

# GCSE Mathematics Practice Tests: Set 2

## Paper 2F (Calculator)

**Time: 1 hour 30 minutes**

You should have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator.

### 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.**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out.**



### Information

- The total mark for this paper is 80
- 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 the 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.

1. Write 0.013 as a fraction.

USE YOUR CALCULATOR

Converting FDP

$$\frac{13}{1000}$$

(Total 1 mark)

2. Change 6.4 centimetres into millimetres

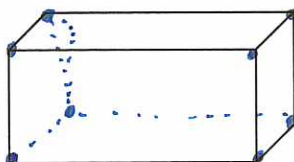
Converting metric units

$1\text{cm} = 10\text{mm}$   
 $\therefore$  Convert by  $\times 10$  |  $6.4 \times 10 = \underline{\underline{64}}$

$$64$$

(Total 1 mark)

3. Here is a cuboid.



3D shape properties

How many vertices does the cuboid have?

corners

8

(Total 1 mark)

4. Find the value of  $7^4$

Calculator Skills

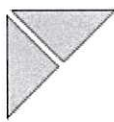
$$7^4 = 2401$$

$$2401$$

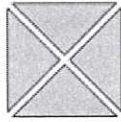
(Total 1 mark)

# Number Patterns

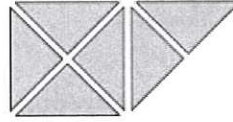
5. Here are some patterns made from triangles.



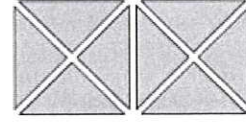
Pattern number  
1



Pattern number  
2



Pattern number  
3



Pattern number  
4

(a) Complete the table.

Pattern number	1	2	3	4	5
Number of triangles	2	4	6	8	10

+2      +2

(1)

(b) How many triangles are needed for Pattern number 12?

5      6      7      8      9      10      11      12  
10      12      14      16      18      20      22      24

24

(1)

Luke says that Pattern number 40 has 82 triangles.

(c) Luke is wrong.  
Explain why.

Because the number of triangles =  $2 \times$  pattern number  $\therefore$  should be 80 triangles.

(1)

(Total 3 marks)

# Best Buy

6. Janet sends parcels by Parcel Express.  
The table shows information about the cost of sending a parcel by Parcel Express.

Parcel Express	
Weight range	Cost
Less than 2 kg	£3.80
2 kg to less than 5 kg	£5.99
5 kg to 10 kg	£71.4

← typo! = £7.14

The table below gives information about the numbers and weights of the parcels Janet sent in April and in May.

Number of parcels		
Weight range	April	May
Less than 2 kg	23	21
2 kg to less than 5 kg	28	27
5 kg to 10 kg	19	32

Janet could have sent her parcels by Parcels R Go.  
The table below shows information about the cost of sending a parcel by Parcels R Go.

Parcels R Go	
Weight range	Cost
0–15 kg	£5.99

Janet thinks that it would have been cheaper to send all her parcels by Parcels R Go.

Is Janet right?  
You must show your working.

Parcels less than 2kg in total:  $23 + 21 = 44$

Parcels between 2kg and 5kg:  $28 + 27 = 55$

Parcels between 5kg and 10kg:  $19 + 32 = 51$

Parcel Express

$$44 \times £3.80 = £167.20$$

$$55 \times £5.99 = £329.45$$

$$51 \times £7.14 = £364.14$$

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$$£860.79$$

Parcels R Go

$$44 + 55 + 51 = 150 \text{ parcels total}$$

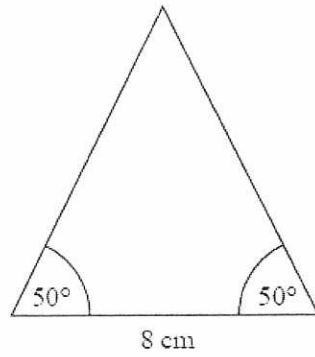
$$150 \times £5.99 = \underline{\underline{£898.50}}$$

(Total 5 marks)

