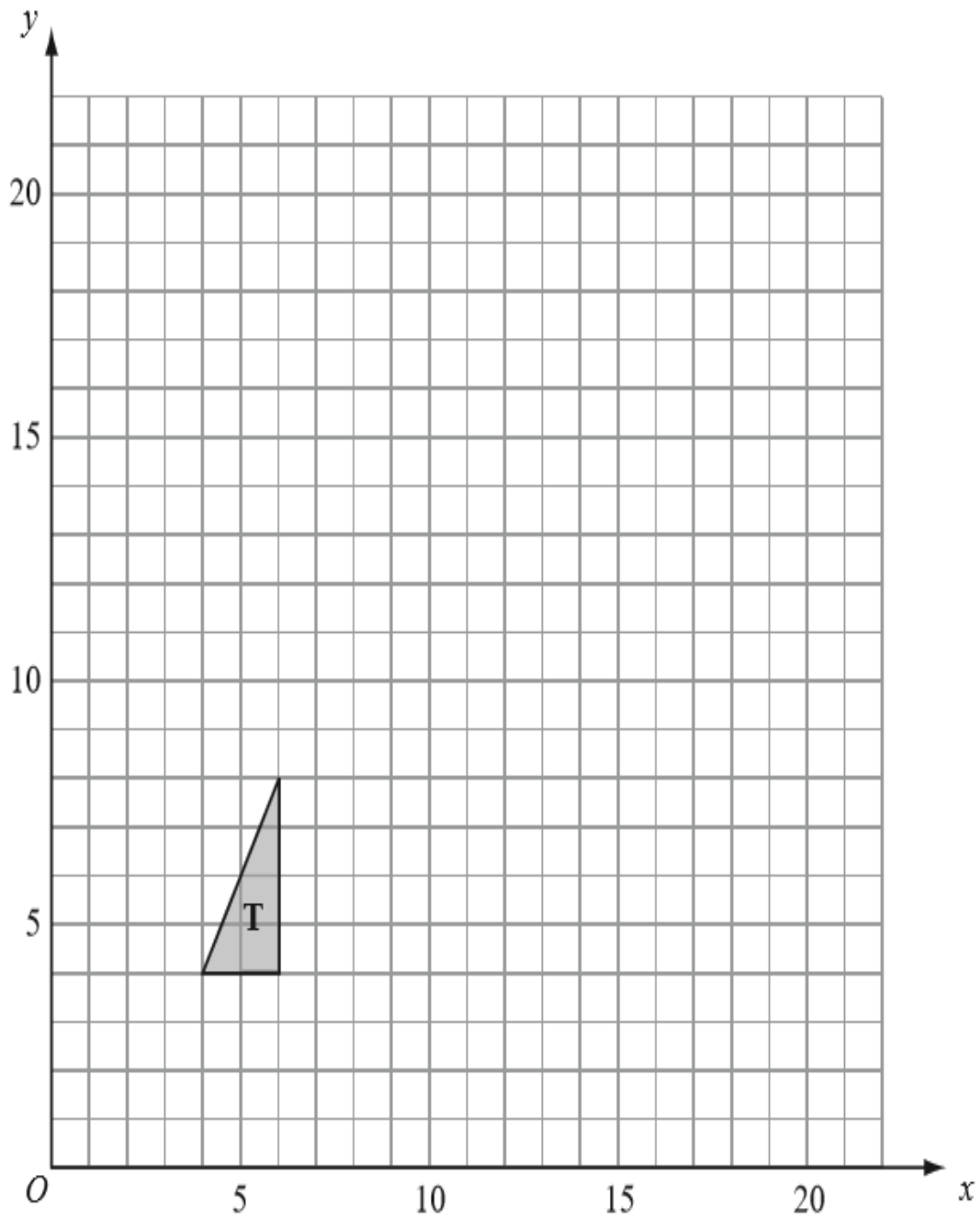
On the grid, enlarge triangle **T** with a scale factor of $2\frac{1}{2}$ and centre (0, 0).

(Total 3 marks)

Jan15 4H

Enlargement 2 centre (1, 3)

5
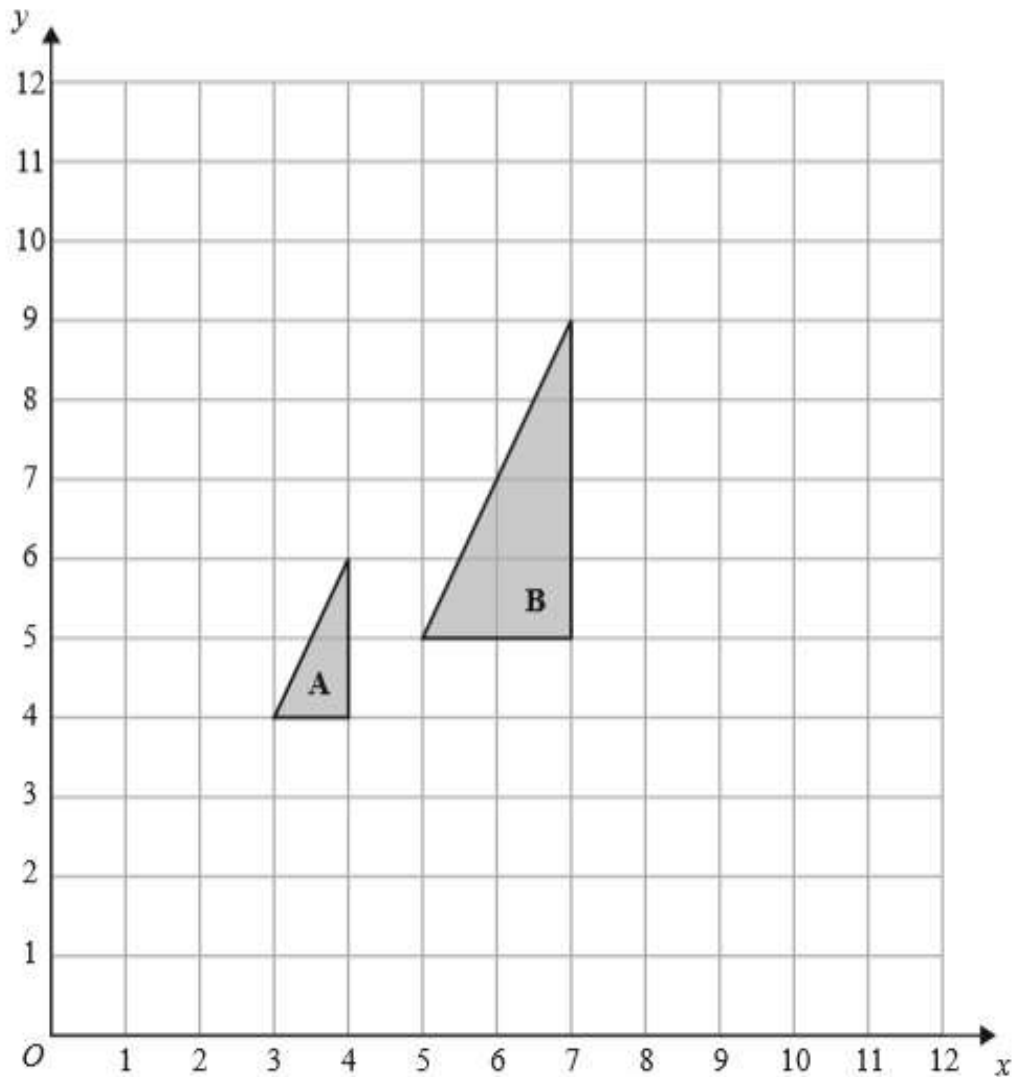
(a) Describe fully the single transformation that maps triangle **A** onto triangle **B**.

....

....

(3)

(b) On the grid, translate triangle **A** by the vector $\begin{pmatrix} 5 \\ -2 \end{pmatrix}$

(1)

(Total for Question 5 is 4 marks)
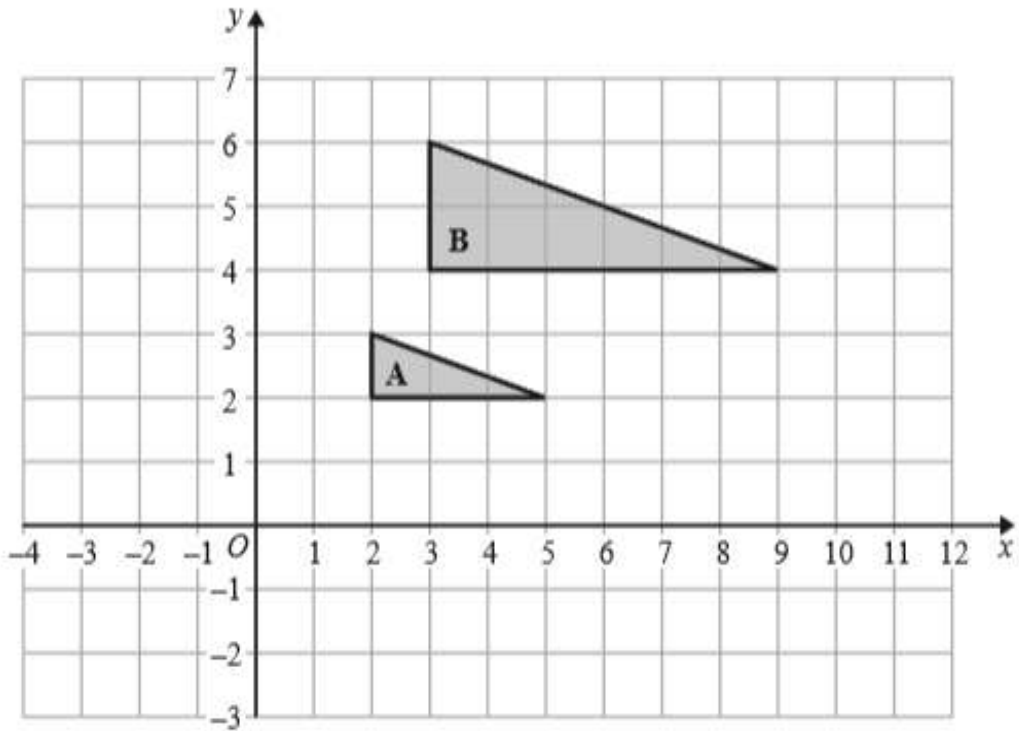
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J16 4H

8

(a) Describe fully the single transformation that maps triangle **A** onto triangle **B**.

....

....

(3)

(b) On the grid, translate triangle **A** by the vector $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$

Label the new shape **C**.

(1)

J16 4H
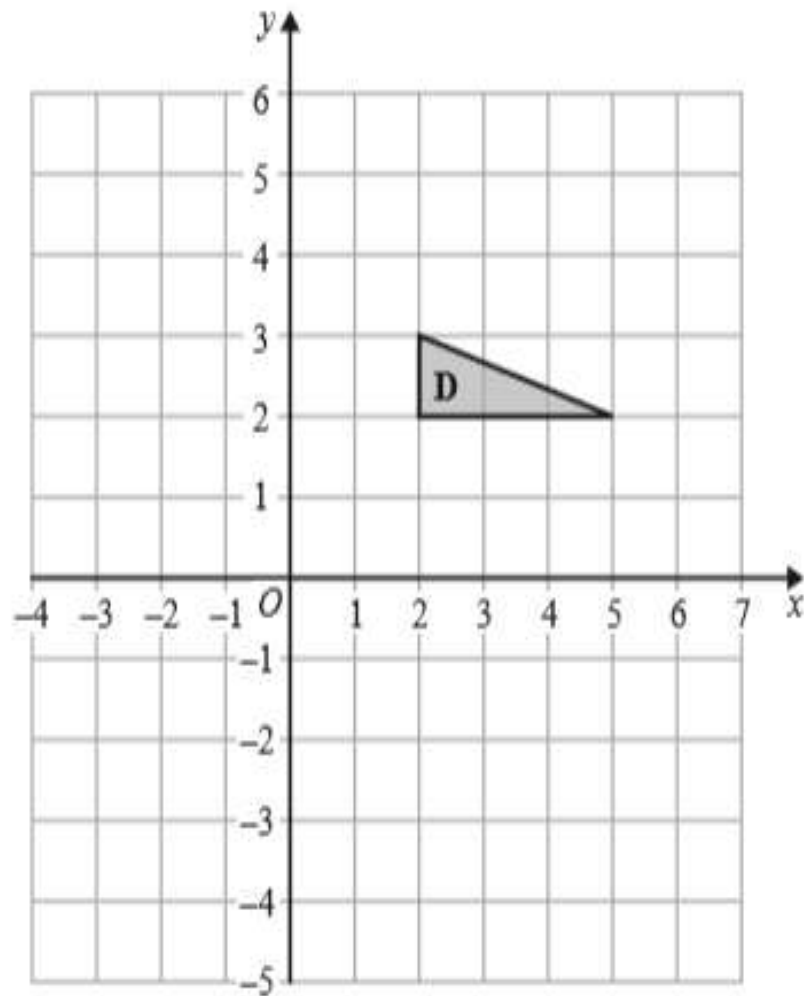
(c) On the grid, rotate triangle **D** 90° anticlockwise with centre (3, 1)

(2)

(Total for Question 8 is 6 marks)

J15 3HR

Reflection x = 2

5
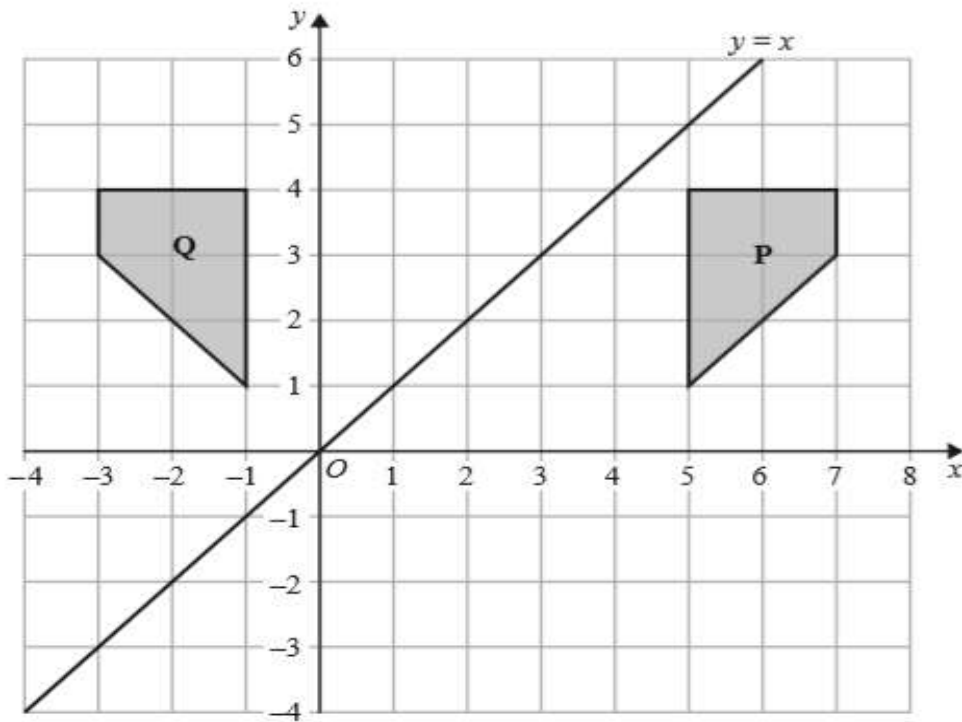
(a) Describe fully the single transformation which maps shape **P** onto shape **Q**.

....

....

(2)

(b) Reflect the shape **Q** in the line $y = x$.
Label the new shape **R**.

(2)

J15 3HR
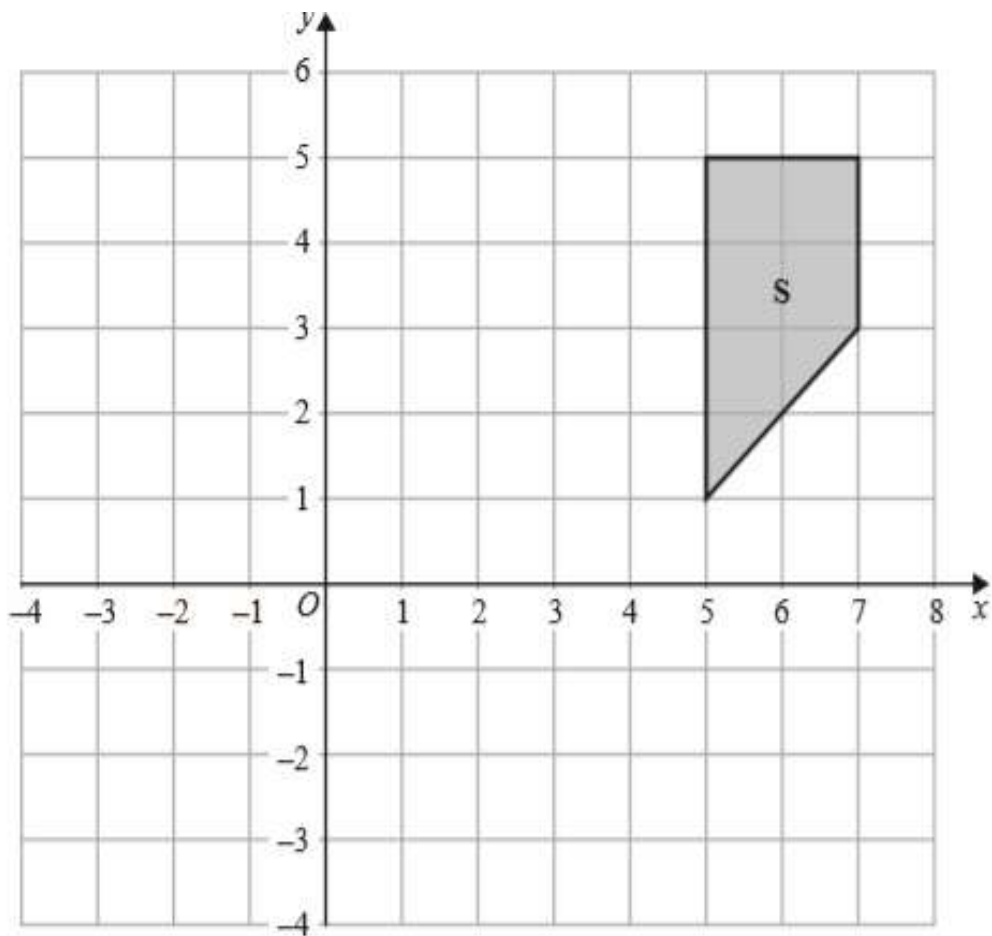
(c) Enlarge shape **S** with scale factor $\frac{1}{2}$ and centre (1, 3)

(2)

(Total for Question 5 is 6 marks)

Graphs in practical situations

N8 4H

8. John goes on a trip.
   Here is the travel graph for his trip.
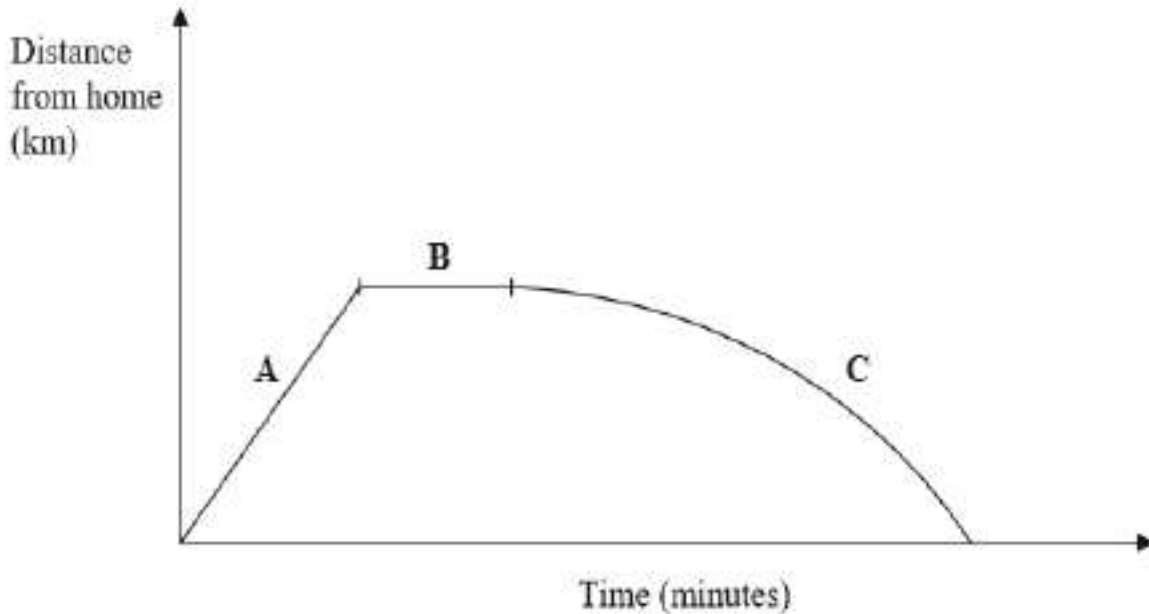
The travel graph has three parts, **A**, **B** and **C**.

Here are four statements.

> John is not moving.
> John is travelling at a steady speed.
> John's speed is increasing.
> John's speed is decreasing.

Choose the statement from the box that best describes

(i) part **A**, ...

(ii) part **B**, ...

(iii) part **C**. ....

(Total 3 marks)

Jan12 4H

2 An aeroplane flew from Qatar to Bahrain.
The distance flown was 135 km.
The average speed was 180 km/h.

Work out the time taken.
Give your answer in **minutes**.

.... minutes

(Total for Question 2 is 3 marks)

Jan14 3H

9159

2 An aeroplane flew from Qatar to Bahrain.
The distance flown was 135 km.
The average speed was 180 km/h.

Work out the time taken.
Give your answer in **minutes**.

.... minutes

(Total for Question 2 is 3 marks)

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46

J11 4H

4 The length of Rachael's journey from her **home to work** is 72 km.
The journey takes 1 **hour** 20 minutes.

Work **out** her average speed in km/h.

.... km/h

(Total for Question 4 is 3 marks)

N10 4H

2. Anya flew from Kuala Lumpur to Singapore.
The average speed for the journey was 248 km/h.
The journey time was 1 hour 15 minutes.

Work out the distance from Kuala Lumpur to Singapore.

.... km

(Total 3 marks)

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J9 3H

530

2. Omar travelled from Nairobi to Mombasa by train.
The journey took 13 hours 15 minutes.
The average speed was 40 km/h.

Work out the distance from Nairobi to Mombasa.

.... km

(Total 3 marks)

N8 4H

4. A train travels 165 km.
Its average speed for the journey is 60 km/h.
Work out the time that this journey takes.
Give your answer in hours and minutes.

2 45

.... hours .... minutes

(Total 3 marks)

N6 4H

5. Bridget flew from the UK to Dubai.
Her flight from the UK to Dubai covered a distance of 5456 km.
The flight time was 7 hours 45 minutes.

