BUMPER "BETWEEN PAPERS (2 & 3)" PRACTICE

SUITABLE FOR HIGHER TIER ONLY

SUMMER 2019

QUESTIONS

NOT A "BEST" GUESS PAPER.

NEITHER IS IT A "PREDICTION" ... ONLY THE EXAMINERS KNOW WHAT IS GOING TO COME UP! FACT! YOU ALSO NEED TO REMEMBER THAT JUST BECAUSE A TOPIC CAME UP ON PAPER 1 OR 2 IT MAY STILL COME UP ON PAPER 3 ...

WE KNOW HOW IMPORTANT IT IS TO PRACTICE, PRACTICE, PRACTICE .... SO WE'VE COLLATED A LOAD OF QUESTIONS THAT WEREN'T EXAMINED IN THE PEARSON/EDEXCEL 9-1 GCSE MATHS PAPER 1 OR 2 BUT WE CANNOT GUARANTEE HOW A TOPIC WILL BE EXAMINED IN THE NEXT PAPERS ...

ENJOY!
MEL & SEAGER

Q1.

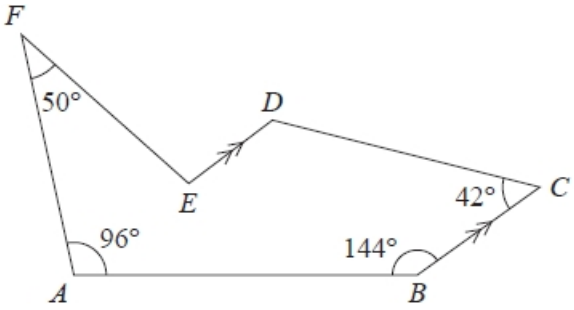


Diagram **NOT** accurately drawn

The diagram shows a hexagon *ABCDEF*.
BC is parallel to *ED*.

Work out the size of the obtuse angle *DEF*.

(5)

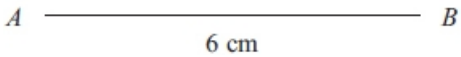
Q2. A triangle has sides of length 8 cm, 10 cm and 14 cm.

Work out the size of the largest angle of the triangle.
Give your answer correct to 1 decimal place.

(3)

Q3 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.



(T4)

Q4.

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

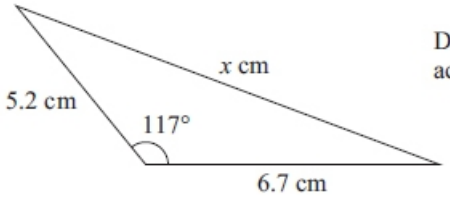


Diagram **NOT** accurately drawn

(3)

Q5.

The diagram shows a pentagon $ABCDE$.
DC is parallel to AB.
The size of an exterior angle at A is 67
The size of an exterior angle at B is 112
The size of an exterior angle at C is x
The size of an exterior angle at D is 74
The size of an exterior angle at E is y

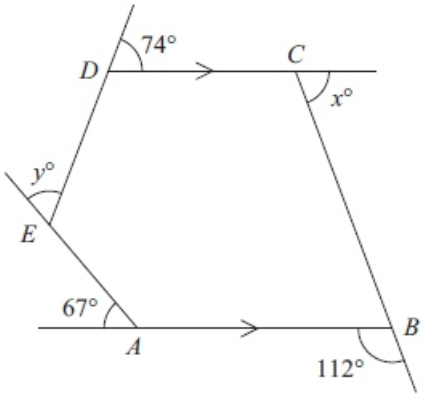


Diagram **NOT** accurately drawn

(a) (i) Work out the value of x.

(ii) Work out the value of y.

(4)

(b) Work out the sum of the interior angles of the pentagon $ABCDE$.

(2)

Q6.

A, B and C are points on horizontal ground.
B is due North of A and AB is 14 m.
C is due East of A and AC is 25 m.

A vertical flagpole, TX, has its base at the point X on BC such that the angle AXC is a right angle.

