

# Model Solutions

Please check the examination details below before entering your candidate information

Candidate surname				Other names			
<b>Pearson Edexcel</b>		Centre Number			Candidate Number		
<b>International GCSE</b>		<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>			<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>		
<b>Monday 7 January 2019</b>							
Morning (Time: 2 hours)				Paper Reference <b>4MA1/1FR</b>			
<b>Mathematics A</b> <b>Level 1/2</b> <b>Paper 1FR</b> <b>Foundation Tier</b>							
<b>You must have:</b> Ruler graduated in centimetres and millimetres, protractor, 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.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- **Calculators may be used.**
- You must **NOT** write anything on the formulae page.  
Anything you write on the formulae page will gain NO credit.

## 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.*

## Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

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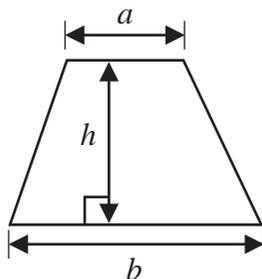
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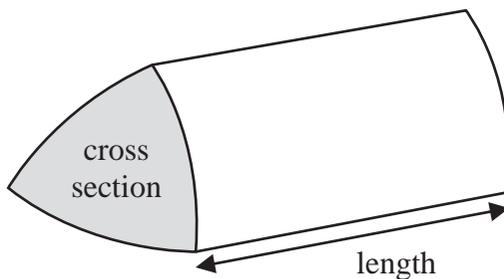
  
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**International GCSE Mathematics**  
**Formulae sheet – Foundation Tier**

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

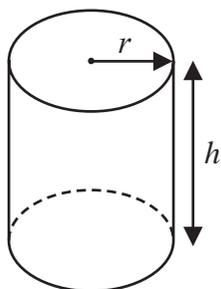


**Volume of prism** = area of cross section  $\times$  length



**Volume of cylinder** =  $\pi r^2 h$

**Curved surface area of cylinder** =  $2\pi r h$



DO NOT WRITE IN THIS AREA



Answer ALL TWENTY SIX questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 The table gives information about the lengths of five canals.

Name of canal	Length (km)
Danube-Black Sea	95.6
Kiel	98.4
Manchester	58.3
Panama	77.1
Suez	193.3

- (a) Which of these canals has the least length?

Manchester

(1)

The length of the Panama Canal is 77.1 km.

- (b) Write 77.1 correct to the nearest 10

↳ 7 > 5 ∴ round up

80

(1)

The Kiel Canal was opened on June 20th 1895

- (c) How many years old was the Kiel Canal on June 20th 2000?

$$\begin{array}{r} 2000 \\ - 1895 \\ \hline 105 \end{array}$$

105 years

(1)

(Total for Question 1 is 3 marks)



- 2 (a) Write these fractions in order of size.  
Start with the smallest fraction.

$$\frac{1}{6} \quad \frac{1}{10} \quad \frac{3}{4} \quad \frac{1}{2}$$

0.16    0.1    0.75    0.5

$$\frac{1}{10}, \frac{1}{6}, \frac{1}{2}, \frac{3}{4}$$

(1)

- (b) Write  $\frac{1}{4}$  as a decimal.

$$\frac{1}{4} = \frac{100}{400} = \frac{25}{100} = 0.25$$

↗ ↘    ↗ ↘  
x100    ÷4

(1)

- (c) Write  $\frac{1}{5}$  as a percentage.

$$\frac{1}{5} \times 100\% = 20\%$$

(1) 20 %

- (d) Work out  $1 - \frac{5}{8}$

$$* 1 = \frac{8}{8}$$

$$\therefore \frac{8}{8} - \frac{5}{8} = \frac{8-5}{8} = \frac{3}{8}$$

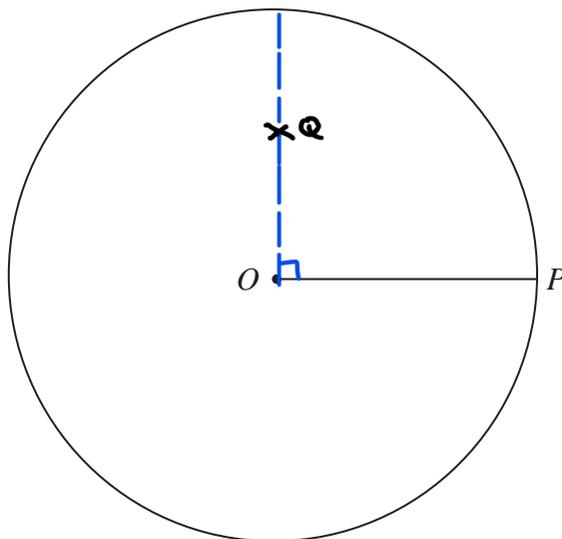
(1)

(Total for Question 2 is 4 marks)

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3 Here is a circle, centre  $O$ .



- (a) Measure the radius,  $OP$ , of the circle.  
Give your answer in centimetres.

Keep a ruler at a coinciding point  
'O' and read the value coinciding point  
'P'.

