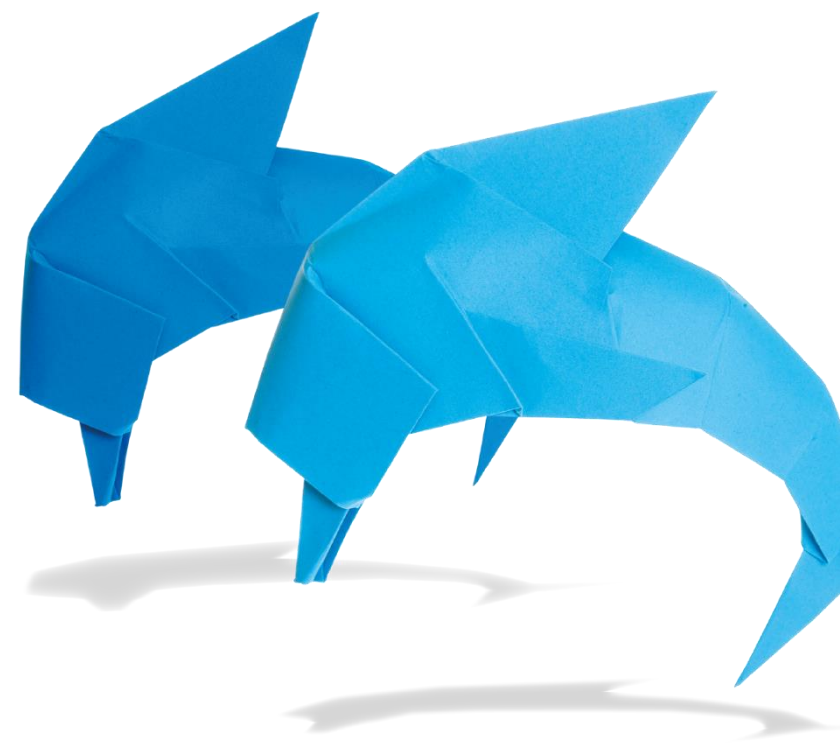


GCSE Mathematics

Marking Guidance Summer 2024

Mel Muldowney
Christian Seagar

JustMaths



While we're waiting ...

What do each of the below abbreviations stand for?

- M method mark awarded for a correct method or partial method
- P process mark awarded for a correct process as part of a problem solving question
- B unconditional accuracy mark
- C communication mark awarded for a fully correct statement(s) with no contradiction or ambiguity
- A accuracy mark (awarded after a correct method or process; if no method or process is seen then full marks for the question are implied but see individual mark schemes for more details)
NB: An accuracy mark cannot be awarded by itself, all previous marks must be awarded as well (may be by implication)



Practice v Theory

General marking guidance

These notes offer general guidance, but the specific notes for examiners appertaining to individual questions take precedence.

- 1 All candidates must receive the same treatment. Examiners must mark the last candidate in exactly the same way as they mark the first.

Where some judgement is required, mark schemes will provide the principles by which marks will be awarded; exemplification/indicative content will not be exhaustive. When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the response should be sent to review.

- 2 All the marks on the mark scheme are designed to be awarded; mark schemes should be applied positively. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme. If there is a wrong answer (or no answer) indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

Questions where working is not required: In general, the correct answer should be given full marks.

Questions that specifically require working: In general, candidates who do not show working on this type of question will get no marks – full details will be given in the mark scheme for each individual question.

- 3 **Crossed out work**

This should be marked **unless** the candidate has replaced it with an alternative response.

- 4 **Choice of method**

If there is a choice of methods shown, mark the method that leads to the answer given on the answer line.

If no answer appears on the answer line, mark both methods **then award the lower number of marks.**

- 5 **Incorrect method**

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review for your Team Leader to check.

- 6 **Follow through marks**

Follow through marks which involve a single stage calculation can be awarded without working as you can check the answer, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

- 7 **Ignoring subsequent work**
It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question or its context. (eg. an incorrectly cancelled fraction when the unsimplified fraction would gain full marks).
It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect (eg. incorrect algebraic simplification).
- 8 **Probability**
Probability answers must be given as a fraction, percentage or decimal. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).
Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.
If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.
- 9 **Linear equations**
Unless indicated otherwise in the mark scheme, full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously identified in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded (embedded answers).
- 10 **Range of answers**
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and all numbers within the range.
- 11 **Number in brackets after a calculation**
Where there is a number in brackets after a calculation E.g. $2 \times 6 (=12)$ then the mark can be awarded **either** for the correct method, implied by the calculation **or** for the correct answer to the calculation.
- 12 **Use of inverted commas**
Some numbers in the mark scheme will appear inside inverted commas E.g. "12" $\times 50$; the number in inverted commas cannot be any number – it must come from a correct method or process but the candidate may make an arithmetic error in their working.
- 13 **Word in square brackets**
Where a word is used in square brackets E.g. [area] $\times 1.5$: the value used for [area] does **not** have to come from a correct method or process but is the value that the candidate believes is the area. If there are any constraints on the value that can be used, details will be given in the mark scheme.
- 14 **Misread**
If a candidate misreads a number from the question. Eg. uses 252 instead of 255; method or process marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

oe	
cao	
ft	
sc	
dep	
indep	
awrt	
isw	

Process (P) Marks

The P mark will work in exactly the same way as the M (method) mark does in our current mark schemes. We have used a different letter to remind examiners that they should be looking for alternative processes (and have used this language rather than method in our mark schemes for AO3 questions). So if a candidate gives a partially correct solution they will be awarded the appropriate P (process) marks provided the working they show is a possible route through to the solution. If a solution is fully correct then full marks will usually be awarded. The exception will be in questions where candidates are specifically instructed to show working. In these questions, the correct solution with no working will score no marks.

Where working is not required

- The correct answer should be awarded full marks (unless it has clearly been obtained from an incorrect method)
- If the answer is not correct, look at the working. Award marks as detailed by the mark scheme

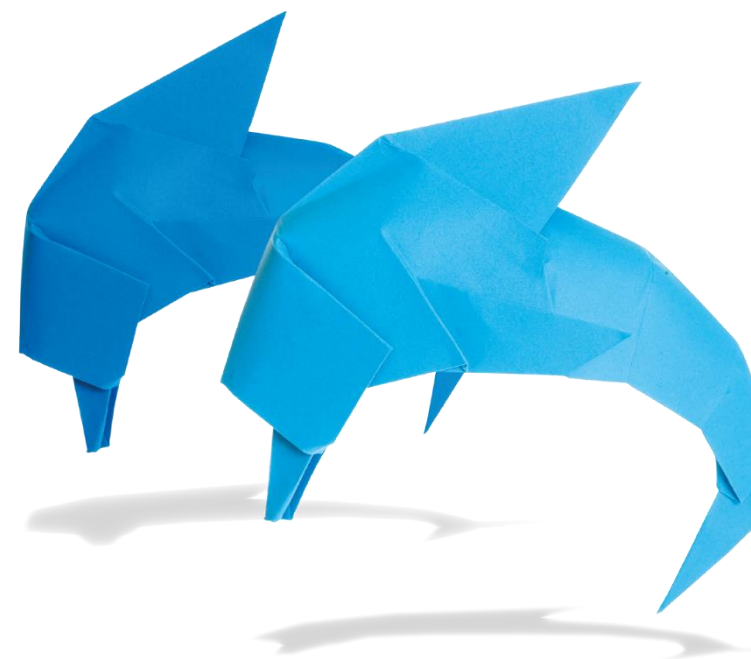
Where working IS required

- A correct answer by itself, with no working, will score no marks
- Go through the working, awarding marks as detailed by the mark scheme
- In the case of a question requiring proof or where the instruction is 'Show that...' each stage of working must be carefully checked

Inverted commas

- Some numbers in the mark scheme will appear inside inverted commas, e.g. “12” \times 50 ;
- The number in inverted commas cannot be any number – it must come from a correct method or process but the candidate may make an arithmetic error in their working.