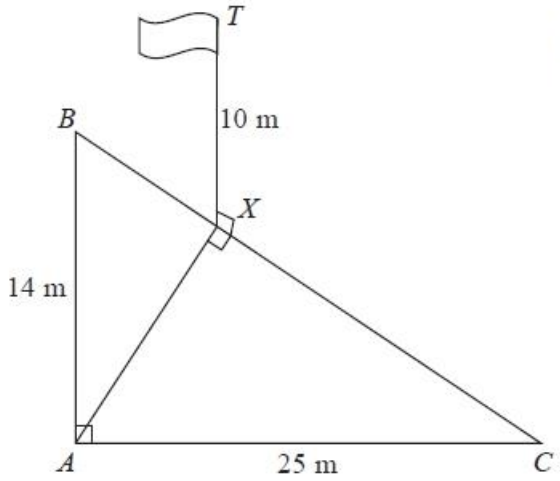


Diagram **NOT** accurately drawn

The height of the flagpole, TX, is 10 m.

Calculate the size of the angle of elevation of T from A.
Give your answer correct to 1 decimal place.

(6)

Q7. ABC is a triangle.

$AB = 12$ cm $\quad$ $AC = 14$ cm $\quad$ The area of triangle ABC is 72 cm^2

Find, in degrees, the two possible sizes of angle BAC.
Give your answers correct to the nearest degree.

(4)

Q8. Work out the area of triangle ABC.
Give your answer correct to 3 significant figures.

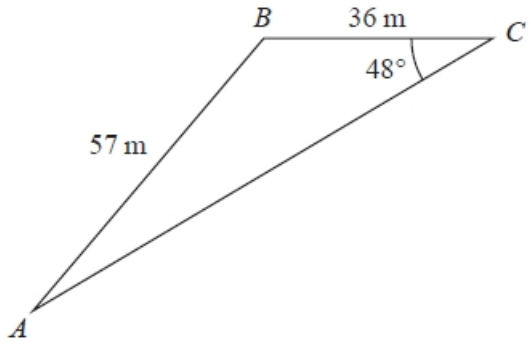


Diagram **NOT** accurately drawn

(4)

Q9. $t = \frac{v-u}{a}$

$v = 27.3$ correct to 3 significant figures.
$u = 18$ correct to 2 significant figures.
$a = 9.81$ correct to 3 significant figures.

Work out the lower bound for the value of t.
Show your working clearly. Give your answer correct to 3 significant figures.

(3)

Q10.

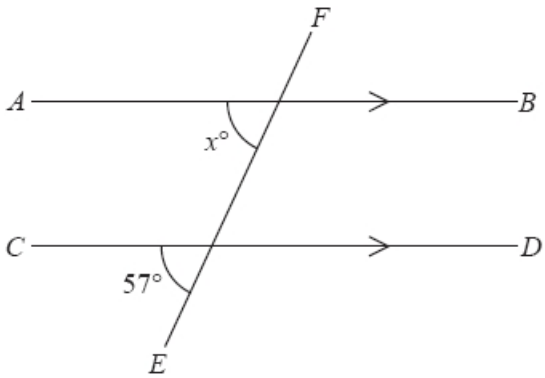


Diagram **NOT** accurately drawn

AB is parallel to CD
EF is a straight line.

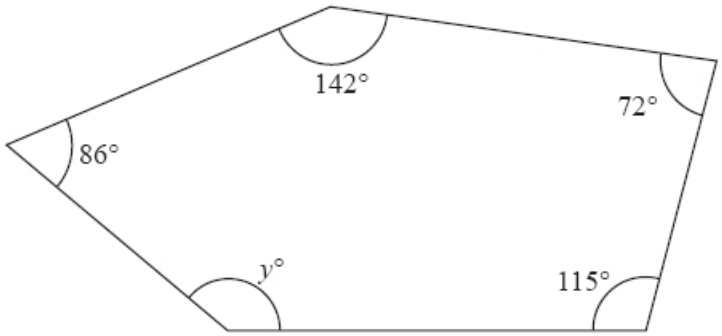
(a) (i) Find the value of x

(ii) Give a reason for your answer.

(2)

Here is a pentagon.

(b) Work out the value of y.



(3)

Q11. $ABCDE$ is a regular pentagon with sides of length 10 cm.