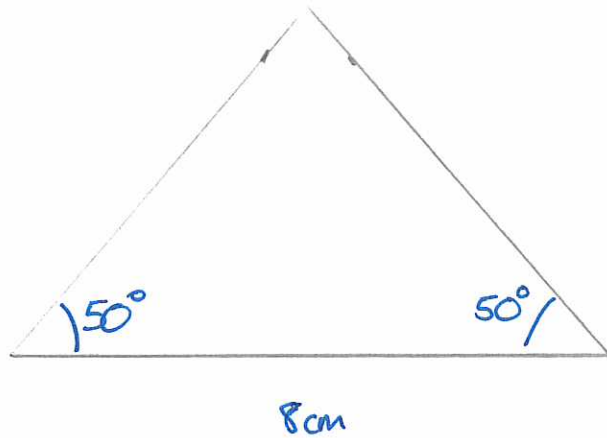
∴ Janet is wrong, since  $£860.79 < £898.50$

# Constructions

7. Here is a sketch of the end of a roof of a toy house.



Draw an accurate diagram of the end of the roof.



(Total 2 marks)

# Probability Scale

8. On the probability scale, mark with a cross (×), the probability that

(i) you will have something to drink tomorrow.

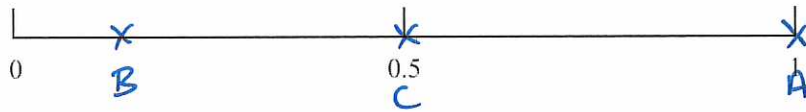
Label this cross **A**. *Certain*

(ii) a teacher chosen at random was born on a Monday.

Label this cross **B**. *unlikely*

(iii) a fair 6-sided dice will show an even number when thrown.

Label this cross **C**. *even*



(Total 3 marks)

9. Jason collected some information about the heights of 19 plants.

This information is shown in the stem and leaf diagram.

*Stem and Leaf*

1		1	2	3	3		
2		3	3	5	9		
3		0	2	2	6	6	7
4		1	1	4	8		

Key: 48 means 48mm

Find the median.

$$\text{Median} = \frac{n+1}{2} \text{ term} = \frac{19+1}{2} = 10^{\text{th}} \text{ term}$$

COUNT THE 10<sup>th</sup> term

$$= \underline{\underline{30\text{mm}}}$$

..... 30 mm

(Total 2 marks)



# Percentages

10. Some of the land in the Netherlands is used to grow bulbs.  
The table shows the percentages of this land used to grow the different types of bulbs.

Type of bulb	Hyacinth	Tulip	Daffodil	Lily	Other
Percentage	8%	50%	12%	$x\%$	7%

- (a) Work out the value of  $x$ .

$$\begin{array}{l|l}
 \text{Total percent} = 100\% & 8\% + 50\% + 12\% + 7\% + x\% = 100\% \\
 \text{collect} & 77\% + x\% = 100\% \\
 (-77\%) & x\% = 23\% \\
 & x = \underline{23} \dots\dots\dots (1)
 \end{array}$$

The area of land used to grow bulbs for hyacinths is 1200 hectares.

- (b) Work out the area of land used to grow bulbs for daffodils.

$$\begin{array}{l|l}
 \text{Hyacinths} = 8\% & 8\% = 1200 \text{ hectares} \\
 (\div 8) & 1\% = 150 \text{ hectares} \\
 \text{Daffodils} = 12\% (\times 12) & 12\% = \underline{1800 \text{ hectares}}
 \end{array}$$

$$\underline{1800} \dots\dots\dots \text{hectares} \quad (2)$$

(Total 3 marks)

combinations

11. Barbara has a tube of sweets.

There are 5 sweets in the tube.

There is one sweet of each of these colours in the tube.

red                      blue                      green                      yellow                      pink

Barbara takes two sweets at random from the tube.

(a) Write down all the possible combinations of colours she can take.

(R,B), (R,G), (R,Y), (R,P), (B,G), (B,Y), (B,P), (G,Y), (G,P)  
(Y,P)

(2)

(b) What is the probability that Barbara takes a red sweet and a yellow sweet from the tube?

