

Write your name here					
Surname			Other names		
Pearson Edexcel		Centre Number		Candidate Number	
Level 1 / Level 2		<div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px;"></div>		<div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px;"></div> <div style="border: 1px solid black; display: inline-block; width: 20px; height: 20px;"></div>	
GCSE (9–1)					
<h1 style="margin: 0;">Mathematics</h1> <h2 style="margin: 0;">Paper 2 (Calculator)</h2>					
<u>Mr Coren's predicted Paper 2</u> NOTE: THIS IS A BEST GUESS OF TOPICS THAT HAVE NOT YET APPEARED IN PAPER 1.				Higher Tier	
				Paper Reference 1MA1/2H	
You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.					Total Marks <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto;"></div>

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.



Information

- The total mark for this section is **240**
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on time.
- Try to answer every question.
- Check your answers if you have time at the end.

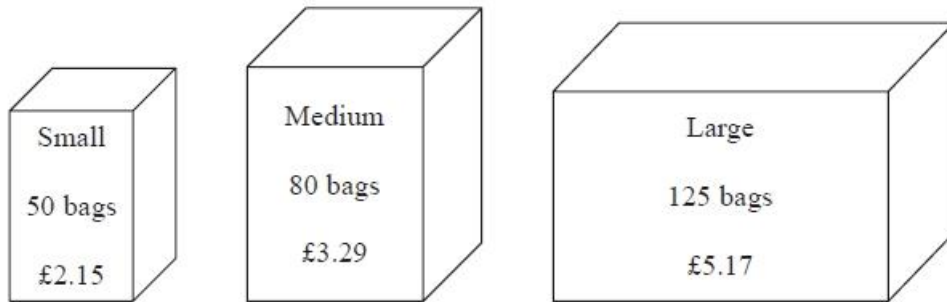
Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

Q1.

Tea bags are sold in three sizes of box.



A small box of 50 tea bags costs £2.15

A medium box of 80 tea bags costs £3.29

A large box of 125 tea bags costs £5.17

Which size of box is the best value for money?

(Total for Question is 4 marks)

Q2. Colin is on holiday in France.

He buys a wallet.

The wallet costs 31 euros.

In London a wallet costs £23.50

The exchange rate is £1 = 1.34 euros.

Compare the cost of the wallet in France with the cost of the wallet in London.

(Total for question = 3 marks)

Q3. You can use this graph to convert between litres and gallons.

Jack buys 8 gallons of diesel.

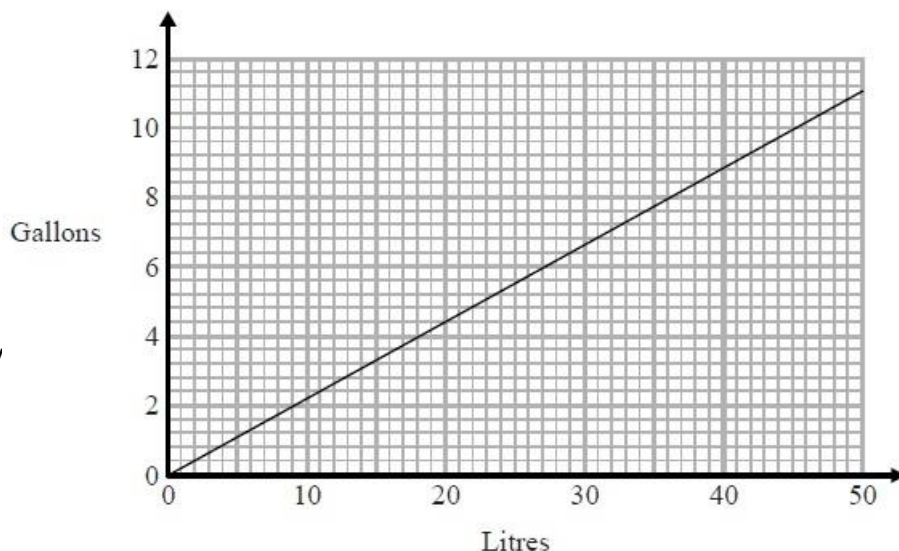
He pays £52

Francoise buys 40 litres of diesel.

She pays £58

Who got the better value for their money

You must show your working.



(Total for Question is 3 marks)

Q4.

(a) Write 4.5×10^{-3} as an ordinary number.

..... (1)

(b) Work out the value of $(2.5 \times 10^{-2}) \div (3.8 \times 10^3)$

Give your answer in standard form correct to 3 significant figures.

..... (2)

(Total for Question is 3 marks)

Q5. Claire is making a loaf of bread.

A loaf of bread loses 12% of its weight when it is baked.

Claire wants the baked loaf of bread to weigh 1.1 kg.

Work out the weight of the loaf of bread before it is baked.

..... kg

(Total for question = 3 marks)

Q6. This notice was in a car magazine.

Most new cars lose more than half of their value
in the first three years

Paul bought a new car. The value of the car was £15 000

In the first year, the value of the car depreciated by 23%.

After the first year, the value of the car depreciated by 18% each year.

Work out if Paul's car lost more than half of its value by the end of three years.

(Total for question = 4 marks)

Q7. Katy invests £2000 in a savings account for 3 years.

The account pays compound interest at an annual rate of

2.5% for the first year

$x\%$ for the second year

$x\%$ for the third year

There is a total amount of £2124.46 in the savings account at the end of 3 years.

(a) Work out the rate of interest in the second year.

..... (4)

Katy goes to work by train.

The cost of her weekly train ticket increases by 12.5% to £225

(b) Work out the cost of her weekly train ticket before this increase.

£.....(2)

(Total for question = 6 marks)

Q8. Prove algebraically that the recurring decimal $0.1\overline{78}$ can be written as the fraction $\frac{59}{330}$

(Total for question = 3 marks)

Q9.

$$I = \frac{V}{R}$$

$V = 250$ correct to the nearest 5

$R = 3900$ correct to the nearest 100

Work out the lower bound for the value of I .

Give your answer correct to 3 decimal places. You must show your working.

(Total for question = 3 marks)

Q10.

(a) Find the value of the reciprocal of 1.6

Give your answer as a decimal.

(1)

Jess rounds a number, x , to one decimal place.
The result is 9.8

(b) Write down the error interval for x .

(2)

(Total for question = 3 marks)

Q11.

(a) Expand $7(x + 5)$

..... (1)

(b) Expand $3y(4y - 3)$

..... (1)

(c) Expand and simplify $(t + 2)(t + 4)$

..... (2)

(Total for question = 4 marks)

Q12.

(a) Expand and simplify $(x + 2)(2x - 3)(3x + 1)$

..... (3)

(b) Simplify $n^4 \div n^{\frac{1}{2}}$

..... (1)

(Total for question = 4 marks)

Q13. Here are the first four terms of an arithmetic sequence.

3

10

17

24

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

..... (2)

(b) Is 150 a term of this sequence?
You must explain how you get your answer.

(2)
(Total for Question is 4 marks)

Q14. Here are the first six terms of a Fibonacci sequence.

1 1 2 3 5 8

The rule to continue a Fibonacci sequence is,

the next term in the sequence is the sum of the two previous terms.

(a) Find the 9th term of this sequence.

..... (1)

The first three terms of a different Fibonacci sequence are

a b $a + b$

(b) Show that the 6th term of this sequence is $3a + 5b$

(2)

Given that the 3rd term is 7 and the 6th term is 29,

(c) find the value of a and the value of b .

..... (3)

(Total for question = 6 marks)

Q15. Here are the first 7 terms of a quadratic sequence.

3 6 11 18 27 38 51

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

..... (2)

(b) Find the 50th term of this sequence.

..... (1)

(Total for question = 3 marks)

Q16. S is a geometric sequence.

(a) Given that $(\sqrt{x} - 1)$, 1 and $(\sqrt{x} + 1)$ are the first three terms of S, find the value of x.

You must show all your working.

..... (3)

(b) Show that the 5th term of S is $7 + 5\sqrt{2}$

(2)
(Total for question = 5 marks)

Q17. $k = 3e + 5$

(a) Work out the value of k when $e = -2$

..... (2)

(b) Solve $4y + 3 = 2y + 14$

$y = \dots\dots\dots$ (2)

(c) Solve $3(x - 5) = 21$

$x = \dots\dots\dots$ (2)

$$-3 < n < 4$$

n is an integer.

(d) Write down all the possible values of n .

(2)

(Total for Question is 8 marks)

Q18. The expression $x^2 - 8x + 6$ can be written in the form $(x - p)^2 + q$ for all values of x .

(a) Find the value of p and the value of q .

$$p = \dots\dots\dots$$

$$q = \dots\dots\dots (3)$$

The graph of $y = x^2 - 8x + 6$ has a minimum point.

(b) Write down the coordinates of this point.

$$(\dots\dots\dots, \dots\dots\dots) (1)$$

(Total for question = 4 marks)

Q19. The diagram shows a trapezium.

All the measurements are in centimetres.

The area of the trapezium is 351 cm^2 .

(a) Show that $2x^2 + x - 351 = 0$

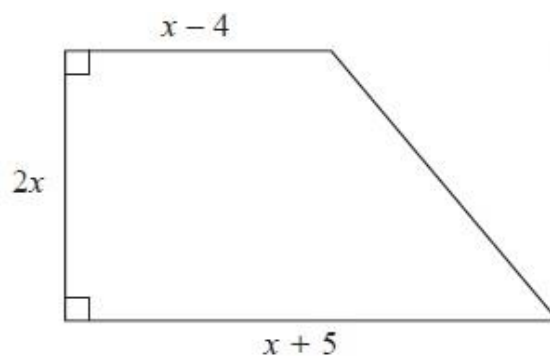


Diagram NOT
accurately drawn

(2)

(b) Work out the value of x .

(3)

(Total for Question is 5 marks)

Q20. Solve, by factorising, the equation $8x^2 - 30x - 27 = 0$

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

Q57. Solve $2x^2 + 4x - 5 = 0$
Give your solutions correct to 2 decimal places.

.....
(Total for question = 3 marks)

Q21.

(a) Show that the equation $x^3 - 3x^2 + 3 = 0$ has a solution between $x = 2$ and $x = 3$

(2)

(b) Show that the equation $x^3 - 3x^2 + 3 = 0$ can be rearranged to give $x = \sqrt[3]{3x^2 - 3}$

(1)

(c) Starting with $x_0 = 2$, use the iteration formula $x_{n+1} = \sqrt[3]{3x_n^2 - 3}$ to find the value of x_2
Give your answer correct to 3 decimal places.

..... (3)
(Total for question = 6 marks)

Q22. PQR is an isosceles triangle.

$$PQ = PR$$

All the angles are in degrees.

Work out the value of x .

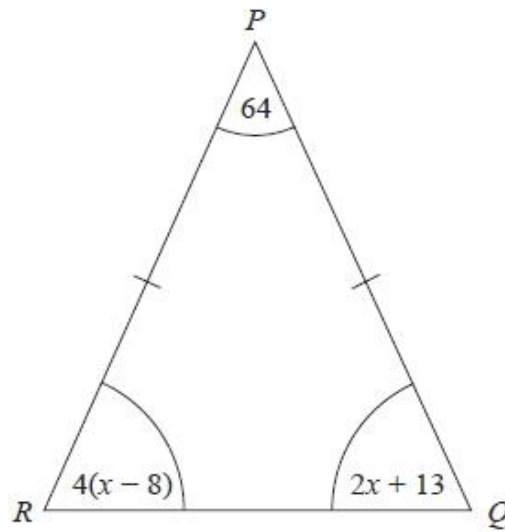


Diagram NOT
accurately drawn

$x = \dots\dots\dots$

(Total for question = 4 marks)

Q23.

The Singh family and the Peterson family go to the cinema.

The Singh family buy 2 adult tickets and 3 child tickets.

They pay £28.20 for the tickets.

The Peterson family buy 3 adult tickets and 5 child tickets.

They pay £44.75 for the tickets.

Find the cost of each adult ticket and each child ticket.

(Total for question = 5 marks)

Q24. Solve the simultaneous equations

$$\begin{aligned}4x + 2y &= 7 \\ 3x - 5y &= -24\end{aligned}$$

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

$$y = \dots\dots\dots$$

(Total for question = 4 marks)

Q25. Solve the equations

$$\begin{aligned}x^2 + y^2 &= 36 \\ x &= 2y + 6\end{aligned}$$

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

Q26.

Solve $\frac{3x - 2}{4} - \frac{2x + 5}{3} = \frac{1 - x}{6}$

$x = \dots\dots\dots$

(Total for question = 4 marks)

Q27.

