

Write your name here

Surname

Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9-1)

Centre Number

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Candidate Number

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Mathematics

Paper 2 (Calculator)

Foundation Tier

Thursday 7 June 2018 – Morning

Time: 1 hour 30 minutes

Paper Reference

1MA1/2F

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.*
- 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 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.

Turn over ►

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6/7/7/7/8/7/1/c2/1/



Pearson

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 Write $\frac{4}{50}$ as a percentage.

Fraction $\xrightarrow{\div}$ decimal $\xrightarrow{\times 100}$ percentage

$$4 \div 50 = 0.08$$

$$0.08 \times 100 = 8\%$$

..... 8 %

(Total for Question 1 is 1 mark)

- 2 Write 1.59 correct to 1 decimal place. ← round

Look to the second decimal place

9 > 5 so we round the 5 up to a 6

$$1.59 \xrightarrow{\text{rounds up to (to 1dp)}} 1.6$$

..... 1.6

(Total for Question 2 is 1 mark)

- 3 Work out the value of 3^5 $3^2 = 3 \times 3$ $3^3 = 3 \times 3 \times 3$ etc.

$$\underbrace{3 \times 3 \times 3 \times 3 \times 3}_{5 \text{ 3's}} = 243$$

..... 243

(Total for Question 3 is 1 mark)

- 4 Write down a 6 digit number that has 4 as its thousands digit.
You can only use the digit 4 once.

Working from the right to the left

$\frac{1}{1} \frac{1}{1} \frac{4}{4} , \frac{1}{1} \frac{1}{1} \frac{1}{1}$

↑ thousands
↑ hundreds
↑ tens
↑ units

four-thousand, one hundred and eleven

..... 114111

(Total for Question 4 is 1 mark)

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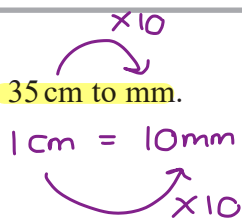


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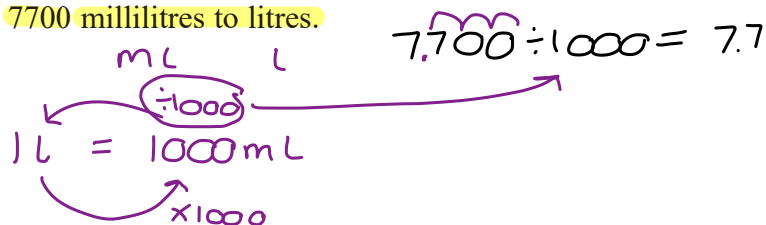
5 (a) Change 35 cm to mm.



$$35 \times 10 = 350 \text{ mm}$$

..... 350 mm
(1)

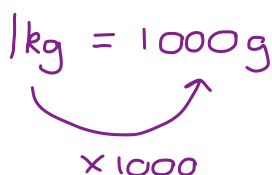
(b) Change 7700 millilitres to litres.



$$7700 \div 1000 = 7.7$$

..... 7.7 litres
(1)

(c) Change 0.32 kilograms to grams.



$$0.32 \times 1000 = 320$$

..... 320 grams
(1)

(Total for Question 5 is 3 marks)

6 Margaret is thinking of a number. She says,

“My number is odd. It is a factor of 36 and a multiple of 3”

There are two possible numbers Margaret can be thinking of.

Write down these two numbers.

Factor pairs of 36

- ~~1~~ ~~36~~
- ~~2~~ ~~18~~
- ③ ~~12~~
- ~~4~~ ⑨
- ~~6~~ ~~6~~

① Crossed out = evens and non multiples of 3

Stop here to avoid repeating factors unnecessarily.

..... 3 ① 9 ①

(Total for Question 6 is 3 marks)



- M Y L
- 7 Mohsin, Yusuf and Luke are going to play a game.
At the end of the game, one of them will be in First place, one of them will be in Second place and one of them will be in Third place.

Use the table below to list all the possible outcomes of the game.

Number of ways
of arranging 3
things:
 $3 \times 2 \times 1 = 6$

Keep one in
1st and swap
2nd and 3rd

First place	Second place	Third place
M	Y	L
M	L	Y
Y	M	L
Y	L	M
L	M	Y
L	Y	M

(Total for Question 7 is 2 marks)

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8 Neil buys 30 pens, 30 pencils, 30 rulers and 30 pencil cases.

$$\frac{\text{Total required}}{\text{Number in a set}} = \text{Number of Sets required}$$

Price list		
pens	6 for 82p	→ £0.82
pencils	15 for 45p	→ £0.45
rulers	10 for £1.25	
pencil cases	37p each	→ £0.37

Conversion into the Same units:

What is the total amount of money Neil spends?