"1 out of 10" =  $\frac{1}{10}$

$\frac{1}{10}$

(1)

(Total 3 marks)



# Percentages of an Amount

12. Ali takes his car to a garage.  
The car has a 5000 mile service.  
It also has an MOT test.

Costs	
5000 mile service	£79 plus VAT at 20%
10 000 mile service	£99 plus VAT at 20%
MOT test	£39 plus VAT at 20%

- (a) Work out Ali's total bill.

$$\begin{array}{l|l}
 \text{5000 mile service:} & £79 + 20\% \\
 20\% = £7.90 \times 2 & = £79 + £15.80 = £94.80 \\
 \text{MOT test:} & £39 + 20\% \\
 20\% = £3.90 \times 2 & = £39 + £7.80 = £46.80 \\
 \text{Total cost:} & = £94.80 + £46.80 = \underline{\underline{£141.60}}
 \end{array}$$

(3)

Ali bought his car for £20 000

The car depreciated by 20% the first year.  
The car depreciated by 10% the second year.

## Depreciation

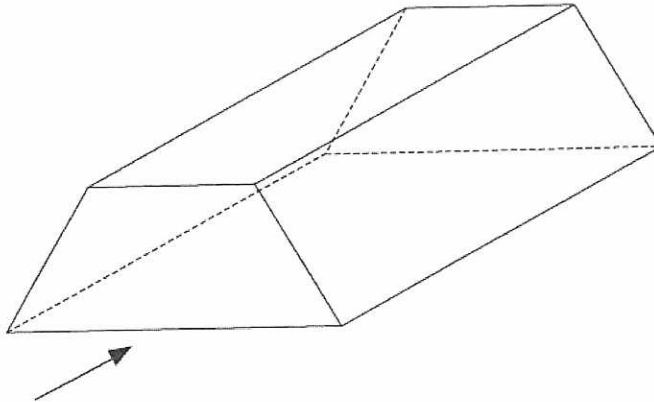
- (b) Work out the value of the car at the end of the second year.

$$\begin{array}{l|l}
 \text{End of first year:} & £20000 - 20\% \\
 20\% = £4000 & = £20000 - £4000 = £16000 \\
 \text{End of second year:} & £16000 - 10\% \\
 10\% = £1600 & = £16000 - £1600 = £14400
 \end{array}$$

£ 14400..... (3)

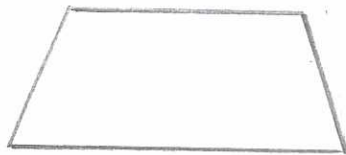
(Total 6 marks)

13.



The diagram shows a prism.

In the space below, sketch the front elevation from the direction marked with an arrow.



**(Total 2 marks)**

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# Types of Number

14. Becky says,

“When you square a prime number you always get an odd number.”

(a) Write down an example to show that Becky is wrong.

2 is prime  $2^2 = 2 \times 2 = 4$  4 is even not odd.  
(1)

James says,

“When you cube any negative number you always get a negative number.”

(b) James is right.  
Explain why.

$(-)^3 = - \times - \times -$	Negative cubed
$= + \times -$	
$= -$	
	$- \times - = +$
	$\{ - \times + \} = -$

(2) (Total 3 marks)

15. There are some blue counters, red counters and green counters in a bag.

Ratio

There are twice as many blue counters in the bag as red counters in the bag.

There are 3 times as many red counters in the bag as green counters in the bag.

For the counters in the bag, write down the ratio of

the number of blue counters to the numbers of red counters to the number of green counters.

Blue : Red : Green

Imagine 1 green... 6 : 3 : 1

6:3:1

(Total 2 marks)

16. Lev writes down the following

$$\frac{2}{3} + \frac{5}{8} = \frac{7}{11}$$

Without doing the exact calculation, explain why Lev's answer cannot be correct.

Because the answer should definitely be  
over 1.

(Total 1 mark)

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# Angles in 2D Shapes

17.