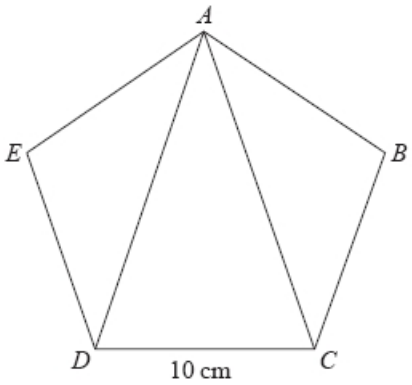


Diagram **NOT** accurately drawn

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

(6)

Q12. $y = \frac{2a}{b-c}$

$a = 42$ correct to 2 significant figures. $b = 24$ correct to 2 significant figures.
$c = 14$ correct to 2 significant figures.

Work out the lower bound for the value of y.
Give your answer correct to 2 significant figures. Show your working clearly.

(3)

Q13. The diagram shows triangle KLM.

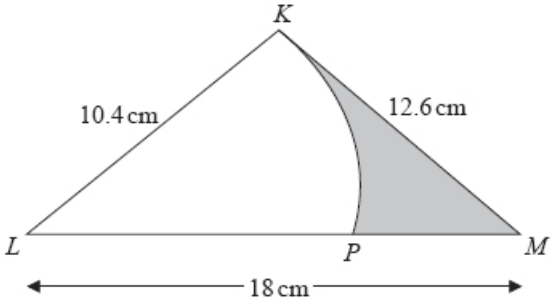


Diagram **NOT** accurately drawn

KLP is a sector of a circle with centre *L* and radius 10.4 cm.
The region of the triangle outside the sector is shown shaded in the diagram.

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

(5)

Q14. Show that the recurring decimal $0.1\dot{7} = \frac{8}{45}$

(2)

Q15. Use algebra to show that the recurring decimal $0.2\dot{6} = \frac{4}{15}$

(2)

Q16.

ABC is a triangle.
AC = 7.9cm
Angle *B* = 90°
Angle *C* = 38°

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

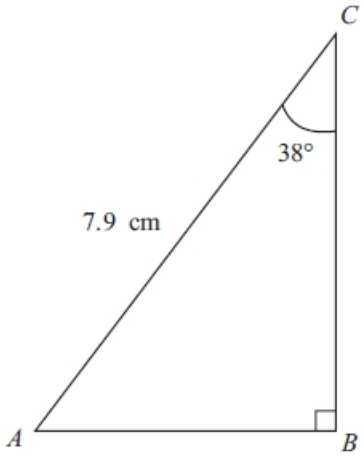


Diagram **NOT** accurately drawn

(3)

(b) The size of angle *C* is 38°, correct to 2 significant figures.
(i) Write down the lower bound of the size of angle *C*.

.....°

(i) Write down the upper bound of the size of angle *C*.

.....°

(2)

Q17. There are 6 batteries in a small packet of batteries.
There are 9 batteries in a large packet of batteries.

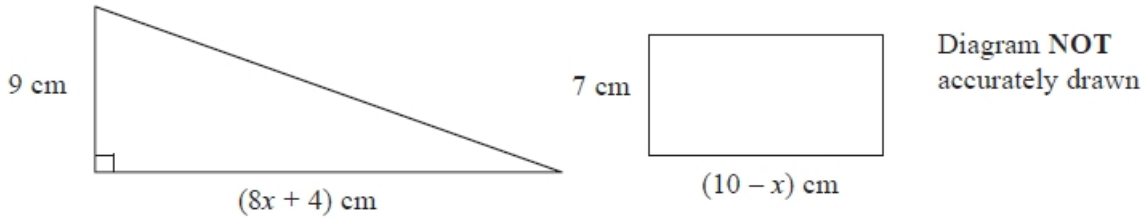
Chow buys m small packets of batteries and g large packets of batteries.

The total number of batteries Chow buys is T.

Write down a formula, in terms of m and g, for T.

(3)

Q18. The diagram shows a right-angled triangle and a rectangle.



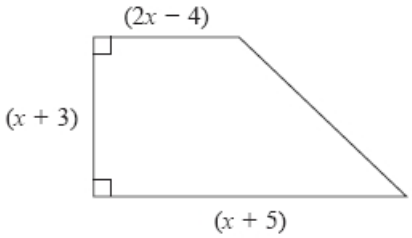
The area of the triangle is twice the area of the rectangle.