3.5 cm  
(1)

The point  $Q$  is 2 cm from  $O$ .  
The angle between  $OP$  and  $OQ$  is a right angle.

- (b) Mark with a cross ( $\times$ ) a possible position of the point  $Q$ .  
Label the point  $Q$ .

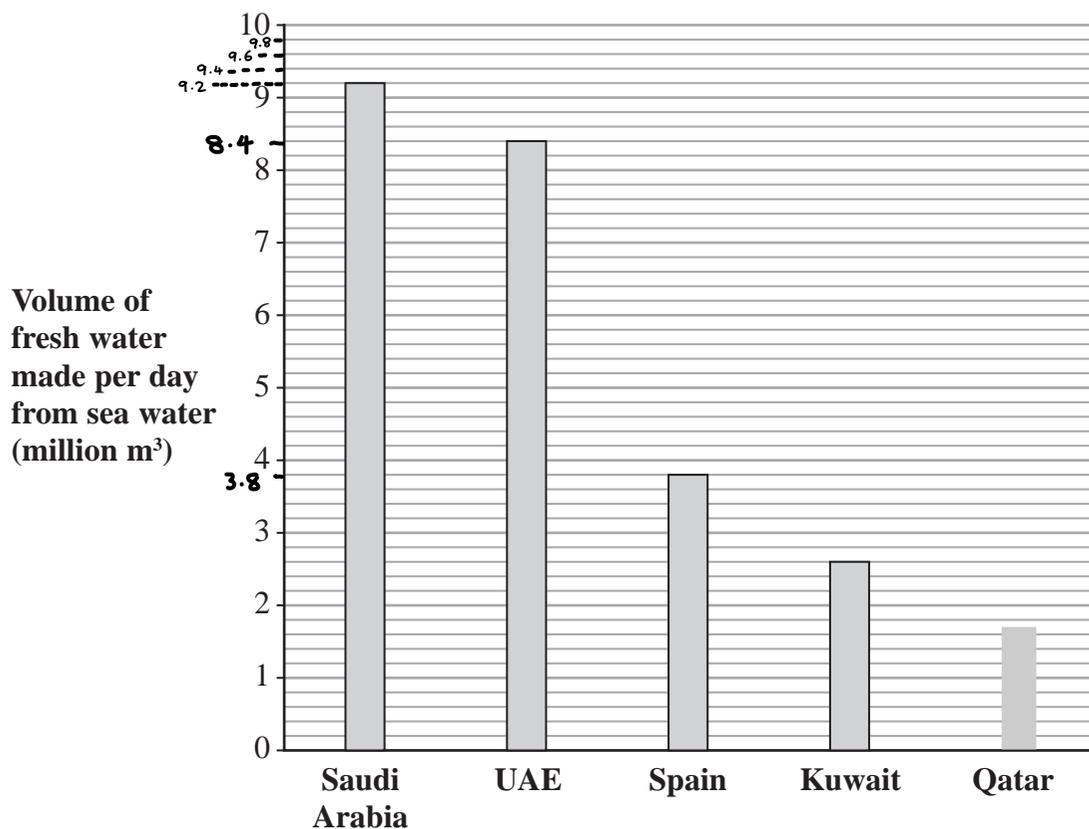
(2)

(Total for Question 3 is 3 marks)



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- 4 The bar chart gives information about the volume of fresh water made per day from sea water in each of four countries in 2015



- (a) Write down the volume of fresh water made per day from sea water in Saudi Arabia in 2015

9.2 million m<sup>3</sup>  
(1)

More fresh water was made per day from sea water in the UAE in 2015 than was made per day from sea water in Spain in 2015

- (b) How much more?

$$\begin{aligned} & \text{UAE} - \text{Spain} \\ & 8.4 - 3.8 = 4.6 \end{aligned}$$

4.6 million m<sup>3</sup>  
(2)

1.7 million m<sup>3</sup> of fresh water was made per day from sea water in Qatar in 2015

- (c) Draw a bar on the bar chart to show this information.

(1)

(Total for Question 4 is 4 marks)



DO NOT WRITE IN THIS AREA

5 Here is a list of numbers.

12    14    15    16    18    20    22    24

(a) Which number in the list is a multiple of both 6 and 9?

$$\begin{array}{l} 6 \times 3 \\ 9 \times 2 \end{array} \left. \vphantom{\begin{array}{l} 6 \times 3 \\ 9 \times 2 \end{array}} \right\} 18$$

(1)

Two numbers in the list are factors of 90

(b) Which two numbers?

$$15 \times 6 = 90$$

$$18 \times 5 = 90$$

18 and 15  
(2)

(c) Write down two numbers in the list that have a sum that is a prime number.