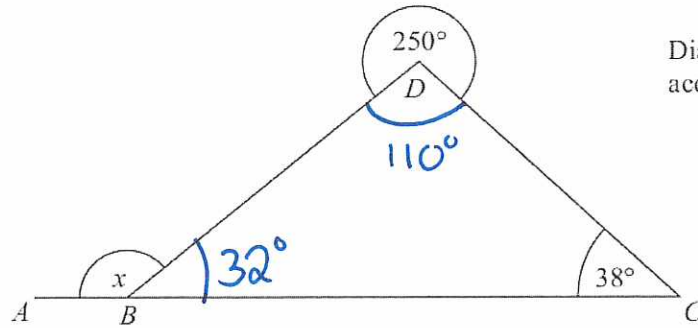


Diagram NOT  
accurately drawn

$ABC$  is a straight line.  
Angle  $BCD = 38^\circ$   
The reflex angle  $BCD = 250^\circ$

Work out the size of the angle marked  $x$ .  
Give reasons for your answer.

$$\begin{array}{l|l} \hat{BDC} = 360^\circ - 250^\circ = 110^\circ & \text{Angles around a point} = 360^\circ \\ \hat{CBD} = 180^\circ - 110^\circ - 38^\circ = 32^\circ & \text{Angles in a triangle} = 180^\circ \\ x^\circ = 180^\circ - 32^\circ = \underline{\underline{148^\circ}} & \text{Angles on a straight line} = 180^\circ \end{array}$$

(Total 4 marks)

## Plotting Straight Lines

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

use pattern

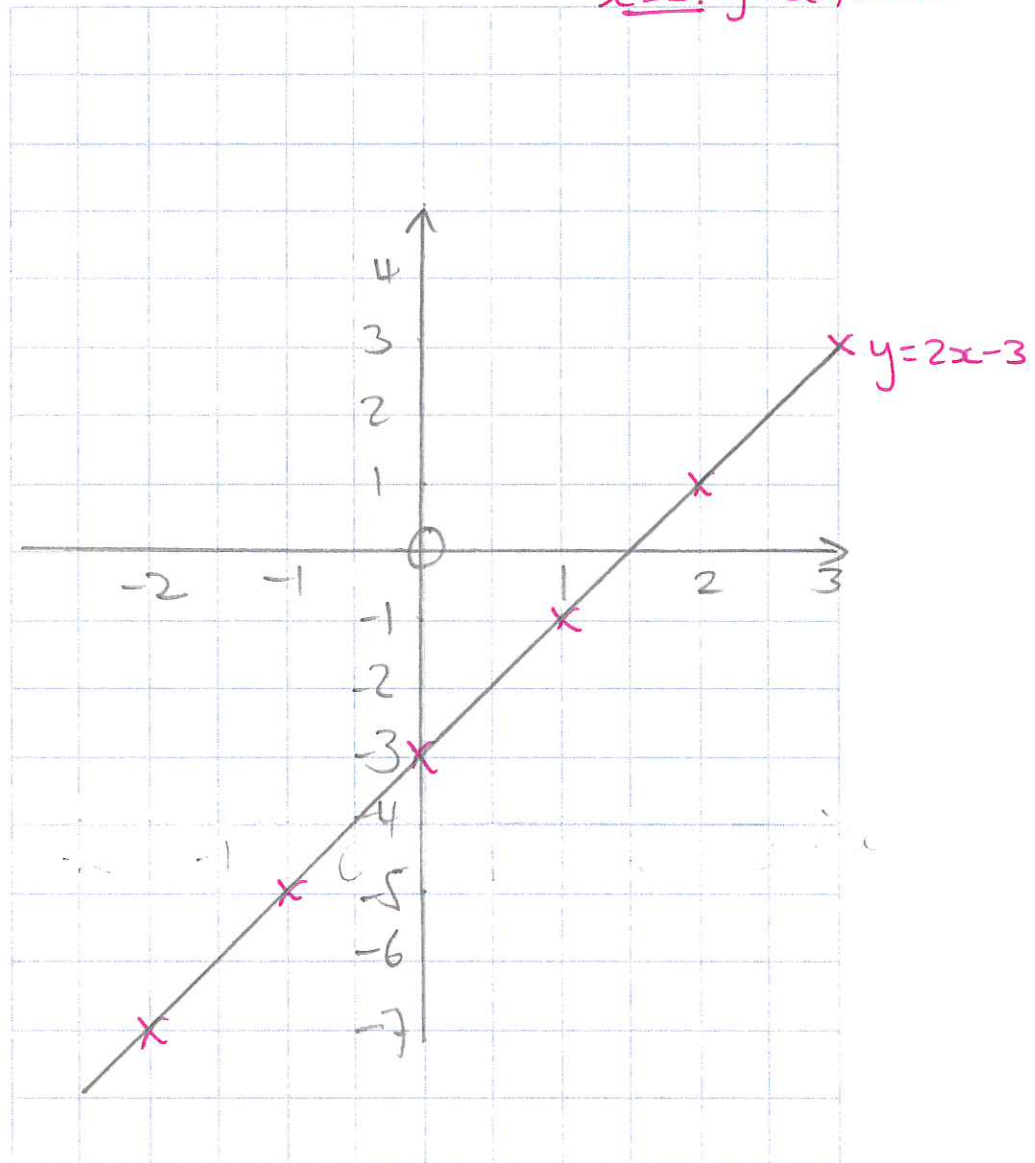
18. On the grid, draw the graph of  $y = 2x - 3$  for values of  $x$  from  $-2$  to  $3$