Foundation P1



Examiners Reports – F P1

This paper provided students with the opportunity to demonstrate their ability across the grades. Plenty of success was seen in the early part of the paper and most questions were attempted by the majority of candidates.

Challenges arose when questions contained a context, particularly where candidates needed to extract the key pieces of information followed by determining and applying the correct mathematical processes.

Candidates also found questions with multiple stages in their working challenging. Despite this, good amounts of working out were often seen which certainly helped students, especially those which had arithmetic errors as part of their solution.

For those questions requiring a written conclusion, most responses did have some sort of decision showing that students are well-accustomed to this sort of demand in a question.

F P1 Q6

6 Ryan buys

4 cakes at £1.30 each
2 identical tins of soup.

Ryan pays with a £10 note.
He gets £1.80 change.

How much does Ryan pay for each tin of soup?

$$\begin{array}{r}
 1.30 \\
 4 \times \\
 \hline
 5.20
 \end{array}$$

1

$$\begin{array}{r}
 10.00 \\
 - 5.20 \\
 \hline
 4.80
 \end{array}$$

$$\begin{array}{r}
 4.80 \\
 2 \div \\
 \hline
 2.40
 \end{array}$$

1

$$\begin{array}{r}
 1.30 \\
 + 1.80 \\
 \hline
 3.10
 \end{array}$$

1

$$\begin{array}{r}
 10.00 \\
 - 3.10 \\
 \hline
 6.90
 \end{array}$$

1

$$\begin{array}{r}
 6.90 \\
 2 \div \\
 \hline
 3.45
 \end{array}$$

1

£ 1.50 1

(Total for Question 6 is 4 marks)

1.5(0)	P1	for $4 \times 1.30 (= 5.2(0))$ or $10 - 1.80 (= 8.2(0))$	Working could be in pence
	P1	for $10 - 1.80 - "5.20" (= 3)$ oe	
	P1	for $"3" \div 2$	
	A1	cao	Condone answer £1.5(0)p
		SCB2 for answer (£)2.4(0)	

F P1 Q6

6 Ryan buys

4 cakes at £1.30 each
2 identical tins of soup.

Ryan pays with a £10 note.
He gets £1.80 change.

How much does Ryan pay for each tin of soup?

1.30, 2.80 3.90 4.20

$$4 \times £1.30 = £4.20$$

$$4.20 + 1.80 = £6.00$$

$$£10 - £6 = £4$$

$$£4 \div £2 = £2$$

1.5(0) P1 for $4 \times 1.30 (= 5.2(0))$ or $10 - 1.80 (= 8.2(0))$

P1 for $10 - 1.80 - "5.20" (= 3)$ oe

P1 for $"3" \div 2$

A1 cao

SCB2 for answer (£)2.4(0)

Working could be in pence

Condone answer £1.5(0)p

£ 2.00

(Total for Question 6 is 4 marks)

F P1 Q6

6 Ryan buys

4 cakes at £1.30 each
2 identical tins of soup.

Ryan pays with a £10 note.
He gets £1.80 change.

How much does Ryan pay for each tin of soup?

$$\begin{array}{r}
 1.30 \\
 + 1.30 \\
 1.30 \\
 1.30 \\
 \hline
 5.20 \\
 \hline
 1
 \end{array}$$

$$\begin{array}{r}
 5 - 10 = 5 \\
 5 - 20p = 4.80 \\
 \begin{array}{r}
 2.40 \\
 2 \overline{) 4.80}
 \end{array}
 \end{array}$$

£ 2.40

(Total for Question 6 is 4 marks)

1.5(0)

P1 for $4 \times 1.30 (= 5.2(0))$ or $10 - 1.80 (= 8.2(0))$

Working could be in pence

P1 for $10 - 1.80 - "5.20" (= 3)$ oe

P1 for $"3" \div 2$

A1 cao

Condone answer £1.5(0)p

SCB2 for answer (£)2.4(0)

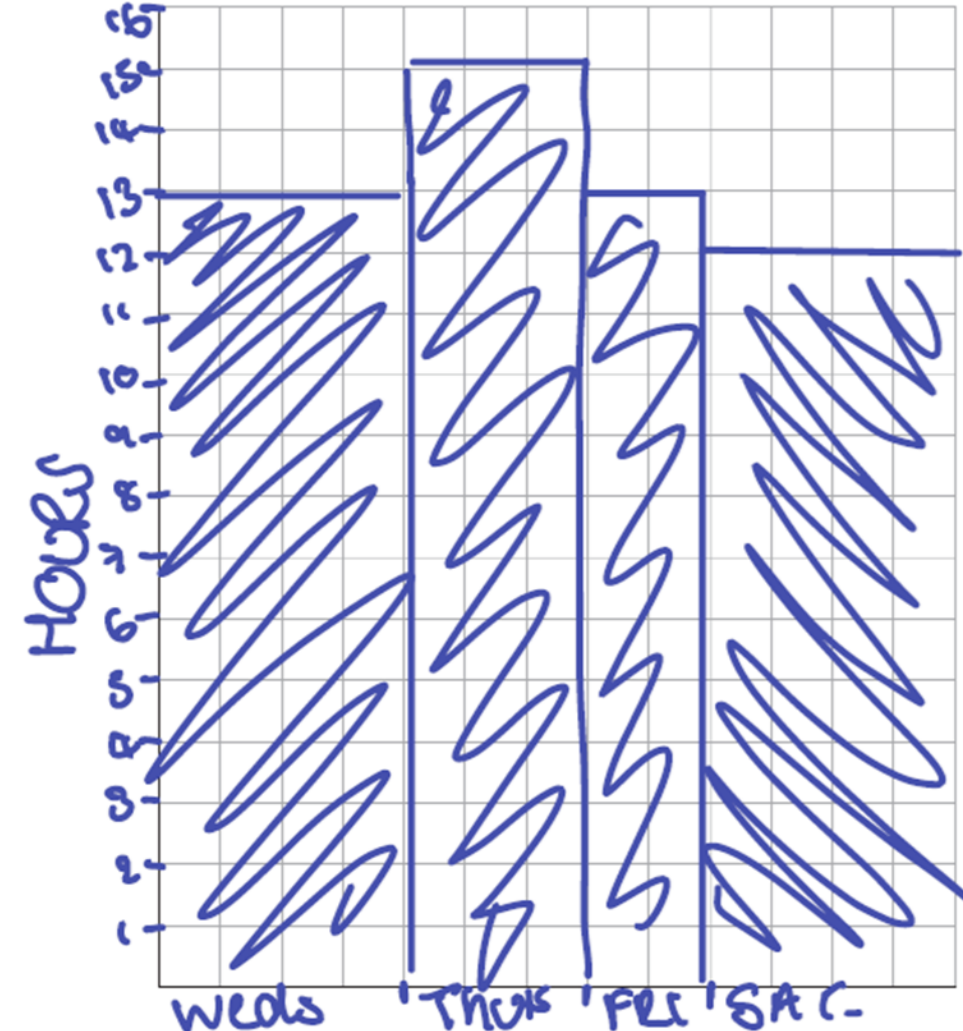
F P1 Q7

- 7 The table shows the number of hours that Lena and Pavel worked on each of four days last week.

	Wednesday	Thursday	Friday	Saturday
Lena	6	9	8	6
Pavel	7	6	5	6

On the grid, draw a suitable diagram or chart for this information.