(i) Write down an equation for x.

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

(7)

Q19. Here is a trapezium.



All measurements are in centimetres.

The area of the trapezium is 60 cm^2

Show that $3x^2 + 10x - 117 = 0$

(3)

(b) Work out the value of x

Show your working clearly. Give your answer correct to 3 significant figures.

(3)

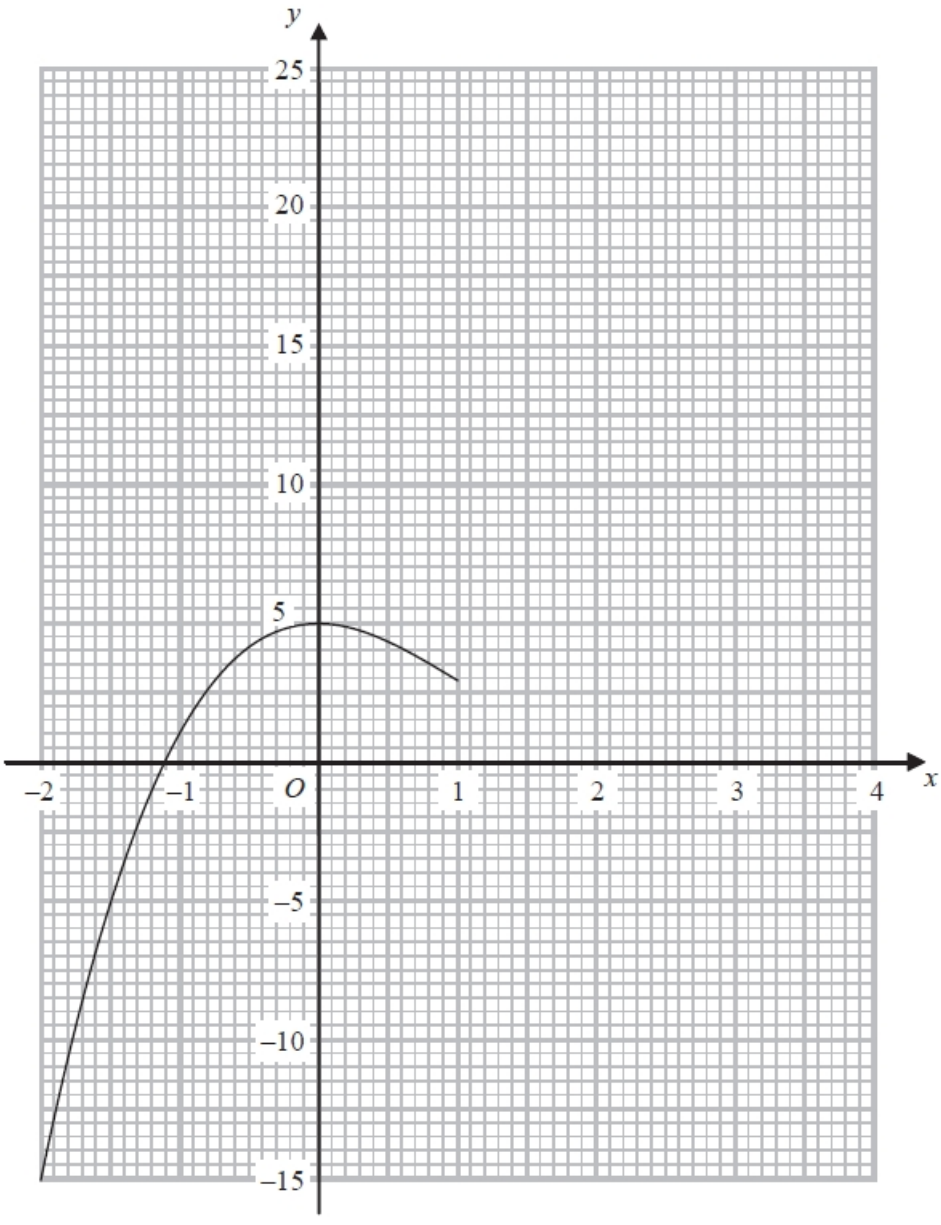
Q20. (a) Complete the table of values for $y = x^3 - 3x^2 + 5$