$$x=0: y=2(0)-3=-3$$

$$x=1: y=2(1)-3=-1$$

$$x=2: y=2(2)-3=1$$

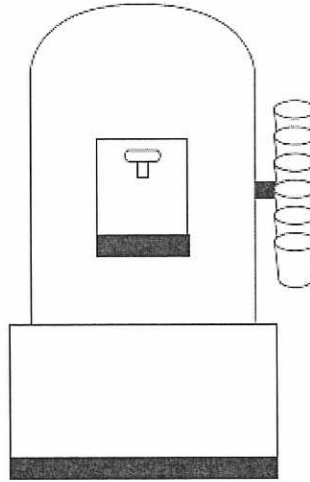
$$x=3: y=2(3)-3=3$$



(Total 4 marks)



19.



A water container has 19.5 litres of water in it.  
A cup holds 210 ml of water.

At most 92 cups can be filled completely from the water container.

Explain why.  
You must show all your working.

Each cup = 210ml	$92 \times 210\text{ml} = 19320\text{ml}$ for 92 cups
1l = 1000ml	$\therefore 19.5\text{l} = 19500\text{ml}$
Remaining water	$19500\text{ml} - 19320\text{ml} = 180\text{ml}$
Conclusion:	180ml isn't enough for another cup.

(Total 3 marks)

# Simultaneous Equations

6. The total cost of 3 apples and 4 pears is £1.84

The total cost of 5 apples and 2 pears is £1.76

Work out the cost of one apple and the cost of one pear.

$\begin{aligned} & \textcircled{2} \times 2: \\ & \textcircled{3} - \textcircled{1} \\ & \\ & (\div 7) \\ & \\ & \text{In } \textcircled{1}: \\ & (-0.72) \\ & (\div 4) \end{aligned}$	$\begin{aligned} 3a + 4p &= \pounds 1.84 \quad \textcircled{1} \\ 5a + 2p &= \pounds 1.76 \quad \textcircled{2} \\ 10a + 4p &= \pounds 3.52 \quad \textcircled{3} \\ 10a + 4p &= \pounds 3.52 \\ 3a + 4p &= \pounds 1.84 \quad \ominus \\ \hline 7a &= \pounds 1.68 \\ a &= \pounds \underline{0.24} \\ \\ 3a + 4p &= \pounds 1.84 \\ 3(0.24) + 4p &= \pounds 1.84 \\ 4p &= \pounds 1.12 \\ \text{Cost of one apple} &= \pounds \underline{0.28} \quad 24 \text{p} \\ \text{Cost of one pear} & \dots\dots\dots 28 \text{p} \end{aligned}$
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(Total 4 marks)

# Ratio and Proportion

4. There are a total of 120 counters in a box.

There are only red counters and blue counters in the box.

There are three times as many red counters as blue counters in the box.

Carl takes  $\frac{1}{3}$  of the red counters from the box.

Kerry takes 80% of the blue counters from the box.

Work out the ratio of the number of red counters to the number of blue counters now in the box.

Give your ratio in its simplest form.