Mark	Mark scheme	Additional guidance
M1	for a key, or suitable labels, to identify Lena and Pavel	Accept bar chart, vertical line graph, dual/multiple bar chart, composite bar chart, frequency polygon for all marks.
M1	for 3 or 4 correct labels for days or a linear scale present	Accept unambiguous abbreviations for labels eg L, P
M1	for a (bar) chart correctly showing data for at least 1 person or 2 days	Allow linear scale not starting at 0 Scale must be marked on grid lines.
M1	for a (bar) chart correctly showing data for at least 1 person or 2 days	Bars / lines / points must be unambiguously correct for their scale (scale must be present).
M1	for a (bar) chart correctly showing data for at least 1 person or 2 days	Allow for correctly showing total hours worked for all four days on chart (13, 15, 13, 12)
C1	for a fully correct (bar) chart with labels for days of the week, vertical axis correctly scaled and labelled and key/labels for Lena and Pavel	Horizontal axis does not need an overall 'day' label Condone frequency for number of hours. For C mark scale must start at 0 and be linear for the range of values plotted. Condone bars of unequal width Condone no gaps or inconsistent gaps

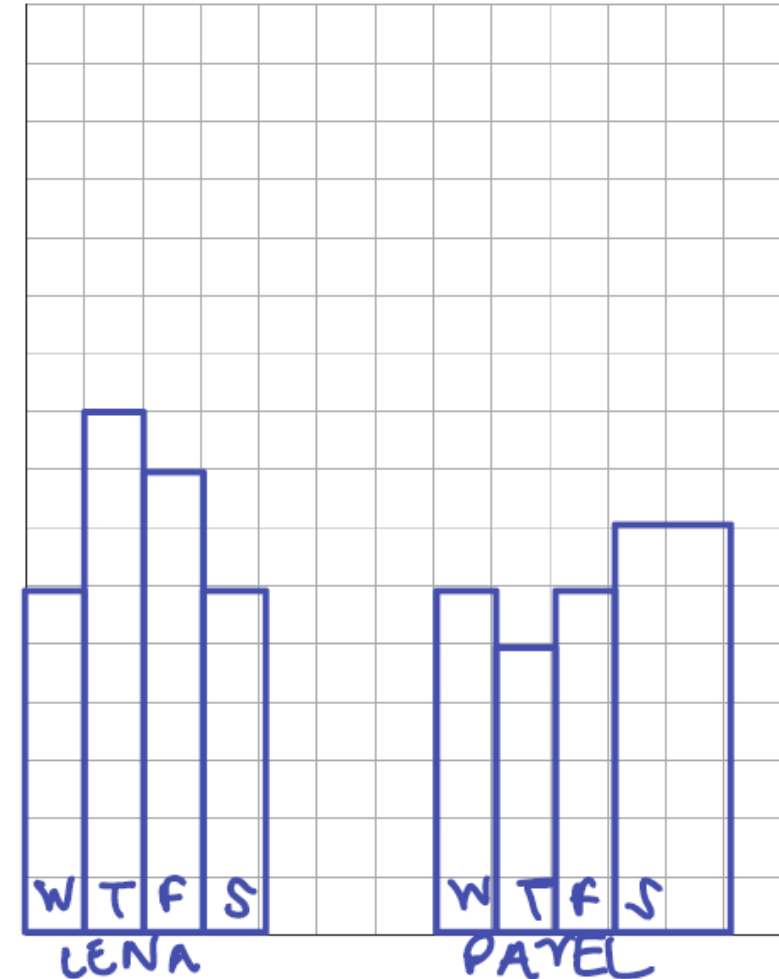


F P1 Q7

- 7 The table shows the number of hours that Lena and Pavel worked on each of four days last week.

	Wednesday	Thursday	Friday	Saturday
Lena	6	9	8	6
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On the grid, draw a suitable diagram or chart for this information.



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M1	for a key, or suitable labels, to identify Lena and Pavel	Accept bar chart, vertical line graph, dual/multiple bar chart, composite bar chart, frequency polygon for all marks. Accept unambiguous abbreviations for labels eg L, P
M1	for 3 or 4 correct labels for days or a linear scale present	Allow linear scale not starting at 0 Scale must be marked on grid lines.
M1	for a (bar) chart correctly showing data for at least 1 person or 2 days	Bars / lines / points must be unambiguously correct for their scale (scale must be present). Allow for correctly showing total hours worked for all four days on chart (13, 15, 13, 12)
C1	for a fully correct (bar) chart with labels for days of the week, vertical axis correctly scaled and labelled and key/labels for Lena and Pavel	Horizontal axis does not need an overall 'day' label Condone frequency for number of hours. For C mark scale must start at 0 and be linear for the range of values plotted. Condone bars of unequal width Condone no gaps or inconsistent gaps

F P1 Q9 b

9 Here is a number machine.



(a) Work out the output when the input is 13

(b) Work out the input when the output is 28

$$28 - 10 = 18 \div 2 = 9$$

9

(2)

(b)	19	M1	starts method to find input using inverse operations eg $28 + 10 (=38)$ or sight of $+10$ and $\div 2$	$+10$ and $\div 2$ could be seen in a flow diagram Working may be next to number machine.
		A1	cao	

F P1 Q10

10 There are 24 cows and 36 sheep on a farm.

Write as a ratio the number of cows to the number of sheep.
Give your ratio in its simplest form.

$$\begin{array}{ccc} 24 & : & 36 \\ \div 12 \swarrow & & \searrow \div 12 \\ 2 & : & 3 \end{array}$$

2 : 3

(Total for Question 10 is 2 marks)

2 : 3	M1	for 24 : 36 oe or 3 : 2 or 1.5 : 1	
	A1	2 : 3 or 1 : 1.5	Do not ISW from 2:3

F P1 Q10

10 There are 24 cows and 36 sheep on a farm.

Write as a ratio the number of cows to the number of sheep.
Give your ratio in its simplest form.

24
↓
12
↓
6
↓
3

36
↓
18
↓
9

3:9

(Total for Question 10 is 2 marks)

2 : 3

M1

for 24 : 36 or 3 : 2 or 1.5 : 1

A1

2 : 3 or 1 : 1.5

Do not ISW from 2:3

F P1 Q11 c

(c) Write **one** pair of brackets in this calculation so that the answer is correct.

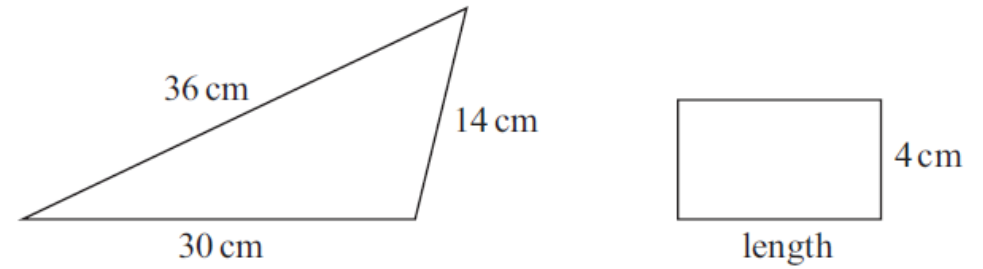
$$30 \div (3 + 2) - 4 = 2$$

(1)

(c)	$30 \div (3 + 2) - 4$	B1	for brackets correctly placed
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F P1 Q12

12 The diagram shows a triangle and a rectangle.



The perimeter of the rectangle is a quarter of the perimeter of the triangle.