(a) Make t the subject of the formula

$$2(a + t) = 5t + 7$$

$t = \dots\dots\dots$ (3)

(b) Solve the simultaneous equations

$$3x - 4y = 8$$

$$9x + 5y = -1.5$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$ (3)

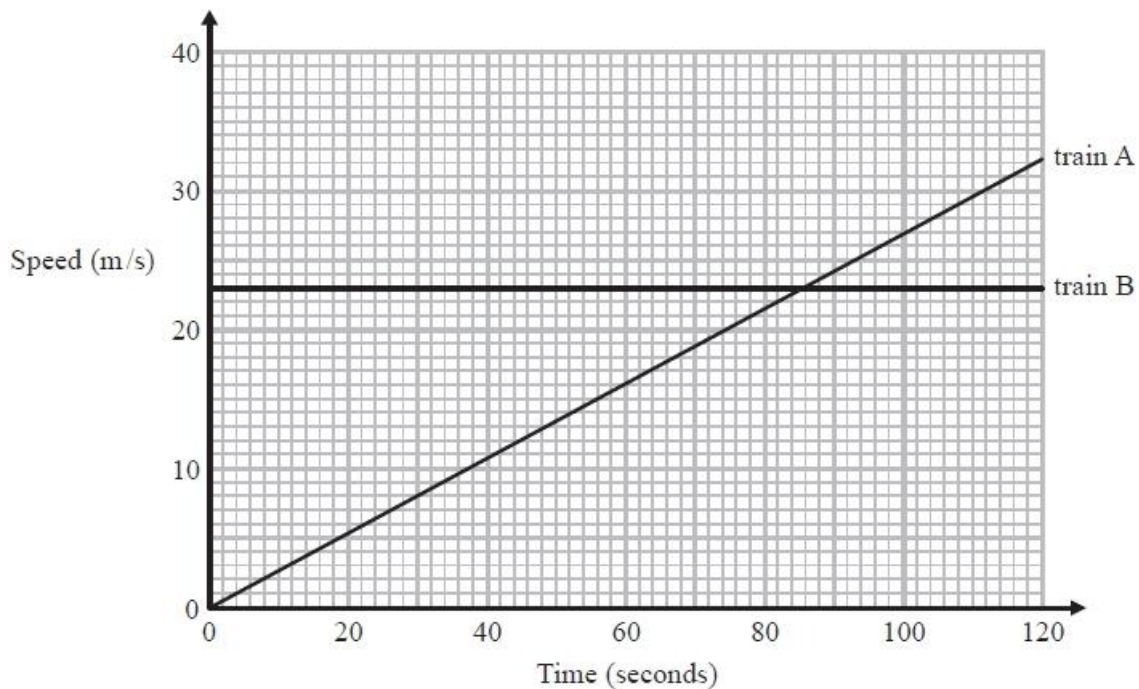
(Total for Question is 6 marks)

Q28. Write $x^2 + 6x - 7$ in the form $(x + a)^2 + b$ where a and b are integers.

.....

(Total for question = 2 marks)

Q29. The graph shows information about the speeds of two trains.



(a) Work out the gradient of the line for train A.

..... (2)

(b) Describe how the speed of train A and the speed of train B are changing in relation to time.

.....

 (1)

(Total for question = 3 marks)

Q30. The diagram shows part of the graph of $y = x^2 - 2x + 3$

(a) By drawing a suitable straight line, use your graph to find estimates for the solutions of $x^2 - 3x - 1 = 0$

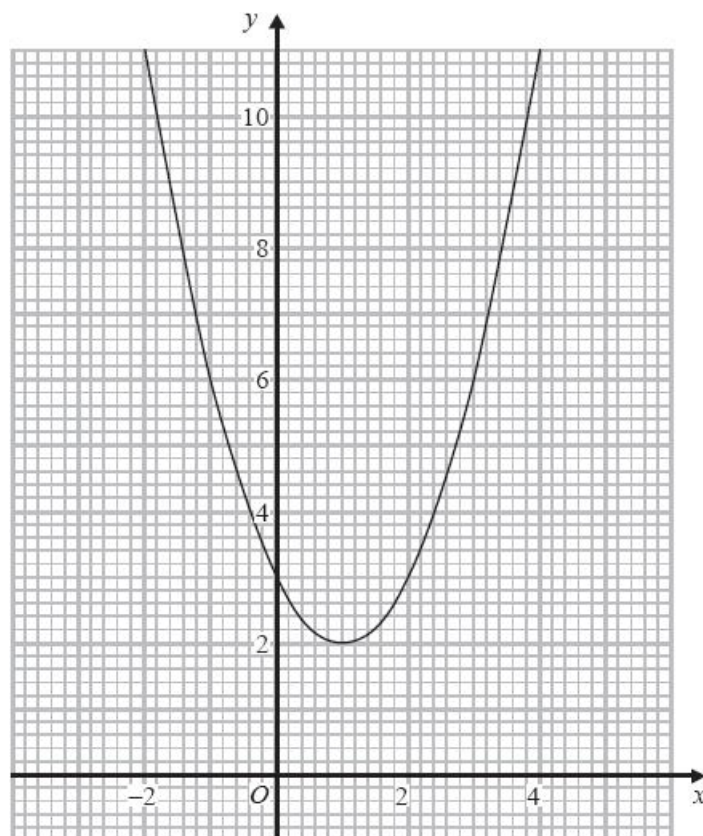
..... (2)

P is the point on the graph of $y = x^2 - 2x + 3$ where $x = 2$

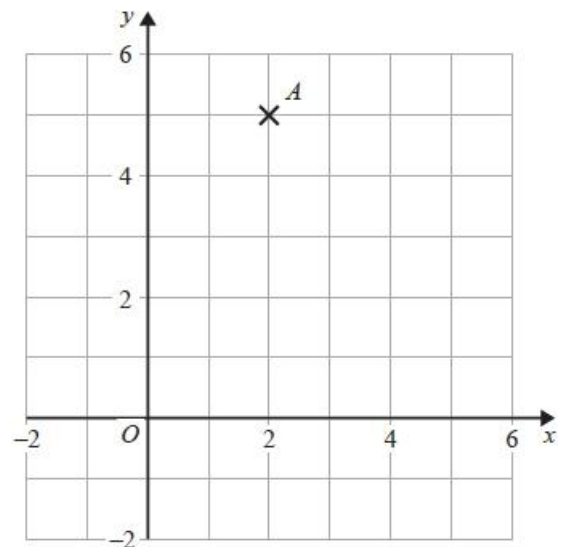
(b) Calculate an estimate for the gradient of the graph at the point P .

..... (3)

(Total for question = 5 marks)



Q31. Find an equation of the straight line with gradient 3 that passes through point A.



.....
(Total for question = 2 marks)

Q32.

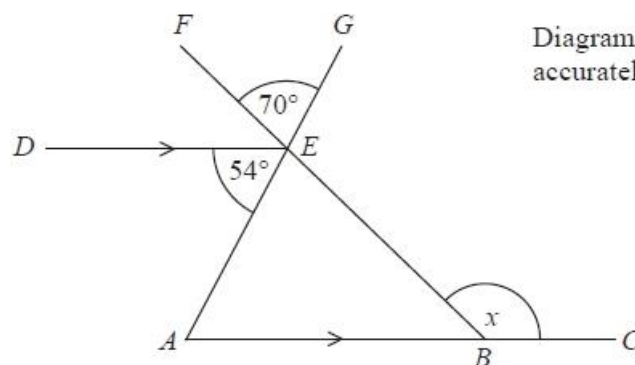


Diagram NOT
accurately drawn

ABC and *DE* are parallel lines.
AEG and *BEF* are straight lines.

Angle *AED* = 54°

Angle *FEG* = 70°

Work out the size of the angle marked *x*.
Give a reason for each stage of your working.

(Total for question = 4 marks)

Q33. $ABCDE$ and $PQRST$ are regular pentagons.

SR is parallel to DC
 $AP = BQ = CR = DS = ET$

Work out the size of angle SRC .
 You must show all your working.

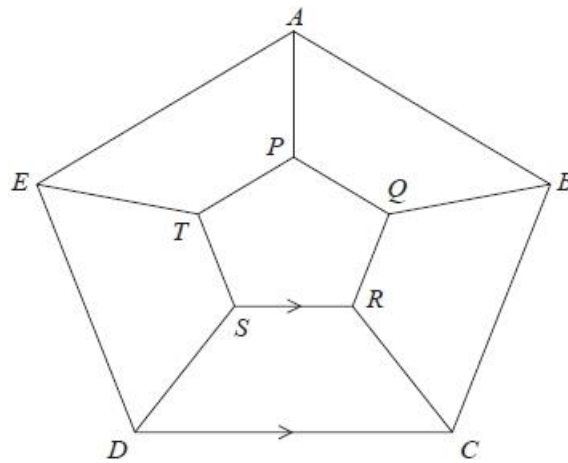


Diagram NOT
accurately drawn

.....°

(Total for question = 3 marks)

Q34.

There is a coastguard station at point A
 and at point B .
 B is due East of A .
 The distance from A to B is 12 km.

There is a rowing boat at point R .
 R is on a bearing of 160° from A .
 R is on a bearing of 220° from B .

There is a speedboat at point T .
 T is 5 km due South of A .

Work out the shortest distance from T to R .
 Give your answer correct to 1 decimal
 place.
 You must show all your working.

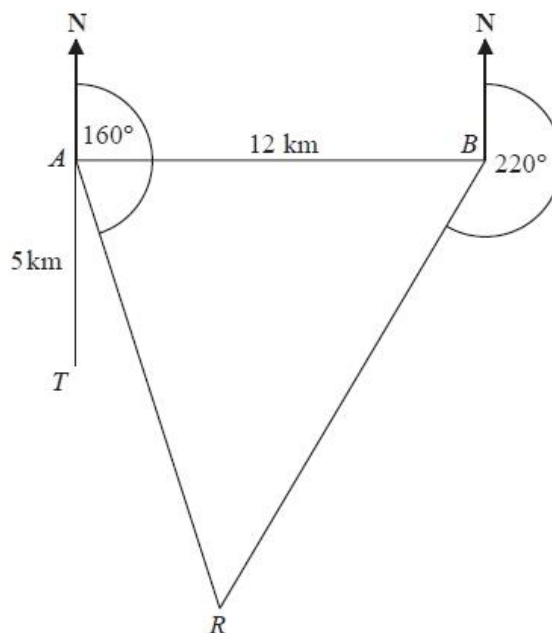


Diagram NOT
accurately drawn

.....km

(Total for question = 5 marks)

Q35. The diagram shows the position of two boats, *B* and *C*.



Boat *T* is on a bearing of 060° from boat *B*.

Boat *T* is on a bearing of 285° from boat *C*.

In the space above, draw an accurate diagram to show the position of boat *T*.

Mark the position of boat *T* with a cross (x).

Label it *T*.

(Total for Question is 3 marks)

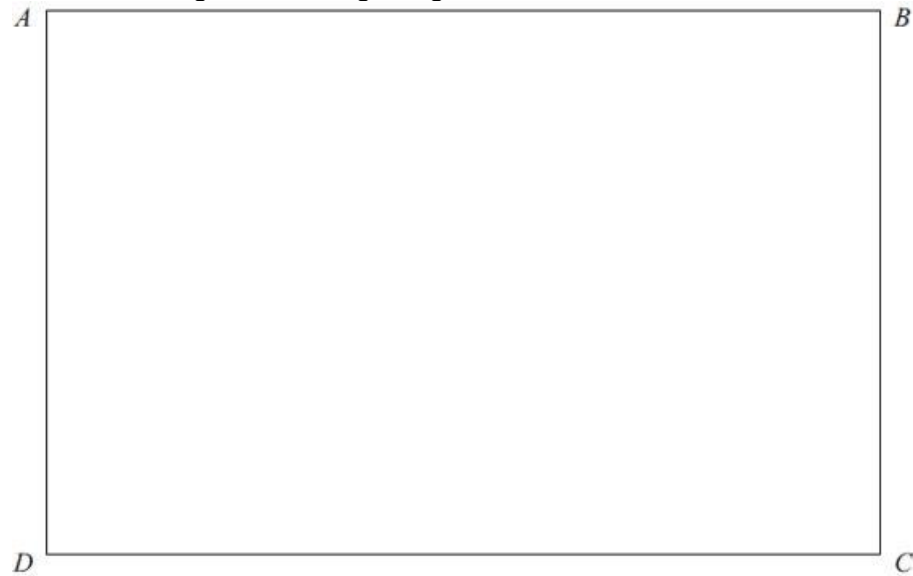
Q36.



Use ruler and compasses to **construct** the perpendicular bisector of the line *AB*.
You must show all your construction lines.

(Total for question = 2 marks)

Q37. Here is a scale drawing of a rectangular garden $ABCD$.



Scale: 1 cm represents 1 metre.

Jane wants to plant a tree in the garden

- at least 5m from point C ,
- nearer to AB than to AD
- and less than 3m from DC .

On the diagram, shade the region where Jane can plant the tree.

(Total for Question is 4 marks)

Q38.

OAC is a sector of a circle, centre O , radius 10 m.

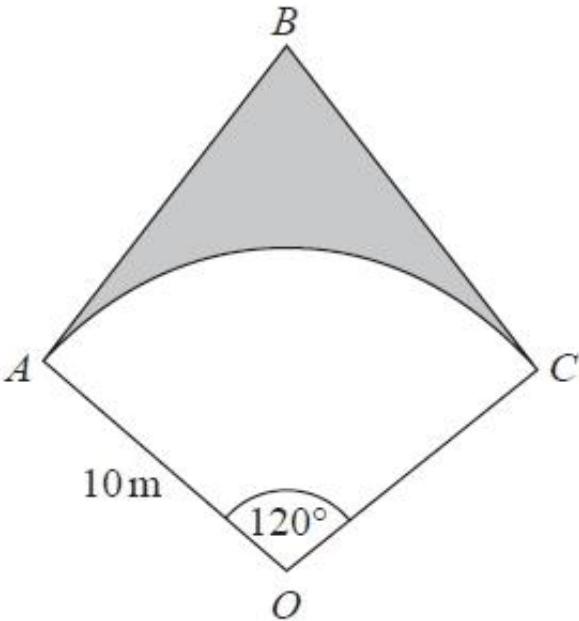
BA is the tangent to the circle at point A .

BC is the tangent to the circle at point C .

Angle $AOC = 120^\circ$

Calculate the area of the shaded region.

Give your answer correct to 3 significant figures.



..... m²

(Total for question = 5 marks)

Q39.

Diagram **NOT** accurately drawn

ABC is a triangle.

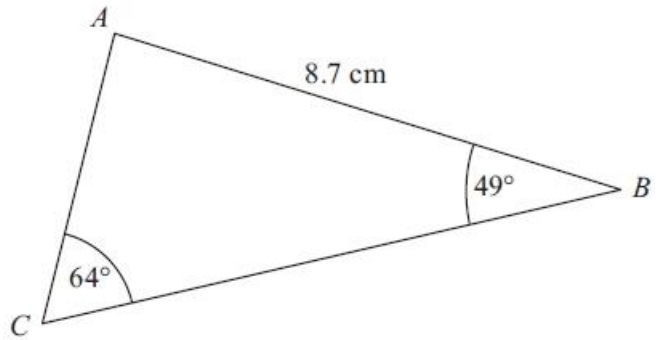
$AB = 8.7$ cm.

