

Write your name here

Surname

M. Seman

Other names

Correction

**Pearson**  
**Edexcel GCSE**

Centre Number

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Candidate Number

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# Mathematics A

## Paper 2 (Calculator)

**Higher Tier**

Friday 7 November 2014 – Morning

**Time: 1 hour 45 minutes**

Paper Reference

**1MA0/2H**

**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



### 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.*
- **Calculators may be used.**
- If your calculator does not have a  $\pi$  button, take the value of  $\pi$  to be 3.142 unless the question instructs otherwise.

### Information

- The total mark for this paper is 100
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk (\*)** are ones where the quality of your written communication will be assessed.

### Advice

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

Turn over ▾

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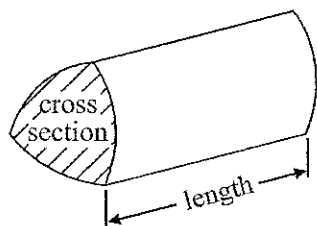
**PEARSON**

# GCSE Mathematics 1MA0

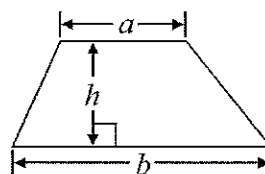
## Formulae: Higher Tier

**You must not write on this formulae page.  
Anything you write on this formulae page will gain NO credit.**

**Volume of prism** = area of cross section  $\times$  length

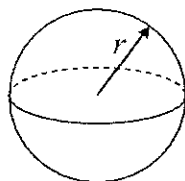


**Area of trapezium** =  $\frac{1}{2} (a + b)h$



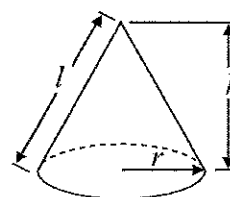
**Volume of sphere** =  $\frac{4}{3} \pi r^3$

**Surface area of sphere** =  $4\pi r^2$

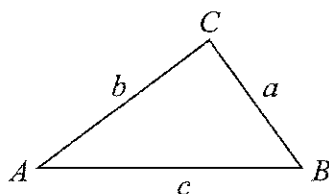


**Volume of cone** =  $\frac{1}{3} \pi r^2 h$

**Curved surface area of cone** =  $\pi r l$



**In any triangle ABC**



**The Quadratic Equation**

The solutions of  $ax^2 + bx + c = 0$   
where  $a \neq 0$ , are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

**Sine Rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

**Cosine Rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

**Area of triangle** =  $\frac{1}{2} ab \sin C$



Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Here are the ingredients needed to make 10 pancakes.

Pancakes	
Ingredients to make 10 pancakes	
300 ml	of milk
120 g	of flour
2	eggs

Matthew makes 30 pancakes.

(a) Work out how much flour he uses.

10 Pancakes  
120g flour

30 pancakes  
 $120 \times 3$

$$\begin{array}{r} 360 \\ \hline (2) \end{array} \text{ g}$$

Tara makes some pancakes.  
She uses 750 ml of milk.

(b) Work out how many pancakes she makes.

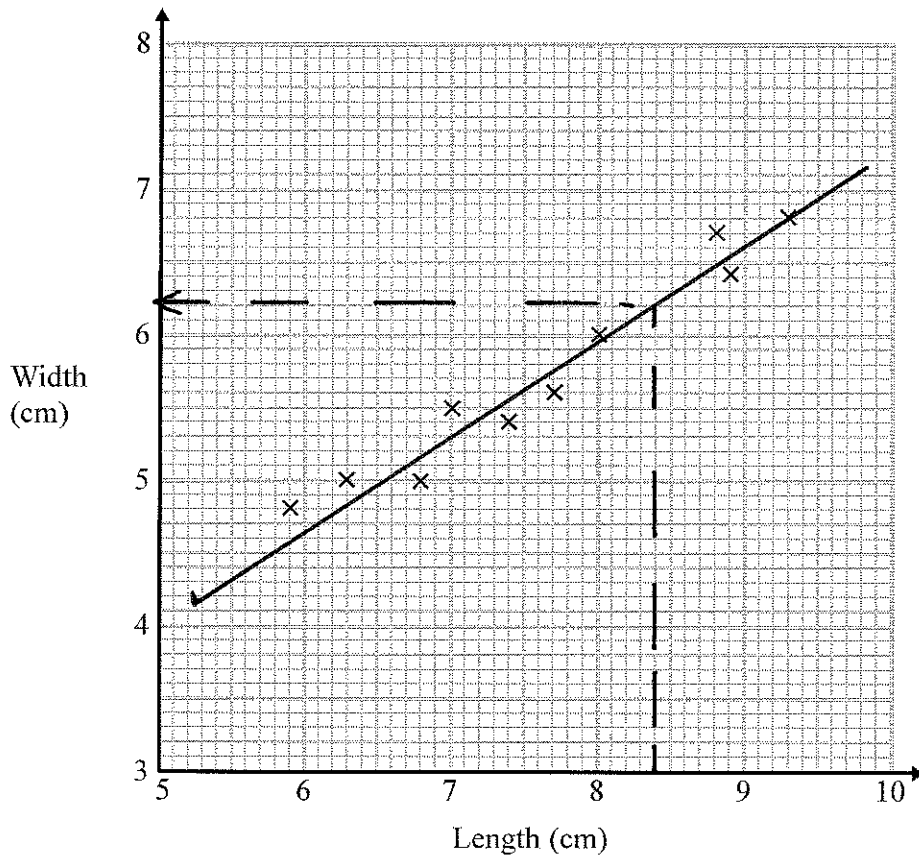
10 pancakes  $\div 2$  5 pancakes  $\times 5$  25 pancakes  
300ml milk 150 ml 750ml

$$\begin{array}{r} 25 \\ \hline (2) \end{array}$$

(Total for Question 1 is 4 marks)



- 2 The scatter graph shows some information about ten pine cones from the same tree. It shows the length and the width of each pine cone.