704

Work out the average speed of the flight.

.... km/h

(Total 3 marks)

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J10 4H

6.8, 62.5, 10.20

4. (a) Rosetta drives 85 kilometres in 1 hour 15 minutes.
Work out her average speed in kilometres per hour.

.... km/h

(2)

(b) Rosetta drives a total distance of 136 kilometres.
Work out 85 as a percentage of 136

.................................%

(2)

(c) Sometimes Rosetta travels by train to save money.
The cost of her journey by car is £12
The cost of her journey by train is 15% less than the cost of her journey by car.
Work out the cost of Rosetta's journey by train.

£ ....

(3)

(Total 7 marks)

J12 4H

3 Bhavik left his home at 12 00 to cycle to Sam's house.
On the way Bhavik stopped for a rest, and then continued his journey.
The distance-time graph shows his journey.
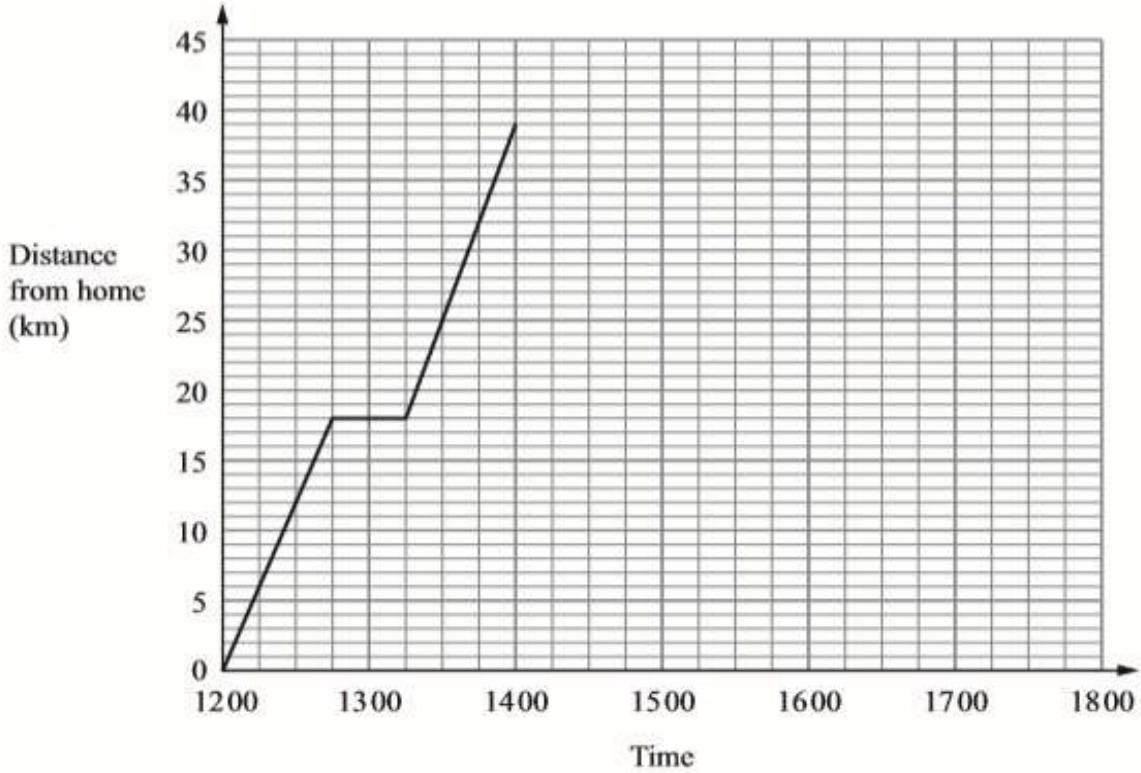
(a) (i) For how many minutes did Bhavik stop for a rest?

.... minutes

(ii) After his rest, how many more kilometres did Bhavik cycle to Sam's house?

.... km

(2)

(b) Bhavik stayed at Sam's house for 2 hours.
He then cycled back to his home.
He arrived home at 17 15.

Show all this information on the graph.

(2)

(c) Write down the times at which Bhavik was 24 kilometres from his home.

....

....

(2)

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J12 4H

31.2

(d) Work out the average speed, in kilometres per hour, of Bhavik's journey from Sam's house back to his home.

Give your answer correct to 1 decimal place.

.... km/h

(3)

(Total for Question 3 is 9 marks)

Jan16 3H

2 Lizzy drove by car to visit her aunt.
   She left home at 9 30 am.

80

Lizzy arrived at her aunt's house at 11 15 am.
She drove a distance of 140 km.

Work out, in km/h, Lizzy's average speed for the journey.

.... km/h

(Total for Question 2 is 3 marks)

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IGCSE

EDEXCEL

PART V

1. Probability.

2. Statistics.

3. Set Notation and Venn diagram.

Prepared by:T.Abeer yousrallah

Probability

3n, 21

21. $\frac{1}{3}$ of the people in a club are men.

The number of men in the club is n.

(a) Write down an expression, in terms of n, for the number of people in the club.

....

(1)

Two of the people in the club are chosen at random.

The probability that both these people are men is $\frac{1}{10}$

(b) Calculate the number of people in the club.

....

(5)

(Total 6 marks)

N6 4H

18, 12

9. There are 48 beads in a bag.
Some of the beads are red and the rest of the beads are blue.
Shan is going to take a bead at random from the bag.

The probability that she will take a red bead is $\frac{3}{8}$

(a) Work out the number of red beads in the bag.

....

(2)

Shan adds some **red** beads to the 48 beads in the bag.

The probability that she will take a red bead is now $\frac{1}{2}$

(b) Work out the number of red beads she adds.

....

(2)

N6 4H

22. Younis spins a biased coin twice.
The probability that it will come down heads both times is 0.36

0.16

Calculate the probability that it will come down tails both times.

....

(Total 3 marks)

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J11 4H

17 Alan has to attend a meeting on Monday and on Tuesday.

The probability that he is late for a meeting is $\frac{1}{8}$

(a) Complete the probability tree diagram.

(3)

Monday meeting   Tuesday meeting

$\frac{1}{8}$ late

not late
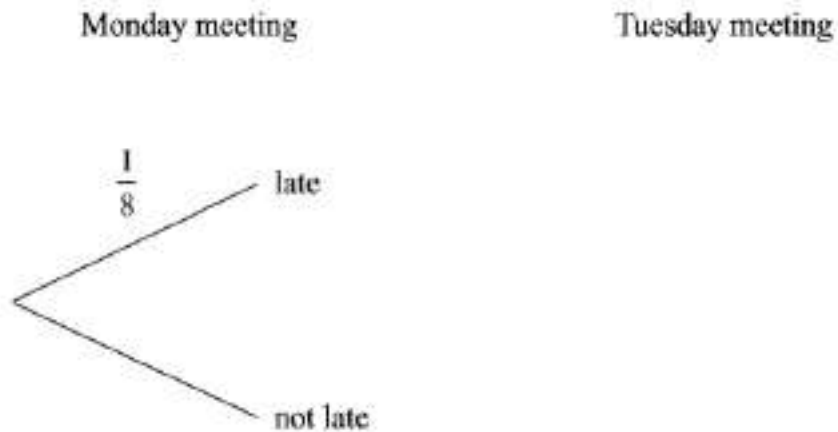
(b) Calculate the probability that Alan is late for at least one of these meetings.

(3)

(Total for Question 17 is 6 marks)

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11. A coin is biased.

When it is thrown, the probability that it shows Heads is $\frac{2}{3}$

Dorcas throws the coin twice.

(a) Complete the probability tree diagram.

First throw   Second throw

$\frac{2}{3}$ — Heads

Tails
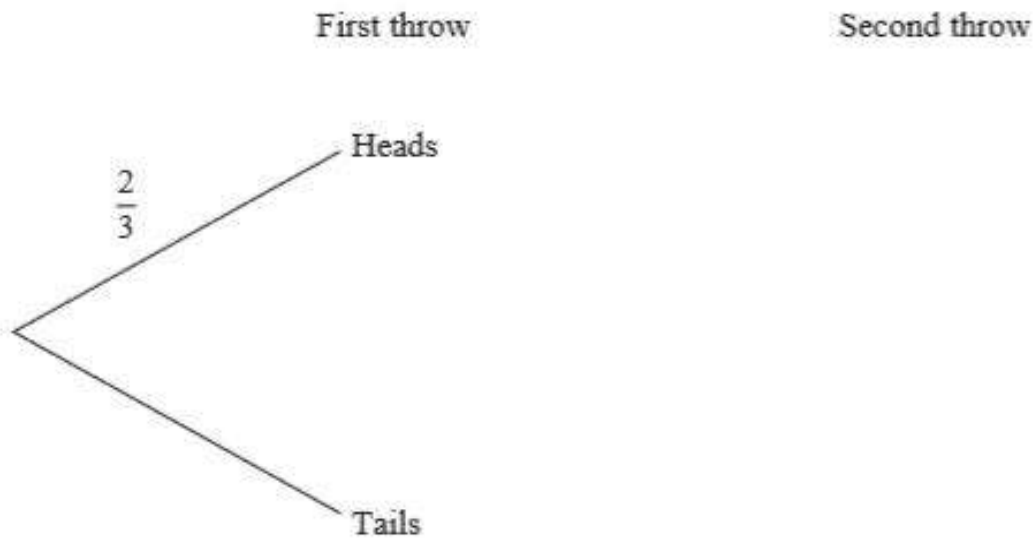
(3)

(b) Find the probability that the coin shows Heads both times.

....
(2)

(c) Find the probability that the coin shows Heads at least once.

....
(3)

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13. Each time Astrid takes a shot at goal, the probability that she will score is $\frac{1}{3}$

<div style="border:1px solid;">

2, 5

3 9

</div>

Astrid takes two shots.

(a) Complete the probability tree diagram.

<div style="display:flex; justify-content:space-between;">

First shot   **Second shot**

</div>

```
              Goal
           /
     1    /
     ─   /
     3  /
       /
       \
        \
         \
          \
           No Goal
```

(3)

(b) Calculate the probability that Astrid scores at least 1 goal.

....

(3)

J5 4H

18. In order to start a course, Bae has to pass a test.
He is allowed only two attempts to pass the test.

The probability that Bae will pass the test at his first attempt is $\frac{2}{5}$.

If he fails at his first attempt, the probability that he will pass at his second attempt is $\frac{3}{4}$.

(a) Complete the probability tree diagram.

<u>First attempt</u>   <u>Second attempt</u>

(3)
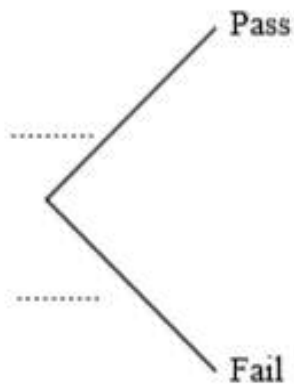
(b) Calculate the probability that Bae will be allowed to start the course.

....

(3)

(Total 6 marks)

J5 4H

| No some are both |

6. In a club, $\frac{1}{2}$ of the members are left-handed and $\frac{1}{4}$ of the members wear glasses. A member is chosen at random.

Stavros says "The probability that this member is left-handed **or** wears glasses is $\frac{3}{4}$"

Is he correct?

....

Explain your answer.

....

....

(Total 2 marks)

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0.3, 0.8, 0.2, 0.5, 0.5, 0.5, 0.5, 0.8, 0.2, 0.75

18 Bill and Jo play some games of table tennis.
The probability that Bill wins the first game is 0.7
When Bill wins a game, the probability that he wins the next game is 0.8
When Jo wins a game, the probability that she wins the next game is 0.5

The first person to win two games wins the match.

(a) Complete the probability tree diagram.

(3)
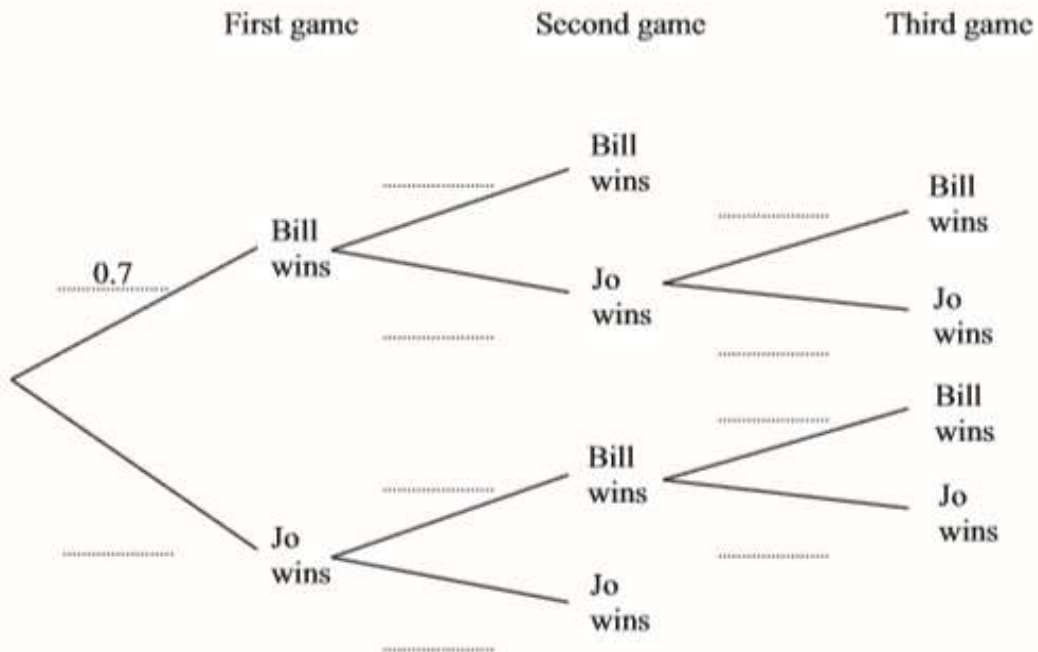
(b) Calculate the probability that Bill wins the match.

....

(3)

(Total for Question 18 is 6 marks)

N10 4H

0.6, 0.7, 48

4. A bag contains some shapes.
   Each shape is a circle or a triangle or a square.
   Lewis takes at random a shape from the bag.
   The probability that he will take a circle is 0.3
   The probability that he will take a triangle is 0.1

   (a) Work out the probability that he will take a square.

   ....

   (2)

   (b) Work out the probability that he will take a shape with straight sides.

   ....

   (2)

   Grace takes at random one of the shapes from the bag and then replaces the shape.
   She does this 160 times.

   (c) Work out an estimate for the number of times she will take a circle.

   ....

   (2)

   (Total 6 marks)

N10 3H

17. Here is a fair dice.

It has six faces numbered 1, 2, 3, 4, 5 and 6
The dice shows a score of 6

Hari throws the dice three times.

(a) Work out the probability that the sum of the scores is 3

....

(2)

(b) Work out the probability that the dice shows a score of 1 on exactly one of the three throws.

....

(3)

(Total 5 marks)

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Jan12 4H

16 Here are 8 dominoes.
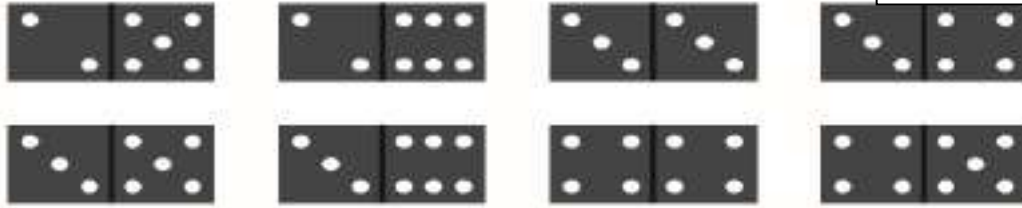
The 8 dominoes are put in a bag.

Riaz takes at random a domino from the bag.

(a) Find the probability that he takes a domino with a total of 8 spots or a domino with a total of 9 spots.

(2)

Helima takes at random 2 dominoes from the bag of 8 dominoes without replacement.

(b) Work out the probability that

(i) the total number of spots on the two dominoes is 18

(ii) the total number of spots on the two dominoes is 17

(5)

(Total for Question 16 is 7 marks)

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N7 4H

24.
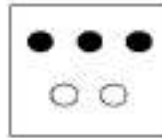
Box A   Box B

In Box A, there are 3 black counters and 2 white counters.
In Box B, there are 2 black counters and 1 white counter.

Farah takes at random a counter from Box A and puts it in Box B.
She then takes at random a counter from Box B.

Work out the probability that the counter she takes from Box B will be a black counter.

....

(Total 3 marks)

13
20

J9 3H

17. Here are five counters.
Each counter has a number on it.

① ③ ③ ③ ⑤

Layla puts the five counters in a bag.
She takes two counters at random from the bag without replacement.

Calculate the probability that

(i)   **both** counters will have the number 3 on them,

....

(ii) the sum of the numbers on the two counters will be 6

....

(Total 5 marks)

6 or **3**, **8** or **2**
20 10 20   5

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J8 3H

16. Here are 9 cards.
Each card has a number on it.

| 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |

Lee takes a card at random.
He records the number which is on the card and replaces the card.
He then takes a second card at random and records the number which is on the card.

(a) Calculate the probability that he will take two even numbers.

....

(2)

(b) Calculate the probability that he will take two numbers with a sum of 43

....

(3)

(Total 5 marks)

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6, 14

36 36

19. The diagram shows six counters.

(B) (A) (N) (A) (N) (A)
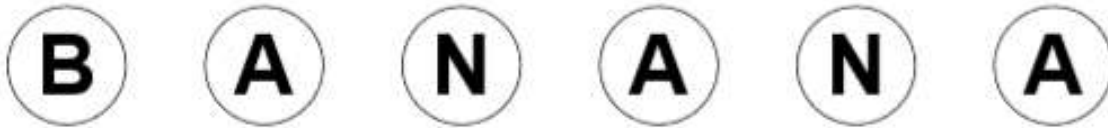
Each counter has a letter on it.

Bishen puts the six counters into a bag.
He takes a counter at random from the bag.
He records the letter which is on the counter and replaces the counter in the bag.
He then takes a second counter at random and records the letter which is on the counter.

(a) Calculate the probability that the first letter will be A and the second letter will be N.

....
(2)

(b) Calculate the probability that both letters will be the same.

....
(4)

(Total 6 marks)

0.03, 0.83

17 Parveen travels to school either by bicycle or by bus.
The probability that, on any day, she will travel by bicycle is 0.7
When she travels by bicycle, the probability that she will be late for school is 0.2
When she travels by bus, the probability that she will be late for school is 0.1

    (a) Calculate the probability that, on a randomly chosen day, Parveen will travel by bus
       and be late for school.

....

(2)

    (b) Calculate the probability that, on a randomly chosen day, Parveen will not be late for
       school.

....

(3)

(Total for Question 17 is 5 marks)

Jan13 3H

0.17, 8

1 Here is a biased 5-sided spinner.
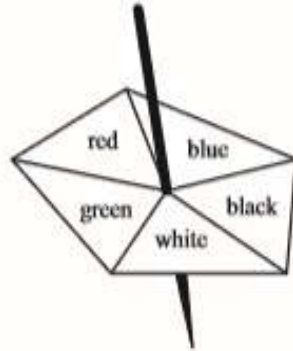
When the spinner is spun, it can land on red, blue, black, white or green.
The probability that it lands on red, blue, black or white is given in the table.

Colour	red	blue	black	white	green
Probability	0.18	0.20	0.23	0.22	

George spins the spinner once.

(a) Work out the probability that the spinner lands on green.

....
(2)

Heena spins the spinner 40 times.

(b) Work out an estimate for the number of times the spinner lands on blue.

....
(2)

(Total for Question 1 is 4 marks)

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Jan13 4H

0.9

4 Abid is waiting for a bus.
   The probability that his bus will be early is 0.2
   The probability that his bus will be on time is 0.7

   Work out the probability that his bus will be either early or on time.

(Total for Question 4 is 2 marks)

20
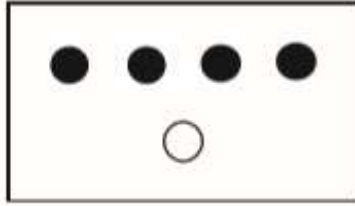
Box X   Box Y
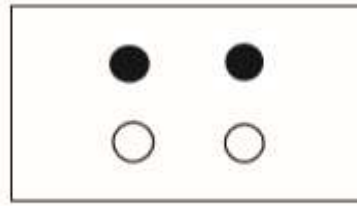
In Box X, there are 4 black discs and 1 white disc.
In Box Y, there are 2 black discs and 2 white discs.

Vikram takes at random a disc from Box X and puts it in Box Y.
He then takes at random a disc from Box Y.

(a) Calculate the probability that the disc he takes from Box X and the disc he takes
from Box Y will both be black discs.

....

(2)

(b) Calculate the probability that the disc he takes from Box Y will be a white disc.

....

(3)

(Total for Question 20 is 5 marks)

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Jan14 3H

13 A box contains 20 nails.
The table shows information about the length of each nail.

Length of nail (mm)	25	30	40	50	60
Number of nails	1	8	4	5	2

(a) Viraj takes at random one nail from the box.

Find the probability that the length of the nail he takes is

(i) 50 mm or 60 mm,

....

(ii) less than 35 mm.

....

(4)

(b) Jamila puts all 20 nails into a bag.
She takes at random one of the nails and records its length.
She replaces the nail in the bag.
She then takes at random a second nail from the bag and records its length.

Calculate the probability that the two nails she takes

(i) each have a length of 60 mm,

....

(ii) have a total length of 80 mm.

....

(5)

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0.3, 0.8, 0.2, 0.24, 0.0576

14 Peter wants to pass his driving test.
The probability that he passes at his first attempt is 0.7
When Peter passes his driving test, he does not take it again.
If he fails, the probability that he passes at the next attempt is 0.8

(a) Complete the probability tree diagram for Peter's first two attempts.

First attempt   Second attempt

Pass
0.7

....
Fail

(2)
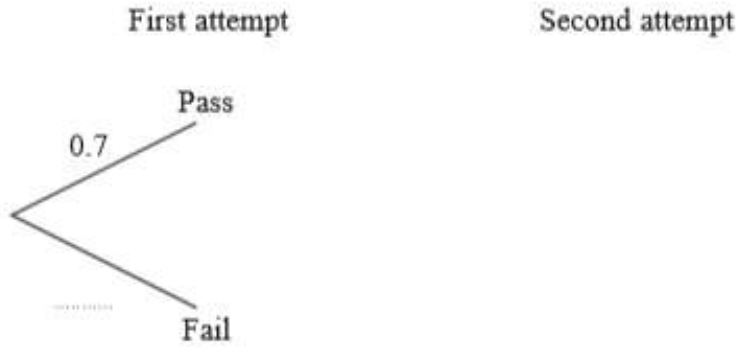
(b) Calculate the probability that Peter needs exactly two attempts to pass his driving test.