Perimeter triangle = $\frac{1}{4}$ of rectangle

$$36 + 30 + 14$$

$$\begin{array}{r} 36 \\ 30 \\ 14 \\ \hline 80 \end{array}$$

$$\textcircled{2} \quad 80 \div 4 = 20$$

$$20 \div 2 = 10$$

Perimeter of rectangle = 20

$$\textcircled{3} \quad 20 - 4 - 4 = 12$$

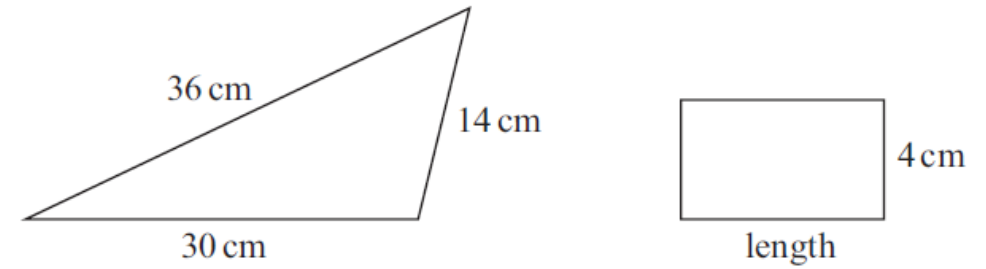
$$12 \div 2 = 6$$

length = 6

Answer	Mark	Mark scheme	Additional guidance
6	P1	for process to find perimeter of triangle eg $14 + 30 + 36 (= 80)$	
	P1	for " 80 " $\div 4 (= 20)$	$36 \div 4 + 14 \div 4 + 30 \div 4 (= 20)$ scores P1P1
	P1	for a complete process eg " 20 " $- 4 - 4 \div 2$ or " 20 " $\div 2 - 4$	

F P1 Q12

12 The diagram shows a triangle and a rectangle.



The perimeter of the rectangle is a quarter of the perimeter of the triangle.

Work out the length of the rectangle.

$$\underbrace{36 + 14 + 30}_{\begin{array}{r} 66 \\ 70 \\ 80 \end{array}} = 80 \div 4 = 20 - 8 = 12 \div 2 = 6 \text{ cm}$$

Answer	Mark	Mark scheme	Additional guidance
6	P1	for process to find perimeter of triangle eg $14 + 30 + 36 (= 80)$	
	P1	for “80” $\div 4 (= 20)$	$36 \div 4 + 14 \div 4 + 30 \div 4 (= 20)$ scores P1P1
	P1	for a complete process eg “20” $- 4 - 4 \div 2$ or “20” $\div 2 - 4$	

F P1 Q13b

There are only 1p coins and 2p coins in a bag.
The total value of the coins in the bag is 40p

The total value of the 1p coins is the same as the total value of the 2p coins.

Simon takes at random a coin from the bag.

(b) Find the probability that Simon takes a 1p coin.

$$\begin{array}{lcl}
 1p = 20 \text{ coins} & = & 1 \times 20 = 20p \\
 2p = 10 \text{ coins} & & 2 \times 10 = 20p \\
 \hline
 & & + 40p \\
 & & + 30 \text{ coins}
 \end{array}$$

$$\frac{20}{30}$$

$\frac{2}{3}$

P1 for start of process to write down proportion of each coin,
writes down a correct ratio, eg $1p : 2p = 2 : 1$ oe
or
a process to work out number of 1p coins and 2p coins,
eg $40 \div 2 (= 20)$ and $(40 \div 2) \div 2 (= 10)$
or
assigns numbers in correct proportion, eg 6 1p coins and 3 2p
coins
or
finding the probability of a 2p coin $(= \frac{1}{3})$

A1 for $\frac{2}{3}$ oe

Accept any equivalent fraction, decimal
form, 0.66(6...) or 0.67 or percentage
form, 66(.6...) % or 67%

F P1 Q13b

There are only 1p coins and 2p coins in a bag.
The total value of the coins in the bag is 40p

The total value of the 1p coins is the same as the total value of the 2p coins.

Simon takes at random a coin from the bag.

(b) Find the probability that Simon takes a 1p coin.

10 2p coins
20 1p coins

2:1

$\frac{2}{3}$

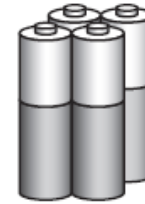
P1
for start of process to write down proportion of each coin,
writes down a correct ratio, eg $1p : 2p = 2 : 1$ oe
or
a process to work out number of 1p coins **and** 2p coins,
eg $40 \div 2 (= 20)$ **and** $(40 \div 2) \div 2 (= 10)$
or
assigns numbers in correct proportion, eg 6 1p coins **and** 3 2p
coins
or
finding the probability of a 2p coin $(= \frac{1}{3})$

A1
for $\frac{2}{3}$ oe

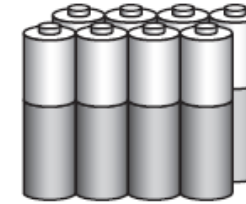
Accept any equivalent fraction, decimal
form, 0.66(6...) or 0.67 or percentage
form, 66(.6...) % or 67%

F P1 Q16

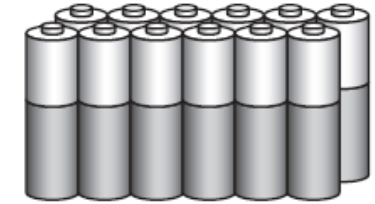
6 Batteries are sold in packs of 4, in packs of 8 and in packs of 12



£1.80



£3.20



£6.00

A pack of 4 batteries costs £1.80

A pack of 8 batteries costs £3.20

A pack of 12 batteries costs £6.00

5.40 for 12
5 for 12
£6 for 12

Which pack gives the best value for money?

You must show how you get your answer.

4 batteries - 12 batteries = 4 x 3 so

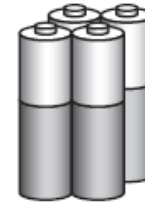
£1.80 x 3 = £5.40

A pack of 8 is better for price

Answer	Mark	Mark scheme	Additional guidance																																
Pack of 8 (supported)	P1	for a process (for at least 2 packs) of division of price by quantity eg at least 2 of $180 \div 4 (= 45)$ or $320 \div 8 (= 40)$ or $600 \div 12 (= 50)$ OR any other process that could lead to a comparison of 2 packs eg $180 \times 2 (= 360)$ or $320 \div 8 (= 40)$ and $40 \times 12 (= 480)$	Calculations could be in pounds or in pence <table><tr><td></td><td>4 pack</td><td>8 pack</td><td>12 pack</td></tr><tr><td>1</td><td>0.45</td><td>0.40</td><td>0.50</td></tr><tr><td>2</td><td>0.90</td><td>0.80</td><td>1.00</td></tr><tr><td>4</td><td>1.80</td><td>1.60</td><td>2.00</td></tr><tr><td>8</td><td>3.60</td><td>3.20</td><td>4.00</td></tr><tr><td>12</td><td>5.40</td><td>4.80</td><td>6.00</td></tr><tr><td>16</td><td>7.20</td><td>6.40</td><td>8.00</td></tr><tr><td>24</td><td>10.80</td><td>9.60</td><td>12.00</td></tr></table>		4 pack	8 pack	12 pack	1	0.45	0.40	0.50	2	0.90	0.80	1.00	4	1.80	1.60	2.00	8	3.60	3.20	4.00	12	5.40	4.80	6.00	16	7.20	6.40	8.00	24	10.80	9.60	12.00
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	P1	for a complete process to give values that can be used for comparison of all 3 packs eg $180 \div 4 (= 45)$ and $320 \div 8 (= 40)$ and $600 \div 12 (= 50)$ OR $3.20 \div 8 (= 0.40)$ and $0.40 \times 4 (= 1.60)$ and $0.40 \times 12 (= 4.80)$ OR $1.80 \times 6 (= 10.80)$ and $3.20 \times 3 (= 9.60)$ and $6.00 \times 2 (= 12.00)$	Condone incorrect units. Pairwise comparison are possible, but check to see that this allows for a decision to be made. Check process. Assuming correct figures found: <table><tr><td colspan="2">Comparisons</td><td>Conclusion possible</td></tr><tr><td>4 vs 8</td><td>8 vs 12</td><td>Yes</td></tr><tr><td>4 vs 8</td><td>4 vs 12</td><td>Yes</td></tr><tr><td>4 vs 12</td><td>8 vs 12</td><td>No</td></tr></table>	Comparisons		Conclusion possible	4 vs 8	8 vs 12	Yes	4 vs 8	4 vs 12	Yes	4 vs 12	8 vs 12	No																				
Comparisons		Conclusion possible																																	
4 vs 8	8 vs 12	Yes																																	
4 vs 8	4 vs 12	Yes																																	
4 vs 12	8 vs 12	No																																	
	A1	for 'pack of 8' and correct values that can be used to compare all 3 packs	Correct answer with no supportive working scores 0 marks. Do not allow A mark where inconsistent units would prevent comparison e.g. 0.40p and 45p																																