$$14 + 15 = 29$$

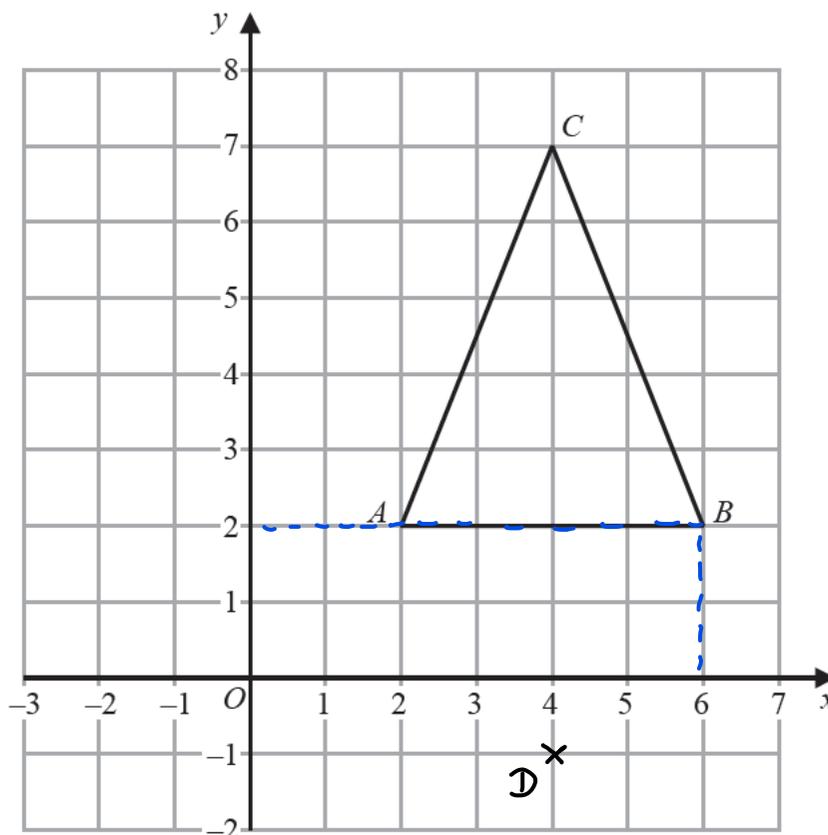
↑  
prime

14 and 15  
(1)

(Total for Question 5 is 4 marks)



6 The diagram shows a triangle  $ABC$  drawn on a grid.



(a) Write down the coordinates of point  $B$ .

$(x, y)$   $( 6 , 2 )$   
(1)

(b) On the grid, mark with a cross ( $\times$ ) the point with coordinates  $(4, -1)$   
Label this point  $D$ .

(1)

(c) What type of triangle is triangle  $ABC$ ?

Isosceles - sides  $AC$  and  $BC$  are equal in size  
(1)

(d) Find the coordinates of the midpoint of the line  $AC$ .

$$\left( \frac{2+4}{2}, \frac{2+7}{2} \right) = \left( \frac{6}{2}, \frac{9}{2} \right)$$

$x$  and  $y$  coordinate of  $C$   $( 3 , 4.5 )$   
 $x$  and  $y$  coordinate of  $A$  (2)

(Total for Question 6 is 5 marks)



DO NOT WRITE IN THIS AREA

- 7 Juan and Gabriella and their two children are going on a train journey from Madrid.

The cost of an adult ticket for this train journey is 53.50 euros.

The cost of a child ticket for this train journey is 60% of the cost of the adult ticket.

Juan buys 2 adult tickets and 2 child tickets.

He pays with two 100 euro notes.

How much change should he get?

cost for adult tickets

$$2 \times \text{€ } 53.50 = \text{€ } 107$$

Cost for child tickets

$$2 \times \left( 60\% \times \text{€ } 53.50 \right) = 2 \times \text{€ } 53.50 \times \frac{60}{100}$$

$$= \text{€ } 64.2$$

Total cost

$$\text{€ } 107 + \text{€ } 64.2$$

$$= \text{€ } 171.2$$

Change receivable

$$\text{€ } 200 - \text{€ } 171.2$$

$$= \text{€ } 28.8$$

28.8 euros

(Total for Question 7 is 4 marks)

- 8 (a) Simplify  $5x + 4y - x - y$

$$\underbrace{5x - x} + \underbrace{4y - y}$$

$$4x + 3y$$

Bring like terms together

(2)

- (b) Solve  $2t + 3 = 12$

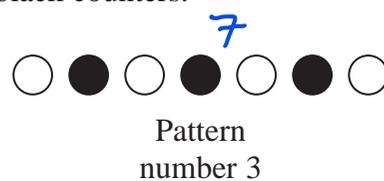
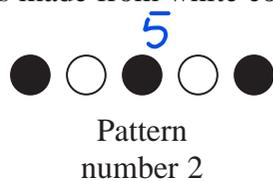
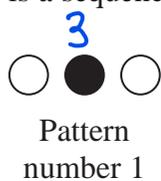
$$\begin{array}{l} -3 \curvearrowright \\ \div 2 \curvearrowright \end{array} \quad \begin{array}{l} 2t + 3 = 12 \\ 2t = 9 \\ t = \frac{9}{2} \end{array}$$

$$t = \frac{9}{2} \quad (2)$$

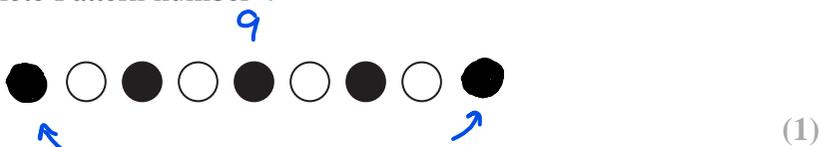
(Total for Question 8 is 4 marks)