(2)

(c) Calculate the probability that Peter passes his driving test at his third or fourth attempt.

(3)

Jan15 3H

0.33, 0.82, 0.02

5   A jar contains coloured beads.
    Ajit takes at random a bead from the jar.
    The probability that the bead is yellow is 0.08
    The probability that the bead is pink is 0.1
    The probability that the bead is blue is 0.25

(a) (i) Find the probability that the bead is yellow or blue.

....

(ii) Find the probability that the bead is neither yellow nor pink.

....
(4)

Ajit replaces the first bead in the jar.
He then takes at random a second bead from the jar.

(b) Find the probability that the first bead is yellow and the second bead is blue.

....
(2)

Jan15 3H

A second jar contains 100 coloured beads.
20 of these beads are brown.

Ajit takes at random a bead from the jar.
He records the colour of the bead and then returns the bead to the jar.
He does this 60 times.

(c) Work out an estimate for the number of times Ajit records a brown bead.

....

(2)

(Total for Question 5 is 8 marks)

Jan15 3H

16 Gemma has 9 counters.
Each counter has a number on it.

$$1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9$$

Gemma puts the 9 counters into a bag.
She takes at random a counter from the bag and does not replace the counter.
She then takes at random a second counter from the bag.

(a) Work out the probability that the number on each counter is an even number.

....

(2)

(b) Work out the probability that the number on the first counter added to the number on the second counter gives an odd number.

....

(3)

(Total for Question 16 is 5 marks)

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21 There are 9 counters in a bag.
There is a number on each counter.
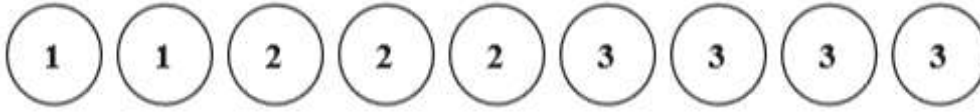
Kal takes at random 3 counters from the bag.

He adds together the numbers on the 3 counters to get his Total.

Work out the probability that his Total is 6

....

(Total for Question 21 is 5 marks)

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J16 4H

16 In a bag there is a total of 20 coins.

10 coins are 20 cent coins
6 coins are 10 cent coins
4 coins are 5 cent coins

Emma takes at random two of the coins from the bag.

(a) Complete the probability tree diagram.

(2)

First coin   Second coin

                                              20 cent coin
                                              10 cent coin
                                              5 cent coin
20 cent coin
$\frac{10}{20}$

                                              20 cent coin
10 cent coin   10 cent coin
                                              5 cent coin

                                              20 cent coin
5 cent coin   10 cent coin
                                              5 cent coin

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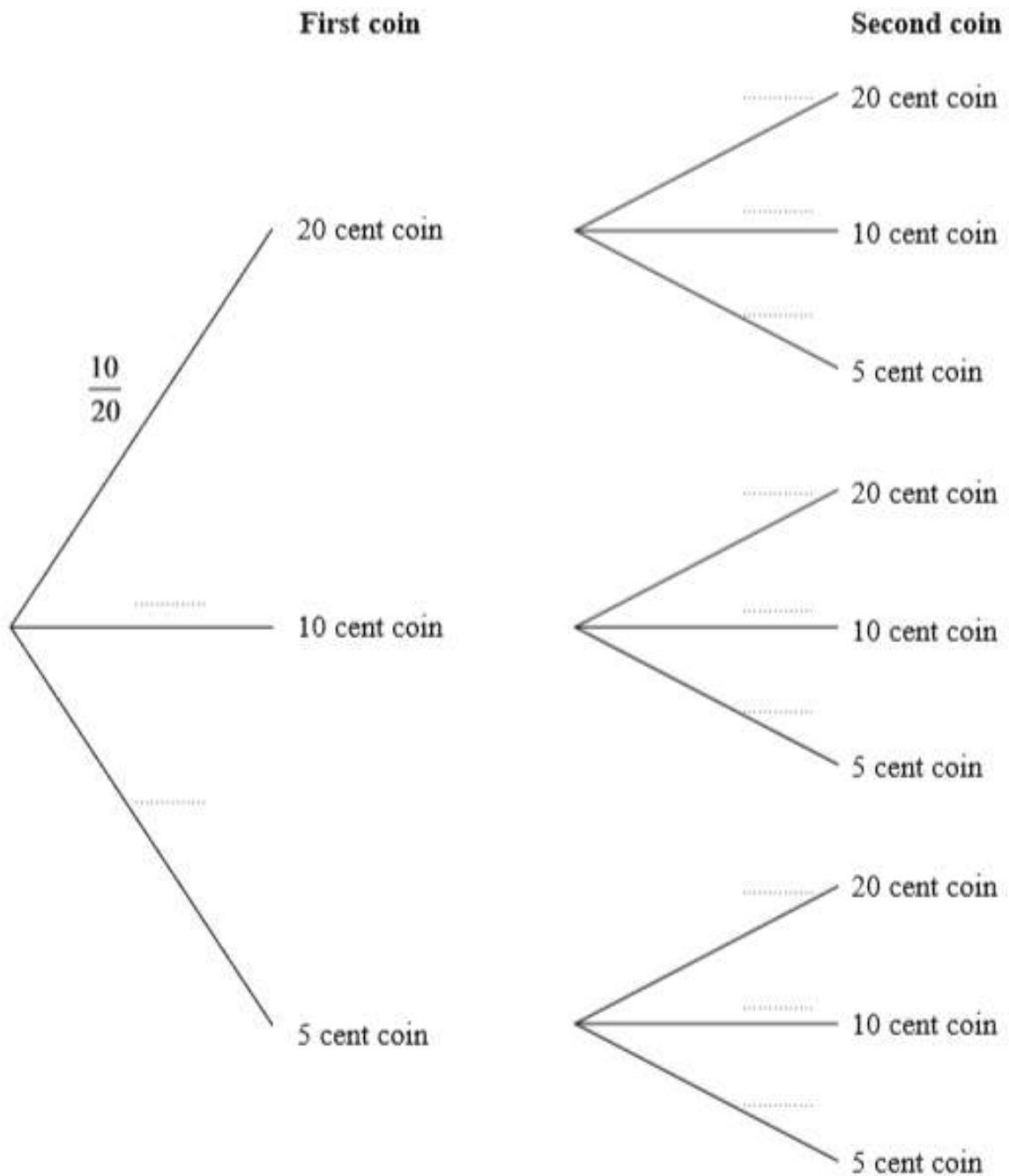
J16 4H

(b) Work out the probability that Emma takes two 5 cent coins.

....

(2)

(c) Work out the probability that the total value of the two coins is 20 cents or less.

....

(3)

(Total for Question 16 is 7 marks)

Statistics

J9 4H

7

4. The table gives information about the shoe sizes of 67 people.

Shoe size	6	7	8	9	10
Number of people	20	19	0	26	2

Find the median shoe size.

....

(Total 2 marks)

J7 4H

A: 11 B: 8, A more spread than B

13. Here are the marks scored in a maths test by the students in two classes.

Class A   2   13   15   16   4   6   19   10   11   4   5   15   4   16   6

Class B   12   11   2   5   19   14   6   6   10   14   9

(a) Work out the interquartile range of the marks for each class.

Class A ....

Class B ....

(4)

(b) Use your answers to give one comparison between the marks of Class A and the marks of Class B.

....

....

(1)

(Total 5 marks)

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4, B higher than A , B less spread than A

11. There are 15 students in class A.

In a test, the students gained these marks.

2   1   2   5   5   6   9   2   5   6   7   5   6   5   6

(a) Find the interquartile range of these marks.

....

(3)

The students in class B took the same test.
Their marks had a median of 7 and an interquartile range of 2

(b) Make **two** comparisons between the marks of the two classes.

(i) ....

....

(ii) ....

....

(2)

(Total 5 marks)

J11 4H

10

7 Six numbers have a mean of 5

   Five of the numbers are

   | 3 | 2 | 7 | 6 | 2 |

   The other number is x.

   Work out the value of x.

$x =$ ....

(Total for Question 7 is 3 marks)

J12 4H

17.4

2 A group of students take a test.
   The group consists of 12 boys and 8 girls.
   The mean mark for the boys is 18
   The mean mark for the girls is 16.5

   Calculate the mean mark for the whole group.

....

(Total for Question 2 is 4 marks)

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Jan12 4H

6

4   Three positive whole numbers have a median of 7 and a mean of 5

Find the range of these three numbers.

....

(Total for Question 4 is 3 marks)

Jan14 4H

1.8

10   The mean of four numbers is 2.6
     One of the four numbers is 5

Find the mean of the other three numbers.

....

(Total for Question 10 is 3 marks)

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1. The table shows information about the numbers of children in 25 families.

2.64

Number of children in the family	Frequency
1	4
2	9
3	8
4	0
5	4

Work out the mean number of children in these 25 families.

....

(Total 3 marks)

$\boxed{1\ \ 5\ \ 6,\ \ 5\ \ 5\ \ 7\ \ x\ ,\ x > 7}$

9. (a) Three positive whole numbers are all different.
   They have a median of 5 and a mean of 4
   Find the three numbers.

   ....

   (2)

   (b) Find four whole numbers which have a mode of 5 and a median of 6

   ....

   (2)

   (Total 4 marks)

35

N7 3H

2.3

2. The table shows information about the scores in a game.

Score	Frequency
1	5
2	8
3	3
4	4

Work out the mean score.

....

(Total 3 marks)

J12 3H

5 Three positive whole numbers have a mean of 4 and a range of 7

Find the three positive whole numbers.

1 3 8

....

(Total for Question 5 is 2 marks)

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J7 3H

48

3. Hajra counted the numbers of sweets in 20 packets.
The table shows information about her results.

Number of sweets	Frequency
46	3
47	6
48	3
49	5
50	2
51	1

Work out the mean number of sweets in the 20 packets.

....

(Total 3 marks)

J12 3H

3.12

10 The table shows information about the number of peas in each of 25 pods.

Number of peas	1	2	3	4	5	6
Number of pods	3	6	5	8	2	1

(a) Work out the mean number of peas in the 25 pods.

....

(3)

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J12 3H

(b) Tariq puts the 25 pods in a bag.
He takes at random one of the pods.

Find the probability that he takes a pod with 3 peas or a pod with 4 peas.

....

(2)

(c) Laila puts the 25 pods in a bag.
She takes at random two pods without replacement.

Calculate the probability that

(i)   there are 3 peas in each of the two pods she takes,

....

(ii) there is a total of 4 peas in the two pods she takes.

....

(5)

(Total for Question 10 is 10 marks)

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J14 4H

10 The table shows information about the times, in minutes, taken by 50 people to get to work.

Time taken (t minutes)	Frequency
$0 < t \leqslant 10$	6
$10 < t \leqslant 20$	10
$20 < t \leqslant 30$	19
$30 < t \leqslant 40$	15

Work out an estimate for the mean time taken to get to work.

.... minutes

(Total for Question 10 is 4 marks)

J13 4H

3480

12 The table shows information about the amount of money, in dollars, spent in a shop in one day by 80 people.

Money spent (x dollars)	Frequency
$0 < x \leqslant 20$	24
$20 < x \leqslant 40$	20
$40 < x \leqslant 60$	9
$60 < x \leqslant 80$	12
$80 < x \leqslant 100$	15

Work out an estimate for the total amount of money spent in the shop that day.

.... dollars

(Total for Question 12 is 3 marks)

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9 The table shows information about the snowfall in Ottawa in January one year.

Snowfall (s cm)	Number of days
$0 \leqslant s < 2$	19
$2 \leqslant s < 4$	8
$4 \leqslant s < 6$	3
$6 \leqslant s < 8$	0
$8 \leqslant s < 10$	1

Work out an estimate for the total snowfall in January.

.... cm

(Total for Question 9 is 3 marks)

0.42

4. There are 5 classes in a school.

(a) The pie chart shows information about the number of students in each class.
The pie chart is accurately drawn.
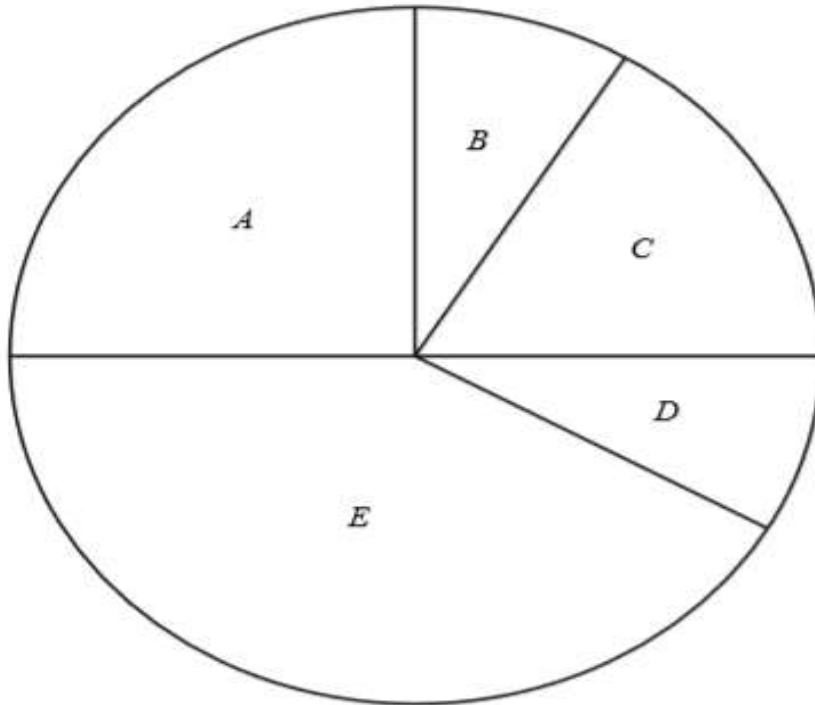
A student from the school is chosen at random.
Find the probability that this student is in class E.

....

(2)

14.3

(b) The table shows information about the ages of the students.

Age, x years	Frequency
$9 \leqslant x < 11$	30
$11 \leqslant x < 13$	12
$13 \leqslant x < 15$	18
$15 \leqslant x < 19$	60

Calculate an estimate of the mean age of these students.
Give your answer correct to 3 significant figures.

.... years

(4)

(Total 6 marks)

4 10 19 33 54

11. The grouped frequency table gives information about life expectancy in the 54 countries of the Commonwealth.

Life expectancy (t years)	Frequency
$30 < t \leqslant 40$	4
$40 < t \leqslant 50$	6
$50 < t \leqslant 60$	9
$60 < t \leqslant 70$	14
$70 < t \leqslant 80$	21

(a) Complete the cumulative frequency table.

Life expectancy (t years)	Cumulative frequency
$30 < t \leqslant 40$	
$30 < t \leqslant 50$	
$30 < t \leqslant 60$	
$30 < t \leqslant 70$	
$30 < t \leqslant 80$	

(1)

(b) On the grid, draw the cumulative frequency graph for your table.

Life expectancy (t years)

(2)

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N8 3H

66
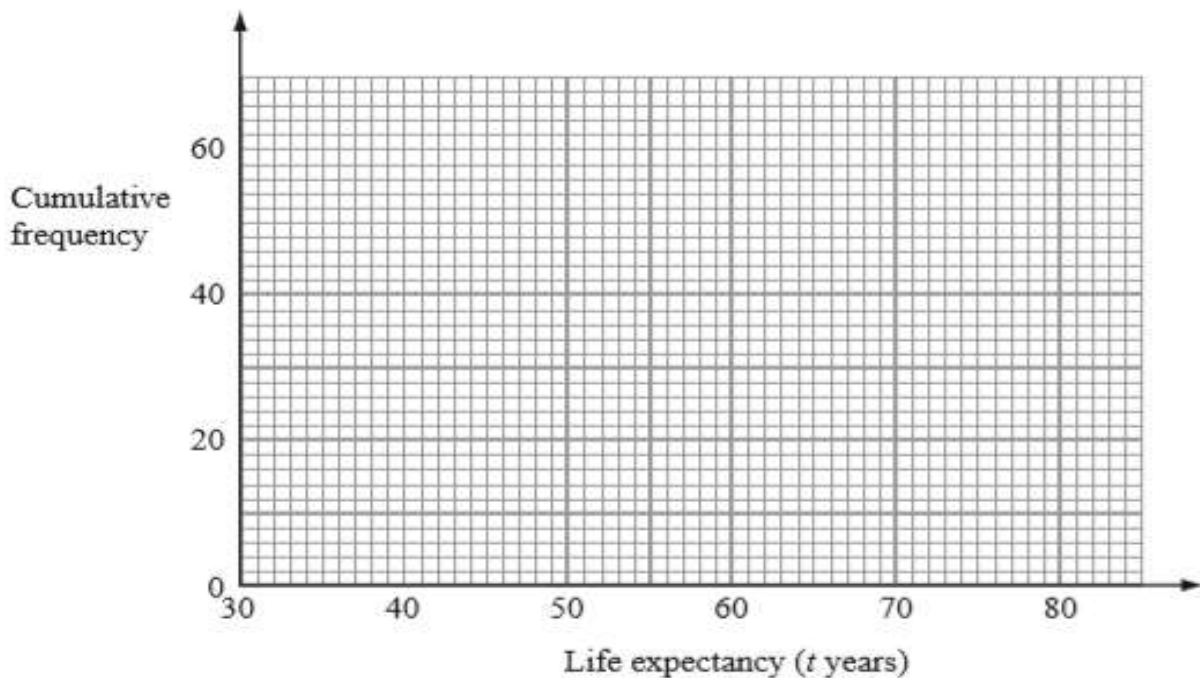
(c) Use your graph to find an estimate for the median of the life expectancies in Commonwealth countries.

.... years

(2)

(Total 5 marks)

J7 3H

10 26 41 50 56 60

12. The grouped frequency table gives information about the weights of 60 cows.

Weight (w kg)	Frequency
$100 < w \leqslant 200$	10
$200 < w \leqslant 300$	16
$300 < w \leqslant 400$	15
$400 < w \leqslant 500$	9
$500 < w \leqslant 600$	6
$600 < w \leqslant 700$	4

(a) Complete the cumulative frequency table.

Weight (w kg)	Cumulative frequency
$100 < w \leqslant 200$	
$100 < w \leqslant 300$	
$100 < w \leqslant 400$	
$100 < w \leqslant 500$	
$100 < w \leqslant 600$	
$100 < w \leqslant 700$	

(1)

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J7 3H

(b) On the grid, draw the cumulative frequency graph for your table.

(2)
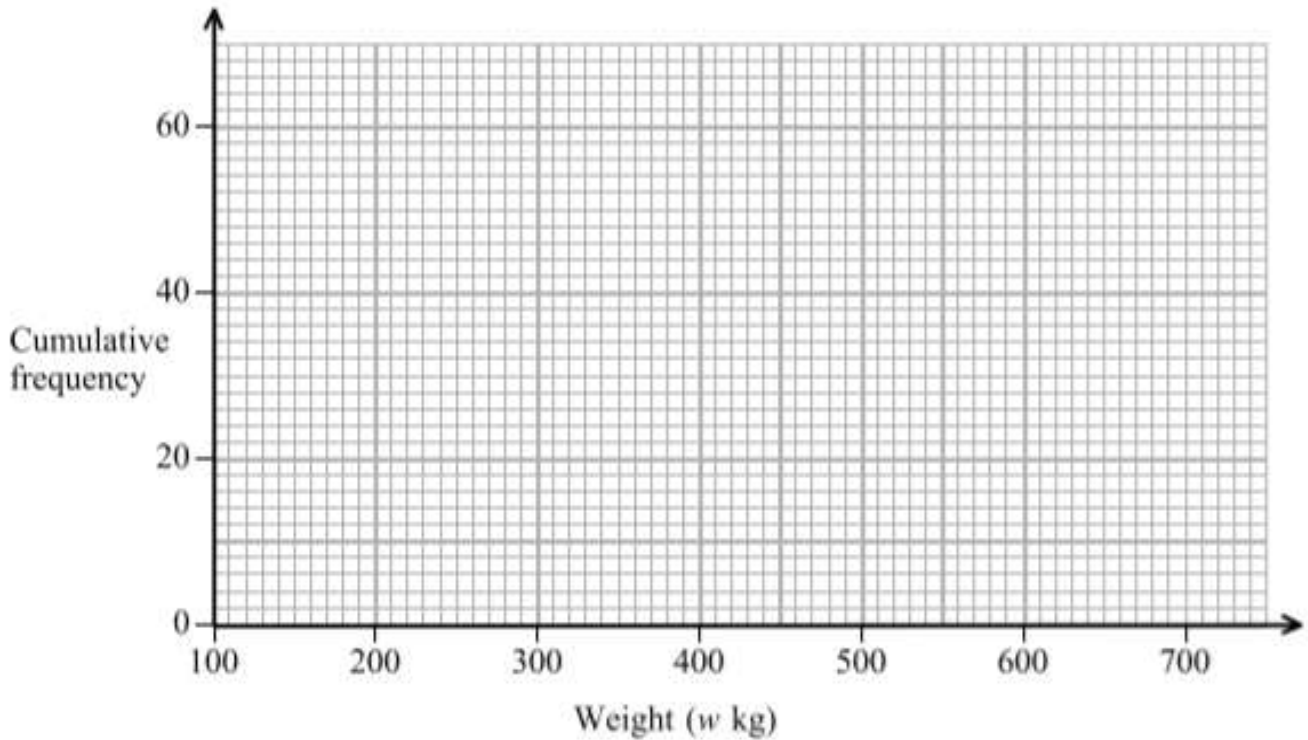
(c) Use your graph to find an estimate for the number of cows that weighed more than 430 kg.
Show your method clearly.

....