- (a) Describe the relationship between the length and the width of a pine cone.

Positive correlation.

Another pine cone from this tree has a length of 8.4 cm.

- (b) Estimate the width of this pine cone.

(Accept 6.1 to 6.4) 6.2 cm

(Total for Question 2 is 3 marks)



3  $f = 3g + 7h$

(a) Work out the value of  $f$  when  $g = -5$  and  $h = 2$

$$\begin{aligned} f &= 3 \times -5 + 7 \times 2 \\ &= -15 + 14 \\ &= -1 \end{aligned}$$

$$f = \frac{-1}{(2)}$$

(b) Factorise  $3x + 6$

$$3(x + 2)$$

$$\frac{3(x + 2)}{(1)}$$

(c) Expand and simplify  $5(y - 2) + 2(y - 3)$

$$\begin{aligned} 5y - 10 + 2y - 6 \\ 5y + 2y - 10 - 6 \end{aligned}$$

$$\frac{7y - 16}{(2)}$$

(d) Simplify  $m^5 \times m^3$

$$m^{5+3}$$

$$\frac{m^8}{(1)}$$

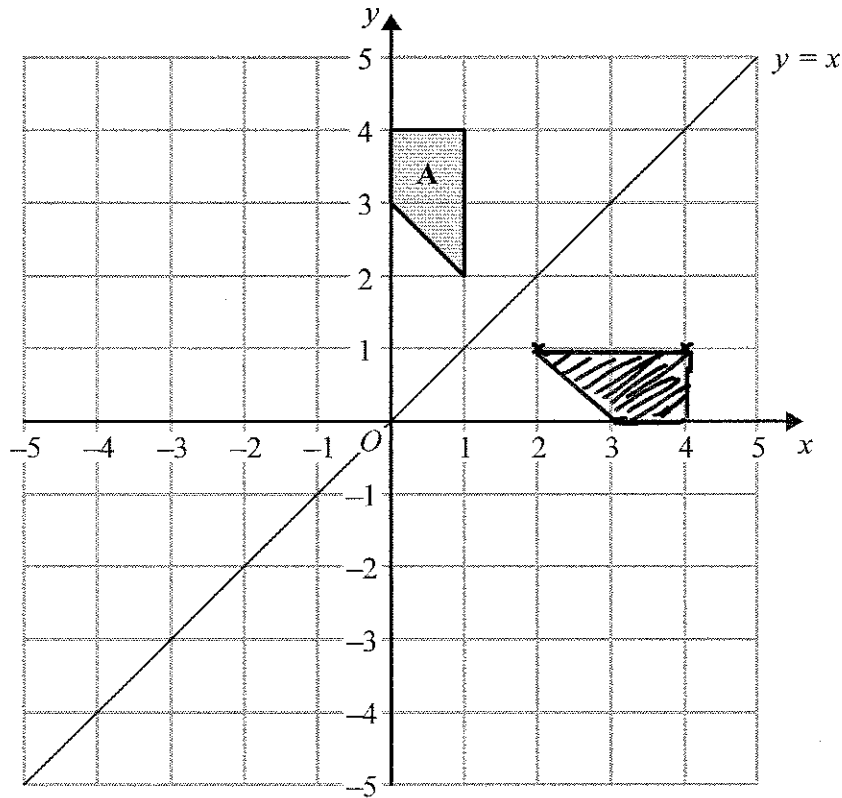
(e) Simplify  $\frac{p^6}{p^2} = p^{6-2}$

$$\frac{p^4}{(1)}$$

(Total for Question 3 is 7 marks)

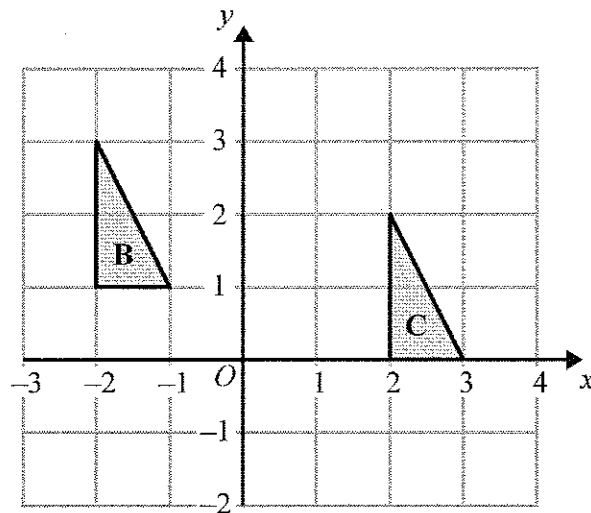


4



(a) On the grid, reflect shape A in the line  $y = x$ .