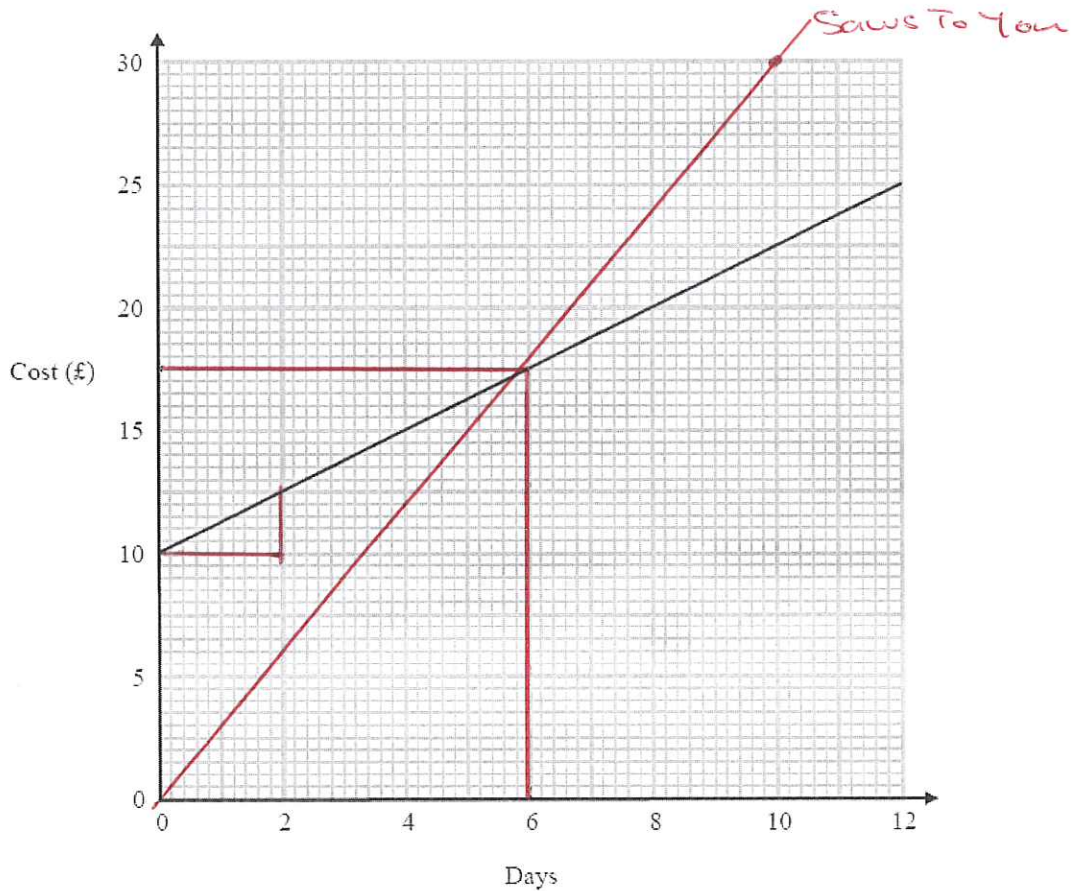
	R : B	Total
	3 : 1	120
( $\times 30$ ) Actual Amount	90 : 30	
( $-\frac{1}{3}$ of amount)	60 : 30	90
Remove 80% Blue	60 : 6	66
Simplify ( $\div 6$ )	<u>10 : 1</u>	

.....10:1.....

(Total 5 marks)

# Conversion Graphs (Real Life Graphs)

22. Salome hires a chainsaw from the **Saws are Us** company.  
This graph shows the cost of hiring a chainsaw from **Saws are Us** for up to 12 days.



- (a) Find the cost of hiring the chainsaw for 6 days from **Saws are Us**.

£ 17.50 .....  
(1)

The cost of hiring a chainsaw from **Saws are Us** is £10 plus a daily rate.

- (b) Work out the daily rate.

Gradient

£ 1.25 .....  
(1)

2 days cost an extra £2.50

( $\div 2$ )  $\therefore$  1 day costs an extra £1.25

Salome wants to compare the cost of hiring a chainsaw from **Saws are Us** and from **Saws to You**.