(2)

(Total 5 marks)

15 to 15.5, 28 to 30, 4

11. The cumulative frequency graph gives information about the lengths of 40 tree branches.
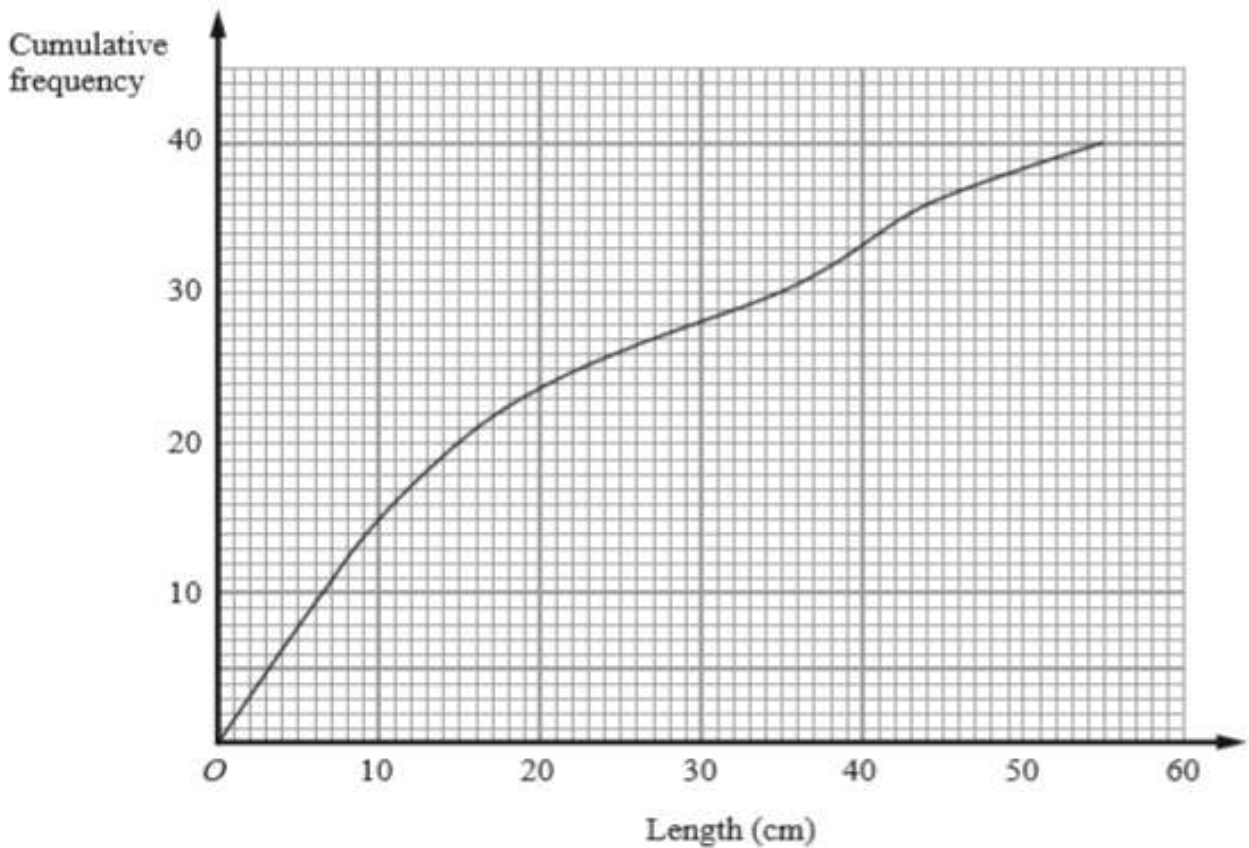
(a) Find an estimate for the median length.

.... cm

(2)

(b) Find an estimate for the interquartile range of the lengths.

.... cm

(2)

(c) Find an estimate for the number of branches with lengths of more than 44 cm.

....

(1)

(Total 5 marks)

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11. The table shows information about the pulse rates of 60 people, when they were resting.

Pulse rate (p beats/min)	Frequency
$50 < p \leqslant 60$	7
$60 < p \leqslant 70$	21
$70 < p \leqslant 80$	15
$80 < p \leqslant 90$	14
$90 < p \leqslant 100$	3

(a) Write down the modal class.

....

(1)

(b) Work out an estimate for the mean pulse rate of the 60 people.

.... beats/min

(4)

J8 3H

The cumulative frequency graph gives information about the pulse rates of the same 60 people, after they have exercised for ten minutes.
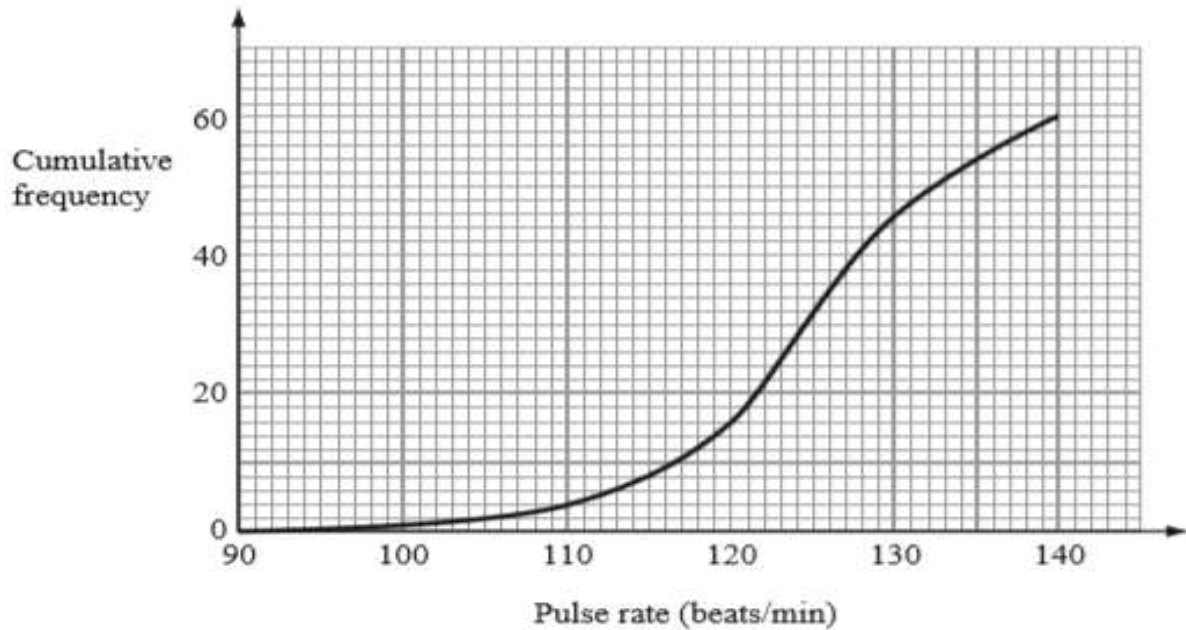
(c) Use the graph to find an estimate for the median pulse rate of the 60 people.

.... beats/min

(2)

(d) Use the graph to find an estimate for the number of people with a pulse rate of more than 131 beats/min.

....

(2)

(Total 9 marks)

54 to 56, 18 to 22

16. The cumulative frequency diagram shows information about the heights, in centimetres, of 200 plants.
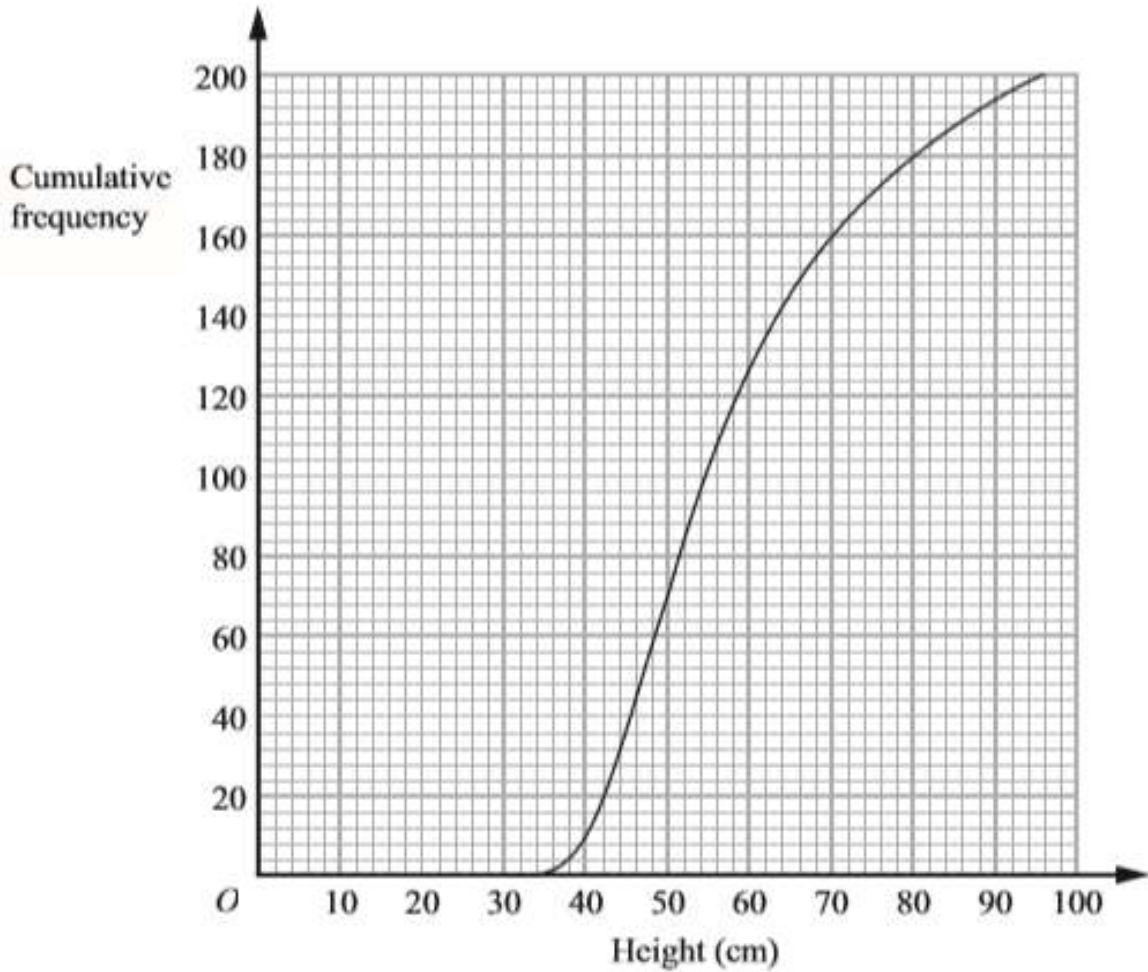
(a) Find an estimate for the median height.

.... cm

(2)

(b) Work out an estimate for the number of plants whose heights are greater than 80 cm.

....

(2)

(Total 4 marks)

400 < V< 500, 395

6. The table shows information about the volume of water, in m³, used by each of 80 families in one year.

Volume of water (V m³)	Frequency
$0 < V \leqslant 100$	2
$100 < V \leqslant 200$	4
$200 < V \leqslant 300$	6
$300 < V \leqslant 400$	18
$400 < V \leqslant 500$	44
$500 < V \leqslant 600$	6

(a) Write down the modal class.

....

(1)

(b) Work out an estimate for the mean volume of water used by the 80 families.

.... m³

(4)

2 6 12 30 74 80, Approx. 420

(c) Complete the cumulative frequency table.

Volume of water (V m³)	Cumulative frequency
$0 < V \leqslant 100$	
$0 < V \leqslant 200$	
$0 < V \leqslant 300$	
$0 < V \leqslant 400$	
$0 < V \leqslant 500$	
$0 < V \leqslant 600$	

(1)

(d) On the grid, draw a cumulative frequency graph for your table.

(2)
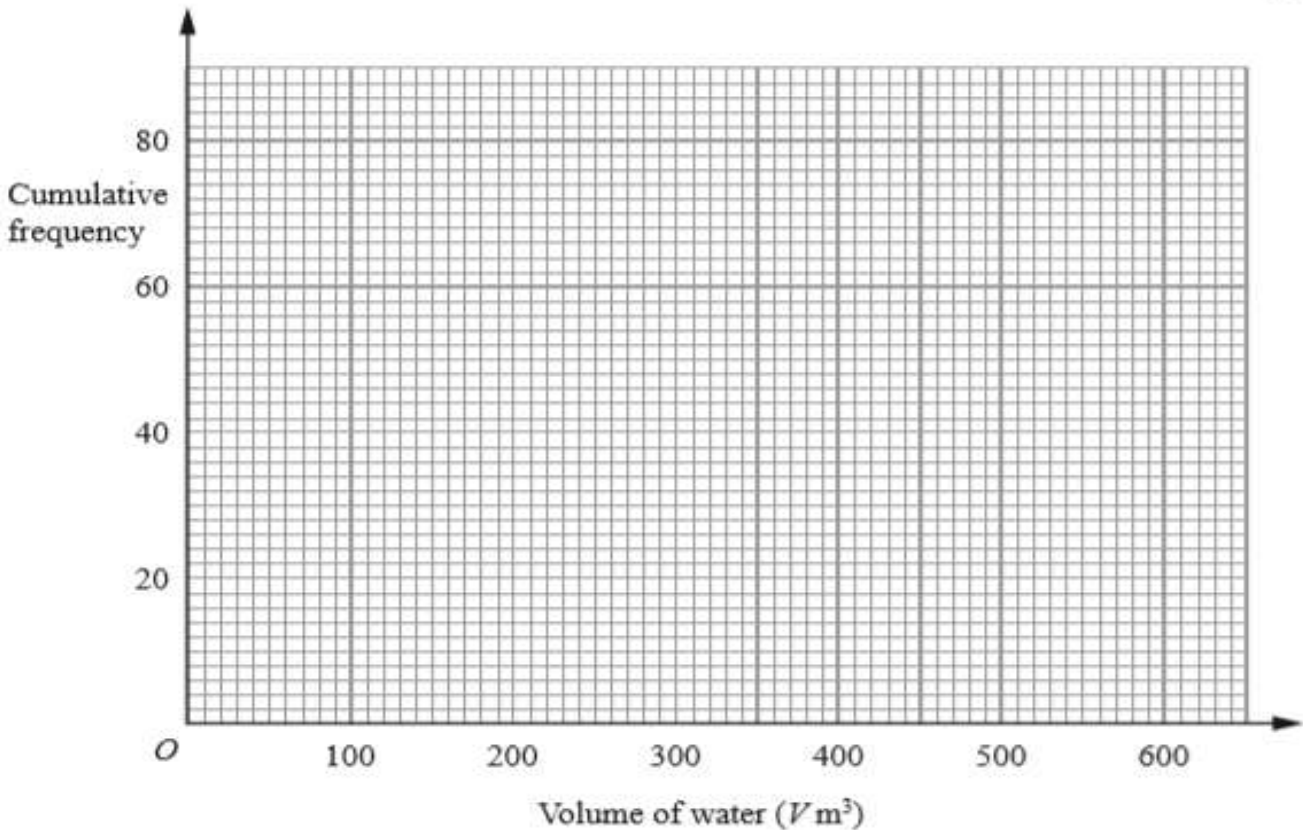
Volume of water (V m³)

(e) Use your graph to find an estimate for the median volume of water used by the 80 families.

.... m³

(2)

(Total 10 marks)

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444, 8 22 48   65 75   80

11 The table shows information about the weights of 80 parcels.

Weight (w kg)	Frequency
$0 < w \leqslant 2$	8
$2 < w \leqslant 4$	14
$4 < w \leqslant 6$	26
$6 < w \leqslant 8$	17
$8 < w \leqslant 10$	10
$10 < w \leqslant 12$	5

(a) Work out an estimate for the total weight of the 80 parcels.

.... kg

(3)

(b) Complete the cumulative frequency table.

Weight (w kg)	Cumulative frequency
$0 < w \leqslant 2$	
$0 < w \leqslant 4$	
$0 < w \leqslant 6$	
$0 < w \leqslant 8$	
$0 < w \leqslant 10$	
$0 < w \leqslant 12$	

(1)

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J11 3H

Approx. 36 - 40

(c) On the grid, draw a cumulative frequency graph for your table.

Weight (*w* kg)

(2)
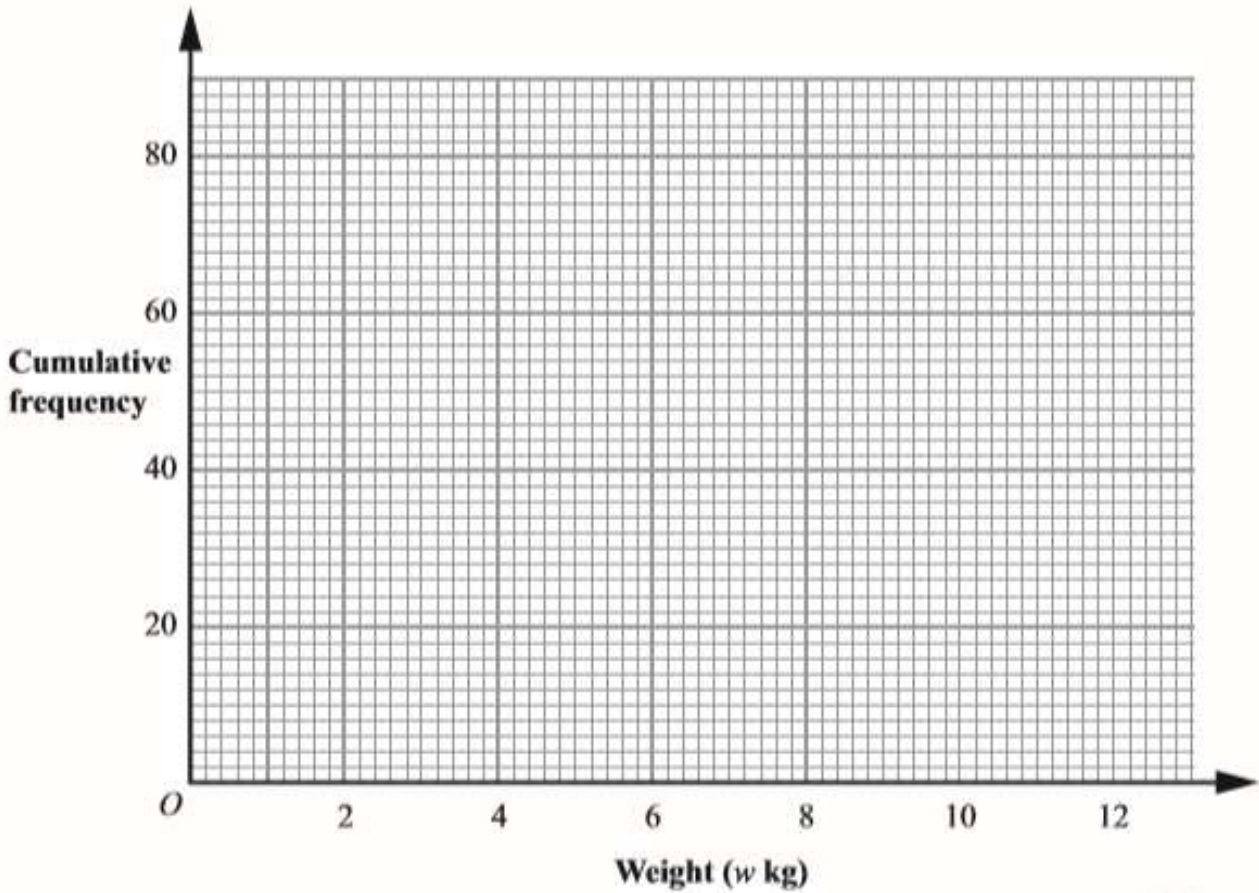
(d) Use the graph to find an estimate for the number of parcels which weighed less than 5.2 kg.

(2)

(Total for Question 11 is 8 marks)

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21. The unfinished table and histogram show information about the weights, in kg, of some babies.

Frequency density
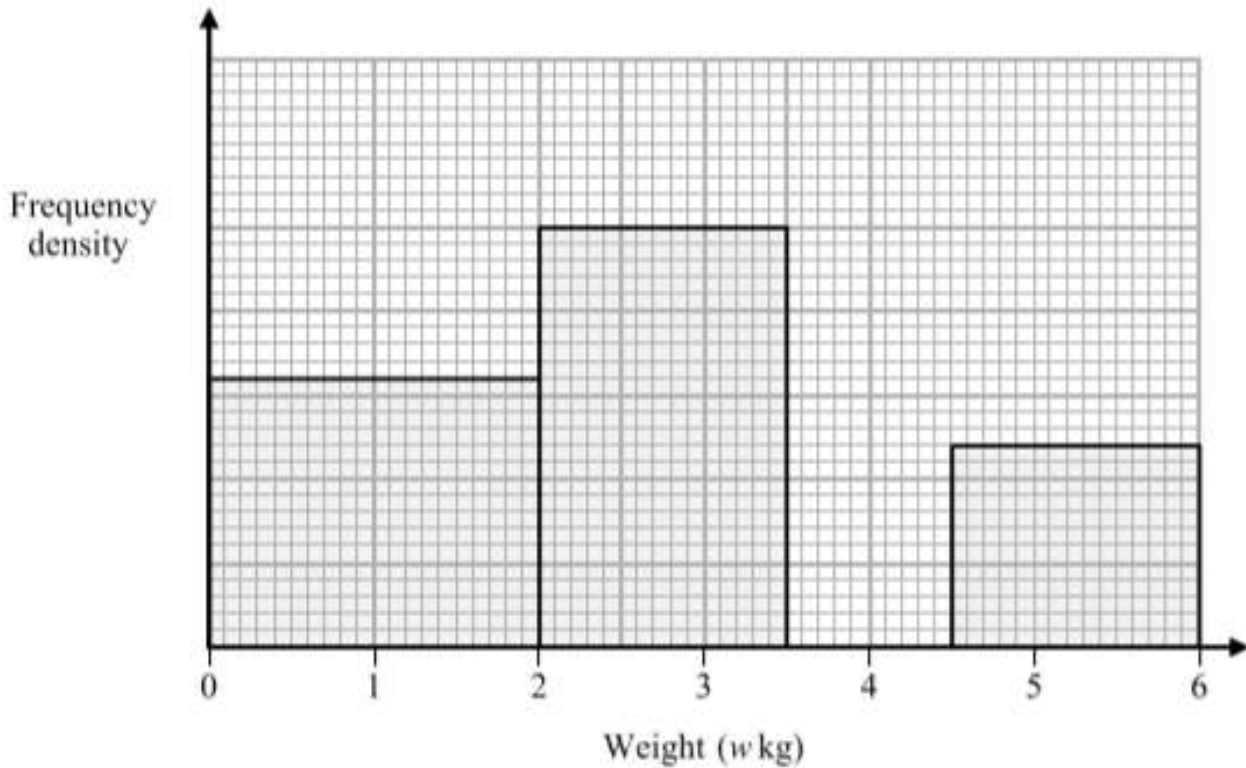
Weight (w kg)

Weight (w kg)	Frequency
$0 < w \leqslant 2$	
$2 < w \leqslant 3.5$	150
$3.5 < w \leqslant 4.5$	136
$4.5 < w \leqslant 6$	

(a) Use the histogram to complete the table.

(2)

(b) Use the table to complete the histogram.