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 $-2 \leq x \leq 4$

(1)



(c) Use the graph to find an estimate for the solution of the equation $x^3 - 3x^2 + 5 = 0$

(1)

(d) By drawing a suitable straight line on the grid, find an estimate for the solution of the equation $x^3 - 3x^2 + 2x + 4 = 0$

(3)

Q21 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)

Q22. (a) On the grid, draw the graph of $y = -2x + 4$ for values of x from -1 to 5

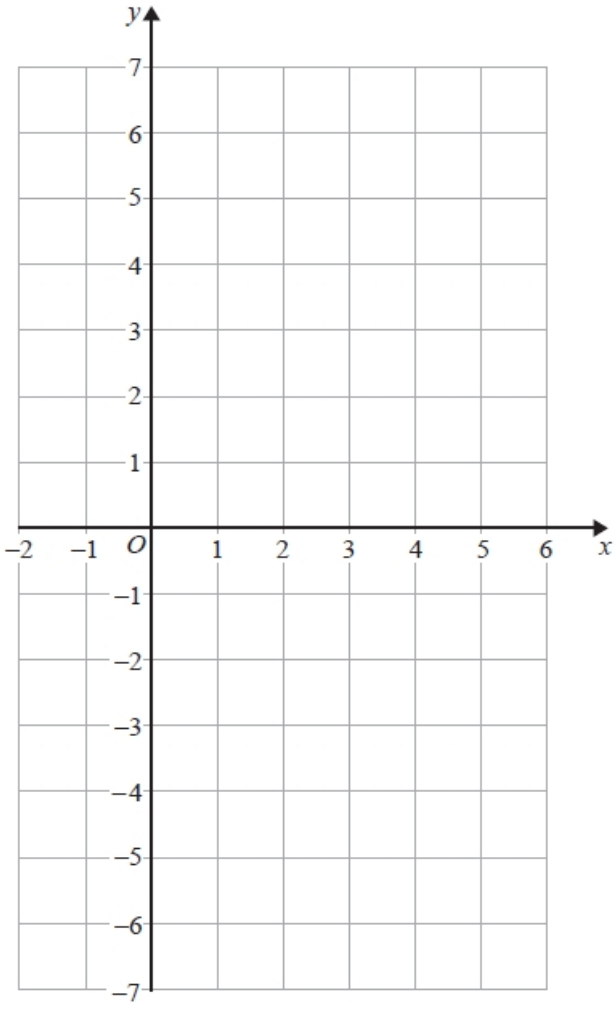
(4)

(b) Show by shading on the grid, the region defined by all three of the inequalities

$y \leq -2x + 4$
$y \geq -4$
$x \geq 1$

Label your region R.

(3)



Q23. (a) Expand $5(2p - 3)$

(1)

(b) Solve the inequality $9 - 2x < 3$

(2)

(c) $y = x^3 - kx + 5$

Work out the value of k when $y = 6$ and $x = -2$

(3)

(d) Solve $\frac{1}{f+2} = 3$

$f =$ ..... (2)

Q24. $f(x) = \frac{4}{x-3}$ $\quad\quad$ $g(x) = \frac{x-2}{x}$

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

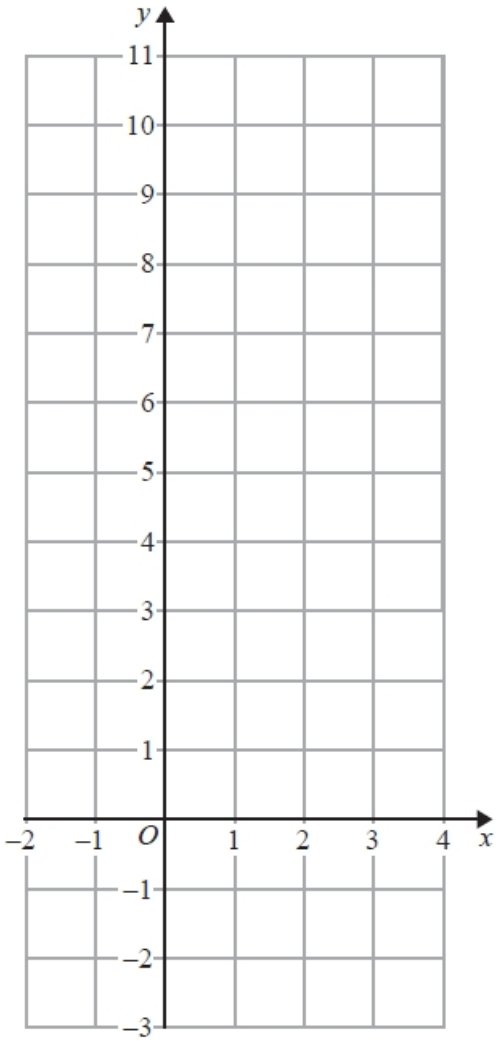
(3)