**Saws to You** charge £3 for each day of hire.

Salome hires chainsaws for different periods of time.  
She wants to use the cheaper company.

- (c) Which of these two companies is the cheaper to hire the chainsaw from?  
You must show your working and explain your answer.

Saws To You: £3 1 day  
(x10) £30 10 days ⇒ DRAW LINE

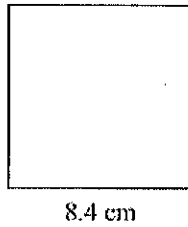
Compare Saws To You are the cheaper option for hiring for up to 6 days. If longer than this, Saws are us are cheaper.

.....  
(3)

(Total 5 marks)

# Pythagoras

3. A square has sides of length 8.4 cm.



Work out the length of a diagonal of the square.  
Give your answer correct to 3 significant figures.

Pythagoras:

The diagram shows a square with side length 8.4 cm. A dashed diagonal is drawn from the top-left corner to the bottom-right corner. To the right of the square, a right-angled triangle is formed by the diagonal (hypotenuse, labeled 'C'), and two sides of the square (both labeled '8.4').

$$a^2 + b^2 = c^2$$
$$(8.4)^2 + (8.4)^2 = c^2$$
$$141.12 = c^2$$
$$\sqrt{141.12} = c$$
$$11.87939 = c$$
$$11.9 \text{ cm} = c \text{ (3 s.f.)}$$

ANS

..... 11.9 ..... cm  
(Total 3 marks)



# Area of Circles

5. The diagram shows a circular pond with a path around it.

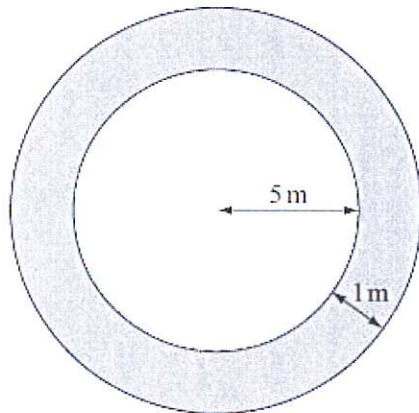


Diagram NOT accurately drawn

The pond has a radius of 5m.  
The path has a width of 1m.

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

Full Area

$$A = \pi \times r^2$$

$$A = \pi \times (6)^2$$

$$A = 36\pi$$

Small circle area

$$A = \pi \times r^2$$

$$A = \pi \times (5)^2$$

$$A = 25\pi$$

Shaded = Total - Non Shaded

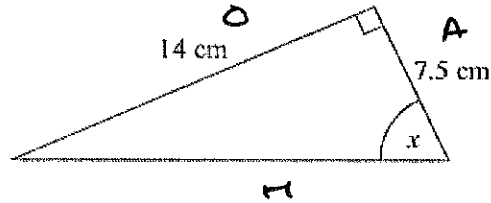
$$36\pi - 25\pi = 11\pi$$

$$= 34.5575 \dots$$

$$= \underline{\underline{34.6}} \text{ (3sf)} \dots \text{ m}^2$$

(Total 3 marks)

7. Here is a right-angled triangle.



Work out the size of the angle marked  $x$ .  
Give your answer to the nearest degree.

SOHCAHTOA

\*Shift tan\*

$$\tan \theta = \frac{O}{A}$$

$$\tan \theta = \frac{14}{7.5}$$

$$\theta = \tan^{-1}\left(\frac{14}{7.5}\right)$$

$$= 61.82140\dots$$

$$= \underline{\underline{62^\circ}} \text{ (nearest degree)}$$

..... 62 °

(Total 3 marks)

# Pressure Formula

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

*Tricky*

1. A box is on a table.

The area of the box in contact with the table is 1500 cm<sup>2</sup>.  
 The pressure on the table is 28 newtons/m<sup>2</sup>.