(2)



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

Translation 4 steps right, 1 step down  
 Vector  $\begin{pmatrix} +4 \\ -1 \end{pmatrix}$

(2)

(Total for Question 4 is 4 marks)



- 5 There are some green counters, some yellow counters, some blue counters and some red counters in a bag.

The table shows the probabilities that a counter taken at random from the bag will be green or yellow or red.

Colour	Green	Yellow	Blue	Red
Probability	0.16	0.4		0.24

Mary takes at random a counter from the bag.

- (a) Work out the probability that the counter will be blue.

$$P(\text{Blue}) = 1 - (0.16 + 0.4 + 0.24) = 0.2$$

0.2

(2)

Mary puts the counter back into the bag.  
There are 125 counters in the bag.

- (b) Work out the number of green counters in the bag.

$$\begin{aligned} \text{Number of green} &= P(\text{Green}) \times 125 \\ &= 0.16 \times 125 \end{aligned}$$

20 counters

(2)

(Total for Question 5 is 4 marks)



6 Margaret is on holiday in France.

She buys an English newspaper.

The cost of the newspaper is 5 euros.

In England, the cost of the same newspaper is £2.50

The exchange rate is £1 = 1.16 euros.

Work out the difference between the cost of the newspaper in France and the cost of the newspaper in England.

$$\begin{aligned} & \text{France} \\ \text{Cost: } & \text{€ } 5 \\ & \text{which is} \\ & 5 \div 1.16 = \text{£ } 4.31 \\ \text{Difference} & = 4.31 - 2.50 \\ & = \text{£ } 1.81 \end{aligned}$$

$$\begin{aligned} & \text{England.} \\ \text{Cost } & \text{£ } 2.50 \\ & \text{(Newspaper cheaper} \\ & \text{in England than France)} \\ & \text{£ } 1.81 \end{aligned}$$

(Total for Question 6 is 3 marks)

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

2      6      10      14      18

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

$$2 = 4 \times 1 - 2$$

$$6 = 4 \times 2 - 2$$

$$10 = 4 \times 3 - 2$$

$$4n - 2$$

(2)

\*(b) Is 86 a term in the sequence?

You must give a reason for your answer.

$$86 = 4 \times ? - 2$$

$$86 + 2 = 4 \times ?$$

$$? = \frac{88}{4} = 22$$

Yes, 86 is the 22<sup>nd</sup> term of the sequence.

(Total for Question 7 is 3 marks)

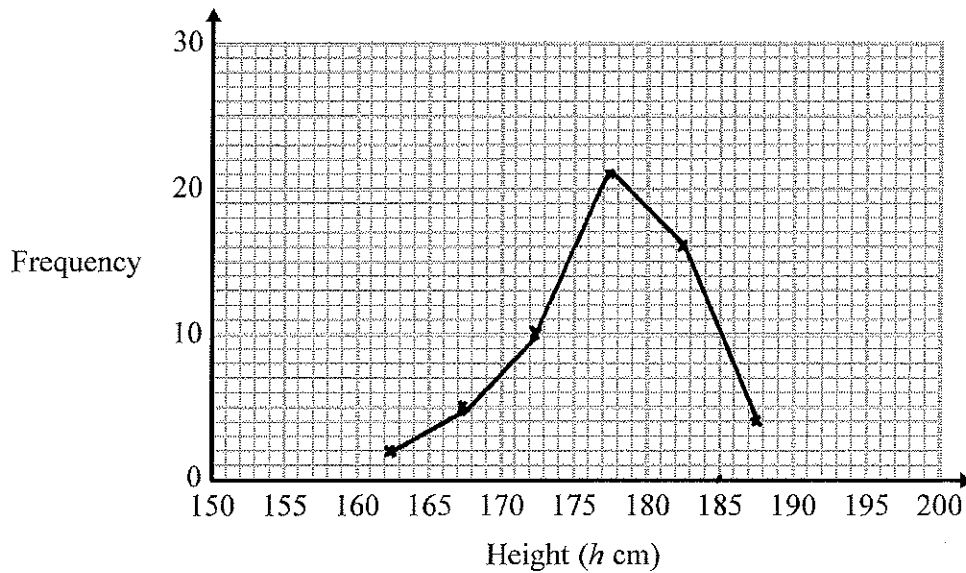




8 The frequency table gives information about the heights of some people.

Height ( $h$ cm)	Frequency
$160 < h \leq 165$	2
$165 < h \leq 170$	5
$170 < h \leq 175$	10
$175 < h \leq 180$	21
$180 < h \leq 185$	16
$185 < h \leq 190$	4

Draw a frequency polygon for this information.



(Total for Question 8 is 2 marks)



P 4 4 5 8 7 A 0 9 2 8

\*9 The table gives some information about student attendance at a school on Friday.

Year	Number of students		
	Present	Absent	Total
Year 7	192	16	208
Year 8	219	22	241
Year 9	234	28	262
Year 10	233	28	261
Year 11	214	24	238

The school has a target of 94% of students being present each day.