(b) Solve $fg(a) = 1$

Show clear algebraic working.

(3)

Q25. (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

$$x \leq 3 \quad \text{and} \quad y \geq 2 \quad \text{and} \quad y \leq 2x + 3$$

Label your region R.

(2)

Q26. The diagram shows a rectangular playground of width x metres and length $3x$ metres.

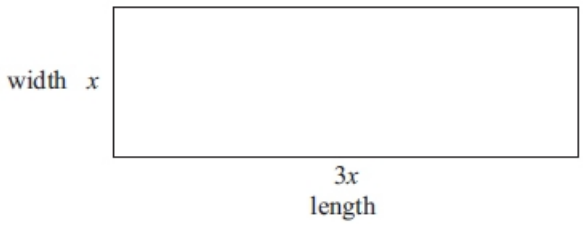


Diagram **NOT** accurately drawn

The playground is extended, by adding 10 metres to its width and 20 metres to its length, to form a larger rectangular playground.
The area of the larger rectangular playground is double the area of the original playground.
(a) Show that $3x^2 - 50x - 200 = 0$

(3)

(b) Calculate the area of the original playground.

(5)

Q27. f is a function such that $f(x) = \frac{1}{x^2+1}$

(a) Find f($^1/_2$)

(1)

g is a function such that
$g(x) = \sqrt{x-1}$ $\quad x \geq 1$

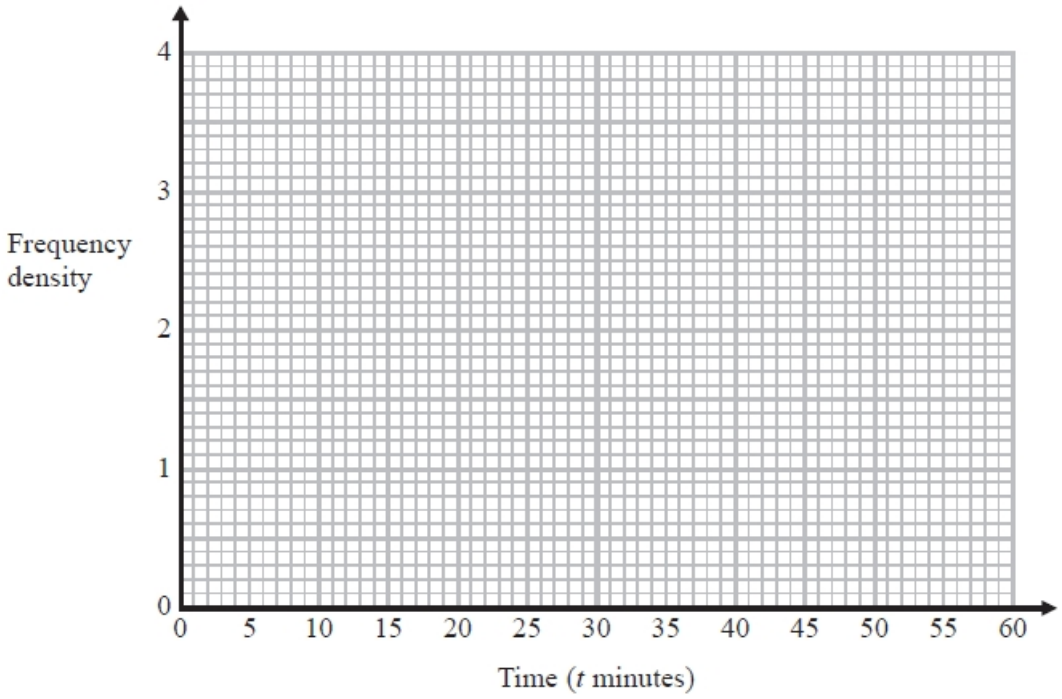
(b) Find fg(x)
Give your answer as simply as possible.