9 Here is a sequence of patterns made from white counters and black counters.



(a) In the space below, complete Pattern number 4



(b) Find the **total** number of counters in Pattern number 6

13 (counters increase by 2)

(1)

(c) Work out the number of **black** counters in Pattern number 14

Pattern: 1 2 3 4 6 8 10 12 14 16

Black counters: 1 3 3 5 7 9 11 13 **15** 17

15

(1)

(d) Work out the **total** number of counters in Pattern number 50

Nth term :  $2n+1$

$$\therefore n=50 : 2(50)+1 = 100+1 = 101$$

(2)

(Total for Question 9 is 5 marks)

DO NOT WRITE IN THIS AREA



10 There are 20 beads in a box.

7 of the beads are red.

11 of the beads are green.

The rest of the beads are yellow.  $\rightarrow 20 - (7 + 11) = 2$

Jan takes at random a bead from the box.

(a) Write down the probability that she takes a red bead.

$$\frac{N(\text{red})}{N(\text{total})} = \frac{7}{20} \quad (1)$$

(b) Find the probability that she takes a red bead or a yellow bead.

$$P(\text{red}) \text{ OR } P(\text{yellow})$$

$$\frac{7}{20} + \frac{2}{20} = \frac{9}{20} \quad (2)$$

There are 26 counters in a bag.

5 of the counters are pink.

10 of the counters are blue.

The rest of the counters are white.  $26 - (5 + 10) = 11$

Jan puts some more pink counters into the bag.

She then takes some blue counters out of the bag.

After she has done this there are still 26 counters in the bag.

Jan then takes at random a counter from the bag.

The probability that she takes a pink counter is  $\frac{1}{2}$

(c) What is the probability that she takes a blue counter?

$$P(\text{pink}) = \frac{1}{2} \quad \therefore N(\text{pink}) = \frac{1}{2} \times 26 = 13 \text{ pink.}$$

$$26 = \text{pink} + \text{white} + \text{blue}$$

$$26 = 13 + 11 + \text{blue}$$

$$26 = 24 + \text{blue}$$

$$\therefore \text{blue} = 2$$

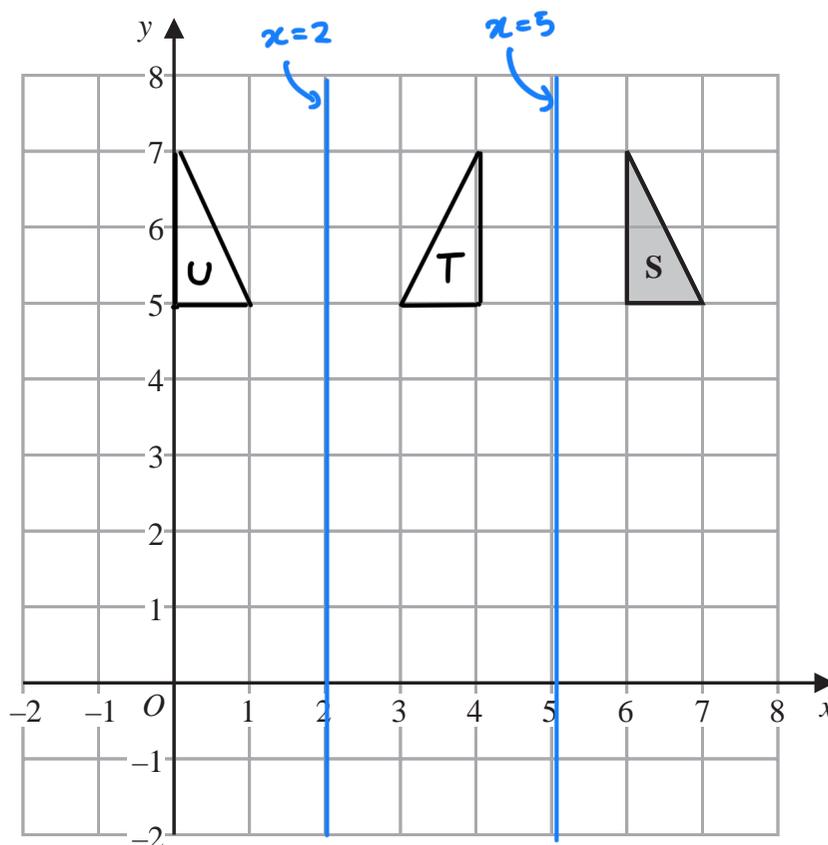
$$\therefore P(\text{blue}) = \frac{2}{26}$$

(3)

(Total for Question 10 is 6 marks)



11 Here is a triangle **S** drawn on a grid of squares.



(a) On the grid, reflect triangle **S** in the line with equation  $x = 5$   
Label the new triangle **T**.