Did the school meet its target on Friday?

$$\begin{aligned} \cdot \text{Total number of students} &= 208 + 241 + 262 + 261 + 238 \\ &= 1210 \end{aligned}$$

$$\begin{aligned} \cdot \text{Total number of present} &= 192 + 219 + 234 + 233 + 214 \\ \text{students} &= 1092. \end{aligned}$$

$$\begin{aligned} \cdot \text{Percentage of students} &= \frac{1092}{1210} \times 100 \\ \text{who are present} &= 90.25\% \end{aligned}$$

The school did not meet its target.

(Total for Question 9 is 3 marks)



10 The equation

$$x^3 - 2x = 125$$

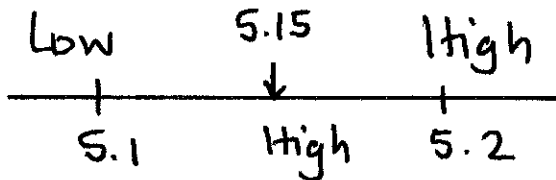
has a solution between 5 and 6

Use a trial and improvement method to find this solution.

Give your answer correct to 1 decimal place.

You must show all your working.

$x$	$x^3 - 2x$	
5	$5^3 - 2 \times 5 = 115$	Low
6	$6^3 - 2 \times 6 = 204$	High.
5.5	$5.5^3 - 2 \times 5.5 = 155.375$	High.
5.1	$5.1^3 - 2 \times 5.1 = 122.451$	Low.
5.2	$5.2^3 - 2 \times 5.2 = 130.208$	High
5.15	$5.15^3 - 2 \times 5.15 = 126.29$	High.



$$x = 5.1$$

(Total for Question 10 is 4 marks)



- \*11 Saphia is organising a conference.  
People at the conference will sit at circular tables.

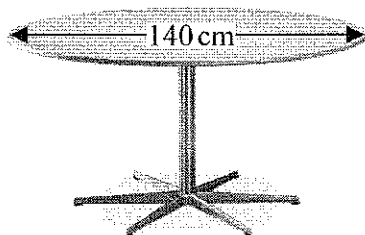


Diagram NOT  
accurately drawn

Each table has a diameter of 140 cm.  
Each person needs 60 cm around the circumference of the table.

There are 12 of these tables in the conference room.  
A total of 90 people will be at the conference.

Are there enough tables in the conference room?

• Circumference of one table  $= \pi \times 140 = 140\pi$ .

• Number of people around one table  $= \frac{140\pi}{60} = 7.33 \approx 7$  people.

• Number of people around 12 tables  $= 7 \times \underline{12} = 84$  people

To sit 90 people, you need 13 tables.