Angle $ABC = 49^\circ$.

Angle $ACB = 64^\circ$.

Calculate the area of triangle ABC .

Give your answer correct to 3 significant figures.



..... cm²

(Total for Question is 5 marks)

Q40. The diagram shows a flower bed in the shape of a circle.

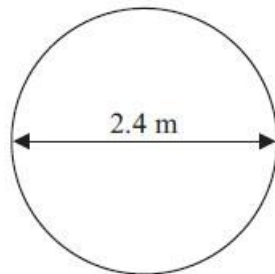


Diagram **NOT**
accurately drawn

The flower bed has a diameter of 2.4 m.

Sue is going to put a plastic strip around the edge of the flower bed.

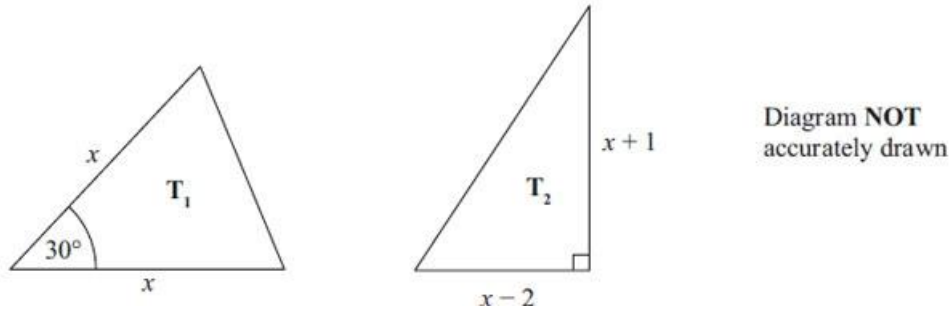
The plastic strip is sold in 2 metre rolls.

How many rolls of plastic strip does Sue need to buy?

You must show all your working.

(Total for Question is 4 marks)

Q41. Here are two triangles **T1** and **T2**.



The lengths of the sides are in centimetres.
 The area of triangle **T1** is equal to the area of triangle **T2**.

Work out the value of x , giving your answer in the form $a + \sqrt{b}$ where a and b are integers.

(Total for Question is 5 marks)

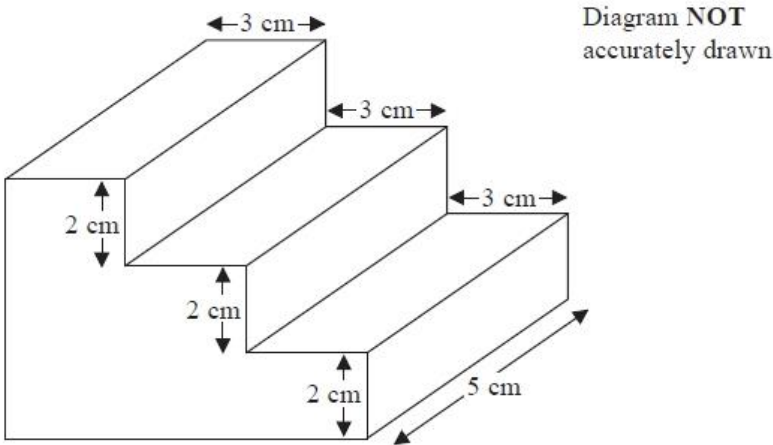
Q42. Change 2 m^3 to cm^3 .

..... cm^3

(Total for question = 2 marks)

Q43. The diagram shows a prism.

All the corners are right angles.
 Work out the volume of the prism.



..... cm^3

(Total for question = 3 marks)

Q44. A frustrum is made by removing a small cone from a similar large cone.

The height of the small cone is 20 cm.

The height of the large cone is 40 cm.

The diameter of the base of the large cone is 30 cm.

Work out the volume of the frustrum.

Give your answer correct to 3 significant figures.

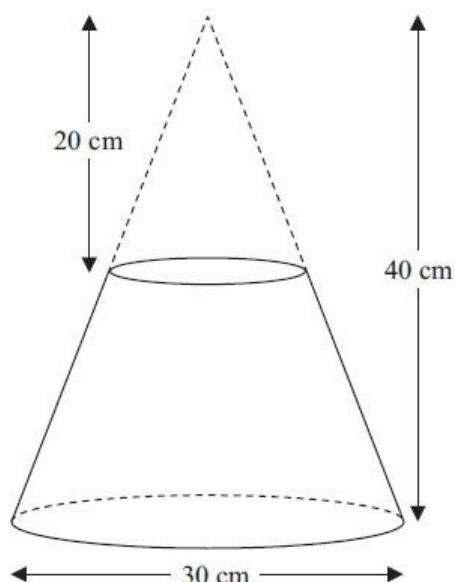


Diagram NOT
accurately drawn

.....cm³

(Total for Question is 4 marks)

Q45. The diagram shows a metal bar in the shape of a prism.

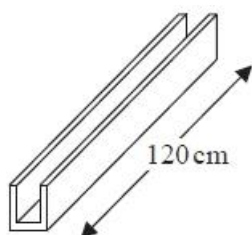


Diagram NOT
accurately drawn

The length of the metal bar is 120 cm.

The cross section of the metal bar is shown here.

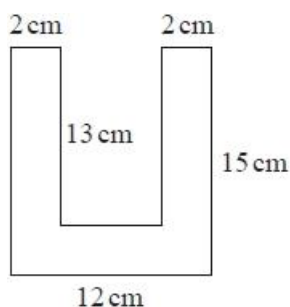


Diagram NOT
accurately drawn

All corners are right angles.

The metal bar is made from steel with density 8 g/cm³.

Sean has a trolley.

The trolley can carry a maximum mass of 250kg.

How many metal bars can the trolley carry at the same time?

You must show your working.

(Total for question = 5 marks)

Q46. The diagram shows a container used to store oil.

The container is in the shape of a cylinder of radius 40 cm.

The height of the oil in the container is 90 cm.

65 litres of oil are taken from the container.

1 litre = 1000 cm^3 .

Work out the new height of the oil in the container.

Give your answer correct to one decimal place.

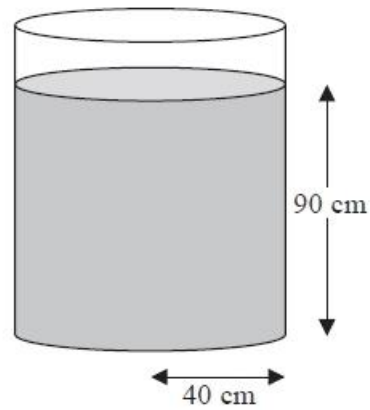


Diagram **NOT**
accurately drawn

Q47. The diagram shows the positions of a tower and a tree.

The tree is 2.1 km South of the tower and 4.5 km East of the tower.

(a) Work out the distance between the tower & the tree.
Give your answer correct to one decimal place.

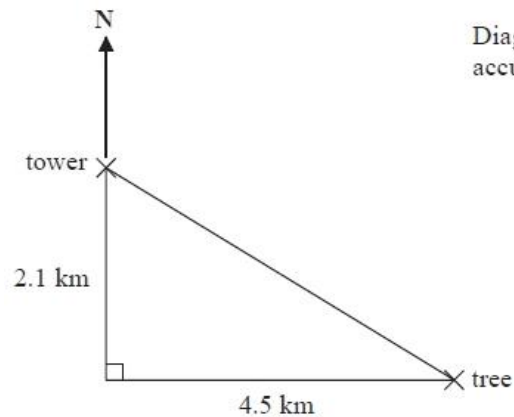


Diagram **NOT**
accurately drawn

.....cm
(Total for Question is 4 marks)

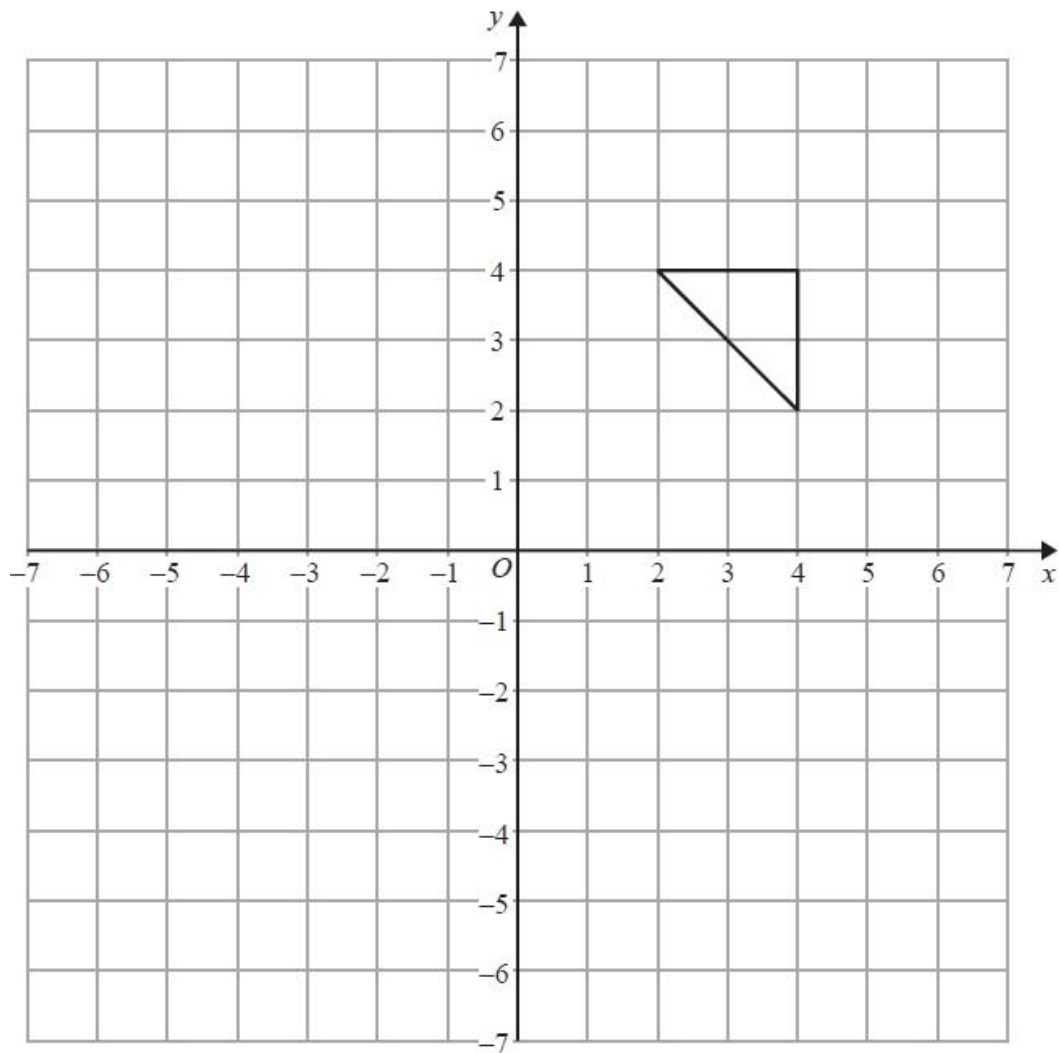
(b) Work out the bearing of the tree from the tower.
Give your answer correct to the nearest degree.

.....km (3)

.....° (4)

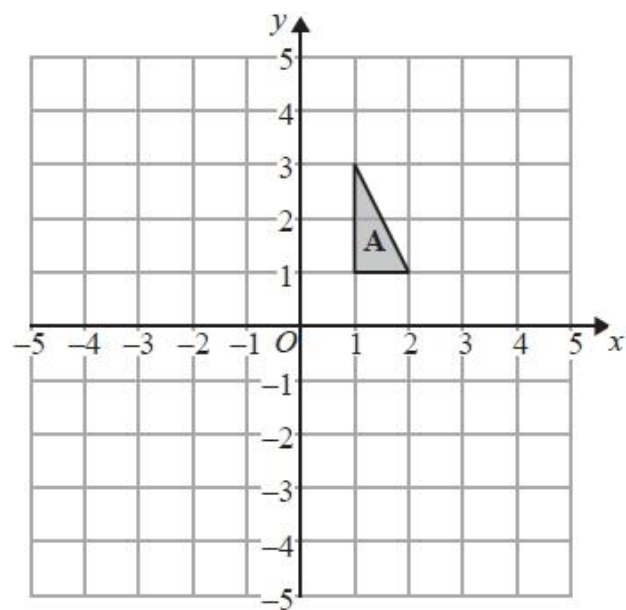
(Total for Question is 7 marks)

Q48.

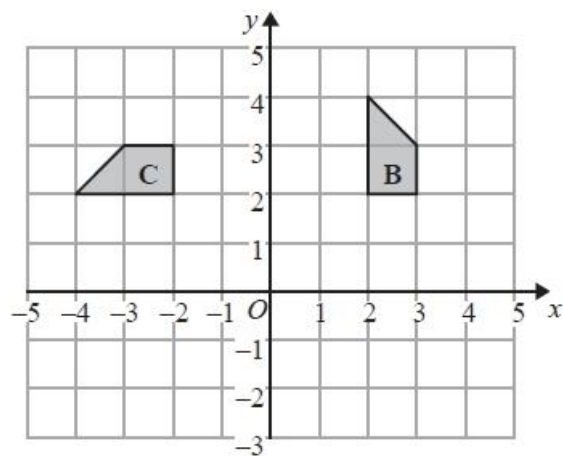


On the grid, enlarge the triangle by scale factor $-1\frac{1}{2}$, centre $(0, 2)$ **(Total for question = 2 marks)**

Q49.