(2)

(b) On the grid, reflect triangle **T** in the line with equation  $x = 2$   
Label the new triangle **U**.

(1)

(c) Describe fully the single transformation that maps triangle **S** onto triangle **U**.

Translation with vector  $\begin{pmatrix} -6 \\ 0 \end{pmatrix}$

(2)

(Total for Question 11 is 5 marks)

DO NOT WRITE IN THIS AREA



12 Andros wants to make a playlist of four songs for a friend.

The total time taken by the four songs will be 20 minutes.

The time taken by each of the first three songs is shown below.

First song                    6 minutes 16 seconds

Second song                4 minutes 28 seconds

Third song                   4 minutes 35 seconds

Work out the time taken by the fourth song.

Give your answer in minutes and seconds.

$$\begin{array}{r}
 6 \text{ min } 16 \text{ sec} \\
 + 4 \text{ min } 28 \text{ sec} \\
 + 4 \text{ min } 35 \text{ sec} \\
 \hline
 14 \text{ min } 79 \text{ sec} \Rightarrow 15 \text{ min } 19 \text{ sec} \\
 \underbrace{60 \text{ sec} + 19 \text{ sec}}_{1 \text{ min}}
 \end{array}$$

$$\begin{array}{r}
 \text{Fourth : } 20 \text{ min } - 15 \text{ min } 19 \text{ sec} \\
 = 4 \text{ min } 41 \text{ sec}
 \end{array}$$

4 minutes                    41 seconds

(Total for Question 12 is 3 marks)



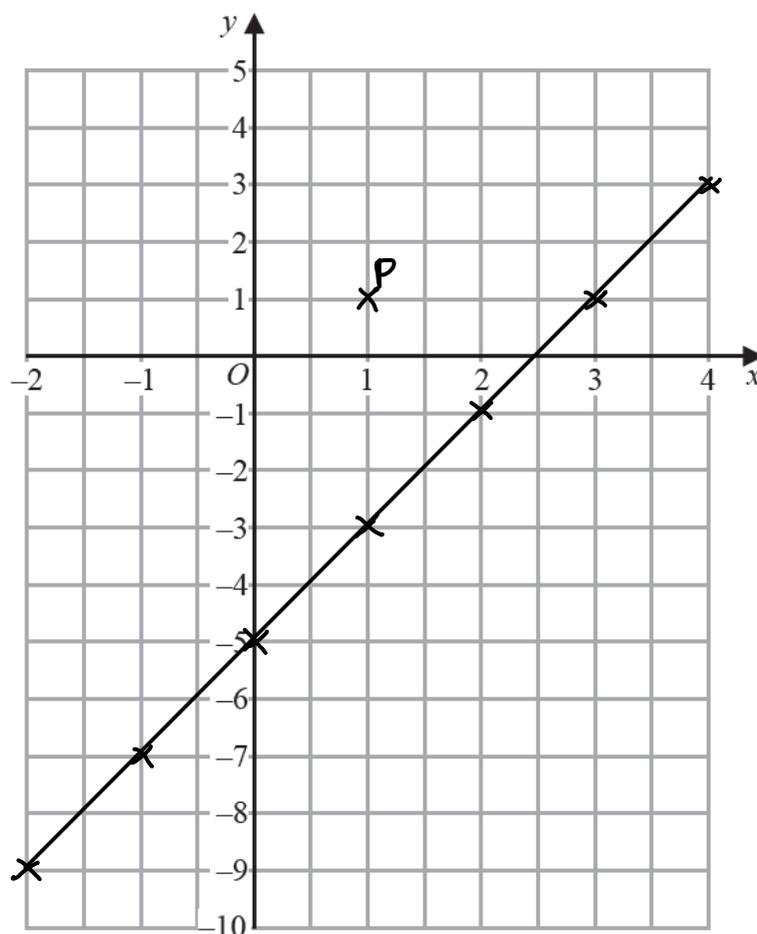
13 (a) Complete the table of values for  $y = 2x - 5$

$$\begin{array}{l}
 x = -2 \quad 2(-2) - 5 \Rightarrow -4 - 5 = -9 \\
 x = 0 \quad 2(0) - 5 \Rightarrow 0 - 5 = -5 \\
 x = 1 \quad 2(1) - 5 \Rightarrow 2 - 5 = -3 \\
 x = 4 \quad 2(4) - 5 \Rightarrow 8 - 5 = 3
 \end{array}$$

x	-2	-1	0	1	2	3	4
y	-9	-7	-5	-3	-1	1	3

(2)

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



(2)

(c) Mark with a cross (×) a point on the grid that has coordinates satisfying both

$$x < 2 \text{ and } y > 2x - 5$$

Label this point  $P$ .