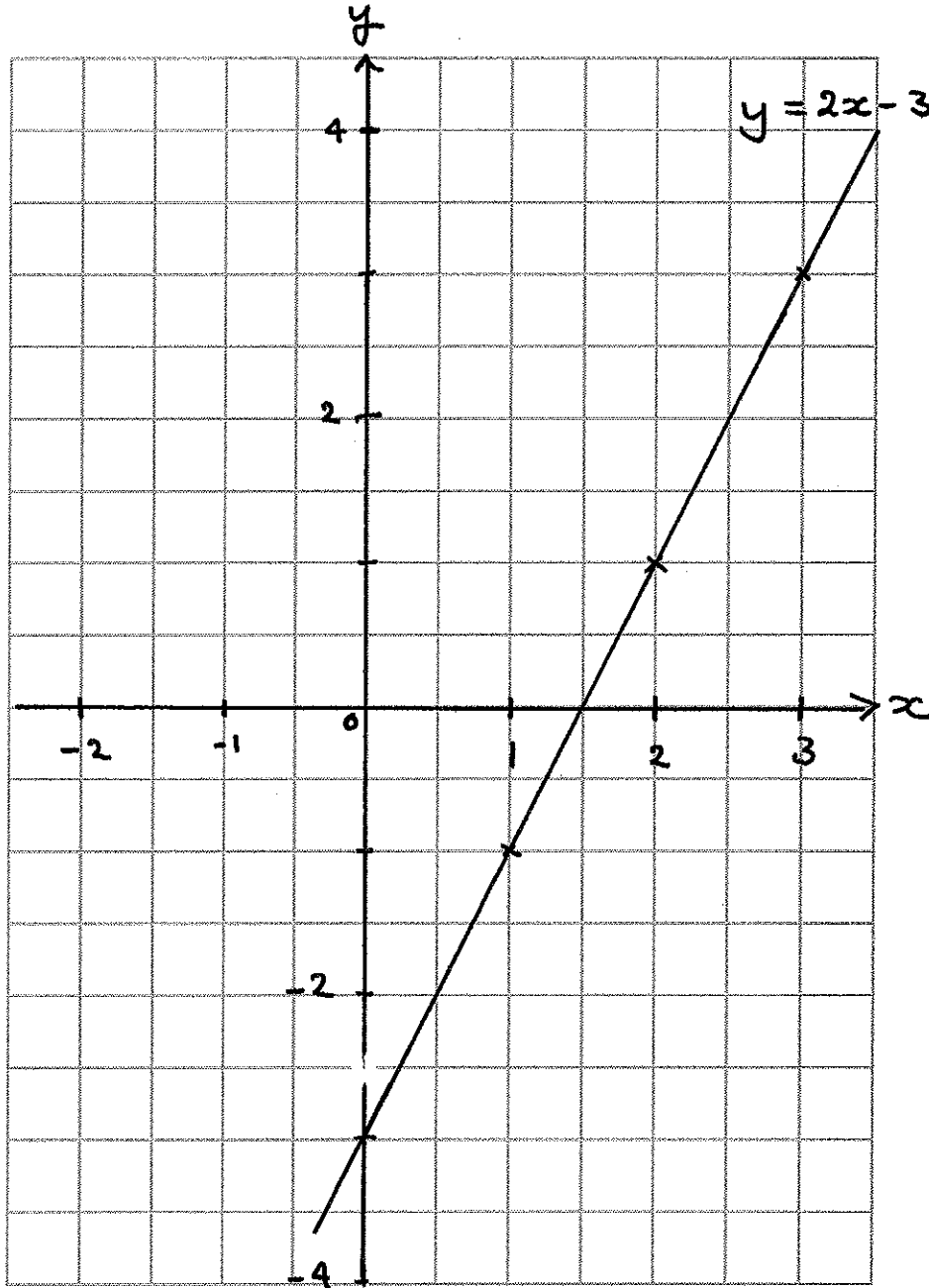
Not enough tables in the room

(Total for Question 11 is 4 marks)



12 On the grid, draw the graph of  $y = 2x - 3$  for values of  $x$  from  $-2$  to  $3$

$x$	-2	-1	0	1	2	3
$y$	-7	-5	-3	-1	1	3



(Total for Question 12 is 4 marks)



P 4 4 5 8 7 A 0 1 3 2 8

13 The diagram shows a swimming pool in the shape of a prism.

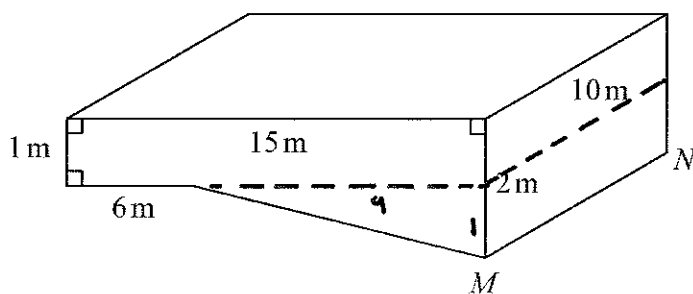


Diagram NOT accurately drawn

The swimming pool is empty.

The swimming pool is filled with water at a constant rate of 50 litres per minute.

- (a) Work out how long it will take for the swimming pool to be completely full of water.  
Give your answer in hours.  
( $1 \text{ m}^3 = 1000 \text{ litres}$ )

Volume of swimming pool

$$\begin{aligned}
 &= \text{[Diagram of a rectangular prism with dimensions 15, 10, 1]} + \text{[Diagram of a triangular prism with base 9, height 1, and length 10]} \\
 &= 1 \times 15 \times 10 + \frac{9 \times 1}{2} \times 10 \\
 &= 150 + 45 = 195 \text{ m}^3
 \end{aligned}$$

Amount of water =  $195 \times 1000 = 195000 \text{ litres}$

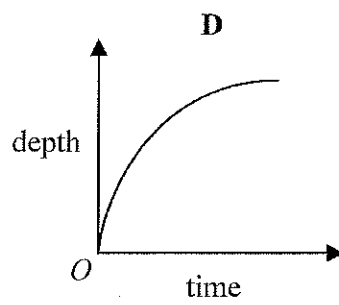
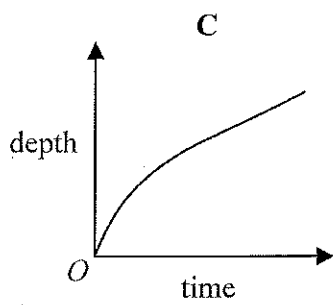
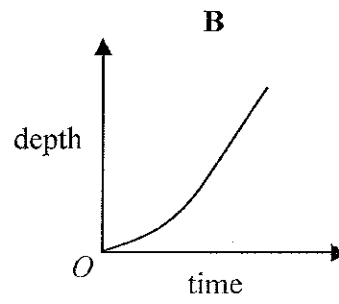
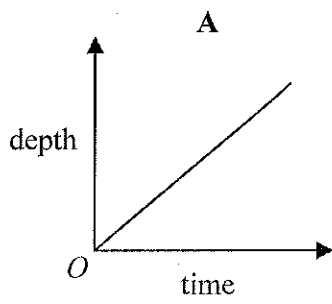
Time =  $195000 \div 50 = 3900 \text{ minutes}$ .  
(1hr = 60 min)

Time in hours =  $3900 \div 60$   
= 65 hours.

65 hours  
(5)



Here are four graphs.



- (b) Write down the letter of the graph that best shows how the depth of the water in the pool above the line  $MN$  changes with time as the pool is filled.

C

(Total for Question 13 is 6 marks)



\*14 Peter has £20 000 to invest in a savings account for 2 years.

He finds information about two savings accounts.

<p><b>Bonus Saver</b></p> <p>Compound interest</p> <p>4% for the first year then 1.5% each year</p>
---

<p><b>Fixed Rate</b></p> <p>Compound interest</p> <p>2.5% each year</p>
---

Peter wants to have as much money as possible in his savings account at the end of 2 years.

Which of these savings accounts should he choose?