(a) On the grid above, translate shape **A** by the vector $\begin{pmatrix} -3 \\ -1 \end{pmatrix}$



(b) Describe fully the single transformation that maps shape **B** onto shape **C**.

.....

(3)

(Total for question = 5 marks)

Q50. ABC is a triangle.

$AC = 8.4\text{m}$

Angle $ACB = 40^\circ$

The area of the triangle = 100m^2 .

Work out the length of AB .

Give your answer correct to 3 significant figures.

You must show all your working.

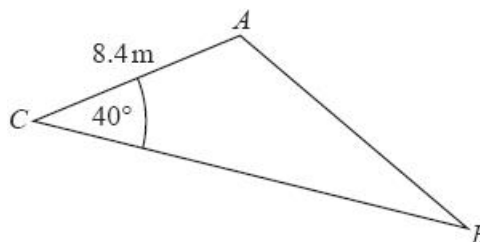


Diagram **NOT**
accurately drawn

..... m

(Total for question = 5 marks)

Q51.

$OBPA$ is a quadrilateral.

$\vec{OA} = 6\mathbf{a}$

$\vec{OB} = 4\mathbf{b}$

$\vec{BP} = 4\mathbf{a} - \mathbf{b}$

Y is the point on AP such that $AY : YP = 2 : 1$

Show that \vec{OY} is parallel to the vector $7\mathbf{a} + 3\mathbf{b}$

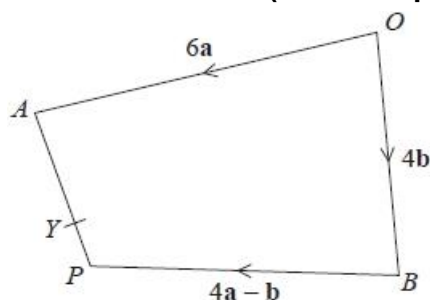


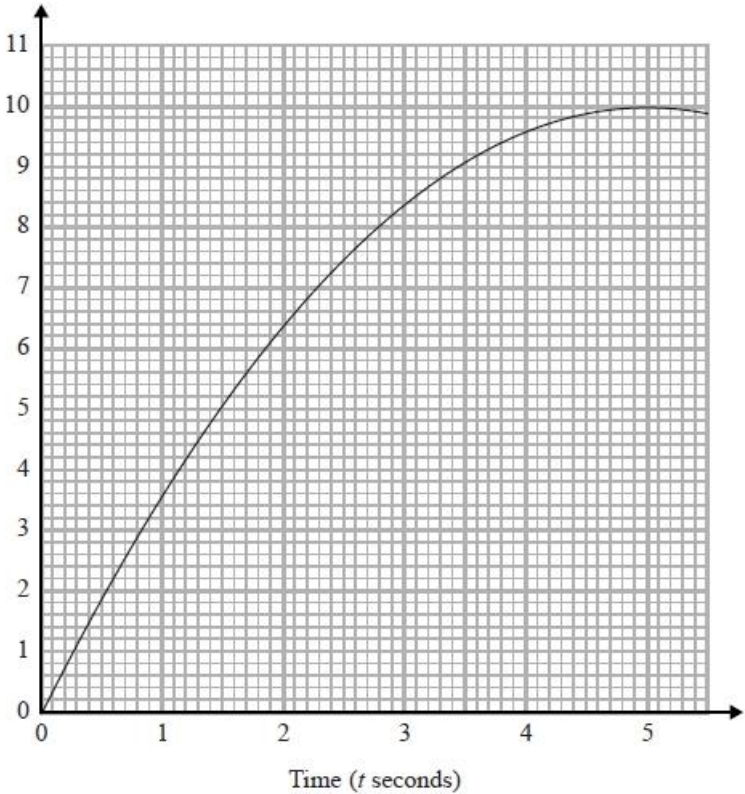
Diagram **NOT**
accurately drawn

(Total for question = 4 marks)

Q52. Here is a speed-time graph showing the speed, in metres per second, of an object t seconds after it started to move.

(a) Use 3 strips of equal width to find an estimate for the area under the graph between $t = 1$ and $t = 4$

Speed (m/s)



.....
.. (3)

(b) Describe fully what your answer to part (a) represents.

.....
..... (2)

(c) Explain whether your answer in part (a) gives an underestimate or an overestimate for the area under the graph.

.....
..... (1)

(Total for question = 6 marks)

Q55. There are six coins in a bag. The value of each coin is shown below.

£2 £1 £1 50p 50p 50p

Laura takes at random a coin from the bag and keeps it.
Fahmida then takes at random a coin from the bag and keeps it.
Calculate the probability that Fahmida's coin has a greater value than Laura's coin.

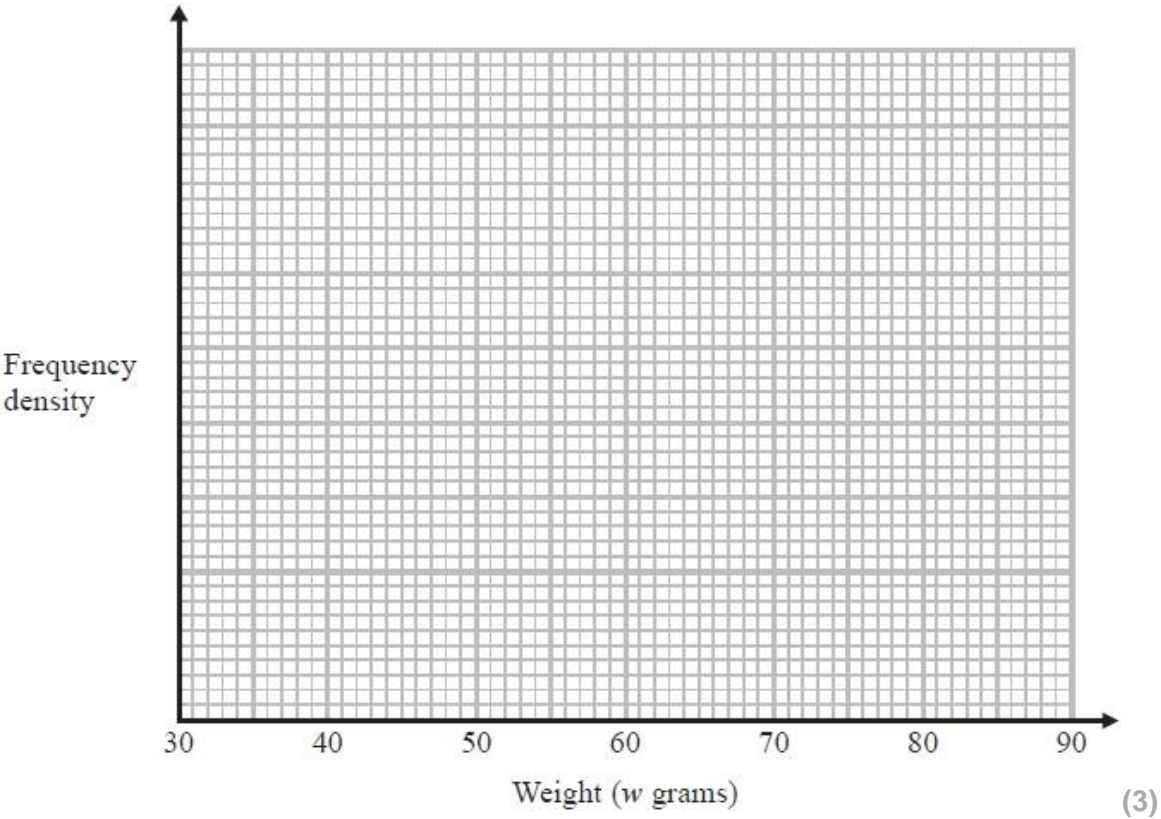
.....
(Total for question = 3 marks)

Q53. Billy keeps chickens.

The table shows information about the weights, in grams, of eggs produced by the chickens.

Weight (w grams)	$30 < w \leq 50$	$50 < w \leq 60$	$60 < w \leq 70$	$70 < w \leq 85$
Number of eggs	12	20	17	6

(a) On the grid, draw a histogram for this information.



Medium eggs weigh between 53grams and 63grams.

(b) Work out an estimate for the number of medium eggs produced.

..... (3)

(Total for question = 6 marks)

Q54. The table shows some information about the times, in minutes, 60 people took to get to work.

Time (x minutes)	Frequency		
$0 < x \leq 10$	5		
$10 < x \leq 30$	11		
$30 < x \leq 50$	23		
$50 < x \leq 80$	13		
$80 < x \leq 100$	8		

(a) Calculate an estimate for the mean.

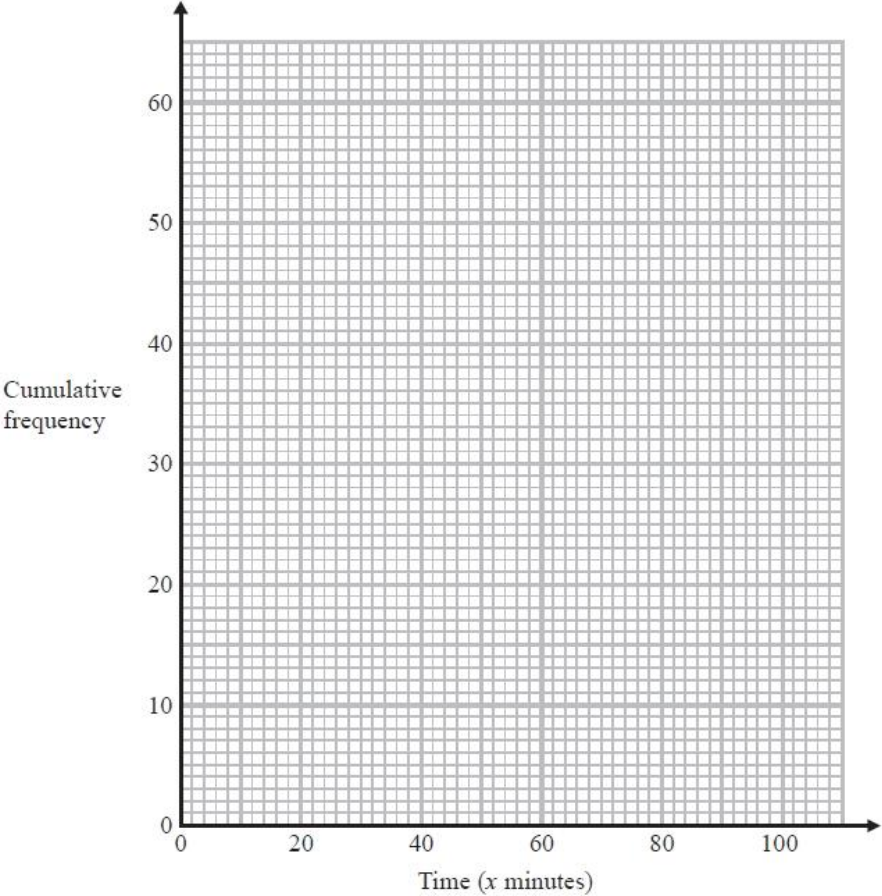
.....minutes (4)

(b) Complete the cumulative frequency table.

Time (x minutes)	Cumulative frequency
$0 < x \leq 10$	
$0 < x \leq 30$	
$0 < x \leq 50$	
$0 < x \leq 80$	
$0 < x \leq 100$	

(1)

(c) On the grid draw a cumulative frequency graph for your table.



(2)

(d) Find an estimate for the number of people who took **more** than 1 hour to travel to work.

..... (2)
(Total for Question is 9 marks)

Q56. The functions f and g are such that

$$f(x) = 3(x - 4) \text{ and } g(x) = \frac{x}{5} + 1$$

(a) Find the value of $f(10)$

..... (1)

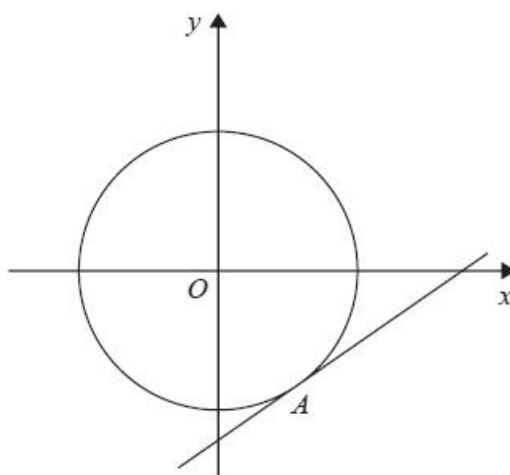
(b) Find $g^{-1}(x)$

$$g^{-1}(x) = \dots\dots\dots (2)$$

(c) Show that $ff(x) = 9x - 48$

(2)
(Total for question = 5 marks)

Q58. The diagram shows the circle with equation $x^2 + y^2 = 261$



A tangent to the circle is drawn at point A with coordinates $(p, -15)$, where $p > 0$
Find an equation of the tangent at A .

.....
(Total for question = 5 marks)

Examiner's Report & Mark Scheme

Q1. Students are becoming confident in their methods to solve "better buy" problems. The most popular method was to work out the cost of one tea bag for each box and this usually resulted in a fully correct solution. For those students that chose to work out the number of tea bags per unit cost, often the 'small' bag was selected as the best buy, having the least absolute value. There were many variations of a correct method which were usually successful.

Paper: 5MB3H_01				
Question	Working	Answer	Mark	Notes
*	Examples $2.15 \div 50 = 0.043$ (4.3) $3.29 \div 80 = 0.0411\ldots$ (4.11...) $5.17 \div 125 = 0.0413\ldots$ (4.13...) Bags per £ (or pence) $50 \div 2.15 = 23.2$ (5...) $80 \div 3.29 = 24.3$ (1...) $125 \div 5.17 = 24.1$ (7...) Price per 400 bags S: $2.15 \times 8 = 17.2$ M: $3.29 \times 5 = 16.45$ Price per 1000 bags M: $3.29 \times 12.5 = 41.125$ L: $5.17 \times 8 = 41.36$	Medium	4	M1 for division of price by quantity for at least two boxes or division of quantity by price for at least two boxes or a complete method to find price of same quantity for at least two boxes or to find quantity of same price applied to at least two boxes M1 for a complete method to give values that can be used for comparison of all 3 boxes. A1 for correct values that can be used for comparison for all 3 boxes C1 ft (dep on M2) for comparison of their values with a correct conclusion.