(1)

(Total 3 marks)

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N10 4H

18, (2..5 -4) 19 squares, (4 – 6) 6 squares

17. The incomplete table and histogram show information about the weights of some books.

Weight (w kg)	Frequency
$0 < w \leqslant 1$	
$1 < w \leqslant 2.5$	36
$2.5 < w \leqslant 4$	57
$4 < w \leqslant 6$	24

Weight (w kg)
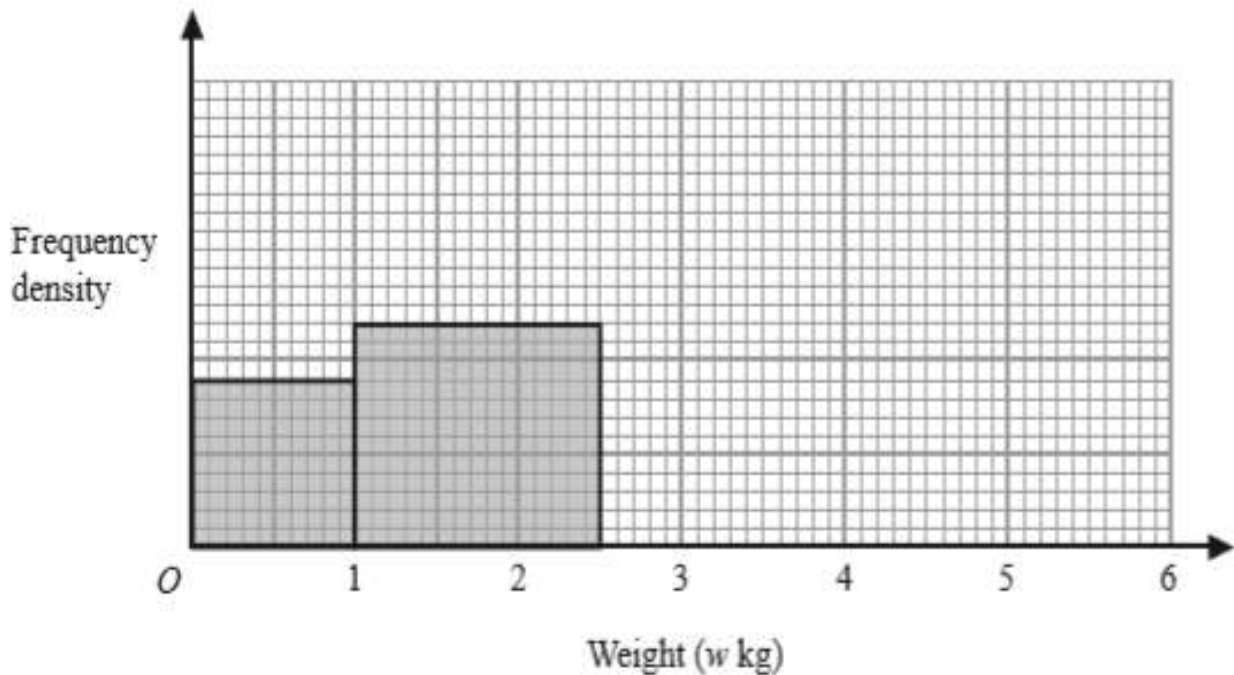
(a) Use the information in the histogram to complete the table.

(1)

(b) Use the information in the table to complete the histogram.

(2)

(Total 3 marks)

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J11 4H

16 The incomplete histogram and table give information about the ages of people living in a village.
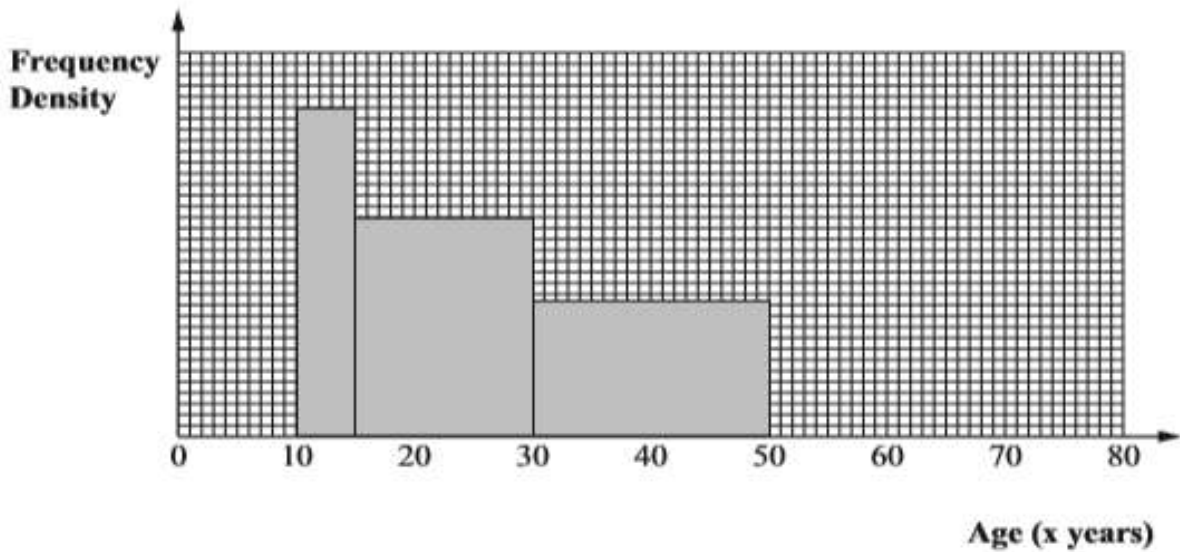
Age (x years)	Frequency
$0 \leqslant x < 10$	100
$10 \leqslant x < 15$	60
$15 \leqslant x < 30$	
$30 \leqslant x < 50$	
$50 \leqslant x < 75$	50
$75 \leqslant x < 80$	20

(i) Use the histogram to complete the table.

(ii) Use the table to complete the histogram.

(Total for Question 16 is 4 marks)

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160, 2.5 cm

15. The unfinished histogram shows information about the heights, h metres, of some trees. A key is also shown.
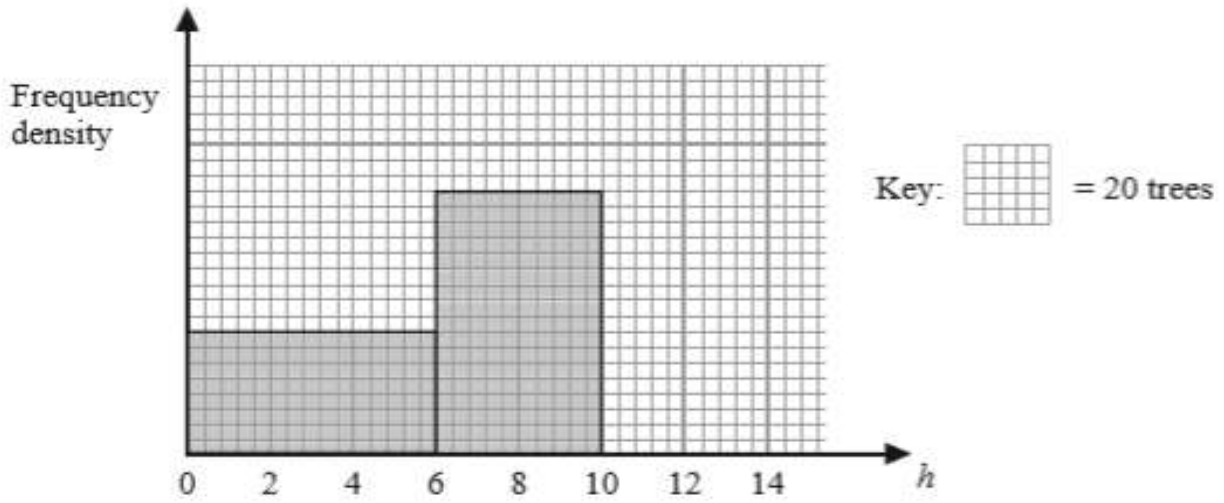
(a) Calculate an estimate for the number of trees with heights in the interval
$4.5 < h \leqslant 10$

....

(3)

(b) There are 75 trees with heights in the interval 10 $< h \leqslant 13$
Use this information to complete the histogram.

(2)

(Total 5 marks)

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19. The histogram shows information about the widths, w centimetres, of some leaves.
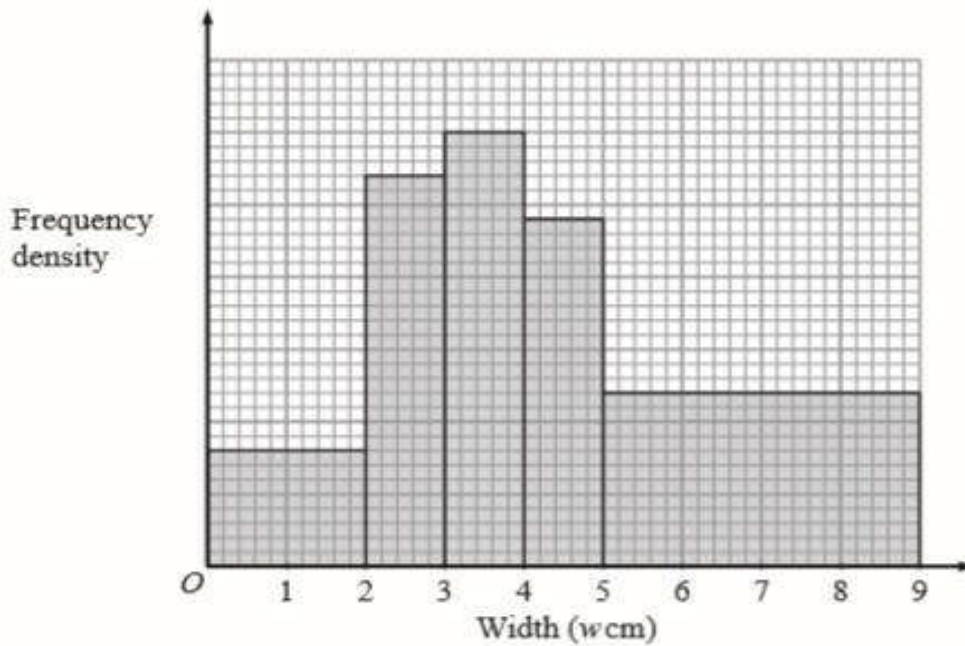
The number of leaves with widths in the class $3 < w \leqslant 4$ is 15

(a) Find the number of leaves with widths in the class $0 < w \leqslant 2$

....

(2)

(b) Find an estimate of the number of leaves with widths in the range

$4.5 < w \leqslant 5.5$

....

(3)

(Total 5 marks)

J14 4H

22 The table shows information about the times, in minutes, that 100 shoppers spent in a supermarket.

Time (*t* minutes)	Frequency
$10 \leqslant t < 15$	6
$15 \leqslant t < 20$	10
$20 \leqslant t < 30$	20
$30 \leqslant t < 40$	36
$40 \leqslant t < 60$	28

Draw a histogram to show this information.

(Total for Question 22 is 3 marks)

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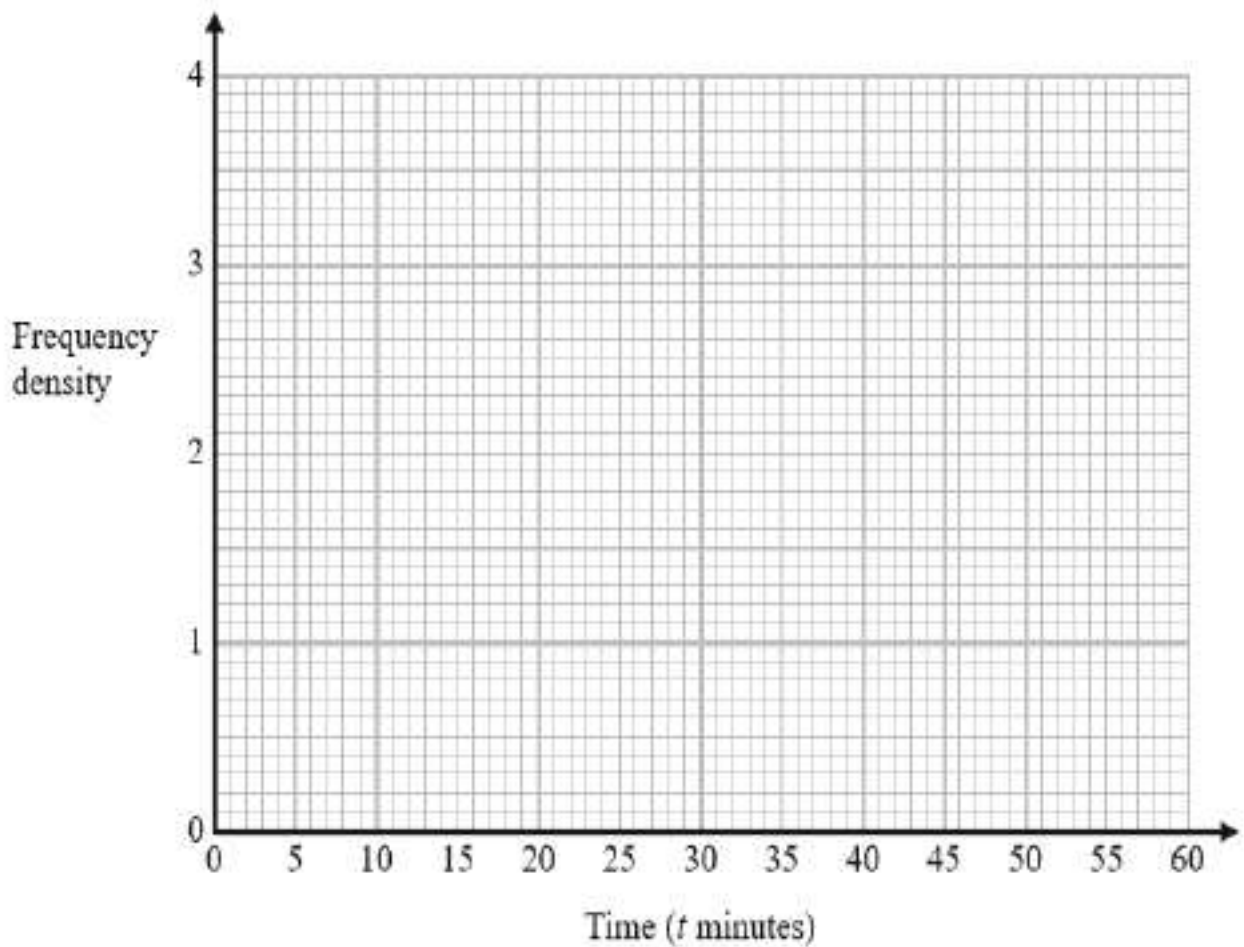
40, 4

17. The histogram shows information about the heights, x cm, of some plants.
The histogram is drawn accurately.

Frequency density
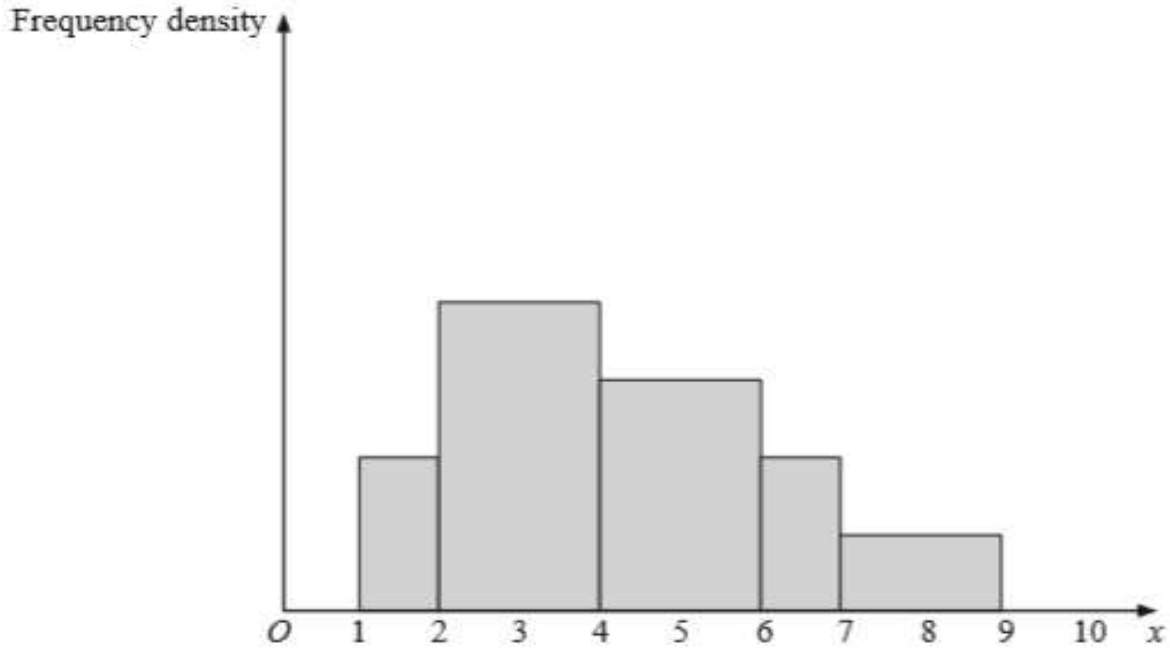
(a) Calculate the percentage of values of x that lie between 2 and 4.

.... %

(3)

(b) Find the median of x.

....

(2)

(Total 5 marks)

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25 < d <30, 1040

6 A school has 60 teachers.

The table shows information about the distances, in km, the teachers travel to school each day.

Distance (d km)	Frequency
$0 < d \leqslant 5$	12
$5 < d \leqslant 10$	6
$10 < d \leqslant 15$	4
$15 < d \leqslant 20$	6
$20 < d \leqslant 25$	14
$25 < d \leqslant 30$	18

(a) Write down the modal class.

....

(1)

(b) Work out an estimate for the total distance travelled to school by the 60 teachers each day.

.... km

(3)

(Total for Question 6 is 4 marks)

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61

Jan13 3H

$40, 5cm \ 6cm \ 1.5cm$

13 The incomplete table and histogram show information about the lengths of time, t minutes, students spent waiting for their school bus one morning.

Time (t minutes)	Number of students
$0 < t \leqslant 2$	20
$2 < t \leqslant 10$	120
$10 < t \leqslant 15$	60
$15 < t \leqslant 20$	
$20 < t \leqslant 30$	30

(i) Use the histogram to complete the table.

(ii) Use the table to complete the histogram.

Time (t minutes)

(Total for Question 13 is 4 marks)

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Jan12 3H

30, 6 cm 10cm 2cm
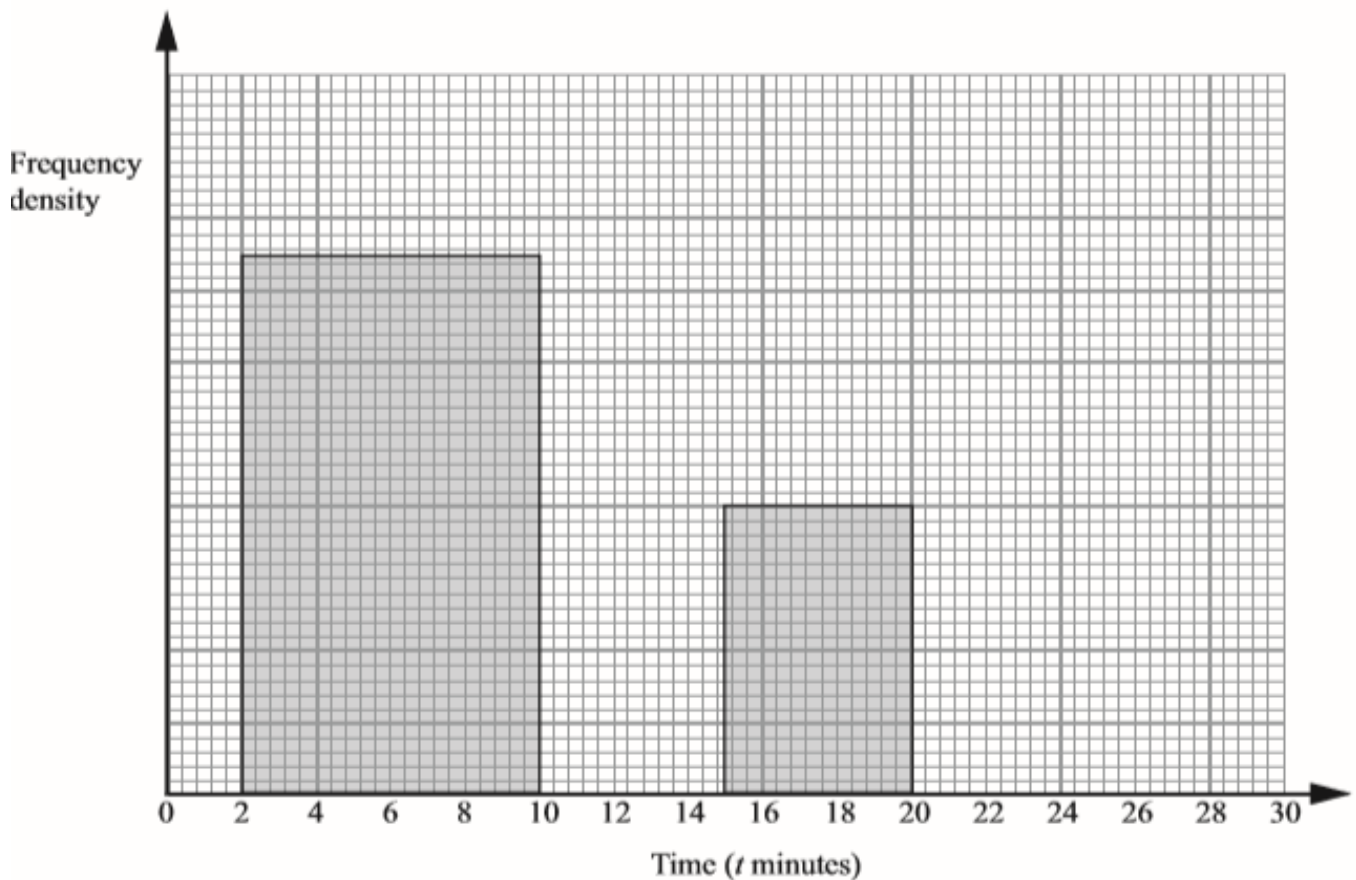
16 The incomplete table shows information about the times, in minutes, that runners took to complete a race.

Time (t minutes)	$30 \leqslant t < 35$	$35 \leqslant t < 40$	$40 \leqslant t < 50$	$50 \leqslant t < 60$	$60 \leqslant t < 80$
Number of runners	12	20		12	16

(a) Use the histogram to calculate the number of runners who took between 40 and 50 minutes to complete the race.

....

(2)

(b) Complete the histogram for the remaining results.