PENS

$$\frac{30}{6} = 5 \text{ lots of } 6 \quad (1)$$

$$5 \times £0.82 = £4.10 \quad (1)$$

RULERS

$$\frac{30}{10} = 3 \text{ lots of } 10$$

$$3 \times £1.25 = £3.75$$

PENCILS

$$\frac{30}{15} = 2 \text{ lots of } 15$$

$$2 \times £0.45 = £0.90 \quad (1)$$

PENCIL CASES

$$30 \times £0.37 = £11.10$$

Sum of all prices = total cost

$$4.10 + 0.90 + 3.75 + 11.10 = £19.85 \quad (1)$$

£ 19.85 (1)

(Total for Question 8 is 5 marks)



9 Emily drives ^d 186 miles in ^t 3 hours.

(a) What is her average speed?

$$S = \frac{d}{t}$$

to check the units

$$\text{average speed} = \frac{\text{total distance}}{\text{total time taken}} = \frac{186 \text{ miles}}{3 \text{ hours}} = 62 \frac{\text{miles}}{\text{hour}} = \text{mph}$$

62 mph
(2)

Sarah drives at an ^s average speed of 58 mph for ^t 4 hours.

(b) How many miles does Sarah drive?

d

$$S = \frac{d}{t} \quad (\text{both sides multiplied by } t)$$

$$d = S \times t$$

UNIT CHECK

$$d = 58 \text{ mph} \times 4 \text{ hours} \\ = 232 \text{ miles}$$

$$\frac{\text{miles}}{\text{hour}} \times \text{hour} = \text{miles}$$

232 miles
(2)

(Total for Question 9 is 4 marks)

10 (a) Write down all the prime numbers between 20 and 30

~~21~~ ~~22~~ (23) ~~24~~ ~~25~~ ~~26~~ ~~27~~ ~~28~~ (29)

x3 x5 x3 ↓ x2

23, 29
(2)

Catherine says,

✓ multiples of 2
"2 is the only even prime number."

(b) Is Catherine right?

You must give a reason for your answer.

Yes, all other even numbers have 2 as a factor

(1)

(Total for Question 10 is 3 marks)

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11 (a) Solve $x + x + x = 51$

$$\begin{array}{l} 3x = 51 \\ \div 3 \quad \left(\begin{array}{l} \\ x = 17 \end{array} \right) \div 3 \end{array}$$

Dividing both sides of the equation by 3 in order to isolate x

$$x = 17 \quad (1)$$

(b) Solve $\frac{y}{4} = 3$

$$\begin{array}{l} \frac{y}{4} = 3 \\ \times 4 \quad \left(\begin{array}{l} \\ y = 12 \end{array} \right) \times 4 \end{array}$$

Isolate y
Multiply both sides of the equation by 4.

$$y = 12 \quad (1)$$

(c) Solve $2f + 7 = 18$

$$\begin{array}{l} 2f + 7 = 18 \\ -7 \quad \left(\begin{array}{l} \\ 2f = 11 \end{array} \right) -7 \\ \div 2 \quad \left(\begin{array}{l} \\ f = \frac{11}{2} \end{array} \right) \div 2 \end{array}$$

Subtract the 7 from both sides to isolate the $2f$.

$$f = 5.5 \quad (1)$$

(Total for Question 11 is 3 marks)

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12 A group of football fans were asked what their half time snack was.

The table below gives information about their answers.

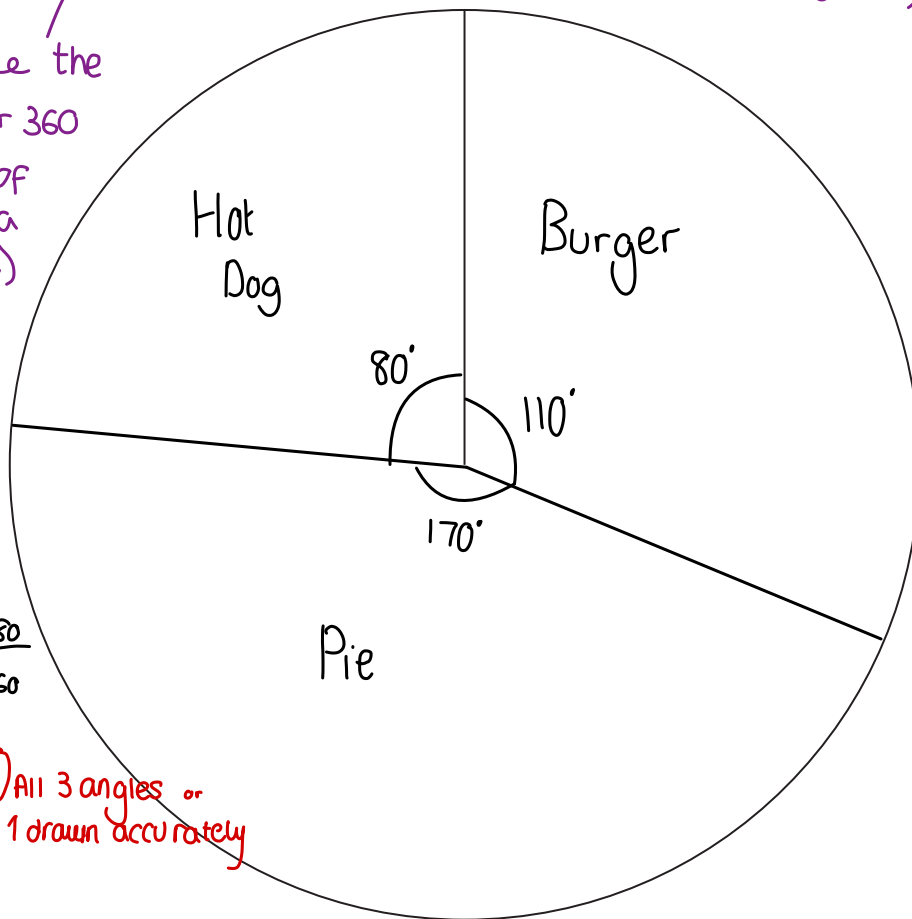
Snack	Number of fans
burger	11
pie	17
hot dog	8