Q2. In this QWC question it was necessary to have a correct calculation, correct units, and a correct statement of comparison. Many of the students who gained 2 marks for changing 31 euros into pounds or £23.50 into euros failed to gain all 3 marks. For some this was because they failed to give the correct units with their conversion. For others it was because they gave

PAPER: IMA0/2H				
Question	Working	Answer	Mark	Notes
*		Comparison	3	M1 for 23.50×1.34 A1 for 31.49 C1 (dep M1) for 'euros' stated and a comparison ft their "31.49" OR M1 for $31 \div 1.34$ A1 for 23.13(43...) C1 (dep M1) for '£' stated and a comparison ft their "23.13" OR M1 for $31 \div 23.50$ A1 for 1.31(91...) C1 (dep M1) for comparison ft their "1.31(91...)" and explanation linked to conversion rate.

a difference in cost rather than the comparison that was asked for in the question, eg 'the wallet is cheaper in France'. Some students used the exchange rate incorrectly, eg working out $23.50 \div 1.34$ instead of 23.50×1.34 , whilst a minority just compared 31 with 23.50.

Q3. Some failed to understand what was necessary in this question and tried to compare the 4 figures given, perhaps merely by converting one of the quantities of diesel. The majority realised that some proportion was needed, either based on a quantity per cost or cost per quantity, so that a comparison can be made, though there were other possible methods for comparison which were demonstrated. Most gave a concluding statement, but there were many cases where working was so unclear that the evidence supporting a comparison was not obvious, and marks were therefore lost. The essence of a QWC question is to present working in such a way that their method is clear, and in this case (for most) two clear methods for each of the two persons described in the question.

5MB1H_01				
Question	Working	Answer	Mark	Notes
*		Jack with comparison	3	M1 for per gallon cost: $52 \div 8$ (=6.50) or $58 \div 8.8$ (=6.59) A1 for 6.50 and 6.59 C1 (dep on M1) for correct decision from their figures if comparable OR M1 for per litre cost: $8 \div 40$ (=1.45) or $52 \div 36$ (=1.44) A1 for 1.45 and 1.40-1.44 C1 (dep on M1) for correct decision from their figures if comparable NB accept equivalent methods

Q4. Very few students failed to secure the mark in part (a). Some did give their answer as a fraction. This was not penalised provided 0.0045 had been seen. In part (b), students who showed their working generally scored at least one mark. Many who attempted the calculation on their calculator without showing their method often scored no marks at all. It was clear that many students did not know what was meant by the instruction "give your answer in standard form". Many wrote the correct answer in the working space but then wrote different on the answer line; e.g. $6.578... \times 10^{-6}$ in the working and 6.58 only on the answer line. This failed to score full marks.

Paper: 5MB3H 01				
Question	Working	Answer	Mark	Notes
(a)		0.0045	1	B1 cao
(b)		6.58×10^{-6}	2	M1 for $(2.5 \div 3.8) \times 10^{(-2-3)}$ or $0.657... \times 10^{-5}$ or 0.00000657.. A1 for an answer in the range 6.57×10^{-6} to 6.58×10^{-6}

Q5. A good proportion of students showed an understanding of "reverse percentages" and were able to use 88% or 0.88 to answer the question successfully. Some students identified the need to use 88% or 0.88 but not how to use it correctly. They usually gained some credit for this. There were, as expected, a large number of students who merely increased 1.1 kg by 12% so 1.232 kg was a commonly seen incorrect answer.

PAPER: 1MA0 2H				
Question	Working	Answer	Mark	Notes
		1.25	3	M1 $100 - 12 (= 88)$ or 0.88 or $1.1 \div 88 (= 0.0125)$ M1 for complete method, eg $1.1 \div 0.88$ A1 cao (SC B2 for 1250 as answer)

Q6. Far too many students were using long winded 'build up methods' to work out percentages which often led to errors. Although many gained full marks, common errors included; finding 82% of £15000 after correctly working out 77% of £15000, finding 59% ($23 + 18 + 18$), using a 'simple interest approach throughout' and some students either stopped after 2 years or continued beyond 3 years. It was pleasing to see fully explained reasoning from those who gained both method marks.

Question	Working	Answer	Mark	Notes
		No (supported)	4	M1 for a correct method to calculate 77% of 15000 or 0.77 seen eg. 15000×0.77 oe (= 11550) or $15000 - \frac{23}{100} \times 15000$ oe (= $15000 - 3450 = 11550$) M1 for demonstrating a correct compound interest method over 3 years, eg " $11550 \times 0.82 (= 9471)$ and " $9471 \times 0.82 (= 7766.22)$ or " 11550×0.82^3 or $0.77 \times 0.82^3 (= 0.517748)$ A1 for 7766(.22) or 0.51(7748) or 0.48(2252) C1 ft (dep on M2) for a statement giving the correct decision for their calculated values

Q7. No Examiner's Report available for this question

Paper 1MA1: 2H			
Question	Working	Answer	Notes
(a)		1.8%	P1 for start to process eg. $2000 \times 1.025 (= 2050)$ P1 for process to use all given information eg. " $2050 \times m^2 = 2124.46$ or " $2050 \times \left(1 + \frac{x}{100}\right)^2 = 2124.46$ P1 for process to find their unknown eg $m = \sqrt{\frac{2124.46}{2050}} (= 1.01799...)$ A1 for 1.79% – 1.8 %
(b)		200	M1 $225 \div 1.125$ oe A1

Q8. Some students could recall the need to consider multiplying the recurring decimal by powers of ten but not many could use a correct combination to eliminate the recurring nature of the decimal. A small number of students gave a clear, accurate and complete solution to score full marks.

PAPER: 5MB3H_01				
Question	Working	Answer	Mark	Notes
		$\frac{59}{330}$	3	M1 for $100x = 17.87878787\dots$ or $1000x = 178.7878787\dots$ and $10x = 1.7878787$ M1 (dep) for subtraction, $100x - x$ or $1000x - 10x$ or $\frac{177}{99}$ or $\frac{177}{990}$ seen A1 working leading to given fraction

Q9. Few chose the correct bounds to use, and of those most incorrectly chose both lower bounds as part of the calculation.

5MB3H_01 November 2015					
Question	Working	Answer	Mark	Notes	
		0.063	3	B1 for 252.5 or 247.5 or 3950 or 3850 M1 for $247.5 \div 3950$ or ft "lower bound for 250" \div "upper bound for 3900" A1 for 0.062–0.063 (from correct working)	

Q10. In part (a) many students were unable to find the value of the reciprocal of 1.6 and a wide variety of incorrect responses were seen.

In part (b) one mark was often scored for showing 9.75 or 9.85 or both of these values but relatively few students went on to give a fully correct error interval. Those that attempted to write an error interval frequently made mistakes with the inequality signs. Some students used 9.84 rather than 9.85. Those that wrote the upper bound as 9.849 failed to indicate the recurring nature of the final digit.

Question	Working	Answer	Mark	Notes
5 (a)		0.625	B1	cao
(b)		$9.75 \leq x < 9.85$	B2	for $9.75 \leq x < 9.85$
			[B1	for 9.75 or 9.85 (or 9.849)]

Q11. Students answered this question well. Nearly all students correctly expanded the brackets in part (a) and the vast majority also obtained the mark available in part (b). Commonly seen incorrect responses to part (b) included $12y - 9y$, $12y - 9$ and $12y^2 - 9$. More careful checking by students would have eradicated many of the errors made here. The double bracket expansion in part (c) was also well done though the weakest students sometimes made arithmetic errors or tried to "simplify" the final correct answer $t^2 + 6t + 8$. Other errors seen included " $t \times t = 2t$ ", " $2t + 4t = 8t$ " and " $2 \times 4 = 6$ ".

PAPER: 1MA0_2H				
Question	Working	Answer	Mark	Notes
(a)		$7x + 35$	1	B1 cao
(b)		$12y^2 - 9y$	1	B1 cao
(c)	$t^2 + 2t + 4t + 8$	$t^2 + 6t + 8$	2	M1 for all 4 terms (and no additional terms) correct with or without signs or 3 out of no more than 4 terms correct with signs A1 for $t^2 + 6t + 8$

Q12. No Examiner's Report available for this question

Question	Working	Answer	Mark	Notes
(a)		$6x^3 + 5x^2 - 17x - 6$	M1 M1 A1	for multiplying out two brackets with at least three terms out of four correct (dep M1) for a complete method cao
(b)		$\frac{7}{n^2}$	B1	oe

Q13.

In part (a) most candidates recognised that the coefficient of n was 7, but failed to identify the correct number term, with "+3" or "-3" as the most common incorrect term used. Some weaker candidates gave n^{+7} as their answer. In part (b) quite a few wrote out the full sequence or demonstrated that the 22nd term worked, which was quite adequate. An algebraic approach using $7n-4=150$ usually worked well. Some described the method they would use such as "adding on 7s" which received some credit. Vague responses included those that made some reference to dividing 150 by 7 or using 150 in some other way.

PAPER: 1MA0 2H				
Question	Working	Answer	Mark	Notes
(a)		$7n - 4$	2	B2 for $7n - 4$ (B1 for $7n + d$ where d is an integer)
(b)		explanation	2	M1 for ' $7n - 4 = 150$ or any other valid method, eg. counting on 7s (to get 150) A1 for a complete explanation eg. the 22 nd term is 150 or $n = 22$ from solution of equation or a clear demonstration based on 22 or complete sequence

Q14. No Examiner's Report available for this question

Paper 1MA1: 3H			
Question	Working	Answer	Notes
(a)	8, 13, 21,	34	B1 cao
(b)	$a, b, a+b, a+2b, 2a+3b$	Shown	M1 Method to show by adding pairs of successive terms $a+2b, 2a+3b$ shown C1
(c)	$3a + 5b = 29$ $a + b = 7$ $3a + 3b = 21$ $b = 4, a = 3$	$a = 3$ $b = 4$	P1 Process to set up two equations P1 Process to solve equations A1

Q15. No Examiner's Report available for this question

Question	Working	Answer	Mark	Notes
(a)		$n^2 + 2$	M1 A1	begins to work with 2 nd differences (e.g. shown as 2) or $n^2 + k$ ($k \neq 2$) cao
(b)		2502	B1	fit a quadratic expression

Q16. The vast majority of students could make no progress with this question designed to test top grade students. Some students confused the geometric sequence with an arithmetic sequence and involved addition of the terms (rather than multiplication).

For part (b) there were again few attempts worth any credit with some students starting their working by using their calculator to write down the value of $7 + 5\sqrt{2}$ as a decimal.

The best students gave clear, concise and full solutions to this question.

Question	Working	Answer	Mark	Notes
(a)		2	M1	for start to express the common ratio algebraically, eg $1/(\sqrt{x} - 1)$ or $(\sqrt{x} + 1)/1$ or $\sqrt{x} + 1 = k \times 1$ or $1 = k \times (\sqrt{x} - 1)$
			M1	for setting up an appropriate equation in x , eg $1/(\sqrt{x} - 1) = (\sqrt{x} + 1)/1$
			C1	for convincing argument to show $x = 2$
(b)		Shown	M1	for expressing the relationship between the common ratio, one of the first three terms of the sequence and the fifth term, eg $5^{\text{th}} \text{ term} = 3^{\text{rd}} \text{ term} \times (\text{common ratio})^2$
			C1	for a complete explanation to include eg, $(\sqrt{2} + 1)(\sqrt{2} + 1)^2 = 7 + 5\sqrt{2}$

Q17. In part (a), most candidates gave the correct answer and those who didn't usually gained one mark for substituting -2 into $3e + 5$. The most common errors were to get as far as $-6 + 5$ but then give the answer as 1, to work out $3 - 2$ instead of $3 \times (-2)$, and to get 6 instead of -6 . These were all infrequent.

Part (b) was another well-answered question. Most candidates were able to gain the first mark by subtracting $2y$ or 3 from both sides and the majority went on to solve the equation correctly. Some had the correct idea of subtracting either $2y$ or 3 from both sides but then failed to carry out the operations correctly. Both $2y = 17$ and $6y = 11$ were quite common. Some candidates added the $2y$ and 3 instead of taking them away to get $6y = 17$. A few candidates, having correctly reached $2y = 11$, then divided 2 by 11 instead of dividing 11 by 2 .

The majority of candidates in part (c) answered this question correctly and those that didn't usually gained the first method mark by expanding the brackets to get $3x - 15$. Most candidates expanded the brackets as a first step with hardly any choosing to divide by 3 first. Two common errors were subtracting 15 from 21 rather than adding it to 21 and failing to multiply 5 by 3 when expanding the brackets.

In part (d), it was pleasing to see that nearly all candidates understood what is meant by an integer with the majority scoring full marks. Of those that did not, more were seen to include either -3 or 4 rather than to include both these values, which appeared somewhat illogical. Others neglected to include zero.

	Working	Answer	Mark	Notes
(a)	$3 \times -2 + 5$	-1	2	M1 for substitution of -2 into $3e + 5$ e.g. $3 \times -2 + 5$ A1 cao
(b)	$4y - 2y = 14 - 3$ $2y = 11$ $y = 11/2$	$11/2$	2	M1 for clear attempt to subtract $2y$ or 3 from both sides A1 for $11/2$ oe
(c)	$3x - 15 = 21$ $3x = 36$ $x = 12$	12	2	M1 for $3 \times x - 3 \times 5$ or intention to divide both sides of equation by 3 as a first step A1 cao
(d)		$-2, -1, 0, 1, 2, 3$	2	B2 for all 6 correct values; ignore repeats, any order (B1 for 5 correct and no incorrect values e.g. $-2, -1, 1, 2, 3$ or 6 correct and one incorrect value e.g. $-2, -1, 0, 1, 2, 3, 4$)

Q18.