(2)
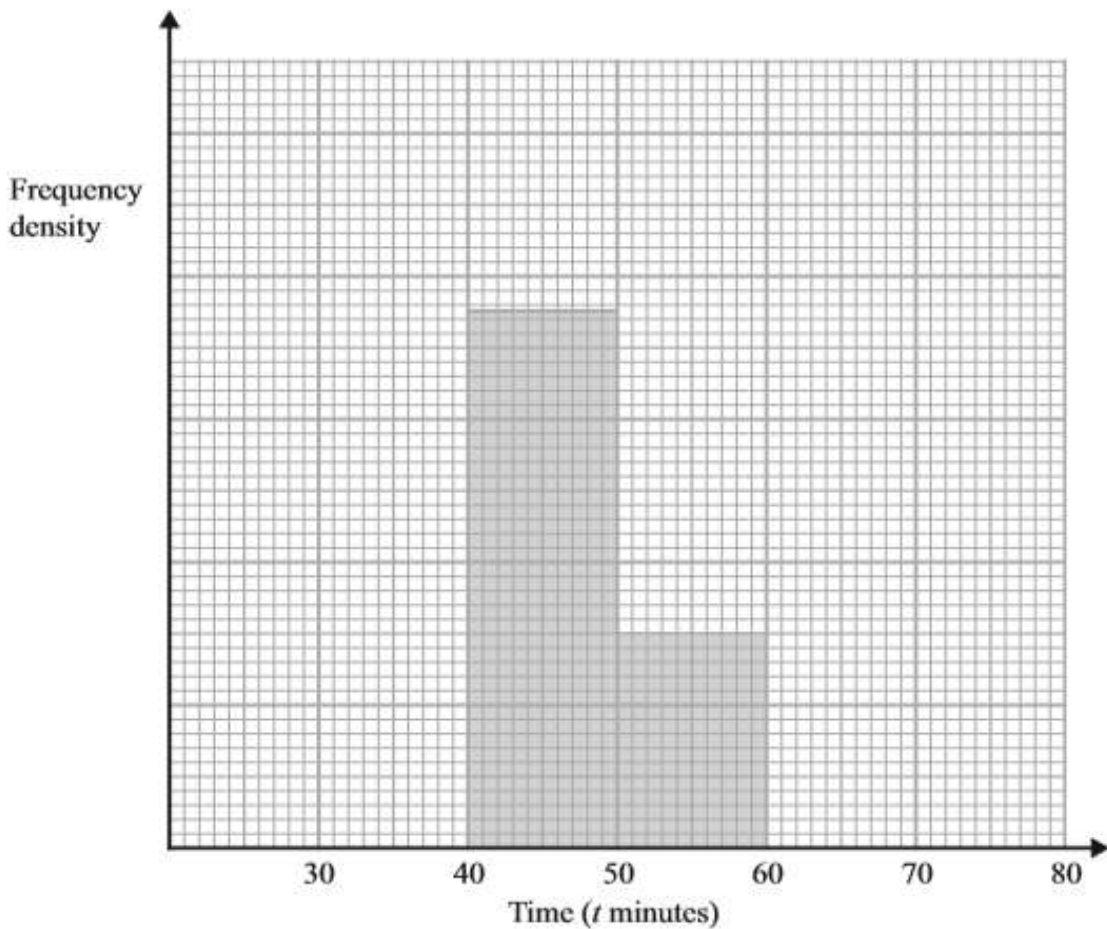
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Runners who achieved a time between 37 and 48 minutes to complete the race were each awarded a silver medal.

(c) Calculate an estimate of the number of runners awarded silver medals.

....

(2)

(Total for Question 16 is 6 marks)

Jan15 3H

69 – 73, 108 - 112

13 The cumulative frequency graph gives information about the intelligence quotients (IQ) of a random sample of 100 adults.
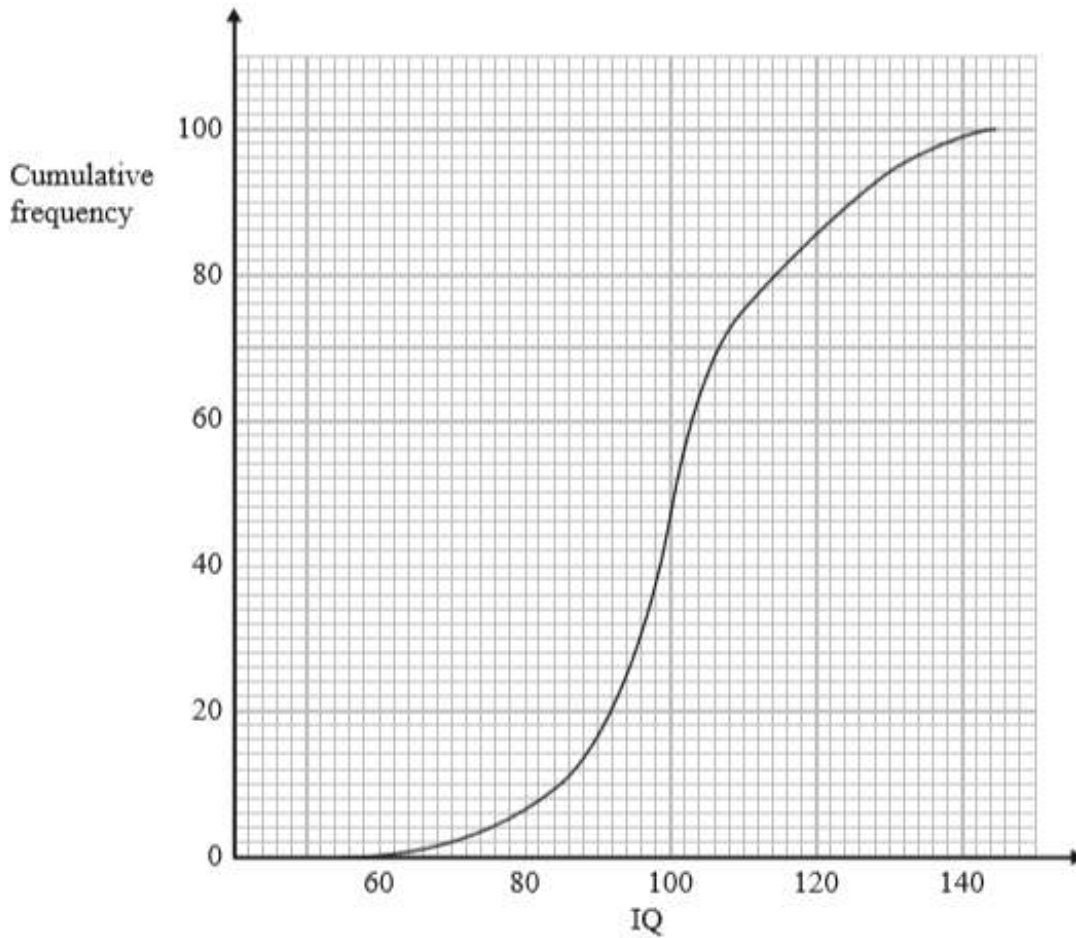
(a) Use the cumulative frequency graph to find an estimate for the number of adults in the sample who have an IQ between 85 and 115

....

(2)

(b) Find an estimate for the upper quartile of the IQ of adults in the sample.

....

(2)

(Total for Question 13 is 4 marks)

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Jan15 4H

47.42

1   Becky counted the number of matches in each of 50 boxes.
    The table shows information about her results.

Number of matches	Frequency
45	3
46	7
47	12
48	23
49	4
50	1

Work out the mean number of matches.

....

(Total for Question 1 is 3 marks)

20 The histogram shows information about the heights of some tomato plants.
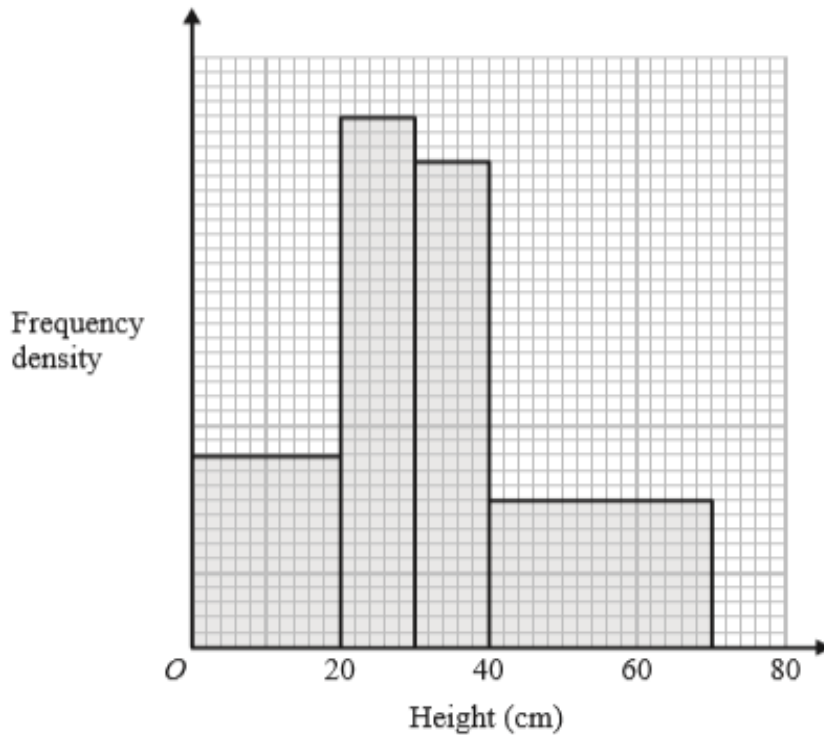
26 plants have a height of less than 20 cm.

Work out the total number of tomato plants.

....

(Total for Question 20 is 3 marks)

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3 The table shows information about the number of visits each of 40 adults made to the gym last week.

Number of visits to the gym	Frequency
0	4
1	3
2	12
3	5
4	8
5	5
6	2
7	1

Work out the mean of the number of visits to the gym.

....

(Total for Question 3 is 3 marks)

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4 11 32 53 71 78 80

11 The frequency table shows information about the weights of 80 adults.

Weight (w kg)	Frequency
$40 < w \leqslant 50$	4
$50 < w \leqslant 60$	7
$60 < w \leqslant 70$	21
$70 < w \leqslant 80$	21
$80 < w \leqslant 90$	18
$90 < w \leqslant 100$	7
$100 < w \leqslant 110$	2

(a) Complete the cumulative frequency table.

Weight (w kg)	Cumulative frequency
$40 < w \leqslant 50$	4
$40 < w \leqslant 60$	
$40 < w \leqslant 70$	
$40 < w \leqslant 80$	
$40 < w \leqslant 90$	
$40 < w \leqslant 100$	
$40 < w \leqslant 110$	

(1)

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J16 3H

(b) On the grid, draw a cumulative frequency graph for your table.

(2)
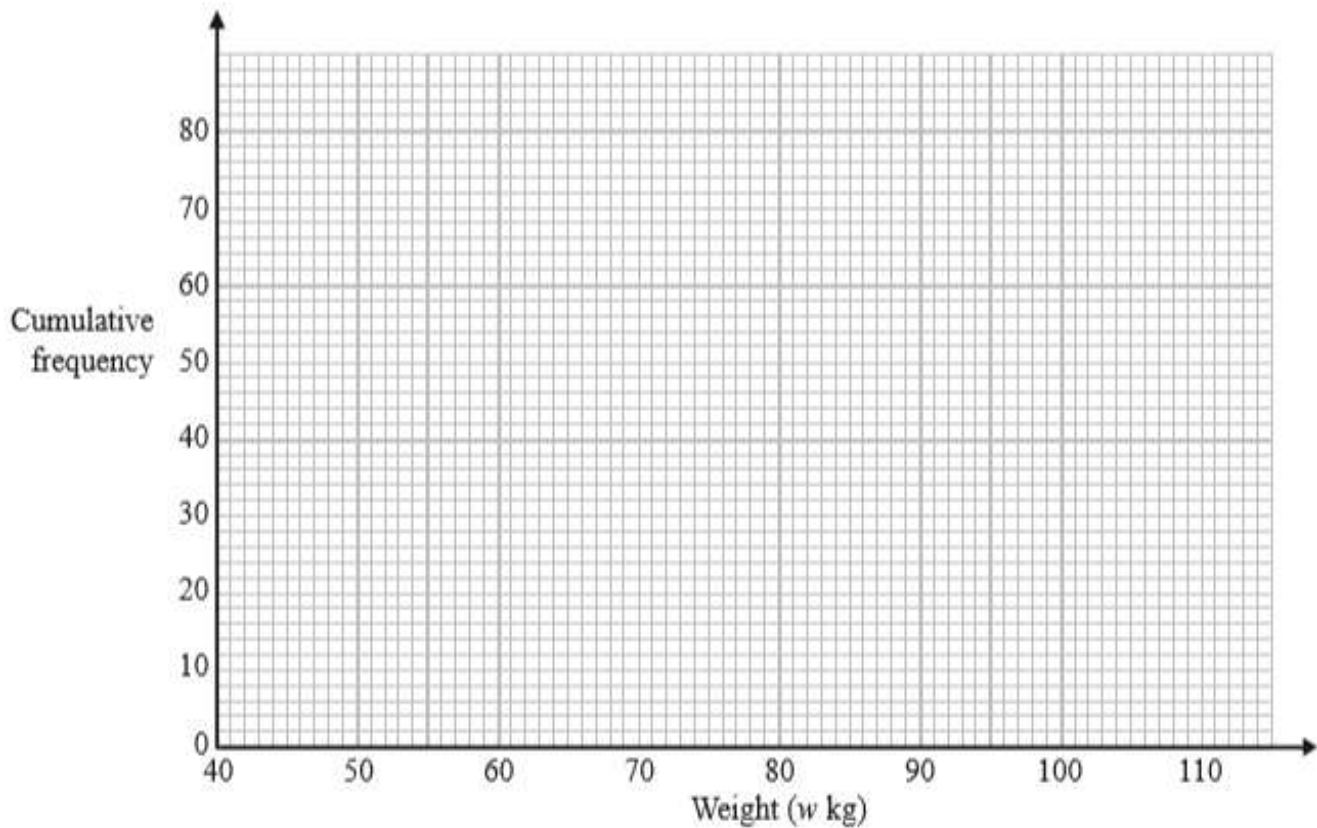
(c) Use your graph to find an estimate for the number of adults with weight more than 85 kg.

....

(2)

(d) Use your graph to find an estimate for the interquartile range of the weights of the adults.

.... kg

(2)

(Total for Question 11 is 7 marks)

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6 Students in class 9Y took part in a sponsored swim.
The table gives information about the amount of money, in £, raised by each student.

Money raised (£x)	Frequency
$0 \leqslant x < 6$	4
$6 \leqslant x < 12$	6
$12 \leqslant x < 18$	8
$18 \leqslant x < 24$	9
$24 \leqslant x < 30$	3

Work out an estimate for the total amount of money raised by the students in class 9Y.

£...

(Total for Question 6 is 3 marks)

18 Miss Cook asked each student in her class how long it took them, in minutes, to travel to school that morning.

The incomplete histogram shows information about the times it took the students who took no more than 30 minutes to travel to school.

Frequency density

Time (minutes)
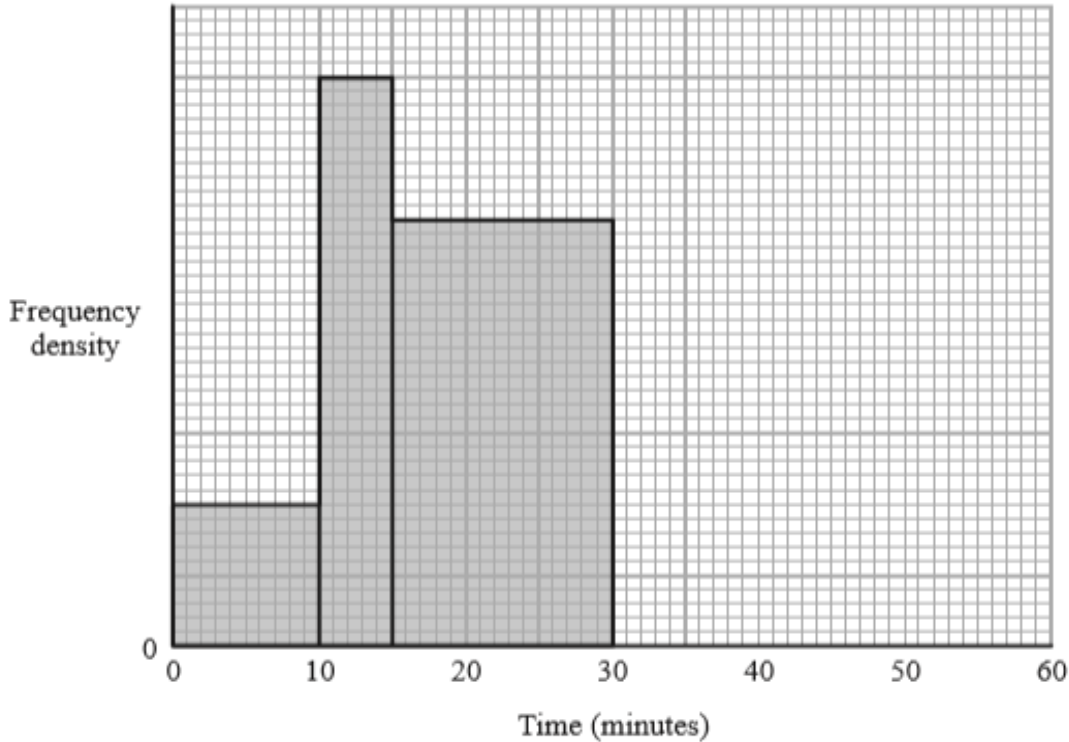
9 students took between 15 minutes and 30 minutes to travel to school.

(a) How many students took no more than 30 minutes to travel to school?

....

(2)

12 students took between 30 and 55 minutes to travel to school.

(b) Use this information to complete the histogram.

(2)

(Total for Question 18 is 4 marks)

Set Notation And Venn Diagram

BC A, A n B = Q

16.

Statements

$A \subset B$ $\qquad$ $B \subset A$ $\qquad$ $A \cup B = \mathcal{E}$ $\qquad$ $A \cap B = \varnothing$ $\qquad$ $A \cap B = A$

Choose a statement from the box that describes the relationship between sets A and B.

(i)

....

(ii)

....
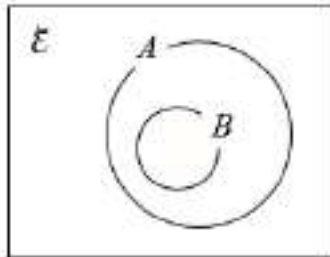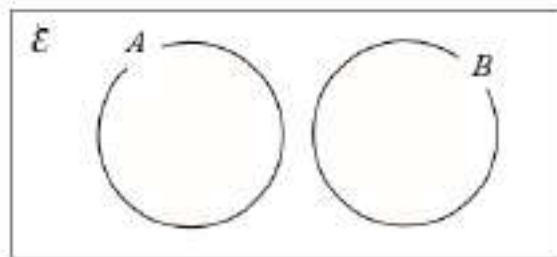
(Total 2 marks)

7 – x, 3

19. Each student in a group plays at least one of hockey, tennis and football.

   10 students play hockey only
   9 play football only.
   13 play tennis only.
   6 play hockey and football but not tennis.
   7 play hockey and tennis.
   8 play football and tennis.
   x play all three sports.

Hockey   Tennis   10 x Football
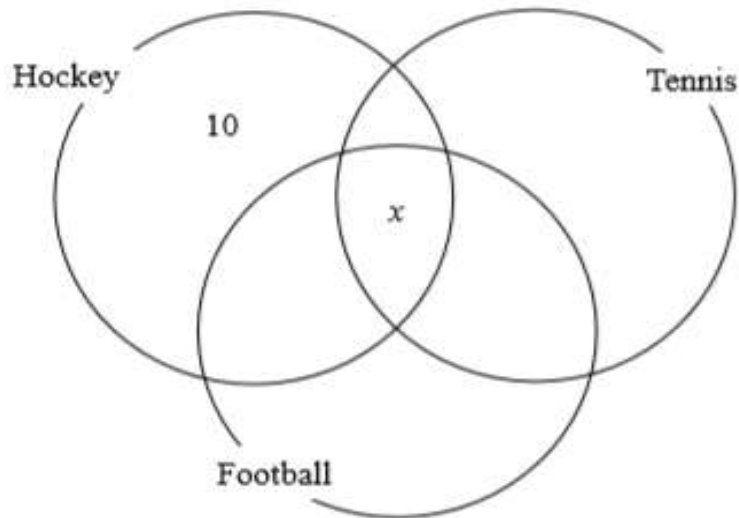
(a) Write down an expression, in terms of x, for the number of students who play hockey and tennis, but not football.

   ....

   (1)

There are 50 students in the group.

(b) Find the value of x.

   $x =$ ....

   (3)

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N7 3H

7. (a) $A = \{1, 2, 3, 4\}$
   $B = \{2, 4, 6, 8\}$

   Write down the members of $A \cup B$.

   1 2 3 4 6 8, 1 2 9

   ....
   (2)

   (b) $\mathcal{E} = \{$Positive integers less than 10$\}$
   $P = \{3, 4, 5, 6, 7, 8\}$
   $P \cap Q = \emptyset$

   Write down all the possible members of Q.

   ....
   (2)

   (Total 4 marks)

J11 3H

8 $\mathcal{E} = \{2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$
   $A = \{$odd numbers$\}$
   $P = \{$prime numbers$\}$

   3 5 7 11, 2 3 5 7 9 11

   List the members of the set

   (i) $A \cap P$,

   ....

   (ii) $A \cup P$.

   ....

   (Total for Question 8 is 2 marks)

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J8 3H

5. $\mathscr{E}$ = {odd numbers}
   A = {1, 5, 9, 13, 17}
   B = {1, 9, 17, 25, 33}
   C = {7, 11, 15}

**1 9 17 , 1 5 9 13 17 25 33 ,
No common numbers**

(a) List the members of the set

   (i) $A \cap B$,

....

   (ii) $A \cup B$.

....

(2)

(b) Explain why $A \cap C = \varnothing$

....

....

(1)

(Total 3 marks)

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N7 4H

19.
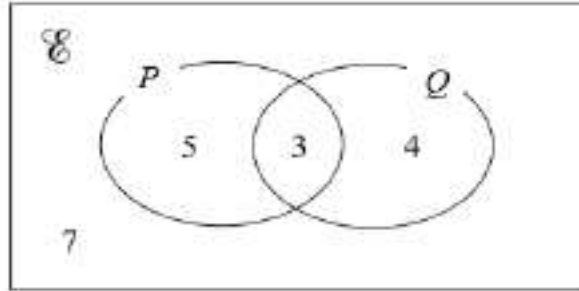
The numbers are the **number** of elements in each part of the Venn Diagram.

(i) Find n(P)

....

(ii) Find n(Q')

....

(iii) Find n(P ∩ Q ∩ Q')

....

(iv) Find n(P' ∪ Q')

....

(Total 4 marks)

N6 4H

6.   ℰ = {even numbers less than 19}
     M = {multiples of 3}
     F = {factors of 12}

   (a) (i)   Explain why it is **not** true that 9 ∈ M.

   ....

        (ii) List the members of M.

        ....
                                                                    (2)

   (b) List the members of M ∩ F.