Draw an accurate pie chart for this information.

Total number of fans :
 $11 + 17 + 8 = 36$

Proportion of fans who chose burger
 Burger : $\frac{11}{36} \times \frac{10}{10} = \frac{110}{360} = 110^\circ$ angle (to represent burgers)

to make the denominator 360 (the number of degrees in a circle)



Pie: $\frac{17}{36} \times \frac{10}{10} = \frac{170}{360}$
 $= 170^\circ$

Hot Dog: $\frac{8}{36} \times \frac{10}{10} = \frac{80}{360}$
 $= 80^\circ$

① All 3 angles or 1 drawn accurately

Check the angles sum to 360°

$110 + 170 + 80 = 360^\circ \checkmark$

Draw in segments and label angles/titles ① (Total for Question 12 is 3 marks)

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- 13 A scout group has a raffle to raise money for charity.
There is 1 prize to be won in the raffle.

Laura buys 12 raffle tickets.

A total of 350 raffle tickets are sold.

Laura has 12 out of a
possible 350 tickets

Find the probability that Laura does not win the prize.

$$P(\text{win}) + P(\text{doesn't win}) = 1$$

← as these are the only 2 possible outcomes

$$P(\text{doesn't win}) = 1 - P(\text{win})$$

$$= 1 - \frac{12}{350} \quad (1)$$

$$= \frac{338}{350}$$

$$\frac{338}{350} \quad (1)$$

(Total for Question 13 is 2 marks)

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14 Each worker in a factory is either left-handed or right-handed.

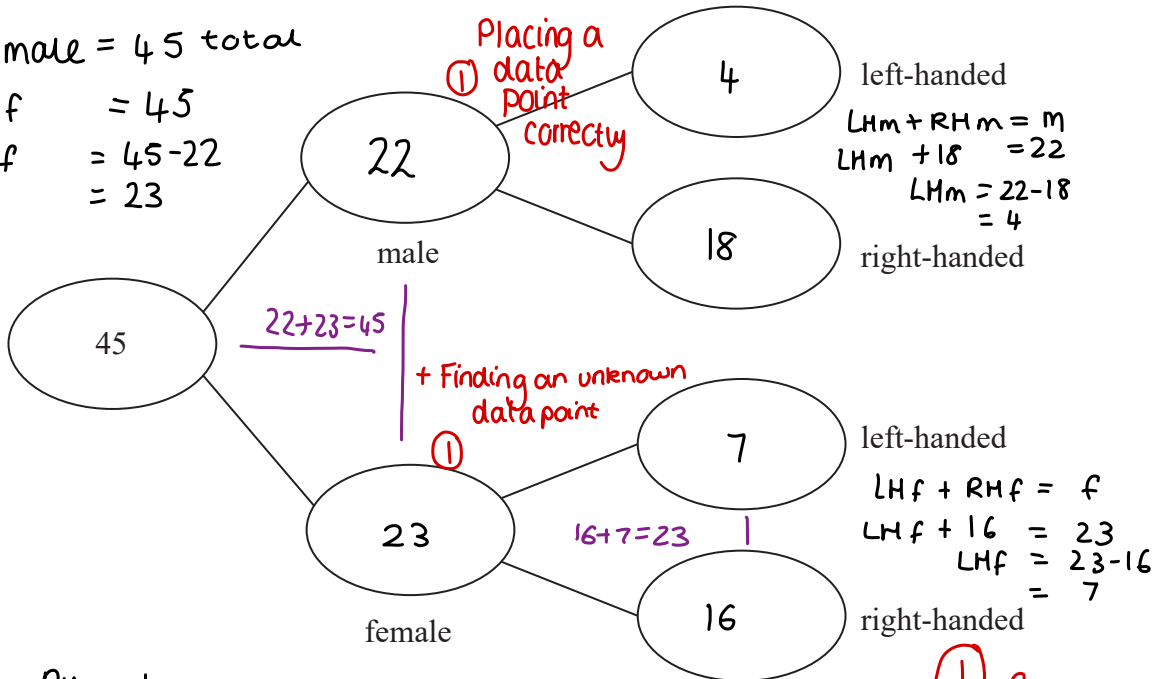
22 of the 45 workers are male.