Bonus saver

Fixed rate

start  
y<sub>1</sub>  
20 000

End of y<sub>1</sub>  
104% of 20000  
=  
1.04 × 20000  
=  
£20800

start y<sub>1</sub>:  
£20000

End of y<sub>1</sub>  
102.5% of  
20000  
=  
1.025 × 20000  
= £20500

start  
y<sub>2</sub>  
£20800

End of y<sub>2</sub>  
101.5% of 20800  
=  
1.015 × 20800  
=  
£21112

start y<sub>2</sub>:  
£20500

End of y<sub>2</sub>  
= 1.025 × 20500  
= £21012.50

OR.  
 $(1.025)^2 \times 20000 = £21012.50$

Bonus saver  
£21 112

Fixed Rate  
£21 012.50

Peter should  
choose  
Bonus Saver

OR:

(Total for Question 14 is 4 marks)

Bonus Saver:  $1.04 \times 1.015 \times 20000 = £21112$

Bonus Saver  
better

Fixed Rate:  $1.025 \times 1.025 \times 20000 = £21012.50$





15 A cinema sells adult tickets and child tickets.

The total cost of 3 adult tickets and 1 child ticket is £30

The total cost of 1 adult ticket and 3 child tickets is £22

Work out the cost of an adult ticket and the cost of a child ticket.

A = Adult

$$3A + C = 30$$

C = child

$$A + 3C = 22$$

Simultaneous equations:

$$\begin{cases} 3A + C = 30 & (1) \\ A + 3C = 22 & (2) \end{cases}$$

$$3 \times \begin{cases} 3A + C = 30 \\ A + 3C = 22 \end{cases} \times 3 \quad \therefore \begin{cases} 9A + 3C = 90 \\ A + 3C = 22 \end{cases}$$

$$\begin{array}{r} 9A + 3C = 90 \\ - A + 3C = 22 \\ \hline 8A = 90 - 22 \end{array}$$

$$8A = 68$$

$$A = \frac{68}{8} = 8.50$$

A = 8.50 into (2):

$$8.50 + 3C = 22$$

$$3C = 22 - 8.50$$

$$3C = 13.50$$

$$C = \frac{13.50}{3}$$

adult ticket £ 8.50

child ticket £ 4.50

(Total for Question 15 is 4 marks)



16 The diagram represents a metal frame.

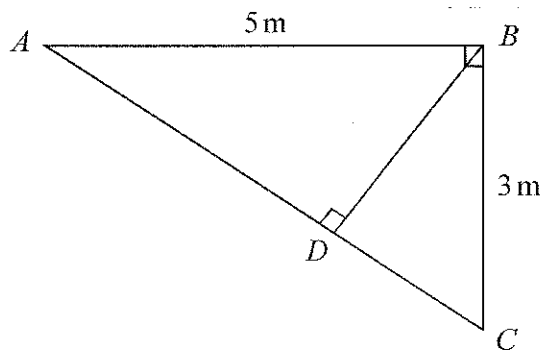


Diagram NOT  
accurately drawn

The frame is made from four metal bars,  $AB$ ,  $AC$ ,  $BC$  and  $BD$ .

Angle  $ABC = \text{angle } ADB = 90^\circ$

$AB = 5 \text{ m}$

$BC = 3 \text{ m}$

Work out the total length of the four metal bars of the frame.

Give your answer correct to 3 significant figures.

$$AC^2 = AB^2 + BC^2$$

$$= 5^2 + 3^2 = 25 + 9 = 34$$

$$AC = \sqrt{34} = 5.83 \text{ m}$$

$$\text{Area of } ABC = \frac{5 \times 3}{2} = \frac{15}{2} = 7.5$$

$$\text{Area of } ABC (\text{triangle}) = \frac{AC \times BD}{2} = 7.5 \text{ m}^2$$

$$AC \times BD = 2 \times 7.5$$

$$BD = \frac{2 \times 7.5}{\sqrt{34}} = 2.57 \text{ m}$$

$$AC = 5.83 \text{ m}$$

$$BD = 2.57 \text{ m}$$

$$BC = 3 \text{ m}$$

$$AB = 5 \text{ m}$$

$$\text{Total} = 5.83 + 2.57 + 3 + 5$$

16.4 m

(Total for Question 16 is 5 marks)



17

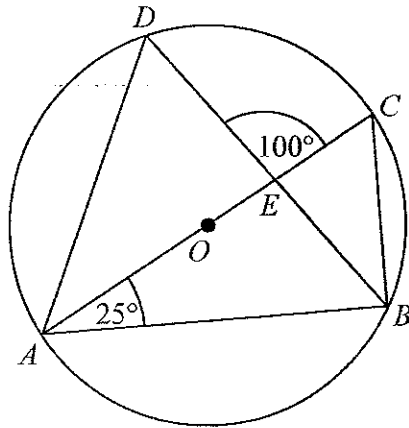


Diagram NOT  
accurately drawn

$A$ ,  $B$ ,  $C$  and  $D$  are points on the circumference of a circle, centre  $O$ .  
 $AC$  is a diameter of the circle.  
 $AC$  and  $BD$  intersect at  $E$ .