Students were equally successful in parts (a) and (b) though many did not gain full marks. Many students did not realise the connection between parts (a) and (b) and even those who gained full marks in part (a) often lost the mark in part (b). Likewise, students who were unable to gain full marks in part (a), sometimes even scoring zero in part (a), then wrote in a fully correct coordinates for their answer to part (b). In part (a) weaker students were often able to write $(x - 4)^2$ or wrote $p = 4$ to gain one mark and slightly more able students correct completed the square, writing $(x - 4)^2 - 10$ or equivalent but then gave the answer $p = -4$ with $q = -10$.

5MB3H/01 June 2015				
Question	Working	Answer	Mark	Notes
(a)		$p = 4,$ $q = -10$	3	M1 for sight of $(x - 4)^2$ or $p = 4$ M1 for $(x - 4)^2 - 16 + 6$ A1 for $p = 4, q = -10$ OR M1 for $x^2 - 2px + p^2 + q$ or $-2p = -8$ or $p^2 + q = 6$ M1 for $-2p = -8$ and $p^2 + q = 6$ A1 for $p = 4, q = -10$
(b)		(4, -10)	1	B1 ft

Q19.

In part (a) most used the formula for the area of a trapezium and gained the first mark for this; the second mark was more difficult to achieve as the processes used were either incomplete or unconvincing. In part (b) a surprising number of candidates made no attempt to use the quadratic formula to find the value of x . Of those who did, most were able to substitute the correct values into the formula and many were able to complete the process leading to the correct answer. A few candidates lost the accuracy mark by suggesting a negative value was acceptable for the value of x . In some cases answers to the two parts were mixed up or poorly organised. Resorting to trial and improvement did not always help.

PAPER: 1MA0 2H				
Question	Working	Answer	Mark	Notes
(a)		'show'	2	M1 for $\frac{1}{2} \times (x - 4 + x + 5) \times 2$ or $2x \times (x - 4) + \frac{1}{2} \times 2x \times 9$ A1 for completion with correct processes seen
(b)		13	3	M1 for $\frac{-1 \pm \sqrt{1^2 - 4 \times 2 \times -351}}{2 \times 2}$ condone incorrect sign for 351 M1 for $\frac{-1 \pm \sqrt{2809}}{4}$ A1 for 13 NB for either M mark accept + only in place of ± OR M2 for $(2x + 27)(x - 13)$ (M1 for $(2x \pm 27)(x \pm 13)$) A1 for 13

Q20.

Factorisation of a quadratic function with non-unitary coefficient of x^2 was poor. Many chose to employ the formula to solve the given equation. Any mistake in the use of the formula, which was more often than not, resulted in no marks. A fully correct solution by this method gained just one of the three available marks. Many did make good attempts at factorising but then failed to complete the solution. A common incorrect attempt at factorisation was $(4x-9)(2x+3)$.

PAPER: 5MB3H 01				
Question	Working	Answer	Mark	Notes
		4.5, -0.75 oe	3	M2 for $(2x - 9)(4x + 3)$ oe (M1 for $(2x \pm 9)(4x \pm 3)$) oe A1 for 4.5, -0.75 oe [SC: B1 for 4.5 and -0.75 oe, found by any other method]

Q21. No Examiner's Report available for this question

Question	Working	Answer	Mark	Notes
(a)		Shown	M1	for method to establish at least one root in (2, 3), e.g. $f(x) = x^3 - 3x^2 + 3$, $f(2) (= -1)$, $f(3) (= 3)$ oe
			A1	for supportive explanation e.g. "since there is a change in sign there must be at least one root in $2 < x < 3$ (as f is continuous)" oe
(b)		Shown	C1	for at least $x^3 = 3x^2 - 3$ and no incorrect steps.
(c)		2.153	M1	for $x_1 = \sqrt[3]{3 \times 2^2 - 3}$
			A1	for $x_1 = 2.080(\dots)$
			A1	for $x_2 = 2.153(\dots)$

Q22.

This was a well understood question with almost all students being able to make a start on the problem and find that the base angles of the isosceles triangles was 58° . Most students were then able to make progress and find a correct value of x . A number of students gained success by forming an equation by using all three angles of a triangle adding to 180° .

Question	Working	Answer	Mark	Notes
		22.5	4	M1 for $4(x - 8) = 2x + 13$ M1 for expansion of bracket or division of all terms by 4, eg $4x - 32 = 2x + 13$, or $x - 8 = \frac{2x}{4} + \frac{13}{4}$ M1 for isolating x and number terms eg $2x = 45$, $\frac{x}{2} = \frac{45}{4}$ A1 for $\frac{45}{2}$ or 22.5 OR M1 for $(180 - 64) \div 2 (= 58)$ M1 for $4(x - 8) = "58"$ or $2x + 13 = "58"$ or $"58" - 13 (= 45)$ M1 for isolating x and number terms eg $4x = 90$, $2x = 45$ or $"45" \div 2$ A1 for $\frac{45}{2}$ or 22.5 OR M1 for $64 + 4(x - 8) + 2x + 13$ M1 for $64 + 4(x - 8) + 2x + 13 = 180$ M1 for isolating x and number terms eg $6x = 135$ A1 for $\frac{45}{2}$ or 22.5

Q23.

Most students did not realise that they needed to set up a pair of simultaneous equations. The students who did successfully set up two equations sometimes got no further than this. It was surprising to see just how many students mistakenly based their method on working out $\text{£}28.20 \div 5$ and $\text{£}44.75 \div 8$. Attempts using a trial and improvement approach were again frequently seen. They were almost always unsuccessful.

PAPER: 5MB3H_01				
Question	Working	Answer	Mark	Notes
*	eg $2a + 3c = 28.2$ $3a + 5c = 44.75$ $6a + 9c = 84.6$ $6a + 10c = 89.5$ $c = 4.9$ $2a + 14.7 = 28.2$ $2a = 13.5$ $a = 6.75$	Adult ticket £6.75 Child ticket £4.90	5	M1 for correctly stating both equations algebraically M1 for correct process to eliminate one variable (condone one arithmetic error) M1 (dep) for correct substitution of their found value to find other variable OR (indep) correct process to eliminate second variable (condone one error in arithmetic) A1 for 6.75 or 4.9 C1 for Adult ticket £6.75 and Child ticket £4.90 in correct money notation

Q24. About half of the students gave fully correct answers to the solution to a pair of simultaneous equations. It was gratifying to see that few students attempted a trial and improvement method of solution with the elimination method being the most popular with the elimination of y by adding being the most successful.

Question	Working	Answer	Mark	Notes
	$20x + 10y = 35$ $6x - 10y = -48$ $x = -\frac{1}{2}$ $y = \frac{9}{2}$ OR $12x + 6y = 21$ $12x - 20y = -96$ $26y = 117$ $y = \frac{9}{2}$ $x = -\frac{1}{2}$	$-\frac{1}{2}, \frac{9}{2}$	4	M1 for a correct process to eliminate either variable (condone one arithmetic error) A1 cao for either x or y M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao OR M1 for full method to rearrange and substitute to eliminate either variable (condone one arithmetic error) A1 cao for either x or y M1 (dep on M1) for correct substitution of found value into one of the equations or appropriate method after starting again (condone one arithmetic error) A1 cao NB Trial and improvement methods score 0 marks unless both x and y are correct

Q25. The algebra required to solve these simultaneous equations was beyond the capabilities of most students, although the majority of students attempted the question. The first step was to perform a substitution into the first equation. Those who did this were often able to go on to expand their squared bracket, although a frequent error occurred with the squared term. Many students were able to simplify their quadratic equation into a form to be solved either by factorisation or by the use of the quadratic formula. Many students stopped at this point. It was pleasing to see a few go on to solve the quadratic, and to realise that their values for x and y needed to be correctly paired.

Question	Working	Answer	Mark	Notes
	$y(5y + 24) = 0$ $\frac{-24 \pm \sqrt{(24)^2}}{10}$	$x = 6, y = 0$ $x = -3.6,$ $y = -4.8$	5	M1 for substitution for elimination eg $(2y + 6)^2 + y^2 = 36$ M1 (dep on M1) for expansion eg $4y^2 + 12y + 12y + 36$ (3 out of 4 terms correct) A1 for $4y^2 + 24y + 36 + y^2 = 36$ oe M1 for a correct attempt to solve a 2 or 3 term quadratic equation eg by factorising or correct substitution into a quadratic formula A1 for $x = 6, y = 0$ and $x = -3.6$ oe, $y = -4.8$ oe SC: B1 (if M0 scored) for all 4 values mis-associated or one correct pair of values.

Q26. Only a few students demonstrated enough convincing algebraic manipulative skills to carry the solution of this equation to its correct conclusion. Many were able to correctly write at least two fractions with a common denominator, usually the LHS, but then failed when trying to remove the fractional elements. One major failing of many students was to multiply **both** numerator and denominator by a common multiple, e.g. $\frac{12(1-x)}{12 \times 6}$ instead of simply $2(1 - x)$. Failure to correctly deal with negative signs was very common.

Question	Working	Answer	Mark	Notes
		$9\frac{1}{3}$	M1	for writing at least 2 fractions with a common denominator eg. $\frac{3(3x-2)}{12}, \frac{4(2x+5)}{12}, \frac{2(1-x)}{12}$ with at least one correct numerator
			M1	or for $\frac{3x}{4} - \frac{2}{4} - \frac{2x}{3} - \frac{5}{3} = \frac{1}{6} - \frac{x}{6}$ (accept $+\frac{5}{3}$ instead of $-\frac{5}{3}$) (dep) for a method to eliminate all fractions in an equation, ignore errors in any expanded terms eg. $3(3x - 2) - 4(2x + 5) = 2(1 - x)$ or $6 \times [3(3x - 2) - 4(2x + 5)] = 12 \times [1 - x]$ or $3 \times 3x - 3 \times 2 - 4 \times 2x - 4 \times 5 = 2 \times 1 - 2 \times x$ OR for the correct expansion of brackets leading to $\frac{9x-6-8x-20}{12} = \frac{2-2x}{12}$
			M1	(dep on M2) for correctly isolating terms in x and number terms of their linear equation
			A1	e.g. $9x - 8x + 2x = 2 + 6 + 20$ for $9\frac{1}{3}$ oe

Q27. Most students showed they were able to expand the brackets correctly. Many also demonstrated that they could rearrange terms, either by rearranging a t term, or by dividing through by a numerical value. Some struggled with sign changes. The final mark was frequently lost when the candidate could not resolve all terms correctly. The final expression did not have to be fully simplified, but candidates did have to write an expression that was algebraically equivalent with the correct answer.

Question	Working	Answer	Mark	Notes
(a)	$2a + 2t = 5t + 7$ $2a = 3t + 7$ $2a - 7 = 3t$	$\frac{2a - 7}{3}$	3	M1 for expansion of bracket eg $2 \times a + 2 \times t$ or divide all terms by 2 M1 for attempt at rearrangement of t term eg $-2t$ each side; $2a = 3t + ?$ but with separate terms. A1 $\frac{2a - 7}{3}$ oe but must have one term in t . NB: for $\frac{2}{3}$ accept working to 2 dp: 0.67, 0.66, 2.33 or better
(b)		$x = \frac{2}{3}$ $y = -1 \frac{1}{2}$	3	M1 for correct process to eliminate either x or y (condone one arithmetic error) M1 (dep on 1 st M1) for correct substitution of their found variable or other acceptable method A1 cao for both $x = \frac{2}{3}$ and $y = -1 \frac{1}{2}$ oe SC: B1 for $x = \frac{2}{3}$ or $y = -1 \frac{1}{2}$ oe NB: for $\frac{2}{3}$ accept working to 2 dp: 0.67 or 0.66 or better

In part (b) clear working out was essential. It was encouraging to see many detailed attempts. Trial and improvement approaches rarely resulted in correct solutions. Substitution methods were equally unsuccessful. Most errors were due to arithmetic mistakes or error in handling negative signs. Most candidates were able to manipulate the equations but processing them was much harder.

Q28. Those students with some idea about completing the square were often able to score one mark for $(x + 3)^2$ but errors were frequently made with the '- 16'.

Question	Working	Answer	Mark	Notes
13		$(x + 3)^2 - 16$	M1 A1	for $(x + 3)^2$ or $(x^2 + 6x - 7) \Rightarrow x^2 + 2ax + a^2 + b$ cao

Q29. Students found this question challenging.

In part (a) a large number of students used change in x over change in y , possibly as this gave an answer greater than 1. Others failed to use a large enough triangle to gain an accurate answer.

Question	Working	Answer	Mark	Notes
(a)		0.27	2	M1 for method to work out the gradient for train A A1 for 0.26 – 0.28
*(b)		Comparison	1	C1 for speed of train B is constant, speed of train A is increasing. oe

In part (b) many wrote down a correct answer but some discussed the relative speed of the trains and gave incorrect statements. There were a significant number who discussed the correlation of the speed, thus misunderstanding the question entirely.

Q30. In part (a), very few students were able to derive the equation $y = x + 4$ from the information given.

Students were generally more familiar with drawing tangents and in part (b), many students gained credit for drawing a tangent and attempting to find its gradient, often giving an answer within the accepted range. A number of students drew inaccurate tangents believing that they had to pass through the origin. Some obtained the correct solution by finding the gradient of a chord and not a tangent, this gained no credit.

Some students used calculus to good effect usually resulting in a correct gradient of 2. This is outside this specification but did gain credit.