        ....
                                                                    (2)

                                                          (Total 4 marks)

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J13 3H

7. $S = \{s, q, u, a, r, e\}$
   $V = \{a, e, i, o, u\}$

List the members of the set

(i) $S \cap V$

(ii) $S \cup V$

a u e, s q r a e l o u

(Total for Question 7 is 2 marks)

N9 3H

6. (a) $S = \{1, 3, 5, 7\}$
   $T = \{2, 3, 7, 11\}$

   How many members are there in $S \cup T$?

   6, 1 2, Black cats

   ....
   (1)

   (b) $U = \{3, 4, 5\}$
   $U \cup V = \{1, 2, 3, 4, 5\}$

   The set V has as few members as possible.
   List the members of the set V.

   ....
   (1)

   (c) $A = \{Cats\}$
   $B = \{Black\ animals\}$

   Describe the members of $A \cap B$.

   ....
   (1)

   (Total 3 marks)

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15, 23, 2, 12

20 The Venn diagram shows a universal set $\mathscr{E}$ and 3 sets A, B and C.
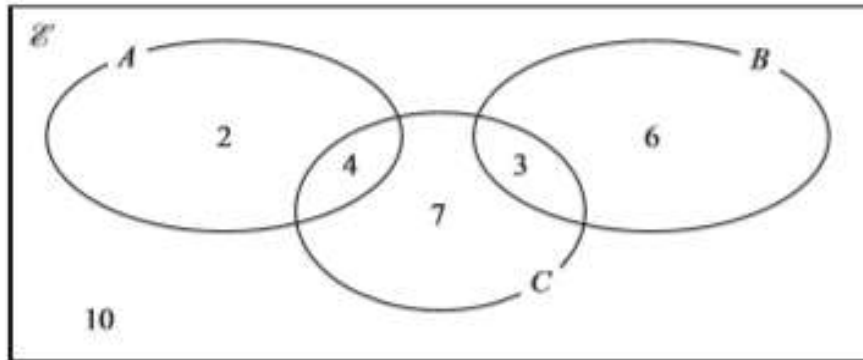
2, 4, 7, 3, 6 and 10 represent **numbers** of elements.

Find

(i) $n(A \cup B)$

(ii) $n(B')$

(iii) $n(A \cap C')$

(iv) $n(B' \cap C')$

(Total for Question 20 is 4 marks)

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J12 4H

12 A, B and C are three sets.

$A \cap B = \emptyset$ and $C \subset A$
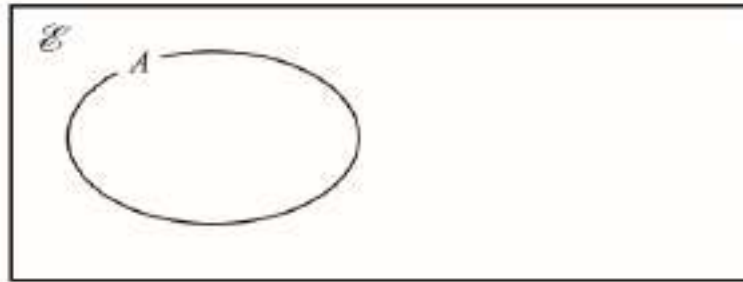
(a) Complete the Venn diagram to show the sets B and C

(2)

(b) On the Venn diagram, shade the region that represents $A \cap C'$

(1)

(Total for Question 12 is 3 marks)

J12 4H

14 There are 31 students in a class.

The only languages available for the class to study are French and Spanish.

17 students study French.

15 students study Spanish.

6 students study neither French nor Spanish.

Using a Venn diagram, or otherwise, work out how many students study only one language.

18

(Total for Question 14 is 4 marks)

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4 5, 6, 3 4 6 OR 3 4 7, 3 4 6 OR 3 4 7

6. (a) $A = \{2, 3, 4, 5\}$

$B = \{4, 5, 6, 7\}$

(i) List the members of $A \cap B$.

....

(ii) How many members are in $A \cup B$?

....

(2)

(b) $\mathcal{E} = \{3, 4, 5, 6, 7\}$
$P = \{3, 4, 5\}$

Two other sets, Q and R, each contain exactly three members.
$P \cap Q = \{3, 4\}$
$P \cap R = \{3, 4\}$
Set Q is not the same as set R.

(i) Write down the members of a possible set Q.

....

(ii) Write down the members of a possible set R.

....

(2)

(Total 4 marks)

N8 4H

9. $\mathcal{E}$ = {Positive integers less than 11}
   A = {Multiples of 3}
   B = {Multiples of 2}

   (a) List the members of

   (i) A,

   ....

   (ii) $A \cup B$.

   ....

   (3)

   (b) $\mathcal{E}$ = {Students in class 12Y}
   P = {Students who study Mathematics}
   Q = {Students who study History}

   (i) Describe the members of $P \cap Q$.

   ....

   (ii) R is also a set of students in class 12Y.
   $P \cap R = \emptyset$
   Use this information to write a statement about the students in set R.

   ....

   (3)

(Total 6 marks)

N10 3H

7. $\mathcal{E} = \{$Clothes$\}$
    $A = \{$Mr Smith's clothes$\}$
    $B = \{$Hats$\}$
    $C = \{$Mrs Koshi's hats$\}$

    (a) (i) Describe the members of the set $A \cap B$

    ....

    (ii) How many members has the set $A \cap C$?

    ....

    (2)

    (b)

A	B	C	$\mathcal{E}$	$\in$	$\emptyset$	$\cap$	$\cup$

    Use a letter or symbol from the box to make each of the following a true statement.

    (i) $B \cup C = $ ....

    (ii) Mr Smith's favourite shirt .... A

    (2)

    (Total 4 marks)

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Jan12 3H

German and Maths, Don't study French, 1 2 3 4

6 (a) $\mathscr{E}$ = {Students in Year 12}
   G = {Students who study German}
   F = {Students who study French}
   M = {Students who study Maths}

(i) $G \cap M = \emptyset$

Use this information to write a statement about the students who study German in Year 12

....

(ii) Preety is a student in Year 12
Preety $\notin F$.

Use this information to write a statement about Preety.

....

(2)

(b) A = {2, 4, 6, 8, 10}
   $A \cap B$ = {2, 4}
   $A \cup B$ = {1, 2, 3, 4, 6, 8, 10}

List all the members of set B.

....

(2)

(Total for Question 6 is 4 marks)

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Jan12 4H

19 A and B are two sets.

$n(\mathscr{E}) = 37$

$n(A) = 22$

$n(A \cap B) = 12$

$n(A \cup B) = 30$

(a) Complete the Venn Diagram to show the **numbers** of elements.
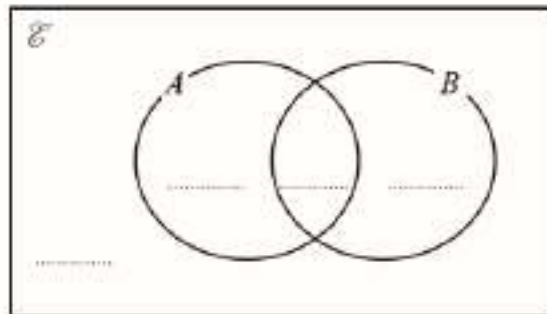
(2)

(b) Find (i) $n(A \cap B')$

....

(ii) $n(A' \cup B')$

....

(2)

(Total for Question 19 is 4 marks)

N9 4H

14, 9, 6 3 2, 11

20. *P* and *Q* are two sets.
   n(*P*) = 9 and n(*Q*) = 5

(a) Find the value of n(*P* ∪ *Q*) when *P* ∩ *Q* = Ø

n(*P* ∪ *Q*) = ...
(1)

(b) Find the value of n(*P* ∪ *Q*) when *Q* ⊂ *P*

n(*P* ∪ *Q*) = ...
(1)

(c) (i) Complete the Venn Diagram to show **numbers** of elements when n(*P* ∩ *Q*) = 3
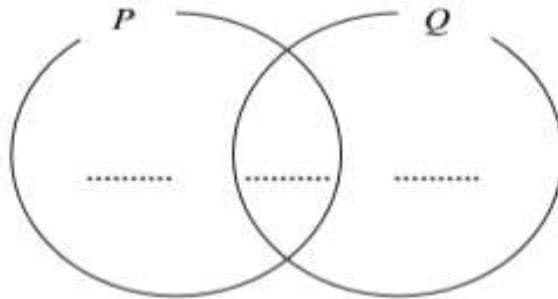
(ii) Find the value of n(*P* ∪ *Q*) when n(*P* ∩ *Q*) = 3

n(*P* ∪ *Q*) = ...
(3)

(Total 5 marks)

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J9 3H

8. $\mathscr{E}$ = {positive whole numbers}
   A = {factors of 27}
   B = {factors of 9}
   C = {first four even numbers}

(a) List the members of $A \cup B$.

....

(2)

(b) (i) Is it true that $A \cap C = \emptyset$?

Tick (✓) the appropriate box.

Yes   No

☐   ☐

(ii) Explain your answer.

....

....

(1)

(c) Complete the Venn Diagram to show the relationship between the sets A, B and C.

$\mathscr{E}$

(2)

(Total 5 marks)

J5 4H

8. (a) The universal set, $\mathcal{E}$ = {Angela's furniture}.
A = {Chairs}.
B = {Kitchen furniture}.

Describe fully the set $A \cap B$.

....

....

(2)

Angela's kitchen chairs, 1 2 3 4 5 6 7 8 9, Yes no common members

(b) P = {2, 4, 6, 8}.
Q = {Odd numbers less than 10}

(i) List the members of the set $P \cup Q$.

....

(ii) Is it true that $P \cap Q = \varnothing$?

....

Explain your answer.

....

....

(3)

(Total 5 marks)

Jan13 3H

15 The Venn diagram shows a universal set $\mathscr{E}$ and three sets A, B and C.
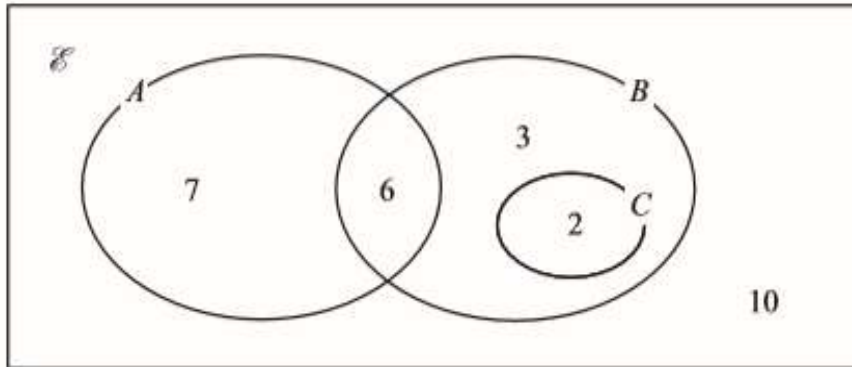
7, 6, 3, 2 and 10 represent the **numbers** of elements.

Find

(i) $n(A \cup B)$

....

(ii) $n(A')$

....

(iii) $n(B \cap C')$

....

(iv) $n(A' \cup B')$

....

(Total for Question 15 is 4 marks)

Jan14 4H

9 $\mathscr{E}$= {positive whole numbers **less than** 13}
   A = {even numbers}
   B = {multiples of 3}
   C = {prime numbers}

(a) List the members of the set

   (i) $A \cap B$

   ....

   (ii) $B \cup C$

   ....

   (2)

(b) Is it true that $14 \in A$?

   Tick (✓) the appropriate box.

   Yes   No

   ☐   ☐

   Explain your answer.

   ....

   (1)

(Total for Question 9 is 3 marks)

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---

6 12, 2 3 5 6 7 9 11 12, No less than 13

1 4 5 6 7, 8, 1 4 7 8 9, 5 6 7

19
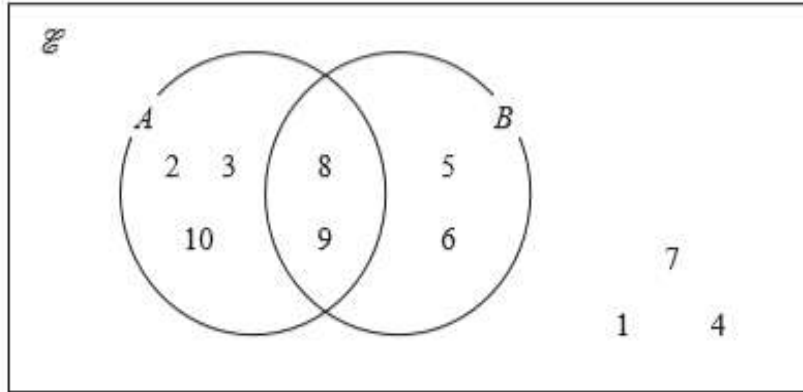
The Venn diagram shows all of the elements in sets A, B and $\mathscr{E}$.

(a) Write down the elements in A'

....

(1)

(b) Find n$(A \cap B)'$

....

(1)

(c) Find the elements in $(A \cap B) \cup (A \cup B)'$

....

(1)

$A \cap C = \varnothing$
$B \cup C = \{5, 6, 7, 8, 9\}$
n$(C) = 3$

(d) Write down the elements in C.

....

(1)

(Total for Question 19 is 4 marks)

Jan15 4H

5 15, 4 5 8 10 12 15 16,
No ticked and 5 is prime

6   $\mathscr{E}$ = {positive whole numbers less than 19}
    A = {odd numbers}
    B = {multiples of 5}
    C = {multiples of 4}

(a) List the members of the set

    (i) $A \cap B$

    ....

    (ii) $B \cup C$

    ....

    (2)

D = {prime numbers}

(b) Is it true that $B \cap D = \varnothing$?

    Tick (✓) the appropriate box.

    Yes   No

    ☐   ☐

    Explain your answer.

    ....

    (1)

(Total for Question 6 is 3 marks)

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IGCSE

EDEXCEL

PART VI

1. Number and Language.

2. Accuracy.

3. Ratio and Proportion.

4. Percentage.

Prepared by:T.Abeer yousrallah

Mrs. Abeer Yousrallah (IGCSE Math) 00966563065252

Number and Language

Jan14 4H

8 Express 825 as a product of its prime factors.

3 x 5 x 5 x 11

....

(Total for Question 8 is 3 marks)

Nov8 4H

10. Express 132 as the product of its prime factors.

2 x 2 x 3 x 11

....

(Total 3 marks)

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J13 4H

8   Express 204 as a product of its prime factors.

2 x 2 x 3 x 17

....

(Total for Question 8 is 3 marks)

J11 4H

10   Express 126 as a product of its prime factors.

2 x 3 x 3 x 7

....

(Total for Question 10 is 3 marks)

J9 4H

10. Express 132 as a product of its prime factors.

2 x 3 x 2 x 11

....

(Total 3 marks)

J12 4H

8 Express 300 as a product of its prime factors.

2 x 2 x 3 x 5 x 5

....

(Total for Question 8 is 3 marks)

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J13 3H

18, 270

11 (a) Find the Highest Common Factor (HCF) of 54 and 90

....
(2)

(b) Find the Lowest Common Multiple (LCM) of 54 and 90

....
(2)

Nov7 4H

18, 360

17. (a) Find the Highest Common Factor of 72 and 90

....
(2)

(b) Find the Lowest Common Multiple of 72 and 90

....
(2)

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Nov9 4H

11. (a) Find the Highest Common Factor of 64 and 80

....
(2)

(b) Find the Lowest Common Multiple of 64 and 80

....
(2)

Jan12 3H

17 Show that the recurring decimal $0.1\dot{7} = \dfrac{8}{45}$

Jan14 4H

20 Show that the recurring decimal $0.0\overset{..}{1}5 = \dfrac{1}{66}$

(Total for Question 20 is 2 marks)

J5 4H

19. Convert $0.5\dot{1}$ to a fraction.

$\dfrac{\mathbf{23}}{\mathbf{45}}$

....

Nov6 4H

10. Express 225 as the product of powers of its prime factors.

$\mathbf{3^2 \times 5^2}$

....

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J14 4H

20 Use algebra to show that the recurring decimal $0.3\dot{8} = \dfrac{7}{18}$

Nov8 3H

7. Show that $\dfrac{2}{5} \div \dfrac{4}{7} = \dfrac{7}{10}$

Nov8 3H

17. (a) Convert the recurring decimal $0.\dot{7}$ to a fraction.

....

(2)

$0.0\dot{y}$ is a recurring decimal.

y is a whole number such that $1 \leqslant y \leqslant 9$

(b) (i) Write the recurring decimal $0.0\dot{y}$ as a fraction.

....

(ii) $0.1\dot{y}$ is also a recurring decimal.

Using your answer to part (i), or otherwise, convert the recurring decimal $0.1\dot{y}$ to a fraction.

Give your answer as simply as possible.

....

(3)

Nov8 3H

1. Find the value of $\dfrac{7.9+3.8}{8.6-2.1}$

....

(Total 2 marks)

J11 4H

18 Show that the recurring decimal $0.\dot{3}9\dot{6} = \dfrac{44}{111}$

J11 3H

5 Show that $\dfrac{5}{6} - \dfrac{3}{4} = \dfrac{1}{12}$

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J5 3H

1.8589

1. Use your calculator to work out the value of $\dfrac{9.5-3.7}{1.3\times2.4}$

Write down all the figures on your calculator display.

....

(Total 2 marks)

J5 3H

$\dfrac{7}{18}$

3. Work out $\dfrac{5}{6}-\dfrac{4}{9}$

Give your answer as a fraction in its simplest form.

....

(Total 2 marks)

J11 3H

1.726666667, 1.72

1 (a) Use your calculator to work out the value of

$$\dfrac{24.1}{8.4-7.8} \;-\; 6.2^2$$

Write down all the figures on your calculator display.

....

(2)

(b) Give your answer to part (a) correct to 3 significant figures.

....

(1)

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Nov7 4H

$$\boxed{0.64}$$

1. Work out $\dfrac{5.9-4.3}{1.3+1.2}$

....

(Total 2 marks)

Nov9 4H

1. Use your calculator to work out the value of $\dfrac{11.7+18.4^2}{0.3}$

Write down all the figures on your calculator display.

$$\boxed{1167.5333}$$

Nov10 4H

$$\boxed{3.424528302,\ 3.42}$$

1. (a) Use your calculator to work out the value of

$$\dfrac{3.7\times2.9}{5.3}+1.4$$

Give your answer as a decimal.
Write down all the figures on your calculator display.

(2)

(b) Give your answer to part (a) correct to 2 decimal places.

(1)

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J8 4H

123.47, 123.53

11. Joshi chooses two numbers from the box.

Marie says

"When you round Joshi's two numbers to
1 decimal place, they are equal."

Mikos says

"When you round Joshi's two numbers to
3 significant figures, they are **NOT** equal."

Both statements are correct.

Write down Joshi's two numbers.

123.37
123.43
123.47
123.53
123.57
123.63
123.67

.... , ...

(Total 2 marks)

Jan14 3H

3×10^m, $2.7 \times 10^{3n + 1}$

18 (a) $x = 9 \times 10^{2m}$ where m is an integer.

Find, in standard form, an expression for $\sqrt{x}$

(2)

(b) $y = 9 \times 10^{2n}$ where n is an integer.

Find, in standard form, an expression for $y^{\frac{3}{2}}$

Give your answer as simply as possible.

(3)

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Nov10 4H

3.6×10^{15}, 19, -8

15. (a) Work out $(9 \times 10^8) \times (4 \times 10^6)$
      Give your answer in standard form.

      ....

      (1)

    (b) $x = 7 \times 10^m$ and $y = 5 \times 10^n$, where m and n are integers.

      (i) It is given that $xy = 3.5 \times 10^{12}$
          Show that $m + n = 11$

      (ii) It is also given that $\dfrac{x}{y} = 1.4 \times 10^{27}$

          Find the value of m and the value of n.

      $m = $ ....

      $n = $ ....

      (5)

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J7 4H

7, 50, 2, 200 or 100, 175 rounded to 200

4. Julian has to work out $\dfrac{6.8 \times 47.6}{2.09}$ without using a calculator.

(a) Round each number in Julian's calculation to one significant figure.

....

(2)

(b) Use your rounded numbers to work out an estimate for $\dfrac{6.8 \times 47.6}{2.09}$

Give your answer correct to one significant figure.

....

(2)

(c) Without using your calculator, explain why your answer to part (b) should be larger than the exact answer.

....

....

....

(2)

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J9 3H

12. 1 astronomical unit = 150 million kilometres.

(a) Write the number 150 million in standard form.

....

(2)

The distance from Venus to the Sun is 108 million kilometres.

(b) Express 108 million kilometres in astronomical units.
Give your answer in standard form.

.... astronomical units

(2)

J11 3H

20 $x = a \times 10^n$ where n is an integer and $\sqrt{10} \leqslant a < 10$

Find, in standard form, an expression for x^2.
Give your expression as simply as possible.

....

Nov6 4H

$7.8 \times 10^{7}, 0.004, 3.75 \times 10^{-12}$

13. (a) Write the number 78 000 000 in standard form.

....

(1)

(b) Write 4×10^{-3} as an ordinary number.

....

(1)

(c) Work out the value of $\dfrac{3 \times 10^{-2}}{8 \times 10^{9}}$

Give your answer in standard form.

....

(1)

(Total 3 marks)

Nov9 3H

13. The table shows the area, in km², of some countries.

Country	Area (km²)
Algeria	2.4×10^6
Botswana	6.0×10^5
Equatorial Guinea	2.8×10^4
Ethiopia	1.2×10^6
Malawi	1.2×10^5

(a) Which of these countries has the largest area?

....

(1)

(b) How many times greater is the area of Ethiopia than the area of Malawi?

....

(1)

(c) Work out the total area of all five countries.
Give your answer in standard form.

.... km²

(2)

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J15 3HR

3.75

3 Use your calculator to work out the value of

$$\frac{12.5 \times 4.5}{6.8 + \sqrt{67.24}}$$

....

J15 3HR

$2^2 \times 5, 2^3 \times 3 \times 5^2, 3$

10 (a) $A = 2^2 \times 3 \times 5^2$

$B = 2^3 \times 5$

(i) Find the Highest Common Factor (HCF) of A and B.

(ii) Find the Lowest Common Multiple (LCM) of A and B.

....

....

(3)

(b) $\dfrac{8^2 \times 8^3}{8^4} = 2^n$

Find the value of n.

$n = $ ....

(2)

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J15 3HR

13 The table shows information about the oil production, in barrels per day, of five countries during one year.

Country	Oil production (barrels per day)
India	8.97×10^5
Brazil	2.63×10^6
United States	8.4×10^6
Russia	1.09×10^7
Saudi Arabia	9.9×10^6

(a) Which country had the highest oil production?

....

(1)

(b) Calculate the difference between the oil production of Brazil and the oil production of India. Give your answer in standard form.

....barrels per day

(2)

During the same year, the oil production of California was 6.3×10^5 barrels per day.

(c) Work out the oil production of California as a proportion of the oil production of the United States.