Angle  $CAB = 25^\circ$   
 Angle  $DEC = 100^\circ$

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

$$\hat{ACB} = 180 - 90 - 25 = 65^\circ \text{ Triangle in a semi-circle}$$

$$\hat{CEB} = 180 - 100 = 80^\circ \text{ straight line } + \text{ to } 180^\circ$$

$$\hat{DBC} = \hat{EBC} = 180 - 80 - 65 = 35^\circ \text{ angle in a triangle.}$$

$$\hat{DBC} = \hat{DAC} = 35^\circ \text{ angles at circumference in the same segment sitting on the same chord are equal.}$$

$$\hat{DAC} = 35^\circ$$

(Total for Question 17 is 4 marks)



P 4 4 5 8 7 A 0 1 9 2 8

18 The table gives some information about the lengths of time, in hours, that some adults watched TV last week.

Length of time ( $t$ hours)	Frequency	Freq. Density
$0 \leq t < 10$	8	0.8
$10 \leq t < 15$	15	3
$15 \leq t < 20$	11	2.2
$20 \leq t < 30$	10	1
$30 \leq t < 50$	6	0.3

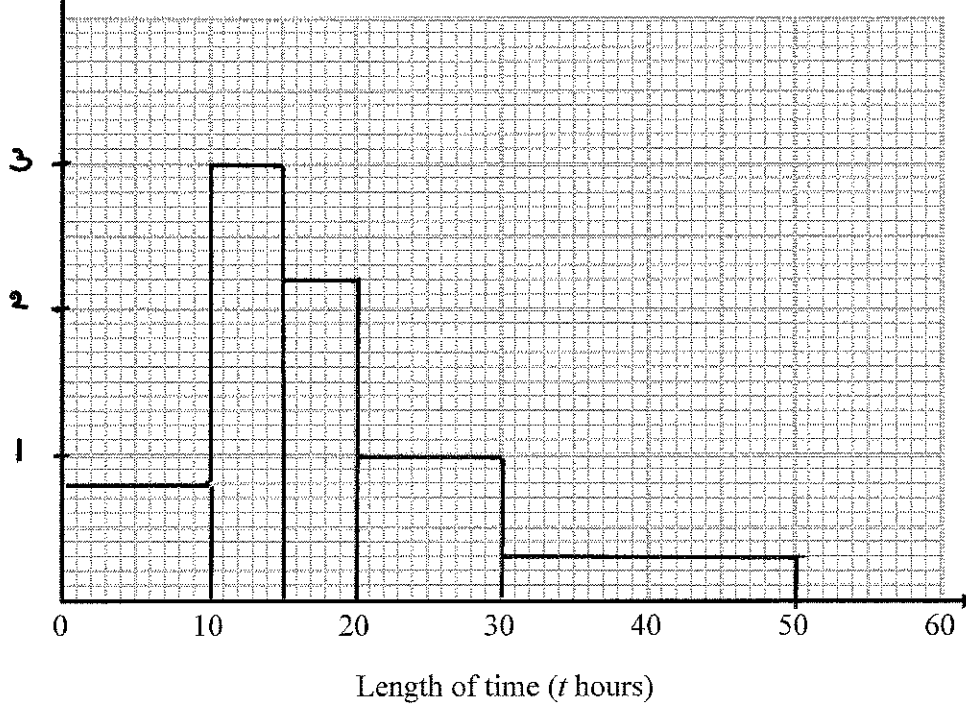
(a) Work out an estimate for the mean length of time.

$$\frac{8 \times 5 + 15 \times 12.5 + 11 \times 17.5 + 10 \times 25 + 6 \times 40}{50}$$

18.2 hours  
(4)

(b) Draw a histogram for the information in the table.

Freq. density



(3)

(Total for Question 18 is 7 marks)

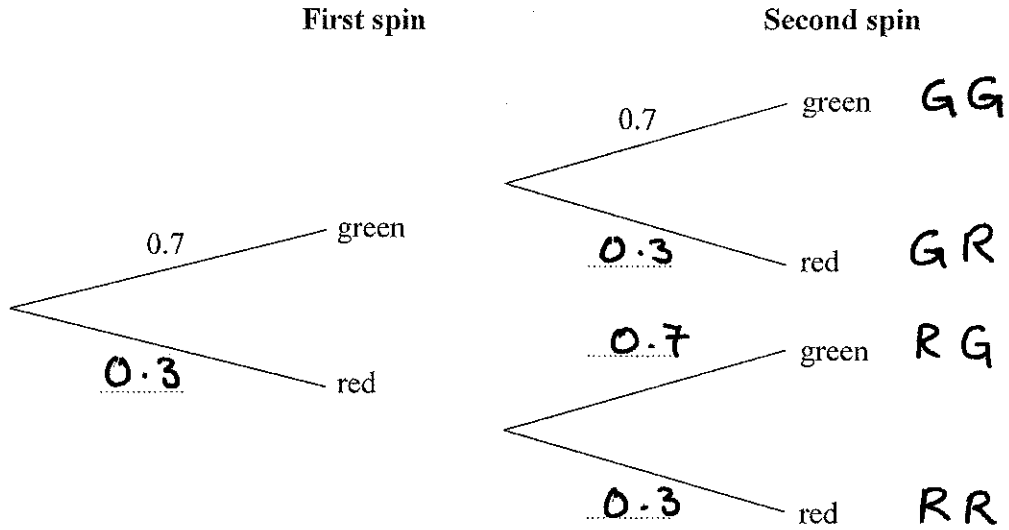


19 Louise makes a spinner.

The spinner can land on green or on red.  
The probability that the spinner will land on green is 0.7

Louise spins the spinner twice.