(2)

Q28. 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.



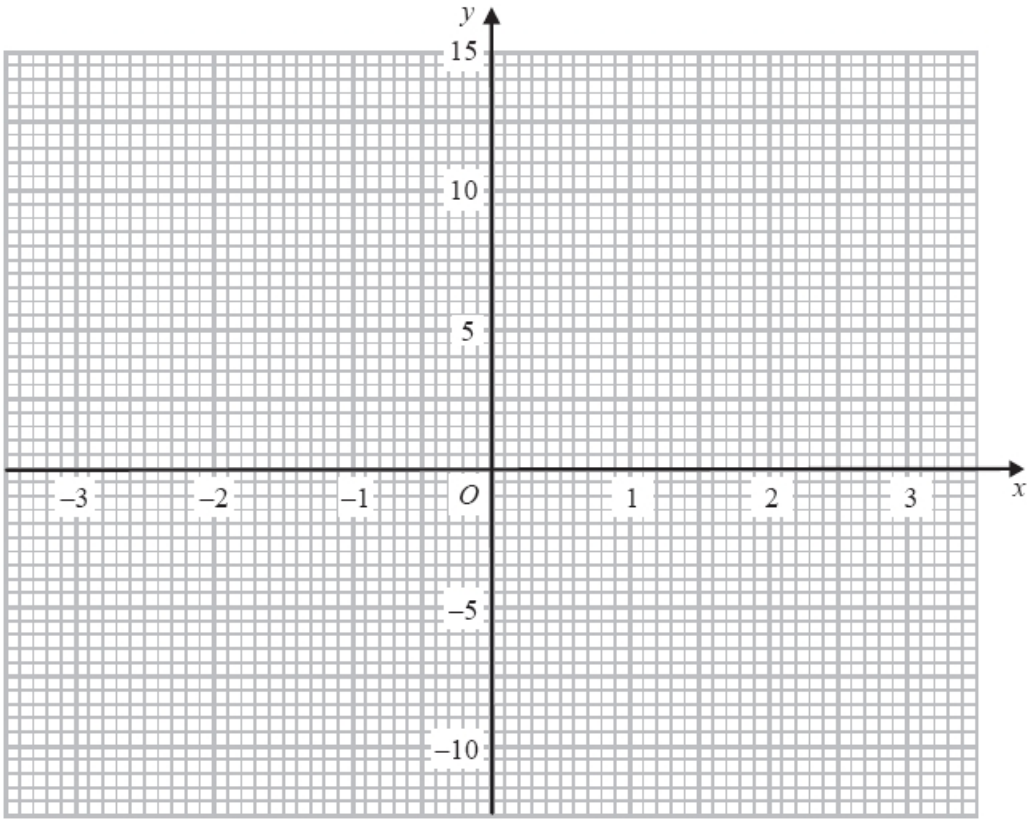
(3)

Q29. (a) Complete the table of values for $y = x^3 - 5x + 2$

x	−3	−2	−1	0	1	2	3
y		4			−2		14

(2)

(b) On the grid, draw the graph of $y = x^3 - 5x + 2$ for $-3 \leq x \leq 3$



(2)

The equation $x^3 - 6x + m = 0$, where m is an integer, has one negative solution and two positive solutions.

c) Given that $x = 1$ is one of the positive solutions, show that $m = 5$

(1)

d) By drawing a suitable straight line on the grid, find an estimate for the negative solution of $x^3 - 6x + 5 = 0$

Give your estimate to 1 decimal place.

(2)

Q30. (a) Solve the inequalities $-6 \leq 3x$

(2)

(b) n is an integer. Write down all the values of n which satisfy $-6 \leq 3n$

(2)

Q31. Solve $2x^2 - 6x + 3 - 0$ Give your solutions correct to 3 significant figures.