16 of the 34 right-handed workers are female. 16 right-handed females

Complete the frequency tree for this information.

male + female = 45 total

$$\begin{aligned} 22 + f &= 45 \\ f &= 45 - 22 \\ &= 23 \end{aligned}$$



$$\begin{aligned} LHm + RHm &= m \\ LHm + 18 &= 22 \\ LHm &= 22 - 18 \\ &= 4 \end{aligned}$$

$$\begin{aligned} LHf + RHf &= f \\ LHf + 16 &= 23 \\ LHf &= 23 - 16 \\ &= 7 \end{aligned}$$

There are 34 RH workers

$$RHf + RHm = 34$$

$$16 + RHm = 34$$

$$\begin{aligned} RHm &= 34 - 16 \\ &= 18 \end{aligned}$$

(Total for Question 14 is 3 marks)

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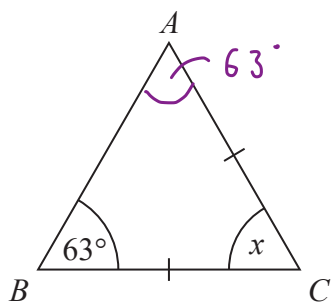
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15 Mary needs to work out the size of **angle x** in this diagram.



b = base angles

angles in Δ sum to 180°

$x = 180 - 63 - 63 = 54^\circ$ or $x = 54^\circ$ (1)

She writes

$x = 63^\circ$ because **base angles of an isosceles triangle** are equal.

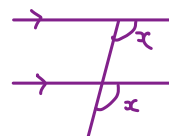
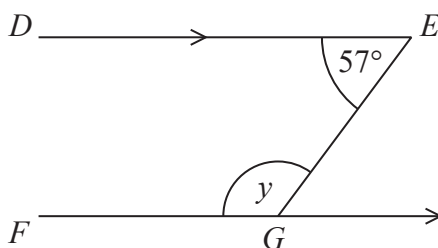
Mary is wrong. x lies between the two equal sides (AC and BC), so is not a base angle.

(a) Explain why.

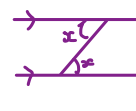
x is not a base angle (1)

(1)

William needs to work out the size of **angle y** in this diagram.



F = corresponding angles



Z = alternate angles

William writes

Working	Reason
angle $EGH = 57^\circ$	because corresponding angles are equal
$y = 180^\circ - 57^\circ$ $y = 123^\circ$	because angles on a straight line add up to 180°

The angles in the diagram are alternate, not corresponding.

One of William's reasons is **wrong**.

(b) Write down the **correct** reason.

alternate angles are equal

(1)

(Total for Question 15 is 2 marks)

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16 Marla buys some bags of buttons.

There are 19 buttons or 20 buttons or 21 buttons or 22 buttons in each bag.

The table gives some information about the number of buttons in each bag.

x	f	fx	
Number of buttons	Frequency	$(f \times x) =$ Number of buttons	
19	5 ①	a	$19 \times ? = a$
20	7	140	20×7
21	3	63	21×3
22	1	22 ①	22×1

The total number of buttons is 320

Complete the table.

Finding a :

$$a = 320 - 140 - 63 - 22 = a$$

$$a = 95$$

320

The fx column must sum to the total number of buttons (320)

Calculating the missing frequency:

$$fx = a$$

$$19f = 95$$

$$f = \frac{95}{19} = 5$$

(Total for Question 16 is 3 marks)

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17 Here is the list of ingredients for making 30 biscuits.

Ingredients for 30 biscuits	
225 g	butter
110 g	caster sugar
275 g	plain flour
75 g	chocolate chips

Lucas has the following ingredients.

How many batches can be made (looking at one ingredient at a time).

900 g butter $900 \div 225 = 4$

1000 g caster sugar $1000 \div 110 = 9.09... \text{ (1)}$

1000 g plain flour $1000 \div 275 = 3.6... \text{ (1)}$

225 g chocolate chips $225 \div 75 = 3 \leftarrow 3 = \text{smallest number of batches}$

What is the greatest number of biscuits Lucas can make? You must show your working.