F P1 Q16

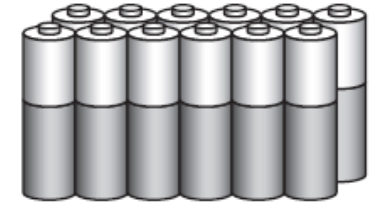
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£1.80



£3.20



£6.00

A pack of 4 batteries costs £1.80

A pack of 8 batteries costs £3.20

A pack of 12 batteries costs £6.00

Which pack gives the best value for money?

You must show how you get your answer.

$$\text{Pack of 8} + \text{pack of 4} = \text{£5}$$

$$12 = \text{£6.00}$$

$$4 \text{ packs} \times 3 = \text{£5.40}$$

$$\text{Pack of 8} + \text{pack of 4} = \text{£5.00}$$

Answer	Mark	Mark scheme	Additional guidance																																
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12	5.40	4.80	6.00																																
16	7.20	6.40	8.00																																
24	10.80	9.60	12.00																																
P1	for a complete process to give values that can be used for comparison of all 3 packs eg $180 \div 4 (= 45)$ and $320 \div 8 (= 40)$ and $600 \div 12 (= 50)$ OR $3.20 \div 8 (= 0.40)$ and $0.40 \times 4 (= 1.60)$ and $0.40 \times 12 (= 4.80)$ OR $1.80 \times 6 (= 10.80)$ and $3.20 \times 3 (= 9.60)$ and $6.00 \times 2 (= 12.00)$	Condone incorrect units. Pairwise comparison are possible, but check to see that this allows for a decision to be made. Check process. Assuming correct figures found: <table><tr><td colspan="2">Comparisons</td><td>Conclusion possible</td></tr><tr><td>4 vs 8</td><td>8 vs 12</td><td>Yes</td></tr><tr><td>4 vs 8</td><td>4 vs 12</td><td>Yes</td></tr><tr><td>4 vs 12</td><td>8 vs 12</td><td>No</td></tr></table>	Comparisons		Conclusion possible	4 vs 8	8 vs 12	Yes	4 vs 8	4 vs 12	Yes	4 vs 12	8 vs 12	No																					
Comparisons		Conclusion possible																																	
4 vs 8	8 vs 12	Yes																																	
4 vs 8	4 vs 12	Yes																																	
4 vs 12	8 vs 12	No																																	
A1	for 'pack of 8' and correct values that can be used to compare all 3 packs	Correct answer with no supportive working scores 0 marks. Do not allow A mark where inconsistent units would prevent comparison e.g. 0.40p and 45p																																	

F P1 Q17

17 Solve $2(4x - 5) = 18$

$$\begin{aligned} 2(4x - 5) &= 18 \\ 8x + 10 &= 18 \\ -10 \quad -10 \end{aligned}$$

$$\begin{aligned} 8x &= 8 \\ \div 8 \quad \div 8 \\ x &= 1 \end{aligned}$$

Answer	Mark	Mark scheme	Additional guidance
3.5	M1	for correct expansion of brackets, ie $8x - 10$ or dividing throughout by 2 as a first step to solve equation, eg $4x - 5 = 9$	For M marks step must be carried out not just intention shown. For example, if you see $\begin{array}{r} 2(4x - 5) = 18 \\ \div 2 \qquad \div 2 \end{array}$ Award M1 for: $4x - 5 = k$ with $k \neq 18, 36$
	M1	for isolating terms in x , eg $8x = 18 + 10$ or $4x = 9 + 5$	ft their equation of the form $ax \pm b = c$ For example, if you see $\begin{array}{r} 8x - 10 = 18 \\ +10 \qquad +10 \end{array}$ Award M1 for: $8x = k$ with $k \neq 8, 18$
	A1	for 3.5 or $3\frac{1}{2}$ oe or $\frac{7}{2}$ oe	

F P1 Q17

17 Solve $2(4x - 5) = 18$

$$\begin{array}{r} 18 \\ 10 \\ \hline 28 \end{array}$$

$$8x - 10 = 18$$

$$8x = 18 + 10$$

$$8x = 28$$

$$x = \frac{28}{8}$$

$$x = 4$$

Answer	Mark	Mark scheme	Additional guidance
3.5	M1	for correct expansion of brackets, ie $8x - 10$ or dividing throughout by 2 as a first step to solve equation, eg $4x - 5 = 9$	For M marks step must be carried out not just intention shown. For example, if you see $\begin{array}{r} 2(4x - 5) = 18 \\ \div 2 \qquad \qquad \div 2 \end{array}$ Award M1 for: $4x - 5 = k$ with $k \neq 18, 36$
	M1	for isolating terms in x , eg $8x = 18 + 10$ or $4x = 9 + 5$	ft their equation of the form $ax \pm b = c$ For example, if you see $\begin{array}{r} 8x - 10 = 18 \\ +10 \qquad \qquad +10 \end{array}$ Award M1 for: $8x = k$ with $k \neq 8, 18$
	A1	for 3.5 or $3\frac{1}{2}$ oe or $\frac{7}{2}$ oe	