Question	Working	Answer	Mark	Notes
(a)		-0.4 to -0.2 and 3.2 to 3.4	M1 A1	for $(y =) x + 4$ for answers in the range -0.4 to -0.2 and 3.2 to 3.4
(b)		1.6 to 2.5	M1 M1 A1	for drawing a tangent to the curve at $x = 2$ for method to find gradient of their tangent for answer in the range 1.6 to 2.5

Q31. No Examiner's Report available for this question

Answer	Mark	Notes
$y = 3x - 1$	M1 A1	for $y = 3x + c$ or a line drawn with gradient 3 passing through A oe

Q32. The greater number of students gained at least one mark in this question for identifying a correct angle, usually angle $FED = 56^\circ$ or angle $AEB = 70^\circ$. Many progressed to correctly find the angle x . Full marks were not as common as many students still fail to give acceptable forms for their reasoning. Confusion between alternate and corresponding angles and/or a failure to write "**vertically** opposite angles are equal", were the major causes for the loss of the loss of communication marks. Centres need to make it clear to students that 'alternative' angles does not gain credit when used instead of alternate angles.

Answer	Mark	Notes
124° with reasons	4	M1 for a method to find any angle, eg. angle $DEF = 180 - 70 - 54 (= 56)$ or angle $AEB = 70$ or angle $EAB = 54$ or angle $GEB = 180 - 70 (= 110)$ A1 for $x = 124$ NB: angles may be just shown on the diagram C2 for full reasons, appropriate to their given method, with no additional reasons (C1 for one appropriate reason relating to parallel lines) Possible reasons: <u>corresponding angles</u> are equal; <u>alternate angles</u> are equal; <u>co-interior angles (allied)</u> add up to <u>180</u> <u>angles on a straight line</u> add up to <u>180</u> ; <u>angles in a triangle</u> add up to <u>180</u> ; <u>vertically opposite angles</u> are equal; the <u>exterior angle</u> of a <u>triangle</u> is equal to the sum of the <u>interior opposite angles</u> ; <u>angles at a point</u> add up to <u>360</u> ;

Q33. This question was not well answered. Students frequently worked out $360 \div 5 = 72$, often followed by $180 - 72 = 108$, but then marked the angles in incorrect positions on the diagram and gained no marks. Many errors were seen. These included: using 72° as an interior angle of a regular pentagon; using 108° as an angle in the trapezium or as an exterior angle of the pentagon; using incorrect totals of 720° or 900° for the sum of the angles in a pentagon. Even when they marked 108 in a correct position many students did not know how to use it to find angle SRC .

Answer	Mark	Notes
126	3	M1 for $180 - (360 \div 5) (= 108)$ or $(5 - 2) \times 180 \div 5 (= 108)$ M1 for a complete method eg $\frac{360 - "108"}{2}$ or $180 - \frac{"108"}{2}$ A1 cao

Q34. This question was well attempted by students and they were gaining the full range of marks. The weakest candidates often gained a mark for finding an angle but usually could not see how to proceed to find TR with many drawing in extra lines to create what they assumed to be right-angled triangles or made assumptions that their lines had bisected angles and so led to incorrect final answers. The slightly more able usually correctly used the Sine Rule to find the length of AR but were unable to then correctly use the Cosine Rule or tried to apply the Sine Rule again so only gained three marks. The most able students were able to correctly apply both the Sine and Cosine rule but some lost the accuracy mark due to premature rounding in their working out.

5MB3H/01 June 2015				
Question	Working	Answer	Mark	Notes
		6.2	5	M1 for a method to find an angle $RAB = 70, ABR = 50, BRA = 60$ or $TAR = 20$ M1 for substitution into sine formula $\frac{AR}{\sin "50"$ $= \frac{12}{\sin "60"}$ M1 for use of sine rule to find AR, $AR = \frac{12}{\sin "60"} \times \sin "50" (=10.61)$ M1 for substitution into cosine formula $TR^2 = 5^2 + "10.61"^2 - 2 \times 5 \times "10.61" \times \cos 20$ $(=37.92)$ A1 for 6.15 - 6.2

Q35.

Many candidates successfully drew both bearings and correctly identified the position of T as the point of intersection. When only one of the bearings was drawn correctly this was more often the bearing of 060° rather than the bearing of 285° . The main problems were incorrect use of a protractor and failing to realise that T would lie where the two lines crossed. Some candidates drew both bearings correctly but did not extend the lines far enough to give an intersection.

	Working	Answer	Mark	Notes
		Correct position of T	3	M1 for line drawn or point marked within guidelines from B M1 for line drawn or point marked within guidelines from C A1 for T within region on overlay

Q36.

There were many correct lines drawn. Some presented an incomplete construction by using only one pair of construction arcs with a measured point on the line.

5MB3H 01 November 2015				
Question	Working	Answer	Mark	Notes
		bisector	2	M1 for an appropriate pair of arcs or correct line drawn without construction arcs A1 for perpendicular bisector of AB drawn with a pair of construction arcs

Q37.

This question on loci was poorly answered with very few candidates scoring full marks. The modal mark awarded was zero; 1 mark was awarded for the quarter circle of radius 5 cm and a line parallel to CD and 3 cm away from it. The most common mistake was to misunderstand 'nearer to AB than to AD' as few bisectors of angle A were given with the diagonal AC often seen in its place.

	Working	Answer	Mark	Notes
		Required region	4	M1 arc radius 5 cm centre C M1 bisector of angle BAD M1 line 3 cm from DC A1 for correct region identified (see overlay)

Q38.

Some students were able to score one mark for calculating the area of the sector or for identifying a right angle between a radius and a tangent or two marks for both. A significant number of students wrote down a correct expression for the area of a circle of radius 10 cm but then did not work out the correct fraction of the circle. Few students were able to give a correct method to find a length in order to calculate the area of the kite. There were a relatively small number of fully correct answers.

Question	Working	Answer	Mark	Notes
		68.5	B1	for angle $OAB = 90^\circ$ or angle $OCB = 90^\circ$, may be seen on diagram
			P1	for a process to find the length of AB or the length of CB (= $10\sqrt{3}$ oe) eg $10 \times \tan 60^\circ (= 17.3\dots)$ or the length of OB (= 20), eg $10 \div \cos 60^\circ$
			P1	for a process (dep previous P1) to find the area of the triangle OAB (= $50\sqrt{3}$ oe) or area of triangle OCB (= $50\sqrt{3}$ oe) or area of kite OABC (= $100\sqrt{3}$ oe)
			P1	for a process to find the area of the sector OAC e.g. $\frac{1}{3} \times \pi \times 10^2 (= 104.7\dots)$, accept rounded or truncated to 3 significant figures or more
			A1	for $68.4 - 68.6$

Q39. This question was often omitted and it was generally not well done by those who did attempt it. A number of candidates treated the triangle as right angled and used cos/sin/tan to find one of the sides. Those who used the sine rule were mostly able to find at least one side successfully. Many candidates found both missing sides which was unnecessary. Most knew that they had to use $\frac{1}{2}ab\sin C$ for the area but sometimes did not use the angle included by their two sides.

Question	Working	Answer	Mark	Notes
	$AC/\sin 49 = 8.7/\sin 64$ $AC = 8.7/\sin 64 \times \sin 49$ $(= 7.305\dots)$ $\frac{1}{2} \times 8.7 \times 7.305\dots \times \sin$ $(180 - 64 - 49)$	29.3	5	<p>M1 for $AC/\sin 49 = 8.7/\sin 64$ oe</p> <p>M1 for $(AC =) 8.7/\sin 64 \times \sin 49$</p> <p>A1 for 7.3(05...)</p> <p>M1 for $\frac{1}{2} \times 8.7 \times '7.305' \times \sin(180 - 64 - 49)$</p> <p>A1 for 29.19 – 29.3</p> <p>OR</p> <p>M1 for $\frac{BC}{\sin(180 - 64 - 49)} =$</p> <p>$8.7/\sin 64$ oe</p> <p>M1 for $(BC =) 8.7/\sin 64 \times \sin 67'$</p> <p>A1 for 8.9(10...)</p> <p>M1 for $\frac{1}{2} \times 8.7 \times '8.910' \times \sin 49$</p> <p>A1 for 29.19 – 29.3</p> <p>OR</p> <p>(X is point such that AX is perpendicular to BC)</p> <p>M1 for $AX = 8.7 \times \sin 49 (= 6.565\dots)$</p> <p>or $XB = 8.7 \times \cos 49 (= 5.707\dots)$</p> <p>M1 for $XB = 8.7 \times \cos 49 (= 5.707\dots)$ and $CX = '6.565' \div \tan 64$ oe $(= 3.202\dots)$</p> <p>A1 for 8.9(10...) or 5.7(07...) and 3.2(02...)</p> <p>M1 for $\frac{1}{2} \times '6.565\dots' \times ('5.707' + '3.202')$ oe</p> <p>A1 for 29.19 – 29.3</p>

Q40. For this QWC question a full method and justification was required. Apart from some who used the area formula, most candidates knew what to do and marks were often lost due to a lack of communication rather than a lack of understanding. The main issues were not showing full working for finding the circumference of the circle and not fully justifying why 4 rolls of plastic strip were required. It was quite common for candidates to jump from a circumference of 7.5 to an answer of 4 rolls.

Answer	Mark	Notes
4 rolls	4	<p>M1 for $\pi \times 2.4$</p> <p>M1 for $(\pi \times 2.4) \div 2$ or 7.5 to 7.541</p> <p>M1 for or 3.75 or 3.76... or 3.77... or (2, 4,) 6, 8</p> <p>C1 for a clear statement that 4 (rolls) are needed</p>

Q41. At this level in the paper it was disappointing to see some candidates who realised that they had to find an expression for the area of each triangle fail to give the correct expression for the area of the right-angled triangle; it was common to see the $\frac{1}{2}$ forgotten. Candidates who did give and then equate two correct expressions then frequently made algebraic errors and so arrived at the wrong quadratic equation. A significant number of candidates who used the correct expression for the area of the first triangle did not evaluate $\sin 30^\circ$, making manipulation and simplification much harder.

Working	Answer	Mark	Notes
	$1 + \sqrt{5}$	5	<p>M1 for $\frac{1}{2} \times x \times x \times \sin 30^\circ$ oe</p> <p>M1 for $\frac{1}{2} (x - 2)(x + 1)$ oe or $\frac{1}{2} \times (x - 2) \times (x + 1) \times \sin 90$</p> <p>M1 (dep on at least one previous M1) for formation of equation from equating areas with x as the only variable</p> <p>A1 for $x^2 - 2x - 4 = 0$ oe in the form $ax^2 + bx + c = 0$ or $ax^2 + bx = c$</p> <p>A1 cao</p>

Q42. A few students scored both marks for a correct answer to this question. The most common incorrect responses seen were 200 and 8 000 000 ($200 \times 200 \times 200$).

PAPER: 5MB3H 01				
Question	Working	Answer	Mark	Notes
		2 000 000	2	M1 for $2 \times 100 \times 100 \times 100$ A1 oe

Q43. There were many confused attempts, with disorganised work which was frequently conflicting. The most successful approaches involved trying to find the area of the cross-section, though division into rectangles regularly involved the choice of incorrect dimensions.

2015		
Answer	Mark	Notes
180	3	M1 for area of cross section, eg $3 \times 2 + 3 \times 4 + 3 \times 6$ ($=36$) or $9 \times 6 - 3 \times 3 \times 2$ ($=36$) M1 for " 36 " $\times 5$ A1 cao OR M1 for area of one cuboid eg $3 \times 2 \times 5$ ($=30$) M1 for $6 \times "30"$ A1 cao OR M1 for 4.5×8 ($=36$) M1 for " 36 " $\times 5$ A1 cao

Q44. A popular incorrect method was to evaluate $\frac{1}{3} \times \pi \times 15^2 \times 20$. Some candidates were able to write down a correct expression for the volume of the large cone but then did not realise that the radius of the smaller cone was 7.5 cm and so failed to make further progress. There was evidence of the wrong formula being used for the volume of a cone despite this being given on the formula sheet at the front of the paper; formulae for the volume of a cylinder or surface area of a cone were commonly seen. It was common to see the volume of the large cone being found correctly, and then halved for the volume of the frustum.

Working	Answer	Mark	Notes
$\frac{1}{3} \times \pi \times 15^2 \times 40 - \frac{1}{3} \times \pi \times 7.5^2 \times 20$	8250	4	B1 for 15cm as diameter or 7.5 cm as radius of smaller cone (may be marked on diagram or used in a formula) M1 for a numerical expression for the volume of one cone eg. $\frac{1}{3} \times \pi \times 15^2 \times 40$ ($=9424\dots$) or $\frac{1}{3} \times \pi \times 7.5^2 \times 20$ ($=1178\dots$) M1 for $\frac{1}{3} \times \pi \times 15^2 \times 40$ oe $-\frac{1}{3} \times \pi \times 7.5^2 \times 20$ oe A1 for answer in the range 8240 – 8250 OR B1 for 2^3 M1 for a numerical expression for the volume of the large cone eg. $\frac{1}{3} \times \pi \times 15^2 \times 40$ ($=9424\dots$) M1 volume of frustum = $\frac{7}{8} \times \frac{1}{3} \times \pi \times 15^2 \times 40$ oe A1 for answer in the range 8240 – 8250

Q45. Many students failed to correctly find the area of the cross section of the bar, usually by incorrectly finding the missing dimensions; $15 \times 2 + 15 \times 2 + 12 \times 2$ ($= 84$) was a common error. Students successfully finding the area of the cross section usually then found the correct volume. Failure to complete the solution correctly was usually a result of dividing their volume by the density instead of multiplying. Some students used their area of cross section as the volume and failed to gain any further credit. A few students lost the final method and hence the accuracy mark for not correctly converting to the right units.