Work out the force exerted by the box on the table.  
 Give your answer correct to the nearest whole number.

$$p = \frac{F}{A}$$

$p$  = pressure  
 $F$  = force  
 $A$  = area

Convert cm<sup>2</sup> to m<sup>2</sup>  
 (÷ 100<sup>2</sup>)

Formula

Substitute

(× 0.15)

Nearest whole

$$1500 \text{ cm}^2 \div (100)^2 = 0.15 \text{ m}^2$$

$$P = \frac{F}{A}$$

$$28 \text{ N/m}^2 = \frac{F}{0.15 \text{ m}^2} \dots\dots\dots 4 \text{ newtons}$$

(Total 3 marks)

$$4.2 \text{ N} = F$$

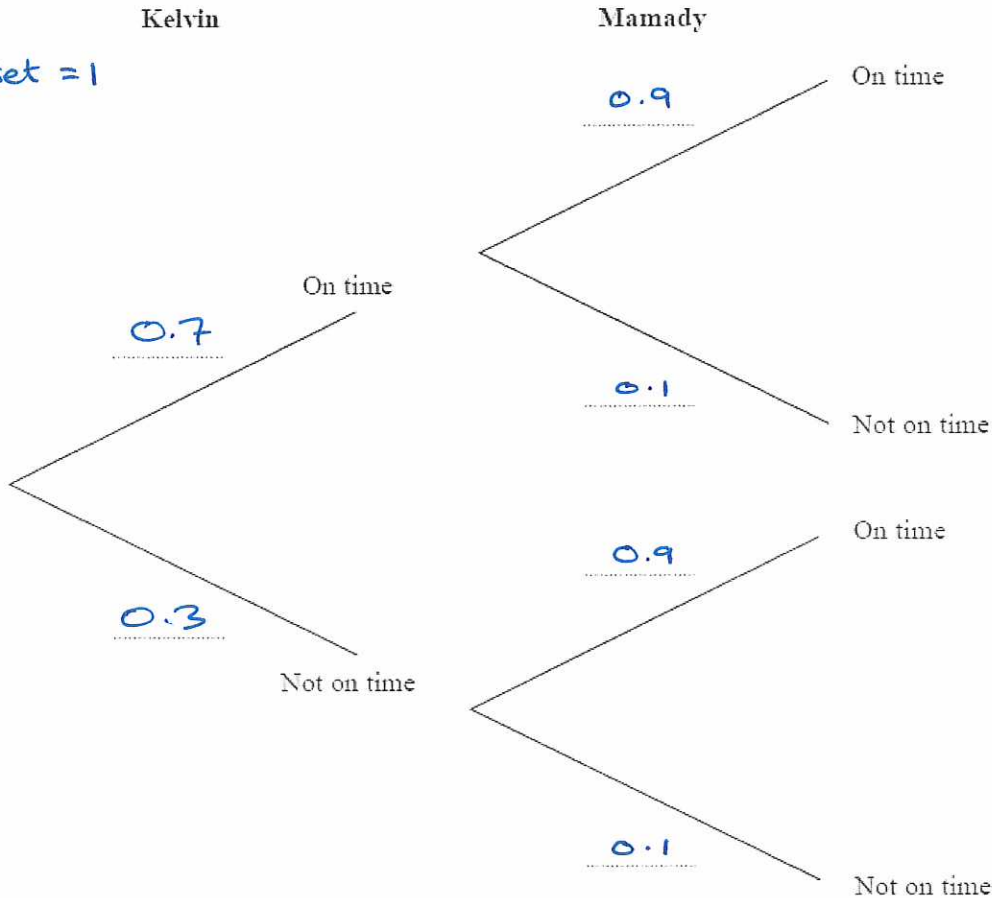
$$\underline{\underline{4 \text{ N}}} = F$$

# Probability Trees

27. Kelvin and Mamady are in the same class.  
 The probability that Kelvin arrives on time is 0.7.  
 The probability that Mamady arrives on time is 0.9.

Complete the probability tree diagram.

Each branches set = 1



(2)

- (b) Work out the probability that Kelvin and Mamady both arrive on time.

$$\begin{aligned}
 P(\text{ontime, ontime}) &= 0.7 \times 0.9 \\
 &= \underline{\underline{0.63}}
 \end{aligned}$$

0.63

(2)

(Total 4 marks)

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**TOTAL FOR PAPER IS 80 MARK**