F P1 Q28

28 Solve $x + 11 \leq 5 - \frac{1}{2}x$

↑
more than

$$\begin{array}{rcl} x + 11 & \leq & 5 - 0.5x \\ -5 & & -5 \end{array}$$

$$\begin{array}{rcl} x + 6 & \leq & 0.5x \\ \times 2 & & \times 2 \end{array}$$

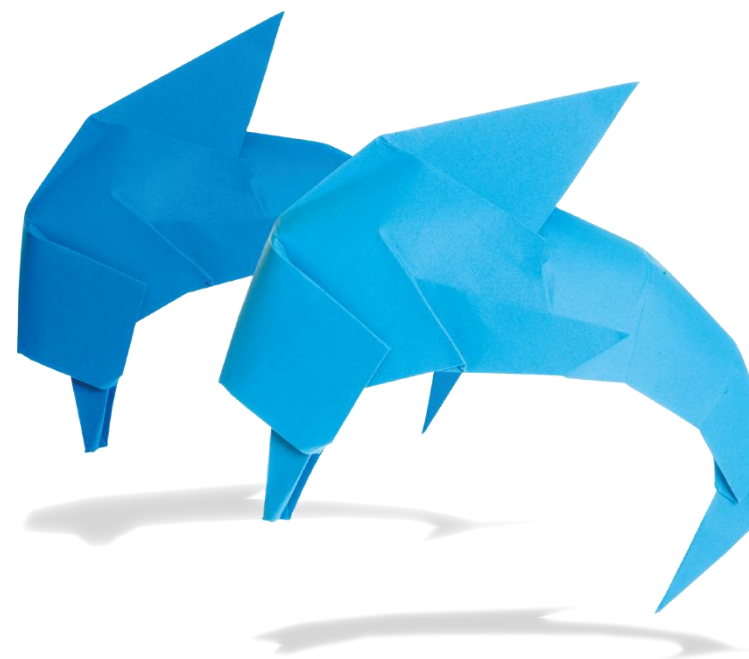
$$x + 12 \leq x$$

$$12 \leq x$$

$x \leq -4$	A1	cao	
	M1	for a correct first step working with an equation or inequality eg $x + 11 - 11 \leq 5 - \frac{1}{2}x - 11$ or $x + 11 + \frac{1}{2}x \leq 5 - \frac{1}{2}x + \frac{1}{2}x$ or $2 \times x + 2 \times 11 \leq 2 \times 5 - 2 \times \frac{1}{2}x$	Can work with an equation or incorrect inequality symbol for both M marks Allow for subtracting 5 from both sides or subtracting x from both sides. For M marks step must be carried out not just intention shown. For example, if you see $\begin{array}{rcl} x + 11 & \leq & 5 - \frac{1}{2}x \\ -11 & & -11 \end{array}$ Award M1 for: $x \leq k - \frac{1}{2}x$ with $k \neq 5, k \neq 16$ or indicating $+\frac{1}{2}x$ reaching $kx + 11 \leq 5$ with $k \neq \frac{1}{2}, k \neq 1$ or indicating multiplying by 2 obtaining an equation or inequality with three of four terms correct and no term unchanged.
	M1	for a full method to solve the inequality or for a critical value of -4	Award 2 marks for answer of $x \geq -4$ where \geq is an $=$ or any incorrect inequality symbol, or for answer shown as just -4
	A1	for $x \leq -4$ oe as final answer	

(Total for Question 28 is 3 marks)

Foundation / Higher Crossover P1



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

$$1 \quad 4 \quad 5 \quad 4 \quad 9 \quad 4 \quad 13$$

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

$$n + 4$$

$$4n + 2$$

$$\underline{n + 4}$$

$4n - 3$	B2	for $4n - 3$ oe	Accept a different variable eg $4x - 3$ Accept $u_n = 4n - 3$, $T = 4n - 3$ etc
	(B1	for $4n + k$ where $k \neq -3$ or is absent unambiguously shown)	$n = 4n - 3$ or $4n^{\text{th}} - 3$ gets B1 only

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

$$1 \quad 4 \quad 5 \quad 4 \quad 9 \quad 4 \quad 13$$

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

$$4n + 1$$

$$\underline{4n + 1}$$

$4n - 3$	B2	for $4n - 3$ oe	Accept a different variable eg $4x - 3$ Accept $u_n = 4n - 3$, $T = 4n - 3$ etc
	(B1	for $4n + k$ where $k \neq -3$ or is absent unambiguously shown)	$n = 4n - 3$ or $4n^{\text{th}} - 3$ gets B1 only

F P1 Q20a
H P1 Q1a

2 (a) Work out $3\frac{4}{5} - 1\frac{2}{3}$

$$\frac{19}{5} - \frac{5}{3}$$

$$\frac{57}{15} - \frac{25}{15}$$

$$= \frac{32}{15}$$

Answer	Mark	Mark scheme	Additional guidance
$2\frac{2}{15}$	M1	for a method to subtract using a common denominator with at least one fraction correct (suitable common denominator for original fractions with at least one correct numerator) eg $\frac{57}{15} - \frac{25}{15}$ or $(3)\frac{12}{15} - (1)\frac{10}{15}$	Use of decimals gets no credit unless it leads to a correct fraction
	A1	for $2\frac{2}{15}$ oe eg $\frac{32}{15}$	ISW incorrect conversion from improper fraction to mixed number or incorrect simplification of improper fraction

(2)

F P1 Q20a

H P1 Q1a

2 (a) Work out $3\frac{4}{5} - 1\frac{2}{3}$

$$\frac{19}{5} - \frac{5}{3}$$

$$\frac{57}{15} - \frac{25}{15} = \frac{32}{15}$$

$$= 2\frac{7}{15}$$

Answer	Mark	Mark scheme	Additional guidance
$2\frac{2}{15}$	M1	for a method to subtract using a common denominator with at least one fraction correct (suitable common denominator for original fractions with at least one correct numerator) eg $\frac{57}{15} - \frac{25}{15}$ or $(3)\frac{12}{15} - (1)\frac{10}{15}$	Use of decimals gets no credit unless it leads to a correct fraction
	A1	for $2\frac{2}{15}$ oe eg $\frac{32}{15}$	ISW incorrect conversion from improper fraction to mixed number or incorrect simplification of improper fraction

(2)

F P1 Q24

H P1 Q5

Sophie drives a distance of 513 kilometres on a motorway in France.
She pays 0.81 euros for every 10 kilometres she drives.

(a) Work out an estimate for the total amount that Sophie pays.

$$513 \div 10 = 51.3$$

$$51.3 \times 0.81 = \text{euros payed}$$

$$\downarrow$$

$$51 \times 1 = 51$$

51 euros
(3)

(b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

An overestimate as I rounded
0.81 to 1 euro, meaning it's
greater than the actual price
payed.

(a)	Estimated value	P1	for using a value rounded to 1sf in a calculation eg $500 \div 10$ or 500×0.8 or 510×0.8 or 513×0.8 or 500×0.81	Their rounded value must be used in a calculation Rounding may occur after a correct process, eg $513 \div 10 = 51.3 \approx 50$ and 50×0.81 $513 \div 10 = 51.3 \approx 51$ and 51×0.8 scores P1P1 Accept 0.81 rounded to 0.80 for this mark Condone 0.81 rounded to 1 for this mark
		P1	for a full process to find the total amount eg $500 \div 10 \times 0.8$ oe (= 40) or $510 \div 10 \times 0.8$ oe (= 40.8) or $500 \div 10 \times 0.81$ (= 40.5) or [distance] $\div 10 \times$ [amount] oe	Where [distance] is their rounded 513 or 513 and [amount] is their rounded 0.81 or 0.81 Accept $513 \div 10 \times 0.81$ for this mark
		A1	for a correct answer following through their correct rounded value(s)	Do not award this mark if 0.81 is rounded to 1
(b)	underestimate with reason	C1	fit from (a) eg underestimate as numbers rounded down	Must relate to estimation and not rounding of their final answer and they must have a final answer to part (a)

F P1 Q24

H P1 Q5

Sophie drives a distance of 513 kilometres on a motorway in France.
She pays 0.81 euros for every 10 kilometres she drives.