(2)

(Total for Question 13 is 6 marks)



DO NOT WRITE IN THIS AREA

14 (a) Work out  $\sqrt{64 \times 36}$

$$\begin{aligned} \sqrt{64} &\times \sqrt{36} \\ 8 &\times 6 = 48 \end{aligned}$$

(1)

(b) Work out  $11^4$

$$11^4 = 14641 \quad \text{use calculator}$$

(1)

(Total for Question 14 is 2 marks)



15 The diagram shows Jonah's fish tank.

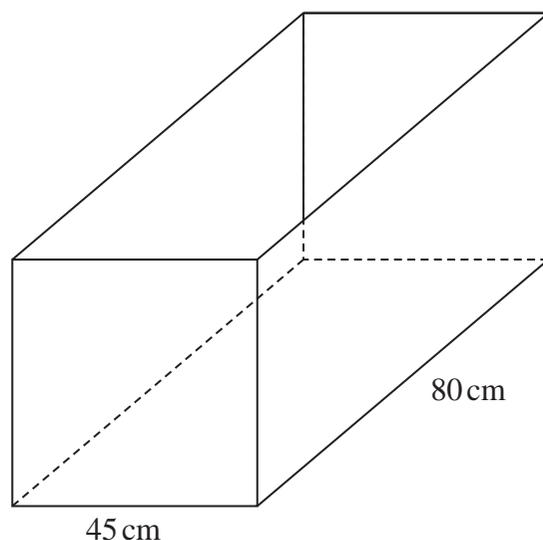


Diagram **NOT** accurately drawn

The fish tank is in the shape of a cuboid.

Jonah wants to keep 20 fish in the fish tank.

He knows that he must have 9 litres of water for each fish in the fish tank.

What is the minimum depth of water in the fish tank that Jonah must have?

Minimum amount of water

$$20 \times 9 = 180 \text{ litres} \approx 180000 \text{ cm}^3$$

$\uparrow$   
 per fish

$\curvearrowright$   
 1 litre = 1000 ml  
 = 1000 cm<sup>3</sup>

Cross-sectional area of tank

$$45 \times 80 \text{ cm} = 3600 \text{ cm}^2$$

Depth (minimum)

$$180000 = \text{Cross-sectional area} \times \text{depth}$$

$$= 3600 \times \text{depth}$$

$$\text{depth} = \frac{180000}{3600} = \frac{10000}{200} = 50$$

50 cm

(Total for Question 15 is 4 marks)



16 Show that  $1\frac{2}{3} + 2\frac{3}{4} = 4\frac{5}{12}$

$$1\frac{2}{3} = \frac{1 \times 3 + 2}{3} = \frac{3 + 2}{3} = \frac{5}{3}$$

$$2\frac{3}{4} = \frac{2 \times 4 + 3}{4} = \frac{8 + 3}{4} = \frac{11}{4}$$

$$\frac{5 \times 4}{3 \times 4} + \frac{11 \times 3}{4 \times 3} = \frac{20}{12} + \frac{33}{12} = \frac{53}{12} = \frac{(4 \times 12) + 5}{12}$$

$$= \frac{48}{12} + \frac{5}{12} = 4\frac{5}{12}$$

(Total for Question 16 is 3 marks)



17 There are 60 children in a club.

In the club, the ratio of the number of girls to the number of boys is 3:1  $\rightarrow$  4 parts

$\frac{3}{5}$  of the girls play a musical instrument.

$\frac{4}{5}$  of the boys play a musical instrument.

What fraction of the 60 children play a musical instrument?

$$\text{No. of boys} = \frac{1}{4} \times 60 = 15$$

$$\text{No. of girls} = \frac{3}{4} \times 60 = 45$$

$$\text{No. of girls who play} = \frac{3}{5} \times 45 = 3 \times 9 = 27$$

$$\text{" " boys " " } = \frac{4}{5} \times 15 = 4 \times 3 = 12$$

$$\text{Total students who play} = 27 + 12 = 39$$

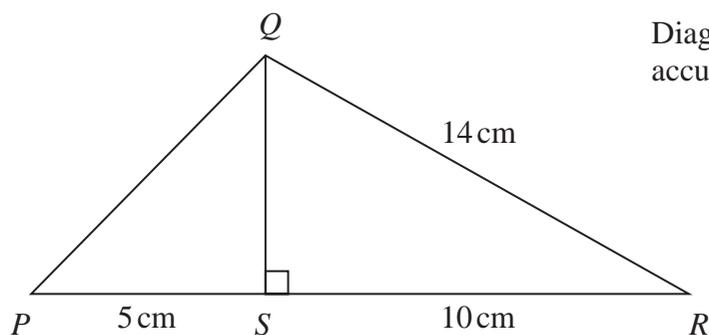
$$\begin{aligned} \text{Fraction of students who play} &= \frac{39}{60} \leftarrow \text{total} \quad \curvearrowright \quad :20 \\ &= \frac{13}{20} \end{aligned}$$

(Total for Question 17 is 4 marks)

DO NOT WRITE IN THIS AREA



18

Diagram **NOT**  
accurately drawnIn triangle  $PQR$ , $S$  is the point on  $PR$  such that angle  $RSQ = 90^\circ$  $RQ = 14$  cm $RS = 10$  cm $SP = 5$  cmWork out the length of  $PQ$ .