....

(2)

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J15 3HR

15 Use algebra to show that the recurring decimal $0.4\dot{1}\dot{7} = \dfrac{139}{333}$

J15 4H

11 x is an integer.
The Lowest Common Multiple (LCM) of x and 12 is 120
The Highest Common Factor (HCF) of x and 12 is 4

Work out the value of x.

40

$x =$ ....

Jan15 3H

2 (a) Work out the value of $\dfrac{451.4}{14.1 + 10.3}$

(2)

(b) Work out the value of $\sqrt{7.8^2 - 7.2^2}$

(2)

Jan15 3H

7.6 x 10^{-5}, 160000000, 11

13 (a) Write 0.000076 in standard form.

(1)

The area covered by the Pacific Ocean is $1.6 \times 10^8 \, \text{km}^2$
The area covered by the Arctic Ocean is $1.4 \times 10^7 \, \text{km}^2$

(b) Write 1.6×10^8 as an ordinary number.

(1)

The area covered by the Pacific Ocean is k times the area covered by the Arctic Ocean.

(c) Find, correct to the nearest integer, the value of k.

$k =$

(2)

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Jan15 3H | 2 x 2 x 3 x 3 x 3 x 5, 2 x 2 x 2 x 3 x 3 x 3 x 3 x 5 x 7

11

| $3780 = 2^2 \times 3^3 \times 5 \times 7$ | $3240 = 2^3 \times 3^4 \times 5$ |

(a) Find the highest common factor (HCF) of 3780 and 3240
Give your answer as a product of prime factors.

....

(2)

(b) Find the lowest common multiple (LCM) of 3780 and 3240
Give your answer as a product of prime factors.

....

(2)

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Accuracy

J11 4H

136.5, 137.5 or 137.49

9   The length of a fence is 137 metres, correct to the nearest metre.

Write down

    (i)   the lower bound for the length of the fence,

.... metres

    (ii) the upper bound for the length of the fence.

.... metres

(Total for Question 9 is 2 marks)

J14 4H

3

181, 7.65, 7.55
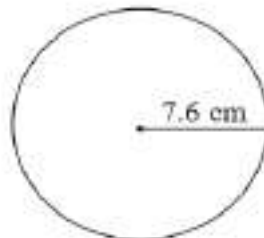
7.6 cm

Diagram **NOT**
accurately drawn

(a) A circle has a radius of 7.6 cm.
   Work out the area of the circle.
   Give your answer correct to 3 significant figures.

.... cm²

(2)

The radius, 7.6 cm, is correct to 1 decimal place.

(b) (i) Write down the upper bound of the radius.

.... cm

    (ii) Write down the lower bound of the radius.

.... cm

(2)

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Nov9 4H

21.

Diagram **NOT** accurately drawn

A, B and L are points on a circle, centre O.
AB is a chord of the circle.
M is the midpoint of AB.
LOM is a straight line.
$AB = 24$ cm.
$LM = 18$ cm.

Calculate the diameter of the circle.

.... cm
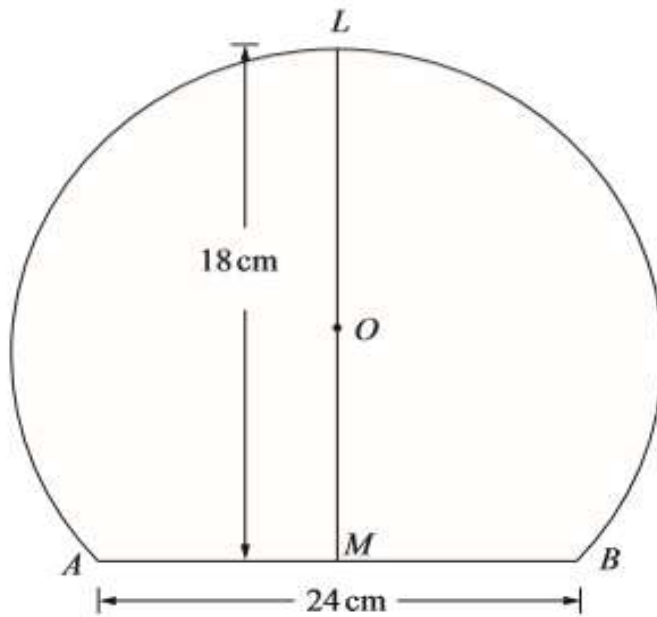
(Total 4 marks)

J13 3H

19 (a) Correct to the nearest millimetre, the length of a side of a regular hexagon is 3.6 cm.

Calculate the upper bound for the perimeter of the regular hexagon.

.... cm

(2)

(b) Correct to 1 significant figure, the area of a rectangle is 80 cm².
Correct to 2 significant figures, the length of the rectangle is 12 cm.

Calculate the lower bound for the width of the rectangle.
Show your working clearly.

.... cm

(3)

J11 3H

14 $y = 1.8$ correct to 1 decimal place.

Calculate the lower bound for the value of $4y + 1$

....

J10 3H

15, 8.25, 61.875, 0.33

14.
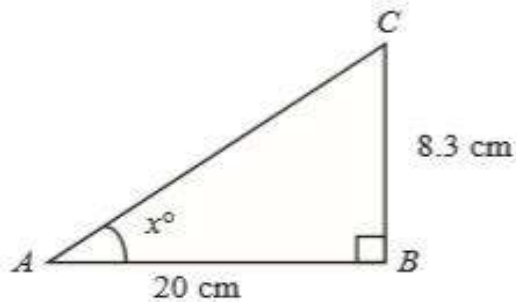
Diagram **NOT** accurately drawn

Triangle *ABC* is right-angled at *B*.
AB = 20 cm, correct to 1 significant figure.
BC = 8.3 cm, correct to 2 significant figures.

(a) Write down the lower bound for the length of

(i) *AB*,

.... cm

(ii) *BC*.

.... cm

(2)

(b) Calculate the lower bound for the area of triangle *ABC*.

.... cm²

(2)

(c) Calculate the lower bound for the value of tan $x°$.

....

(3)

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Jan12 3H

35.9, 5.85, 5.75

9
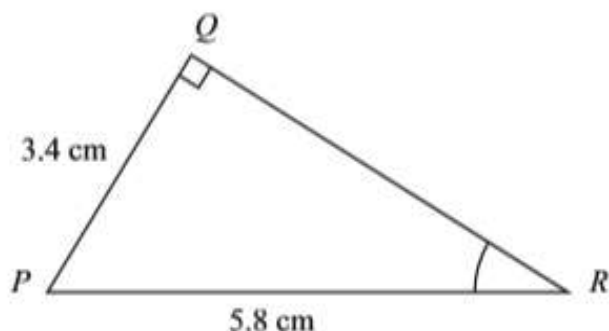
Diagram **NOT**
accurately drawn

Triangle *PQR* has a right angle at *Q*.

PQ = 3.4 cm and *PR* = 5.8 cm.

(a) Work out the size of angle *QRP*.
   Give your answer correct to 1 decimal place.

.... °

(3)

The length 5.8 cm, of *PR*, is correct to 2 significant figures.

(b) (i) Write down the upper bound of the length of *PR*.

.... cm

(ii) Write down the lower bound of the length of *PR*.

.... cm

(2)

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J12 3H

20 Correct to 2 decimal places, the volume of a solid cube is 42.88 cm³

Calculate the lower bound for the surface area of the cube.

.... cm²

Jan14 4H

21 There are 1300 sheets of paper, correct to the nearest 100 sheets, in a pile.
Each sheet is of equal thickness.
The height of the pile is 160 mm, correct to the nearest 10 mm.

Calculate the upper bound, in millimetres, for the thickness of one sheet of paper.

.... mm

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J7 3H

14. (a) Make r the subject of the formula $A = \pi r^2$, where r is positive.

$$\sqrt{\dfrac{A}{\pi}} \ ,$$

2.07296, 2.1

$r =$ ....
(2)

The area of a circle is 14 cm^2, correct to 2 significant figures.

(b) (i) Work out the lower bound for the radius of the circle.
Write down all the figures on your calculator display.

.... cm

(ii) Give the radius of the circle to an appropriate degree of accuracy.
You must show working to explain how you obtained your answer.

.... cm
(4)

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J9 3H

60

20. Correct to 2 significant figures, the area of a square is $230\,cm^2$.

Calculate the lower bound for the perimeter of the square.

.... cm

Nov9 3H

33 mins 43 sec

23. In a race, Paula runs 25 laps of a track.
Each lap of the track is 400 m, correct to the nearest metre.
Paula's average speed is 5.0 m/s, correct to one decimal place.

Calculate the upper bound for the time that Paula takes to run the race.
Give your answer in minutes and seconds, correct to the nearest second.

....

J8 3H

15. Mia's weight is 57 kg, correct to the nearest kilogram.

   (a) Write down

      (i) the upper bound of her weight,

      .... kg

      (ii) the lower bound of her weight.

      .... kg

      (2)

   Alice's weight is 62 kg, correct to the nearest kilogram.

   (b) Work out the upper bound for the difference between Alice's weight and Mia's weight.

      .... kg

      (2)

Nov6 4H

59.9, 5.45, 5.35, 1.74766

14.
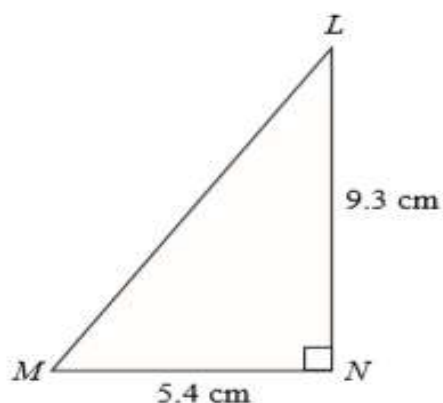
Diagram **NOT**
accurately drawn

9.3 cm

5.4 cm

Triangle *LMN* is right-angled at *N*.
MN = 5.4 cm and *LN* = 9.3 cm.

(a) Work out the size of angle *LMN*.
Give your answer correct to 1 decimal place.

..............................°

(3)

The length of *MN* is 5.4 cm, correct to 2 significant figures.

(b) (i) Write down the upper bound of the length of *MN*.

.... cm

(ii) Write down the lower bound of the length of *MN*.

.... cm

(2)

The length, 5.4 cm, of *MN* and the length, 9.3 cm, of *LN*, are each correct to 2 significant figures.
The line *MN* is horizontal and the line *LN* is vertical.

(c) Work out the upper bound for the gradient of the line *LM*.

....

(2)

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Nov7 3H

18. Some cases have to be lifted by a crane.
Each case has a mass of 68 kg, correct to 2 significant figures.

(a) Write down the upper bound of the mass of a case.

.... kg

(1)

A crane can lift safely a load of 1200 kg, correct to 2 significant figures.

(b) Find the greatest number of cases that the crane can lift safely in one load.

....

(3)

Ratio, Proportional and Percentage

J11 3H

9 Ella invested $8000 for 3 years at 5% per annum **compound interest**.

Calculate the value of her investment at the end of 3 years.

$ ....

J14 4H

6 Jalin lives in England.
He does a search on the internet and sees the same type of camera on sale in
France and in America.

In France, the camera costs 126 euros.
In America, the camera costs $165.24

Jalin finds out these exchange rates.

Exchange rates
1 euro = £0.89
£1 = $1.62

How much cheaper is the camera in America than in France?
Give your answer in pounds (£).

£ ....

Nov10 4H

7956

5.

| 1 euro = £0.72 |
| £1 = 221 Sri Lankan rupees |

Change 50 euros to Sri Lankan rupees.

.... Sri Lankan rupees

Nov7 4H

350

3.

| £1 = 2.61 New Zealand dollars |
| £1 = 1.45 euros |

Change 630 New Zealand dollars to euros.

.... euros

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J7 3H

15. The frequency, f kilohertz, of a radio wave is inversely proportional to its wavelength, w metres.

When $w = 200$, $f = 1500$

$$\frac{300000}{w}, 240$$

(a) (i) Express f in terms of w.

$f = $ ....

(ii) On the axes, sketch the graph of f against w.
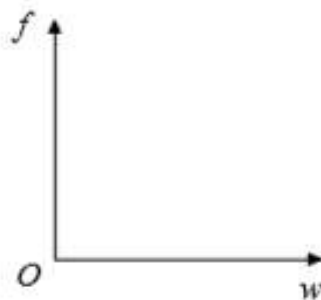
(4)

(b) The wavelength of a radio wave is 1250 m.
Calculate its frequency.

.... kilohertz

(2)

Nov7 3H

$0.174 \text{ w}^3, 73.2, 12.6$

19. A wind turbine generates a power of P kilowatts when the wind speed is w m/s.

P is proportional to w^3.

$P = 300$ when $w = 12$

(a) Find a formula for P in terms of w.

....
(3)

(b) Calculate the value of P when $w = 7.5$
Give your answer correct to 3 significant figures.

$P =$ ....
(2)

(c) When the wind speed is x m/s, the wind turbine generates twice as much power as it does when the wind speed is 10 m/s.
Calculate the value of x.
Give your answer correct to 3 significant figures.

$x =$ ....
(4)

Jan14 3H

14 D is directly proportional to t^2
When $t = 4$, $D = 8$

(a) Find a formula for D in terms of t.

$$\boxed{\frac{1}{2}\,t^2,\ 10}$$

.... (3)

(b) Find the positive value of t when $D = 50$

$t =$ .... (2)

J11 3H

19 P is directly proportional to the cube of Q.
When $Q = 15$, $P = 1350$

(a) Find a formula for P in terms of Q.

$$\boxed{0.4\ Q^3,\ 3200}$$

$P = $ .... (3)

(b) Calculate the value of P when $Q = 20$

$P = $ .... (1)

Jan12 3H

15 Two small magnets attract each other with a force, F newtons.
F is inversely proportional to the square of the distance, d cm, between them.

When $d = 2$, $F = 12$

(a) Express F in terms of d.

....
(3)

(b) Calculate the value of F when $d = 5$

$F = $ ....
(1)

(c) Calculate the value of d when $F = 3$

$d = $ ....
(2)

J8 3H

$3.6\sqrt{h}$, 28.8, 289

17. The distance, d kilometres, of the horizon from a person is directly proportional to the square root of the person's height, h metres, above sea level.
When $h = 225$, $d = 54$

(a) Find a formula for d in terms of h.

$d =$ ....
(3)

(b) Calculate the distance of the horizon from a person whose height above sea level is 64 metres.

.... kilometres
(1)

(c) Calculate the height above sea level of a person, when the distance of the horizon is 61.2 kilometres.

.... metres
(2)

Nov9 3H

$t = 6\sqrt{d}$, 18

21. *t* is proportional to the square root of *d*.

$t = 12$ when $d = 4$

(a) Find a formula for *t* in terms of *d*.

....
(3)

(b) Calculate the value of *t* when $d = 9$

$t =$ ....
(2)

Nov10 4H

16. P is inversely proportional to V.
$P = 18$ when $V = 24$

(a) Express P in terms of V.

....

(3)

(b) Find the positive value of V when $P = 3V$

$V = $ ....

(2)

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Jan15 3H

1

1 euro = 120 yen
£1 = 1.2 euros

Change £50 to yen.

.... yen

17 P is directly proportional to q^3
$P = 270$ when $q = 7.5$

(a) Find a formula for P in terms of q

16 q^3, 1.25
25

.... (3)

(b) Work out the positive value of q when $P = q$

$q = $ .... (2)

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N6 3H

3.

Andrea's Café

Delicious cakes
Only $4.00 each

Andrea buys 100 cakes to sell in her café.
She pays $1.80 for each cake.

On Monday she sells 60 cakes.
She sells these cakes for $4.00 each.

On Tuesday she reduces the price of each cake by $\frac{1}{5}$

She sells 35 cakes at this reduced price.

Andrea then gives away the 5 unsold cakes.

Calculate the total profit that Andrea makes on the cakes.

$...........................

84

Nov7 4H

5. In 2004, the ratio of the number of planes in Air China's fleet to the number of planes in Malaysian Airlines' fleet was 6 : 7
There were 72 planes in Air China's fleet.

Work out the number of planes in Malaysian Airlines' fleet.

....

Nov7 3H

57

4. The total number of students in Denton College is 280
160 of the students in Denton College are in Year 1
Express 160 as a percentage of 280
Give your answer correct to 2 significant figures.

.... %

J7 3H

8. (a) Shri invested 4500 dollars. After one year, he received 270 dollars interest.
Work out 270 as a percentage of 4500

.... %

(2)

(b) Kareena invested an amount of money at an interest rate of 4.5% per year.
After one year, she received 117 dollars interest.
Work out the amount of money Kareena invested.

.... dollars

(2)

(c) Ravi invested an amount of money at an interest rate of 4% per year.
At the end of one year, interest was added to his account and the total amount in his account was then 3328 dollars.
Work out the amount of money Ravi invested.

.... dollars

Nov8 3H

117, 240, 680

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5. In a sale, normal prices were reduced by 35%.

   (a) The normal price of a camera was £180
       Work out the sale price of the camera.

       £ ....
       (3)

   (b) The normal price of a clock was reduced by £84
       Work out the normal price of the clock.

       £ ....
       (3)

   (c) The sale price of a computer was £442
       Work out the normal price of the computer.

       £ ....
       (3)

Nov8 4H   18, 25

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2. (a) Philip and Nikos share some money in the ratio 3:4
Nikos receives £24
Work out how much Philip receives.

£.................................

(2)

(b) James and Suki share £40 in the ratio 3:5
Work out how much Suki receives.

£.................................

(2)

Nov9 4H

5. (a) Cheng invested 3500 dollars.
   At the end of one year, interest of 161 dollars was added to his account.

   Express 161 as a percentage of 3500

   .... %

   (2)

   (b) Lian invested an amount of money at an interest rate of 5.2% per year.
   After one year, she received interest of 338 dollars.

   Work out the amount of money Lian invested.

   .... dollars

   (3)

Nov9 4H

7. Carlos mixes cement, lime and sand in the ratios 1 : 2 : 9 by weight.

   Work out the weight of cement, the weight of lime and the weight of sand in 60 kg of the mixture.

   cement .... kg

   lime .... kg

   sand .... kg

Jan14 3H

1 Here is a list of the ingredients needed to make leek and potato soup for 6 people.

Leek and Potato Soup
Ingredients for 6 people
900 ml chicken stock
900 ml water
750 g leeks
350 g potatoes
350 g onions

(a) Ainsley wants to make leek and potato soup for 13 people.

Work out the amount of chicken stock he needs.

.... ml

(2)

(b) Delia makes leek and potato soup for a group of people.
She uses 1250 g of leeks.

Work out the number of people in the group.

....

(2)

Jan14 3H

65, 251

8 A box contains 80 tea bags.
The table shows information about the weight of each tea bag.

Weight (w grams)	Number of tea bags
$2.8 < w \leqslant 2.9$	2
$2.9 < w \leqslant 3.0$	4
$3.0 < w \leqslant 3.1$	22
$3.1 < w \leqslant 3.2$	32
$3.2 < w \leqslant 3.3$	14
$3.3 < w \leqslant 3.4$	6

(a) Work out the percentage of the 80 tea bags that weigh more than 3.1 grams.

.... %

(2)

(b) Work out an estimate for the total weight of the 80 tea bags.
Use halfway values of 2.85 grams, 2.95 grams, ...

.... grams

(3)

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Nov9 3H

15. Jothi bought a car.
Later, Jothi sold the car for £2125
He made a loss of 15%.
Work out the original price of the car.

£ ....

Jan12 3H

1432.62

10 A bank pays compound interest of 6% per annum on its savings accounts.
Julia invests $7500 for 3 years.

Calculate the total interest gained after 3 years.

$ ....

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J11 3H

7   The perimeter of a triangle is 90 cm.
    The lengths of the sides of the triangle are in the ratios 3 : 5 : 7

    Work out the length of the longest side of the triangle.

    .... cm

J12 3H

47.6, 2500

8   On 9th May, 2009, there were 3440 people in the world with swine flu.
    Of these people, 1639 were in the USA.

    (a) Express 1639 as a percentage of 3440
        Give your answer correct to 1 decimal place.

    .... %

    (2)

    The 3440 people who had swine flu on 9th May was an increase of 37.6% on
    the number of people who had swine flu on 8th May.

    (b) Calculate the number of people who had swine flu on 8th May.

    ....

    (3)

J12 3H

40.4

16 The population of India increased by 20% between 1989 and 1999.
The population of India increased by a further 17% between 1999 and 2009.

Calculate the percentage by which the population of India increased between 1989 and 2009.

.... %

Jan14 3H

9826

10 Serena bought a car that had a value of $16 000
At the end of each year, the value of her car had depreciated by 15%.

Calculate the value of her car at the end of 3 years.

$............................

J5 3H

204, 780

8. In a sale at *Bargain Buys*, all the normal prices are reduced by 15%.
   The normal price of a printer is £240

   (a) Work out the sale price of the printer.

   £........................

   (3)

   In the same sale, the sale price of a laptop computer is £663

   (b) Work out the normal price of the laptop computer.

   £........................

   (3)

Jan15 4H

80

7   Lisa, Max and Punita share £240 in the ratio 3 : 4 : 8

   How much more money than Lisa does Punita get?

   £........................

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Jan15 3H

<div style="border:1px solid;">22.4, 180</div>

7 Eloy's height was 125 cm when his age was 7 years.
   His height was 153 cm when his age was 12 years.

   (a) Work out the percentage increase in Eloy's height between the ages of 7 and 12 years.

   .... %

   (3)

   Eloy's height at the age of 12 years was 85% of his height at the age of 20 years.

   (b) Work out Eloy's height when his age was 20 years.

   .... cm

   (3)

J16 3H

52

9 Bhavin, Max and Imran share 6000 rupees in the ratios 2 : 3 : 7

Imran then gives $\frac{3}{5}$ of his share of the money to Bhavin.

What percentage of the 6000 rupees does Bhavin now have?
Give your answer correct to the nearest whole number.

750, 30

J16 3H

1   Here are the ingredients needed to make 12 muffins.

Ingredients to make 12 muffins
300 g flour
150 g sugar
250 ml milk
100 g butter
2 eggs

Sarah makes 60 muffins.

(a) Work out how much sugar she uses.

.... **g**

(2)

James makes some muffins.
He uses 625 ml of milk.

(b) How many muffins did he make?

....

(2)

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J16 4H

388, 395

3 In a sale, all normal prices are reduced by 20%

(a) The normal price of a television set is 485 euros.
Work out the sale price of the television set.

.... euros

(3)

(b) In the sale, the normal price of a tablet computer is reduced by 79 euros.
Work out the normal price of the tablet computer.

.... euros

(3)

J16 4H

$$M = 0.25 \, p^3, \; 31.25$$

13 M is directly proportional to p^3

$M = 128$ when $p = 8$

(a) Find a formula for M in terms of p.

....

(3)

(b) Find the value of M when $p = 5$

....

(1)

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