(a) Work out an estimate for the total amount that Sophie pays.

$$513 \div 10$$

$$51.3$$

$$500 \div 10 = 50$$

$$0.81 \approx 1 \quad 50 \times 1 = 50$$

50

euros

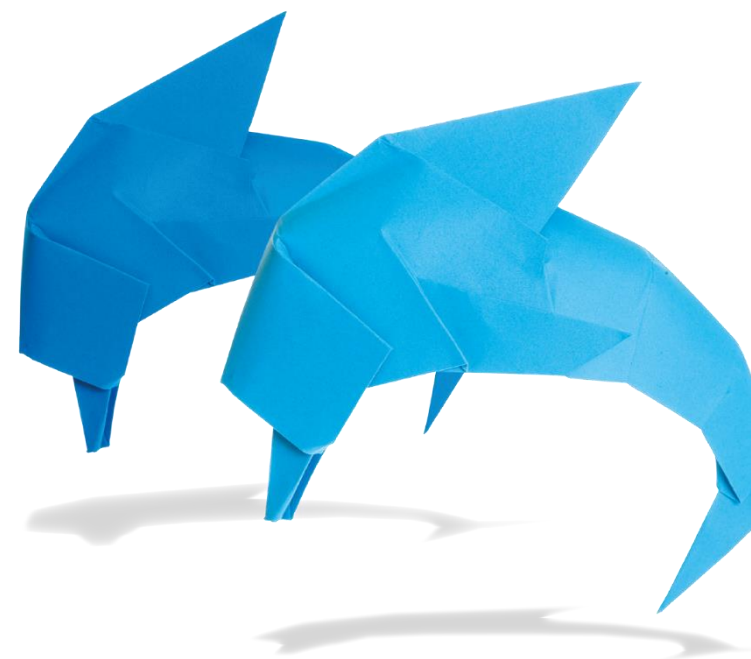
(3)

(b) Is your answer to part (a) an underestimate or an overestimate?
Give a reason for your answer.

underestimate, rounded
513 down to 500

(a)	Estimated value	P1	for using a value rounded to 1sf in a calculation eg $500 \div 10$ or 500×0.8 or 510×0.8 or 513×0.8 or 500×0.81	Their rounded value must be used in a calculation Rounding may occur after a correct process, eg $513 \div 10 = 51.3 \approx 50$ and 50×0.81 $513 \div 10 = 51.3 \approx 51$ and 51×0.8 scores P1P1 Accept 0.81 rounded to 0.80 for this mark Condone 0.81 rounded to 1 for this mark
		P1	for a full process to find the total amount eg $500 \div 10 \times 0.8$ oe (= 40) or $510 \div 10 \times 0.8$ oe (= 40.8) or $500 \div 10 \times 0.81$ (= 40.5) or [distance] $\div 10 \times$ [amount] oe	Where [distance] is their rounded 513 or 513 and [amount] is their rounded 0.81 or 0.81 Accept $513 \div 10 \times 0.81$ for this mark
		A1	for a correct answer following through their correct rounded value(s)	Do not award this mark if 0.81 is rounded to 1
(b)	underestimate with reason	C1	fit from (a) eg underestimate as numbers rounded down	Must relate to estimation and not rounding of their final answer and they must have a final answer to part (a)

Higher P1



Examiners Reports – H P1

This paper was accessible to the majority of students. Overall, the paper was well answered and allowed a good differentiation between the students achieving higher grades and the students achieving lower grades. The majority of students appeared well prepared and familiar with the types of questions they were presented with and understood how to approach many questions.

Arithmetic errors led to many students losing marks, particularly on questions involving division or negative numbers. On many occasions a simple check would have alerted students to an error which could have been corrected. On a non-calculator paper, students should look to use efficient methods to perform arithmetic operations, including where possible simplifying calculations by using fractions in their simplest form,

The general standard of presentation of solutions was quite varied but it was pleasing that many students presented their answers in a clear and logical way. Attempts at the more challenging questions were sometimes quite messy with working spread all over the page which made them difficult for examiners to follow. It is in a student's own interest to ensure that working is clearly laid out and flows logically down the page. Centres should advise students to cross out unnecessary working to avoid leaving a choice of methods. There were many cases across many different questions of students miscopying their own figures or misreading the numbers in questions.

H P1 Q8

Len has 8 parcels.

The mean weight of the 8 parcels is 2.5 kg.

The mean weight of 3 of the parcels is 2 kg.

Work out the mean weight of the other 5 parcels.

$$2.5 \times 8 = 20.0$$

$$3 \times 2 = 6 = \text{weight of 3}$$

$$\begin{array}{r} 20 - \\ 6 \\ \hline 14 \end{array}$$

$$14 \div 5 = 2.8$$

$$\begin{array}{r} 2.8 \\ 5 \overline{) 14.0} \end{array}$$

2.8 kg

	Answer	Mark	Mark scheme
1	2.8	M1	for $8 \times 2.5 (= 20)$ or $3 \times 2 (= 6)$
		M1	for a complete method eg $(“20” - “6”) \div 5$
		A1	for 2.8 or $2\frac{4}{5}$ or mixed number

H P1 Q8

Len has 8 parcels.

The mean weight of the 8 parcels is 2.5 kg.

The mean weight of 3 of the parcels is 2 kg.

Work out the mean weight of the other 5 parcels.

$$8 \times 2.5 = 20$$

$$3 \times 2 = 6$$

$$20 - 6 = 14$$

$$2 + 0.8 = 2.8$$

$$\frac{14}{5} = 2 \frac{4}{5}$$

$$\frac{4}{5} = 0.8$$

$$\underline{2.8}$$

n	Answer	Mark	Mark scheme
1	2.8	M1	for $8 \times 2.5 (= 20)$ or $3 \times 2 (= 6)$
		M1	for a complete method eg $(“20” - “6”) \div 5$
		A1	for 2.8 or $2\frac{4}{5}$ or mixed number

H P1 Q13a

- 13 The table gives information about the amount of time that each of 150 people were in a shop.

$$10 \overline{) 0.8}$$

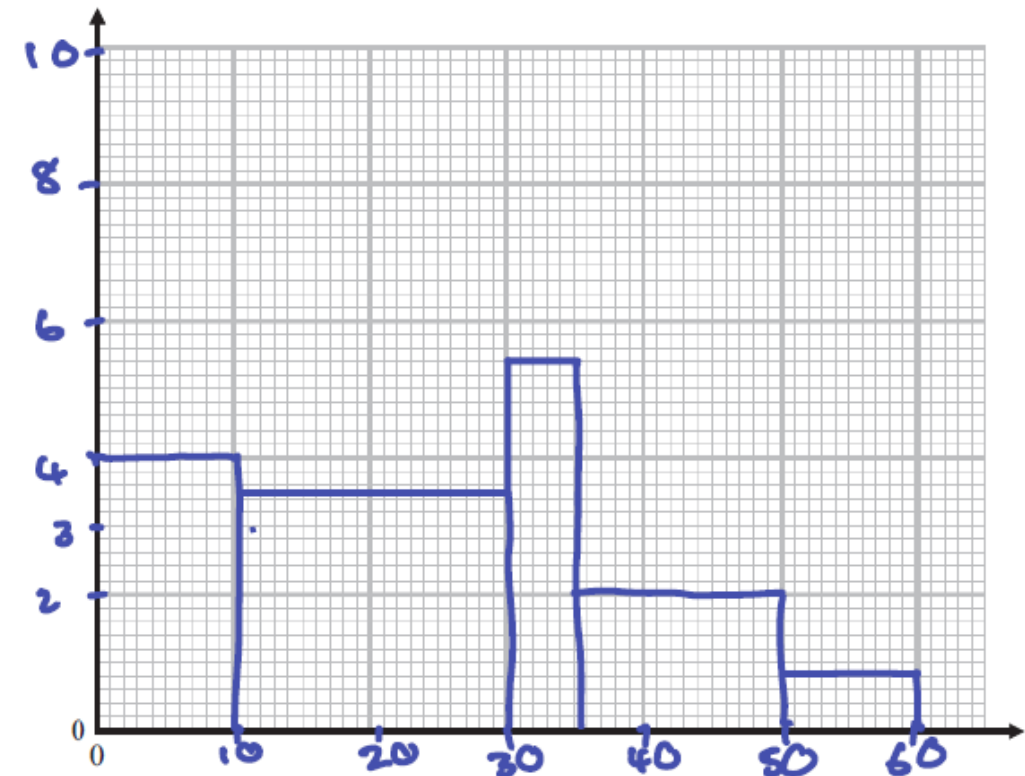
$$20 \overline{) 3.5}$$

$$5 \overline{) 22.0}$$

Time (t minutes)	Frequency
$0 < t \leq 10$	20
$10 < t \leq 30$	70
$30 < t \leq 35$	22
$35 < t \leq 50$	30
$50 < t \leq 60$	8