Pythagoras theorem

$$a^2 = b^2 + c^2$$

$$RQ^2 = QS^2 + RS^2$$

$$14^2 = QS^2 + 10^2$$

$$196 = QS^2 + 100$$

$$96 = QS^2$$

$$QS = \sqrt{96} = 4\sqrt{6}$$

$$PQ^2 = QS^2 + SP^2$$

$$= 96 + 5^2$$

$$= 96 + 25$$

$$= 121$$

$$PQ = \sqrt{121} = 11 \text{ cm}$$

11 cm

(Total for Question 18 is 4 marks)



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

19  $a$ ,  $a$ ,  $b$  and 40 are four numbers.

$a$  is the least number.

40 is the greatest number.

The range of the four numbers is 14

The median of the four numbers is 30

Work out the value of  $a$  and the value of  $b$ .

greatest - Smallest = range

$$40 - a = 14$$

$$40 - 14 = a$$

$$26 = a$$

$a$ ,  $a$ ,  $b$ , 40

median

$$\rightarrow \frac{a+b}{2} = 30$$

$$\frac{26+b}{2} = 30$$

$$26+b = 60$$

$$b = 34$$

$$a = 26$$

$$b = 34$$

(Total for Question 19 is 3 marks)

DO NOT WRITE IN THIS AREA



20 The Shanghai Maglev Train takes 8 minutes to travel a distance of 30.5 kilometres.

Work out the average speed of the train.  
Give your answer in kilometres per hour.

$$\text{Time in hours} : \frac{8}{60} \text{ hr} \leftarrow 60 \text{ minutes in an hour}$$

$$\begin{aligned} \text{Average Speed} &= \frac{\text{Total distance}}{\text{Total time}} \\ &= \frac{30.5}{\left(\frac{8}{60}\right)} = 228.75 \end{aligned}$$

228.75 kilometres per hour

(Total for Question 20 is 3 marks)



21 The diagram shows the triangle  $PQR$ .

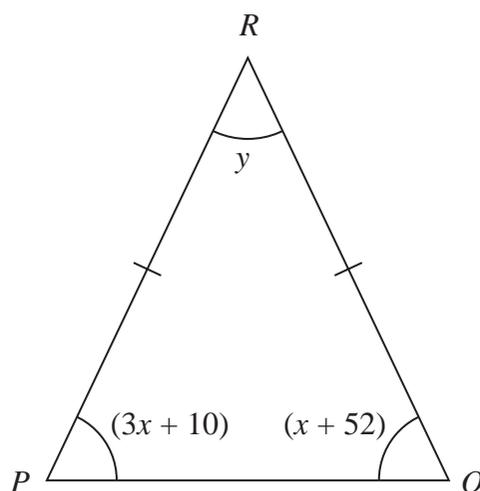


Diagram NOT  
accurately drawn

In the diagram, all the angles are in degrees.

$$RP = RQ$$

Find the value of  $y$ .

Show clear algebraic working.

$$3x + 10 = x + 52 \quad (\text{Isosceles base angles are equal})$$

$$3x - x = 52 - 10$$

$$2x = 42$$

$$x = 21$$

$$3x + 10 + x + 52 + y = 180 \quad (\text{Angles in a triangle add to } 180).$$

$$4x + 62 + y = 180$$

$$4(21) + 62 + y = 180$$

$$84 + 62 + y = 180$$

$$146 + y = 180$$

$$y = 180 - 146$$

$$= 34$$

$$y = 34$$

(Total for Question 21 is 4 marks)



22 The diagram shows two water towers in Kuwait.

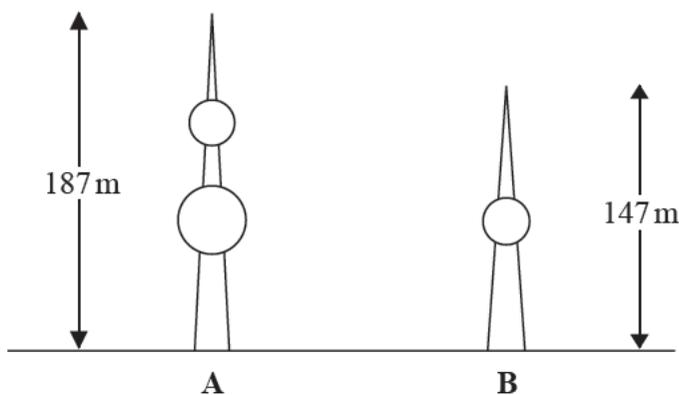


Diagram NOT accurately drawn

The real height of tower A is 187 m.

The real height of tower B is 147 m.

Ahmed makes a scale model of both towers.

The height of tower A on the scale model is 90 cm.

Work out the height of tower B on the scale model.