Chocolate chips are the limiting ingredient here so a maximum of 3 batches can be made

$3 \times 30 = 90$

batch maximum (pointing to 3)
biscuits in a batch (pointing to 30)

90 (1)

(Total for Question 17 is 3 marks)

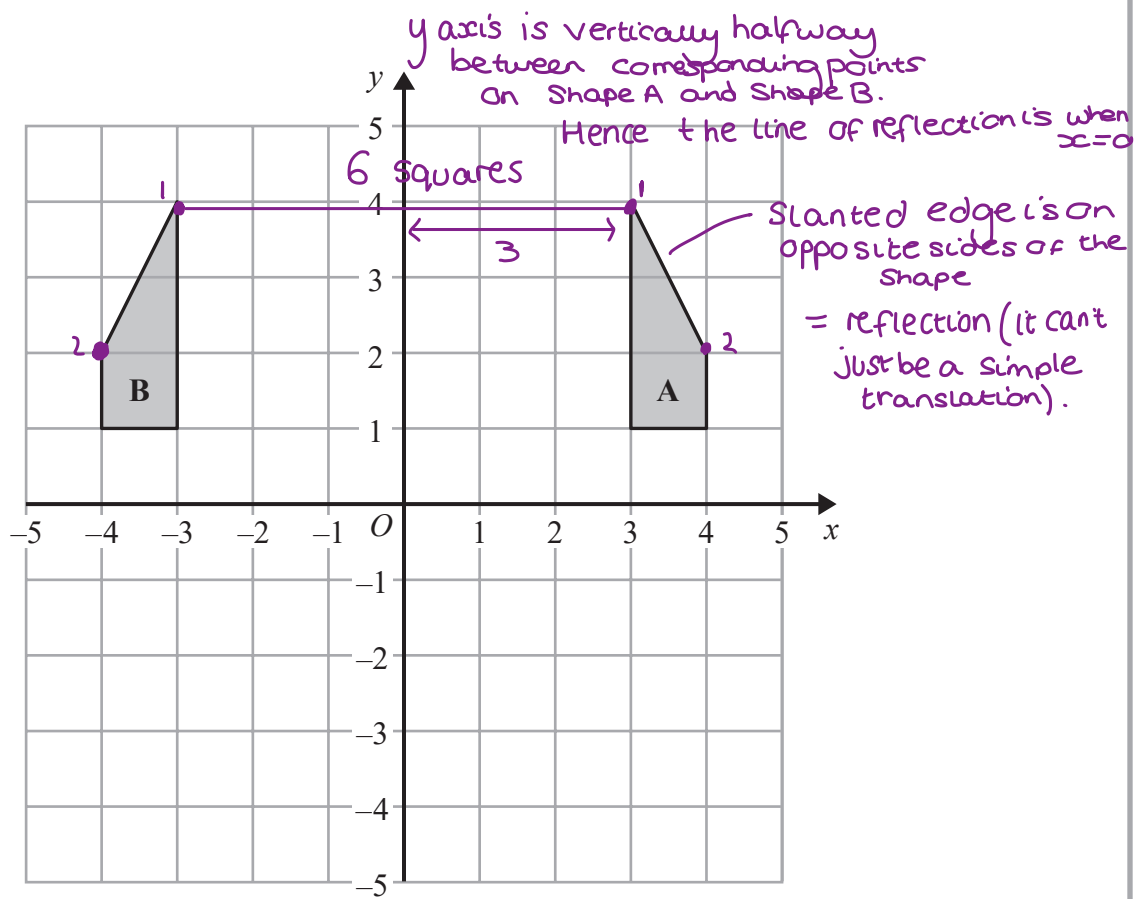
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18



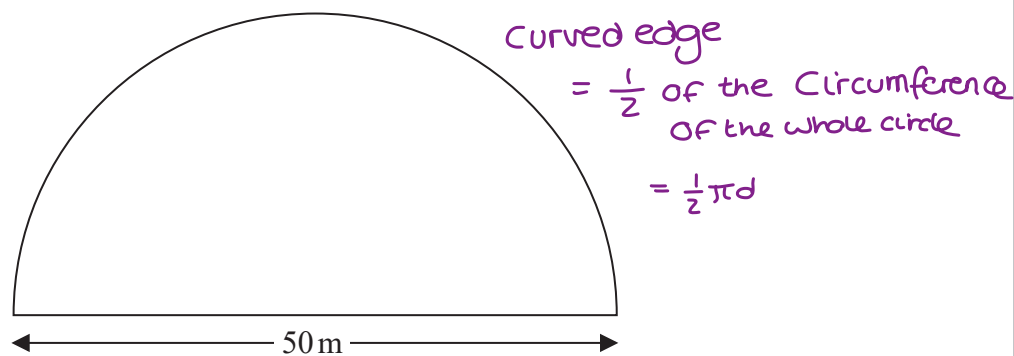
Describe fully the **single transformation** that maps shape **A** onto shape **B**.

reflection⁽¹⁾ in the y-axis⁽¹⁾

(Total for Question 18 is 2 marks)



19 A farmer has a field in the shape of a semicircle of diameter 50 m.



The farmer asks Jim to build a fence around the edge of the field.
 Jim tells him how much it will cost.

Total cost = £29.86 per metre of fence plus £180 for each day's work

Jim takes three days to build the fence.

Work out the total cost.