(3)

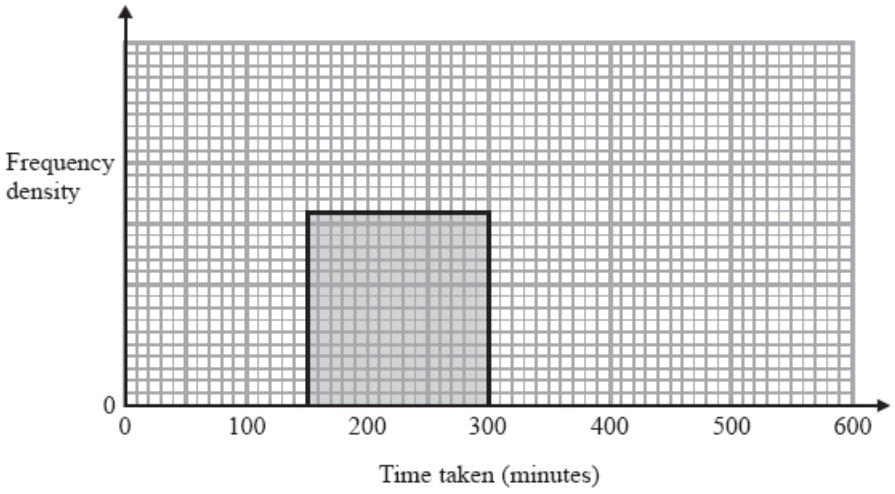
Q32.The table gives information about the time taken by each of 600 people to reach their holiday destination.

Time taken (t minutes)	Frequency
$0 < t \leqslant 100$	120
$100 < t \leqslant 150$	140
$150 < t \leqslant 300$	240
$300 < t \leqslant 500$	80
$500 < t \leqslant 600$	20

(a) Use the information in the table to complete the histogram.

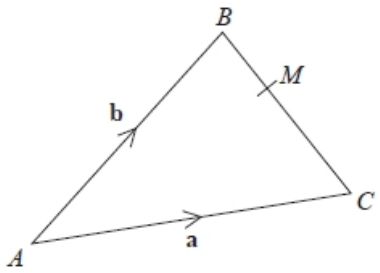
(3)

(b) Work out an estimate for the number of people who took more than 200 minutes to reach their holiday destination.



(2)

Q33. M is the point such that $BM : MC$ is 1 : 2



Here is Charlie's method to find $\overrightarrow{BM}$ in terms of a and b.

$$\overrightarrow{BC} = \overrightarrow{BA} + \overrightarrow{AC}$$
$$= -\mathbf{b} + \mathbf{a}$$
$$= \mathbf{a} - \mathbf{b}$$
$$\overrightarrow{BM} = \frac{1}{2}\overrightarrow{BC}$$
$$= \frac{1}{2}(\mathbf{a} - \mathbf{b})$$

(a) Evaluate Charlie's method.

(1)

Martin expands $(2x + 1)(2x - 3)(3x + 2)$

He gets $12x^3 - 4x^2 - 17x + 6$

(b) Explain why Martin's solution cannot be correct.

(1)

Q34 At time t = 0 hours a tank is full of water. Water leaks from the tank.
At the end of every hour there is 2% less water in the tank than at the start of the hour.

The volume of water, in litres, in the tank at time t hours is V_t

Given that

$V_0 = 2000$
$V_{t+1} = kV_t$

write down the value of k.

(1)

Q35 At the start of year n, the quantity of a radioactive metal is P_n
At the start of the following year, the quantity of the same metal is given by
$P_{n+1} = 0.87P_n$

At the start of 2016 there were 30 grams of the metal.

What will be the quantity of the metal at the start of 2019?
Give your answer to the nearest gram.

(3)

Q36. Show that $(x + 1)(x + 2)(x + 3)$ can be written in the form $ax^3 + bx^2 + cx + d$ where a, b, c and d are positive integers.

(3)

Q37. (a) Show that the equation $2x^3 + 4x = 3$ has a solution between 0 and 1

(2)

(b) Show that $2x^3 + 4x = 3$ can be rearranged to give $x = \frac{3}{4} - \frac{x^3}{2}$

(1)

(c) Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = \frac{3}{4} - \frac{x_n^3}{2}$ times to find an estimate for the solution to $2x^3 + 4x = 3$

(3)