Give your answer correct to the nearest centimetre.

$$\begin{aligned}
 & \div 187 \quad \left( \begin{array}{l} 187 \text{ m} \rightarrow 90 \text{ cm} \\ 1 \text{ m} \rightarrow \frac{90}{187} \text{ cm} \end{array} \right. \\
 & \times 147 \quad \left( \begin{array}{l} 147 \text{ m} \rightarrow \frac{90}{187} \times 147 \text{ cm} \approx 70.7 \\ \rightarrow 70.7 \\ \rightarrow 70.7 \\ \therefore \text{round up} \end{array} \right.
 \end{aligned}$$

71 cm

(Total for Question 22 is 3 marks)



23 Solve the simultaneous equations

$$4x + 2y = 9 \quad \text{---} \textcircled{1}$$

$$x - 4y = 9 \quad \text{---} \textcircled{2}$$

Show clear algebraic working.

$$\textcircled{1} \times 2 \quad 8x + 4y = 18 \quad \text{---} \textcircled{3}$$

$$\begin{array}{r} \textcircled{2} + \textcircled{3} \quad x - 4y = 9 \\ + 8x + 4y = 18 \\ \hline 9x + 0 = 27 \\ x = \frac{27}{9} = 3 \end{array}$$

Substitute  $x = 3$  in  $\textcircled{2}$

$$3 - 4y = 9$$

$$-4y = 6$$

$$y = \frac{-6}{4} = -\frac{3}{2}$$

$$x = 3$$

$$y = -\frac{3}{2}$$

(Total for Question 23 is 3 marks)

DO NOT WRITE IN THIS AREA



24  $N = 480 \times 10^9$

$a^b \times a^c = a^{b+c}$

(a) Write  $N$  as a number in standard form.

$4.8 \times 10^2 \times 10^9 = 4.8 \times 10^{11}$   
 (480 is underlined in blue)

(1)

(b) Write  $N$  as a product of powers of its prime factors.  
 Show your working clearly.

2	$4.8 \times 10^{11}$	5	15625
2	$2.4 \times 10^{11}$	5	3125
2	$1.2 \times 10^{11}$	5	625
2	$6 \times 10^{10}$	5	125
2	$3 \times 10^{10}$	5	25
2	$1.5 \times 10^{10}$	5	5
2	$7.5 \times 10^9$		①
2	$3.75 \times 10^9$		
2	$1.875 \times 10^9$		
2	$9.375 \times 10^8$		
2	$4.6875 \times 10^8$		
2	$2.34375 \times 10^8$		
2	$1.171875 \times 10^8$		
2	$5.859375 \times 10^7$		
3	$2.9296875 \times 10^7$		
5	$9.765625 \times 10^6$		
5	$1.953125 \times 10^6$		
5	$3.90625 \times 10^5$		
5	78125		
	15625		

$2^{14} \times 3 \times 5^{10}$

(3)

(c) Find the largest factor of  $N$  that is an odd number.

$3 \times 5^{10} = 29296875$

(1)

(Total for Question 24 is 5 marks)



25 The shape, shown shaded in the diagram, is the region between two semicircles.

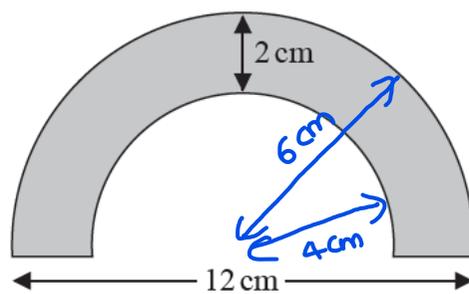


Diagram NOT  
accurately drawn

The diameter of the outer semicircle is 12 cm.  
The shape has constant thickness 2 cm.

Calculate the area of the shape.  
Give your answer as a multiple of  $\pi$ .

area of semicircle  
equation

$$\begin{aligned} \text{Area of the outer} &= \frac{1}{2} \times \pi \times r^2 = \frac{1}{2} \times \pi \times 6^2 \\ \text{Semi-circle} &= \frac{36}{2} \pi = 18\pi \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Area of the inner} &= \frac{1}{2} \times \pi \times (6-2)^2 = \frac{1}{2} \times \pi \times 4^2 \\ \text{Semi-circle} &= \frac{16}{2} \pi = 8\pi \text{ cm}^2 \end{aligned}$$

Difference :

$$18\pi - 8\pi = 10\pi \text{ cm}^2$$

$$10\pi \text{ cm}^2$$

(Total for Question 25 is 3 marks)



- 26 There are 12 boys and 8 girls in a class.  
The boys and the girls have some coins.

The mean number of coins that the boys have is 5.5  
The girls have a total of 18 coins.

Work out the mean number of coins the 20 children have.

$$\frac{\text{Total coins with boys}}{\text{No. of boys}} = \text{mean of boys}$$

$$\frac{x}{12} = 5.5$$

$$x = 12 \times 5.5$$

$$= 66 \text{ coins}$$

$$\text{Total coins} = 18 + 66 = 84 \text{ coins}$$

$$\text{Mean} = \frac{\text{Total coins}}{\text{Total children}} = \frac{84}{20} = 4.2$$

(Total for Question 26 is 3 marks)

TOTAL FOR PAPER IS 100 MARKS



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