Whole circle
 Circumference: $\pi d = \pi \times 50$
 $= 50\pi \text{ m}$ (1)

Curved edge: $\frac{1}{2} \times 50\pi = 25\pi \text{ m}$

Semicircle perimeter: $= 25\pi + 50$
 $= 128.54 \text{ m}$ (1)

Fence cost: length (m) \times cost per m
 $128.54 \text{ m} \times £29.86 = £3838.20$

Work cost: days \times cost per day
 $3 \times £180 = £540$ (1)

Total cost: fence cost + work cost
 $= £3838.20 + £540$ (1)
 $= £4378.20$ £ 4.378.20 (1)

(Total for Question 19 is 5 marks)



20 (a) Simplify $m^3 \times m^4$

Laws of indices

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

$$m^{3+4} = m^7$$

$$m^7$$

(1)

(b) Simplify $(5np^3)^3$

$(5 \times n \times p^3)^3$ - raise each individual term to the power of 3.

$$= 5^3 \times n^3 \times (p^3)^3$$

$$= 125 \times n^3 \times p^9$$

$$= 125n^3p^9$$

Laws of Indices
 $(x^a)^b = x^{ab}$

$$(p^3)^3 = p^9$$

① 2 correct terms

$$125n^3p^9$$

(2)

(c) Simplify $\frac{32q^9r^4}{4q^3r} = \frac{32 \times q^9 \times r^4}{4 \times q^3 \times r} = \frac{32}{4} \times \frac{q^9}{q^3} \times \frac{r^4}{r}$

$$= 8 \times q^{9-3} \times r^{4-1}$$

$$= 8 \times q^6 \times r^3$$

① 2 correct terms

$$8q^6r^3$$

(2)

Laws of Indices:

$$\frac{x^a}{x^b} = x^{a-b}$$

(Total for Question 20 is 5 marks)

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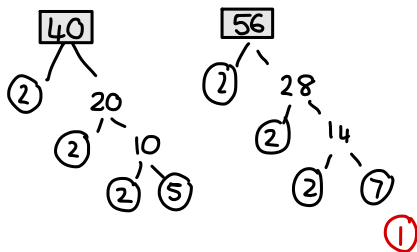
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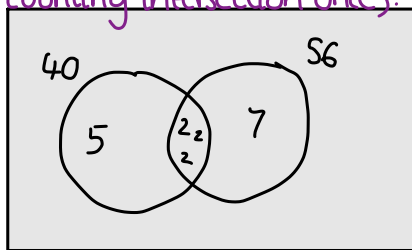


21 (a) Find the lowest common multiple (LCM) of 40 and 56

Prime Factorisation



LCM = Product of every number in the Venn diagram (only counting intersection once).



$$\text{LCM} = 2 \times 2 \times 2 \times 5 \times 7 = 280$$

280 (1)

$A = 2^3 \times 3 \times 5$

$B = 2^2 \times 3 \times 5^2$

(b) Write down the highest common factor (HCF) of A and B.



$A = 2 \times 2 \times 2 \times 3 \times 5$
 $B = 2 \times 2 \times 3 \times 5 \times 5$

HCF = product of shared prime factors

$2 \times 2 \times 3 \times 5 = 60$

60 (1)

(Total for Question 21 is 3 marks)

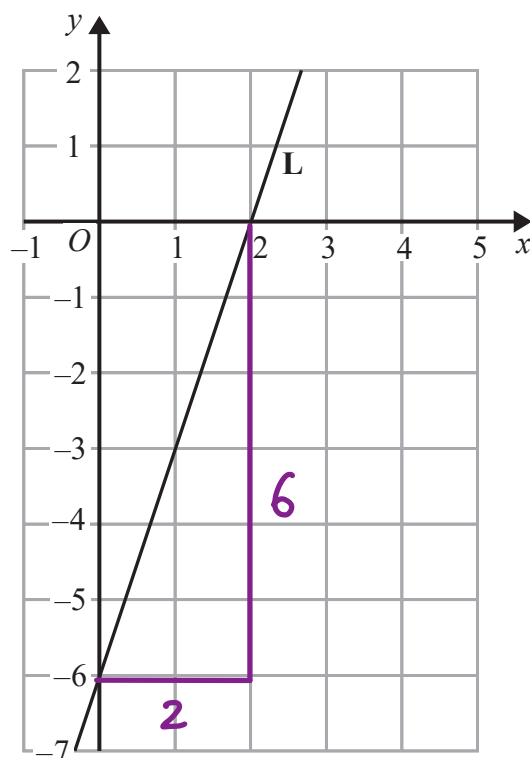
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22 The line L is shown on the grid.



Find an equation for L .

Equation of a straight line: $y = mx + c$

m → gradient

c → y-intercept when $x = 0$

$y = mx + c$
 $y = 0m + c$
 $y = c$

$$m = \frac{\Delta y}{\Delta x} = \frac{6}{2} = 3 \quad (1)$$

$$y = 3x + c \quad (1)$$

$$c = \text{y-intercept} = -6$$

↑ where L crosses the y axis

$$y = 3x - 6 \quad (1)$$

(Total for Question 22 is 3 marks)

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23 Raya buys a van for £8500 plus VAT at 20%

Raya pays a deposit for the van.