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that the spinner lands on two different colours.

GR or RG.

$$\begin{aligned}
 P(GR) + P(RG) &= 0.7 \times 0.3 + 0.3 \times 0.7 \\
 &= 0.21 + 0.21
 \end{aligned}$$

0.42

(3)

(Total for Question 19 is 5 marks)



20 Solve  $3x^2 - 5x - 1 = 0$

Give your solutions correct to 3 significant figures.

$$a = 3$$

$$b = -5$$

$$c = -1$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x_1 = \frac{5 + \sqrt{(-5)^2 - 4(3)(-1)}}{2 \times 3} = 1.85 \text{ (3 sf)}$$

$$x_2 = \frac{5 - \sqrt{(-5)^2 - 4(3)(-1)}}{2 \times 3} = -0.180$$

$$1.85 ; -0.180$$

(Total for Question 20 is 3 marks)



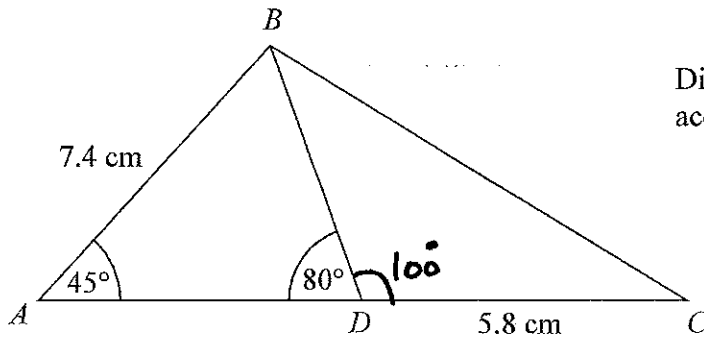


Diagram NOT  
accurately drawn

$ABC$  is a triangle.  
 $D$  is a point on  $AC$ .  
 Angle  $BAD = 45^\circ$   
 Angle  $ADB = 80^\circ$   
 $AB = 7.4$  cm  
 $DC = 5.8$  cm

Work out the length of  $BC$ .

Give your answer correct to 3 significant figures.

$$\frac{BD}{\sin 45} = \frac{AB}{\sin 80} \quad \therefore BD = AB \times \frac{\sin 45}{\sin 80}$$

$$BD = 5.313311\dots \text{ cm}$$

$$\therefore \hat{BDC} = 180 - 80 = 100^\circ \text{ straight line}$$

$$\therefore BC^2 = BD^2 + DC^2 - 2 \times BD \times DC \cos 100^\circ \quad [\text{cosine rule}]$$

$$BC^2 = 5.3133\dots^2 + 5.8^2 - 2 \times 5.3133\dots \times 5.8 \times \cos(100)$$

$$BC = 8.519036\dots$$

$$8.52 \text{ (3 s.f.)}$$

..... cm

(Total for Question 21 is 5 marks)



22 (a) Simplify fully  $\frac{2x^2 - 5x + 3}{x^2 + 5x - 6} = \frac{(x-1)(2x-3)}{(x+6)(x-1)}$

$$\begin{aligned} 2x^2 - 5x + 3 &= 2x^2 - 2x - 3x + 3 \\ &= 2x(x-1) - 3(x-1) \\ &= (x-1)(2x-3) \end{aligned}$$

$$x^2 + 5x - 6 = (x+6)(x-1)$$

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

(3)

(b) Make  $m$  the subject of

$$\frac{m}{v} - \frac{t}{b} = \frac{m-t}{R}$$

$$\frac{mb - tv}{vb} = \frac{m-t}{R}$$

$$R(mb - tv) = vb(m-t)$$

$$Rmb - Rtv = vbm - vbt$$

$$Rmb - vbm = Rtv - vbt$$

$$m(Rb - vb) = tv(R-b)$$

$$m = \frac{tv(R-b)}{b(R-v)}$$

$$m = \frac{tv(R-b)}{b(R-v)} \quad (4)$$

(Total for Question 22 is 7 marks)





\*23 A road is 4530 m long, correct to the nearest 10 metres.  
Kirsty drove along the road in 205 seconds, correct to the nearest 5 seconds.

The average speed limit for the road is 80 km/h.

Could Kirsty's average speed have been greater than 80 km/h?  
You must show your working.

$$\text{Distance: } 4530 \begin{cases} 4535 \text{ Upper} \\ 4525 \text{ Lower} \end{cases}$$

$$\text{Time: } 205 \begin{cases} 207.5 \text{ Upper} \\ 202.5 \text{ Lower} \end{cases}$$

$$S = \frac{D}{T} \quad \text{Speed} = \frac{D_{\text{Upper}}}{T_{\text{Lower}}} \quad \begin{matrix} (4535 \text{ m} = 4.535 \text{ km}) \\ (1 \text{ hr} = 3600 \text{ seconds}) \end{matrix}$$

$$\text{Speed} = \frac{4.535 \text{ km}}{202.5 \div 3600 \text{ (hr)}}$$

$$= 80.622 \text{ km/hr}$$

Answer: yes.

(Total for Question 23 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS



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