Answer	Mark	Notes
3	5	M1 for a complete method to find the area of the cross section, eg. $15 \times 2 + "(12 - 4)" \times 2 + 15 \times 2$ ($= 76$) or for finding the volume of a relevant prism, eg. $15 \times 2 \times 120$ ($= 3600$) "(12 - 4)" maybe just seen on the diagram M1 for a method to find the volume of the bar, eg. " 76 " $\times 120$ ($= 9120$) or ft "area of cross section" $\times 120$ provided "area of cross section" includes a method to find the area of at least two relevant rectangles M1 for "volume" $\times 8$, eg. " 9120 " $\times 8$ ($= 72960$) or $250 \times 1000 \div 8$ ($= 31250$) NB "volume" must be dimensionally correct M1 (dep on previous M1) for $250 \div ("volume" \times 8) \div 1000$, eg. $250 \div "72960 \div 1000"$ ($= 3.4265\dots$) or " 31250 " $\div "9120"$ A1 for an answer of 3 with correct working

Q46. This question was not well answered largely as a result of the inability of so many students to find the volume of a cylinder and $40 \times 90 = 3600$ was seen often. Formulae for the volume of a cone or sphere were also seen often. Many of those students who did find the volume of the container, then correctly converted to litres and subtracted the 65 litres to be removed, but were able to go no further. A significant number of students subtracted just one instead of 65 litres.

Paper: 5MB3H_01				
Question	Working	Answer	Mark	Notes
		77 to 77.2	4	M1 for $\pi \times 40^2 \times 90 (= 452389. \dots)$ M1 for " $452389. \dots$ " – 65000 ($= 387389. \dots$) M1 (dep on at least M1) for " $387389. \dots \div (\pi \times 40^2)$ " A1 for answer in the range 77 to 77.2 OR M1 for $\pi \times 40^2 (= 5026. \dots)$ M1 for $65000 \div "5026. \dots" (= 12.93 \dots)$ M1 (dep on at least M1) for $90 - "12.93 \dots"$ A1 for answer in the range 77 to 77.2

Q47. Part (a) was usually correctly answered well with students showing a sound understanding of Pythagoras. A few did try to find an angle first and then work out the distance from the tree to the tower. In part (b), many students were able to correctly find the size of one of the angles but the understanding of bearings was poor. Some students insisted on finding an angle using either, or in some cases both, the sine or cosine rules. Often this led to inaccuracies, as a result of premature approximations. A significant number of students simply measured the angle with a protractor ignoring the fact that the diagram was not drawn to scale.

Paper: 5MB3H_01				
Question	Working	Answer	Mark	Notes
(a)		5.0	3	M1 for $2.1^2 + 4.5^2$ or $4.41 + 20.25$ or 24.66 M1 for $\sqrt{(2.1^2 + 4.5^2)}$ or $\sqrt{24.66}$ A1 for answer in the range 4.9 to 5.0
(b)		115	4	M1 for a correct method to find the angle at the tower (A) or the angle at the tree (B), eg. $\tan(A) = \frac{4.5}{2.1} (= 2.14 \dots)$ or $\tan(B) = \frac{2.1}{4.5} (= 0.46 \dots)$ M1 for $\tan^{-1}\left(\frac{4.5}{2.1}\right) (= 64.98 \dots)$ or $\tan^{-1}\left(\frac{2.1}{4.5}\right) (= 25.01 \dots)$ A1 for 64.9(8...) or 25.0(1...) A1 for 115 or ft 180 – "64.98..." or 90 + "25.01"

Q48. No Examiner's Report available for this question

Question	Working	Answer	Notes
		Triangle (-6, 2), (-6, -1), (-3, -1)	M1 for correct shape and the correct orientation in the wrong position or two vertices correct. A1 cao

Q49. Students often applied a translation to the shape A to score one mark but only a small proportion of students placed the shape in the correct position on the grid. Other types of transformation were seen on many scripts. In response to part (b) of this question, most but by no means all students described a single transformation, usually a rotation. A complete description with the correct centre and angle of rotation eluded most students.

PAPER: 5MB3H_01				
Question	Working	Answer	Mark	Notes
(a)		Triangle	2	B1 for triangle translated B1 for triangle at (-2,2), (-2,0), (-1,0)
(b)		Rotation 90° anticlockwise centre (0,0)	3	B1 Rotation B1 90° anticlockwise oe B1 centre (0,0) Note Award no marks if more than one transformation is given

Q50. This question was designed to assess the problem-solving capabilities of more able students. They had to recognise that by equating $\frac{1}{2} ab \sin C$

the area, solving for the missing side a , they could then use the cosine rule to find the side opposite the 40° . This proved to be very difficult for the students who sat this question paper. There were a few students who scored all the marks, and some who scored two marks, but for many the working space was blank or they attempted to use right angled triangle trigonometry inappropriately.

Answer	Mark	Notes
31.1	5	M1 for $\frac{1}{2} \times 8.4 \times x \times \sin 40 = 100$ M1 for $100 \div (0.5 \times 8.4 \times \sin 40)$ ($= 37.041\dots$) M1 (dep on 1 st M1) for substituting the appropriate figures into the cosine rule eg $8.4^2 + 37.041^2 - 2 \times 8.4 \times 37.041 \times \cos 40^\circ$ M1 (dep on previous M1) for correct order of evaluation or ($c^2 =$) 965.897... A1 31.07 - 31.1

There was some indication that students could equate the formula $\frac{1}{2} ab \sin C$ to 100, substitute in the values correctly and even find the answer of 37 although some divided the 100 by 2 instead of multiplying by 2. However, they then stopped because they thought they had solved the problem. They had confused the ab in the area formula with the AB they were being asked to find. Students who went on after finding side a often secured all 5 marks. Although some lost 1 mark because of overenthusiasm in approximating their answer as they proceeded through the calculation.

A few students used a more indirect approach, first using sine to find the height of the appropriate altitude and then $\frac{1}{2} \times \text{base} \times \text{height}$ to work out the base. They then used a combination of right-angled triangle trigonometry and Pythagoras to find the length of the side.

Q51. Vector geometry questions appear frequently on these papers and students usually struggle with them. This was certainly true on this occasion with few students making any progress with the question. Those that did score marks were able write vector AP or vector OY in terms of another vector and then work with dividing vector AP in the ratio 2: 1. Quite a few of the students also gave an answer for vectors which were in the opposite direction, i.e. gave the vector for PA when they said they were giving AP . Once the students had established the correct answer for vector OY only the most able were

Answer	Mark	Notes
$\frac{2}{3}(7a + 3b)$ and correct conclusion	4	M1 for correct vector for \overrightarrow{OY} , or \overrightarrow{AP} eg $(\overrightarrow{OY}) = \overrightarrow{OA} + \overrightarrow{AY}$, or $\overrightarrow{OY} = \overrightarrow{OA} + \frac{2}{3}\overrightarrow{AP}$ may include terms in a and b , eg. $6a + \overrightarrow{AY}$, $4b + 4a - b + \overrightarrow{PY}$ or $\overrightarrow{AP} = \overrightarrow{AO} + \overrightarrow{OB} + \overrightarrow{BP}$ or $-6a + 4b + 4a - b$ or $-2a + 3b$ M1 for $(\overrightarrow{AY}) = \frac{2}{3}\overrightarrow{AP}$ or $\frac{2}{3}(-6a + 4b + 4a - b)$ or $\frac{2}{3}(-2a + 3b)$ or $(\overrightarrow{PY}) = \frac{1}{3}\overrightarrow{PA}$ or $\frac{1}{3}(-4a + b - 4b + 6a)$ or $\frac{1}{3}(2a - 3b)$ M1 for correct expression for \overrightarrow{OY} in terms of a and b , eg $\frac{14}{3}a + 2b$ C1 for $\frac{2}{3}(7a + 3b)$ and " \overrightarrow{OY} is parallel to the vector $7a + 3b$ " oe

able to recognise that vector OY is $\frac{2}{3}(7a + 3b)$ and establish that the lines were therefore parallel.

Q52. No Examiner's Report available for this question

Question	Working	Answer	Mark	Notes
(a)		21.4	3	M1 for using values 3.6 and 9.6 M1 for substituting values into trapezium rule, e.g. $\frac{1}{2} \times 1 \times ((3.6 + 9.6) + 2(6.4 + 8.4))$ A1 cao
(b)		Distance in metres	2	C1 estimate of distance covered C1 in metres
(c)			1	C1 under-estimate as chords are under curve

Q53.

For part (a), some fully correct answers were seen whilst some students just plotted the frequency without considering frequency density. A few scale issues were seen with students starting at 0.2 instead of 0 or using 0.3 for every 2 cm. A few missed the width of the last interval and plotted 70 to 80 instead of 70 to 85

In part (b), there were fully correct answers or answers arriving at 19.1. The ability to split the rectangles was seen but not the ability to arrive at a total. Those trying to count squares generally made little headway in this part of this question. Some students did arrive at 19.1 but failed to round to a whole number of eggs. A common error was to average 20 and 17 and give 18.5 as the final answer.

Question	Working	Answer	Mark	Notes
(a)	$12 \div 20 = 0.6$ $20 \div 10 = 2$ $17 \div 10 = 1.7$ $6 \div 15 = 0.4$	Correct histogram	3	B3 for fully correct histogram (B2 for 3 correct blocks or all 4 frequency \div class interval, y-axis labelled and 1 correct block) (B1 for 2 correct blocks of different widths or for correct key eg $1\text{cm}^2 = 1$ egg or for frequency \div class interval for at least 3 frequencies) Due to scale accept to within 1mm on plotting
(b)		19	3	M1 for splitting one of relevant rectangles or for $\frac{7}{10} \times 20 (=14)$ or $\frac{3}{10} \times 17 (=5.1)$ M1 for (area of 53 – 63 interval) \div (total area) $\times 55$ or for “14” + “5.1” A1 for 19

Q54.

It was encouraging to see that a good proportion of all students were able to work out an estimate for the mean in part (a) of this question. Errors arose because the class intervals did not all have the same width and 60 was often used as the midpoint of the interval $50 < x \leq 80$. Some students rounded their answer to 46. Examiners accepted this provided 45.5 had been seen in the working space. A small minority of students worked out class width multiplied by frequency rather than midpoint by frequency and there were some students who divided by 5 rather than 60.

Nearly all students completed the table in part (b) correctly.

In part (c) students usually plotted their points using the upper boundary of the class intervals though some used the midpoints instead.

Cumulative frequency curves were generally well drawn and used correctly to find the estimate required in part (d), though some students failed to subtract the value obtained from their graph from 60.

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Question	Working	Answer	Mark	Notes
(a)	$5 \times 5 = 25$ $11 \times 20 = 220$ $23 \times 40 = 920$ $13 \times 65 = 845$ $8 \times 90 = 720$ $2730 \div 60$	45.5	4	M1 for fx with x consistent within intervals (including the end points) allow one error M1 (dep) for use of all correct mid-interval values M1 (dep on first M1) for $\Sigma fx \div 60$ A1 cao
(b)		5, 16, 39, 52, 60	1	B1 cao
(c)		Cumulative frequency graph	2	M1 ft for at least 4 of 5 points from their cf table (values must be cumulative) plotted consistently within each interval A1 for a fully correct cf graph
(d)		15, 16 or 17	2	M1 for method shown to read off from $x = 60$ on their cf graph or linear interpolation from the table A1 ft from their cf graph

Q55. Many tree diagrams were seen but there was then a lack of calculations carried out. A few sample space diagrams were drawn but these were rarely used to produce any probabilities. A small number of students worked with decimals rather than fractions and the use of fractions in this type of question is preferable. There were some fully correct answers seen.

Answer	Mark	Notes
$\frac{11}{30}$	3	M1 for at least one of $\frac{2}{6} \times \frac{1}{5}$ or $\frac{3}{6} \times \frac{1}{5}$ or $\frac{3}{6} \times \frac{2}{5}$ or $\frac{3}{6} \times \frac{3}{5}$ oe M1 for $\frac{2}{6} \times \frac{1}{5} + \frac{3}{6} \times \frac{1}{5} + \frac{3}{6} \times \frac{2}{5}$ oe A1 for $\frac{11}{30}$ oe (SCB2 for $\frac{11}{36}$)

Q56. No Examiner's Report available for this question

Question	Working	Answer	Notes
(a)		18	B1 cao
(b)		$5(x-1)$	M1 for method to find inverse function A1 for $5(x-1)$ or $5x-5$
(c)		$9x-48$ shown	M1 for method to find composite function A1 for working leading to $9x-48$

Q57. This question was well attempted by the more able students who quickly identified that it required the use of the formula. These students usually worked carefully and accurately to score full marks. Of the many students who were not successful, most either attempted to factorise the quadratic expression or they attempted other fruitless algebraic manipulation. Attempts using trial and improvement were also often seen but these were invariably unsuccessful.

Answer	Mark	Notes
-2.87, 0.87	3	M1 for substitution into formula; allow sign errors in b and c M1 for reduction to $\frac{-4 \pm \sqrt{56}}{4}$ or $\frac{-4 \pm \sqrt{56}}{4}$ A1 for 0.87 to 0.88 and -2.87 to -2.88 OR M1 for $(x+1)^2$ M1 for reduction to $\sqrt{\frac{7}{2}} - 1$ or $-\sqrt{\frac{7}{2}} - 1$ A1 for 0.87 to 0.88 and -2.87 to -2.88

Q58. No Examiner's Report available for this question

Question	Working	Answer	Mark	Notes
		$y = 0.4x - 17.4$	P1	for process to find p , e.g. $\sqrt{261-15^2}$
			P1	for process to find gradient of OA , e.g. $-15 \div 6 (= \frac{-5}{2})$
			P1	(dep on previous P1) for process to find the perpendicular gradient using $-\frac{1}{m}$ or states gradient as $\frac{2}{5}$
			P1	for process to find the y -intercept of the gradient, e.g. $-15 = \frac{2}{5} \times 6 + c$
			A1	oe