She then pays the rest of the cost in 12 equal payments of £531.25 each month.

Find the ratio of the deposit Raya pays to the total of the 12 equal payments.

Give your answer in its simplest form.

A) Total cost of van:

$$= 120\% \text{ of } £8500$$

$$1.2 \times 8500 = £10200 \text{ (1)}$$

B) Total cost of payments:

$$12 \times £531.25 = £6375 \text{ (1)}$$

$$\begin{array}{r} \text{c) Deposit:} \\ \begin{array}{r} \text{A} \quad \quad \quad \text{B} \\ \text{Van cost} \quad - \quad \text{payment cost} \\ = 10200 \quad - \quad 6375 \\ = £3825 \text{ (1)} \end{array} \end{array}$$

$$\begin{array}{l} \text{C : B} \\ \text{Deposit : Total of 12 payments} \end{array}$$

$$3825 : 6375 \text{ (1)}$$

Simplify Ratio

$$\begin{array}{l} \div 3825 \left(\begin{array}{l} 3825 : 6375 \\ 1 : \frac{5}{3} \end{array} \right) \div 3825 \\ \times 3 \left(\begin{array}{l} 3 : 5 \end{array} \right) \times 3 \end{array}$$

Whole number ratio

$$3 : 5 \text{ (1)}$$

(Total for Question 23 is 5 marks)



24 (a) Complete the table of values for $y = x^2 - x - 6$

x	-3	-2	-1	0	1	2	3
y	6	0	-4	-6	-6	-4	0

Substitute each x value into $y = x^2 - x - 6$ to obtain the corresponding y value (same column in table)

e.g. when $x = -2$

$$y = x^2 - x - 6$$

$$= (-2)^2 - (-2) - 6$$

$$= 4 + 2 - 6$$

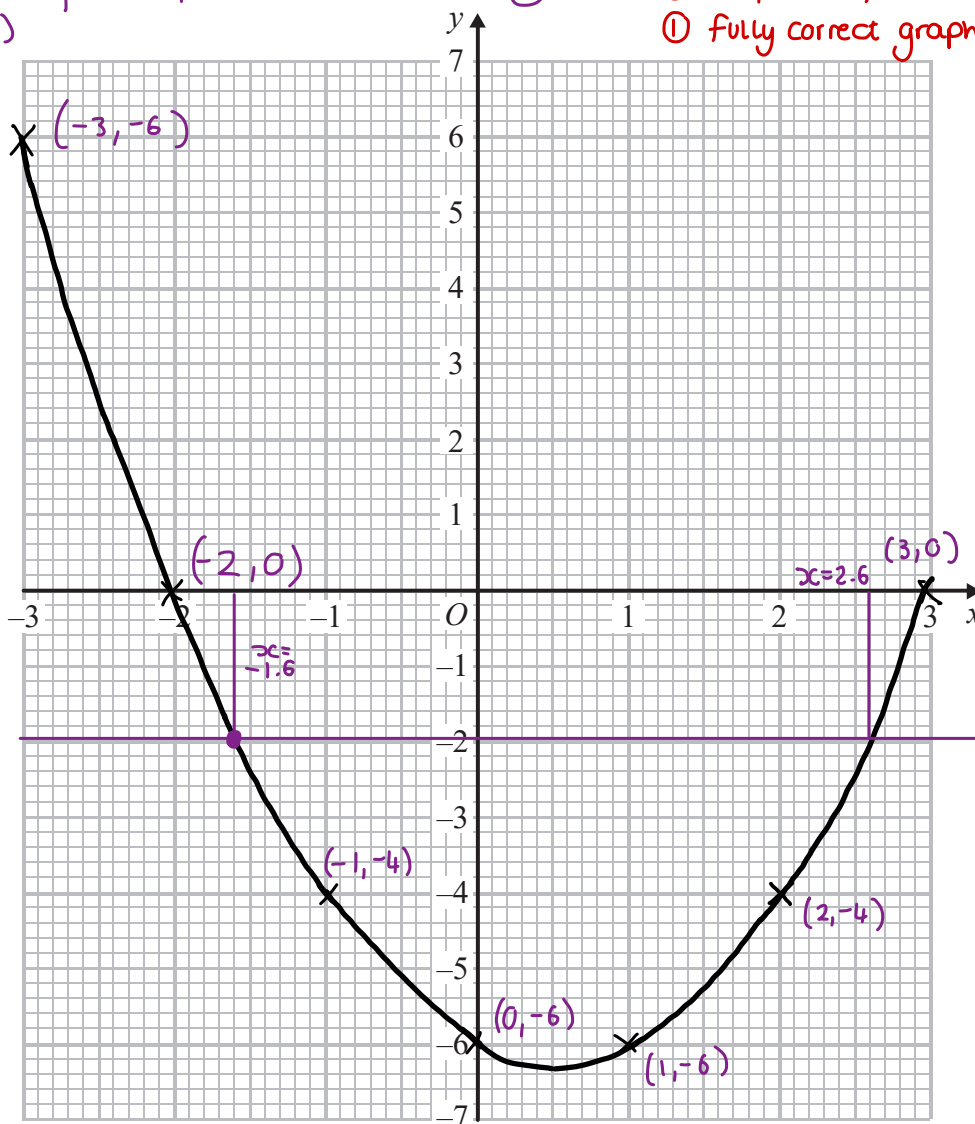
$$y = 0$$

(2)

(b) On the grid, draw the graph of $y = x^2 - x - 6$ for values of x from -3 to 3

Plot each point from the table in @ (x, y)

- ① ≥ 5 points plotted correctly
- ② fully correct graph



(c) Use your graph to find estimates of the solutions to the equation $x^2 - x - 6 = -2$

$$\overline{y} = x^2 - x - 6$$

- Draw the line $y = -2$ onto the graph (1)
- Find the x values of the 2 points at which the line $y = -2$ and the curve $y = x^2 - x - 6$ cross

$$\underline{-1.6 \text{ and } 2.6} \quad (1)$$

(2)

(Total for Question 24 is 6 marks)

25 A force of 70 newtons acts on an area of 20 cm^2

The force is increased by 10 newtons.

The area is increased by 10 cm^2

pressure = $\frac{\text{force}}{\text{area}}$

Helen says,

“The pressure decreases by less than 20%”

Is Helen correct?

You must show how you get your answer.

Initial Pressure:

$$P = \frac{F}{A} = \frac{70}{20} = 3.5 \quad (1)$$

These values both have the same unit (Ncm^{-2})

New Pressure:

$$P = \frac{F}{A} = \frac{70+10}{20+10} = \frac{80}{30} = 2.6$$

20% less than the initial pressure = 80% of initial pressure

$$3.5 \times 0.8 = 2.8 \quad (1)$$

80% of initial > new pressure

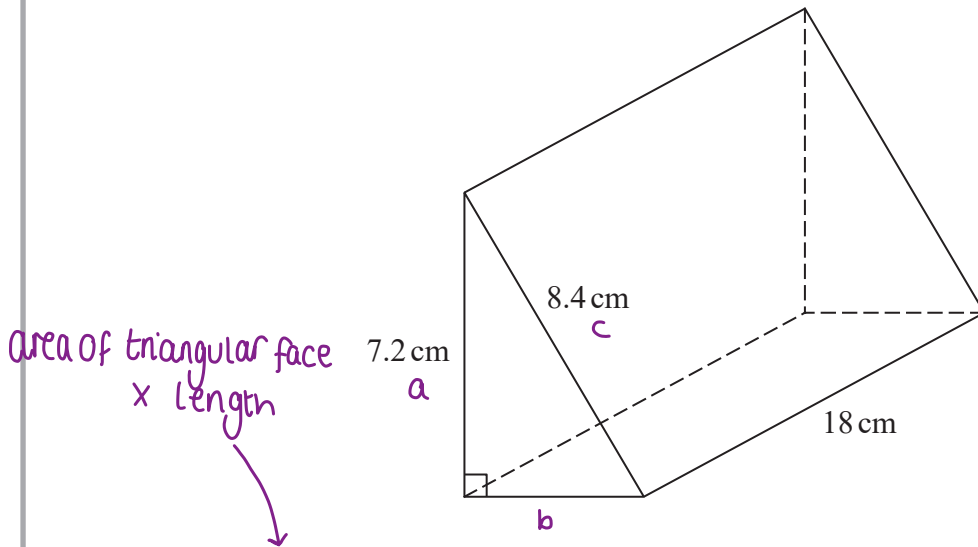
$$2.8 > 2.6 \quad (1)$$

No, Helen is incorrect. The decrease is greater than 20%

(Total for Question 25 is 3 marks)



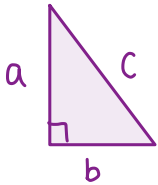
26 Here is a triangular prism.



Area of triangular face
× Length

Work out the volume of the prism.

Give your answer correct to 3 significant figures.



Finding b (base of triangle):

$$a^2 + b^2 = c^2 \quad \leftarrow \text{Pythagorean theorem}$$

$$b^2 = c^2 - a^2$$

$$b^2 = 8.4^2 - 7.2^2 \quad \textcircled{1}$$

$$b^2 = 18.72$$

$$b = \sqrt{18.72} \quad \textcircled{1} \leftarrow \text{leave in exact form}$$

Area of triangle:

$$A = \frac{1}{2}bh$$

$$= \frac{1}{2} \times \sqrt{18.72} \times 7.2$$

$$= 15.57598... \quad \textcircled{1}$$

Volume of prism:

$$15.57598... \times 18 = 280.368... \quad \textcircled{1}$$

↑
Use exact value

$3 < 5$ so round down

to 280 to 3 SF

..... 280 $\textcircled{1}$ cm^3

(Total for Question 26 is 5 marks)

TOTAL FOR PAPER IS 80 MARKS



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