F. D .
4
3.5
5.4
2
0.8

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



Question	Answer	Mark	Mark scheme	Additional guidance
(a)	Histogram drawn	B3	for fully correct histogram with axes scaled and labelled	Relative heights 2, 3.5, 4.4, 2, 0.8

H P1 Q14

Expand and simplify $(3x - 1)(2x + 3)(x - 5)$

$$(3x - 1)(2x + 3)$$

$$6x^2 + 9x - 2x - 3$$

$$(6x^2 + 7x - 3)(x - 5)$$

$$6x^3 + 7x^2 - 30x^2 - 35x + 15$$

$$6x^3 - 23x^2 - 35x + 15$$

$6x^3 - 23x^2 - 35x + 15$	M1	for method to find the product of any two linear expressions (3 out of 4 terms correct or 4 correct terms ignoring signs) eg $6x^2 + 9x - 2x - 3$ or $3x^2 - 15x - x + 5$ or $2x^2 - 10x + 3x - 15$	Note that, for example, $7x - 3$ in expansion of $(3x - 1)(2x + 3)$ is regarded as 3 correct terms Do not award this mark for eg $6x^2 + 9x - 2x - 3 + 3x^2 - 15x - x + 5$
	M1	for a complete method to obtain all terms, half of which are correct (ft their first product) eg $6x^3 + 7x^2 - 30x^2 - 35x - 3x + 15$ or $6x^3 + 9x^2 - 32x^2 - 48x + 10x + 15$ or $6x^3 - 2x^2 - 21x^2 - 45x + 7x + 15$	First product must be quadratic with at least 3 terms but need not be simplified or may be simplified incorrectly
	A1	cao	

H P1 Q14

Expand and simplify $(3x - 1)(2x + 3)(x - 5)$

$$5x^2 + 9x - 2x - 3 = 5x^2 + 7x - 3$$

	$5x^2$	$7x$	-3
x	$5x^3$	$7x^2$	$-3x$
-5	$-25x^2$	$-35x$	-15

$$5x^2 + 7x^2 - 25x^2 - 3x - 35x - 15$$

$$= 5x^2 - 18x^2 - 38x - 15$$

$6x^3 - 23x^2 - 38x + 15$	M1	for method to find the product of any two linear expressions (3 out of 4 terms correct or 4 correct terms ignoring signs) eg $6x^2 + 9x - 2x - 3$ or $3x^2 - 15x - x + 5$ or $2x^2 - 10x + 3x - 15$	Note that, for example, $7x - 3$ in expansion of $(3x - 1)(2x + 3)$ is regarded as 3 correct terms Do not award this mark for eg $6x^2 + 9x - 2x - 3 + 3x^2 - 15x - x + 5$
	M1	for a complete method to obtain all terms, half of which are correct (ft their first product) eg $6x^3 + 7x^2 - 30x^2 - 35x - 3x + 15$ or $6x^3 + 9x^2 - 32x^2 - 48x + 10x + 15$ or $6x^3 - 2x^2 - 21x^2 - 45x + 7x + 15$	First product must be quadratic with at least 3 terms but need not be simplified or may be simplified incorrectly
	A1	cao	

H P1 Q17 a

(a) Rationalise the denominator of $\frac{1}{\sqrt{7}}$

$$\frac{1}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}}$$

$$= \frac{\sqrt{7}}{7}$$

(a)

$$\frac{\sqrt{7}}{7}$$

B1

for $\frac{\sqrt{7}}{7}$ or $\frac{k\sqrt{7}}{7k}$ or $\frac{\sqrt{7k^2}}{7k}$ where k is an integer not equal to 0

H P1 Q17 b

(b) Simplify fully $\sqrt{80} - \sqrt{5}$

$$\sqrt{80} = 2\sqrt{20}$$

$$\begin{array}{r} 80 \div 4 = 20 \\ 40 \div 2 = 20 \\ 20 \div 1 = 20 \end{array}$$

$$\begin{aligned} 2\sqrt{20} - \sqrt{5} \\ = 2\sqrt{15} \end{aligned}$$

$$\underline{2\sqrt{15}}$$

(b)	$3\sqrt{5}$	M1	for writing $\sqrt{80}$ as $\sqrt{16 \times 5}$ or $\sqrt{16} \times \sqrt{5}$ or $4\sqrt{5}$
		A1	for $3\sqrt{5}$ or $\sqrt{45}$

H P1 Q18

Show that $0.\dot{1}\dot{5} + 0.2\dot{2}\dot{7}$ can be written in the form $\frac{m}{66}$ where m is an integer.

$$x = 0.15151515$$

$$x = 0.2272727$$

$$100x = 15.151515$$

$$1000x = 227.2727$$

$$0.2272$$

$$99x = 15$$

$$999x = 227.20455$$

Mark	Mark scheme	Additional guidance
M1	for $0.1515... + 0.22727... (= 0.37878... \text{ or } 0.3\dot{7}\dot{8})$	
M1	for finding two correct recurring decimals that when subtracted would result in a terminating decimal or integer, eg $(1000x - 10x \Rightarrow) 378.7878... - 3.7878... (= 375) \text{ or } \frac{375}{990}$ or $(100x - x \Rightarrow) 37.8787... - 0.37878... (= 37.5) \text{ or } \frac{37.5}{99}$	Recurring decimal notation acceptable for this mark
C1	for correct working leading to $\frac{25}{66}$ OR	
M1	for start of a method to convert $0.1515... \text{ or } 0.22727... \text{ to a fraction,}$ eg $100x = 15.1515... \text{ or } \frac{15}{99} \text{ or } \frac{5}{33} \text{ oe}$ or $10y = 2.2727... \text{ or } 100y = 22.7272... \text{ or } 1000y = 227.2727... \text{ or } \frac{225}{990} \text{ or } \frac{22.5}{99} \text{ or } \frac{5}{22} \text{ oe}$	Recurring decimal notation acceptable for both M marks
M1	for a method to convert $0.1515... \text{ and } 0.22727... \text{ to fractions,}$ eg $(100x - x \Rightarrow) 15.1515... - 0.1515... (= 15) \text{ or } \frac{15}{99} \text{ or } \frac{5}{33} \text{ oe}$ and $(1000y - 10y \Rightarrow) 227.2727... - 2.2727... (= 225)$ or $(100y - y \Rightarrow) 22.7272... - 0.22727... (= 22.5)$ or $\frac{225}{990} \text{ or } \frac{22.5}{99} \text{ or } \frac{5}{22} \text{ oe}$	
C1	for correct working leading to $\frac{25}{66}$	

H P1 Q18

Show that $0.\dot{1}\dot{5} + 0.2\dot{2}\dot{7}$ can be written in the form $\frac{m}{66}$ where m is an integer.

$$0.\dot{1}\dot{5} = x$$

$$15.\dot{1}\dot{5} = 100x$$

$$15 = 99x = \frac{15}{99} = \frac{5}{33}$$

$$0.2\dot{2}\dot{7} = x$$

$$22.7\dot{2}\dot{7} = 100x$$

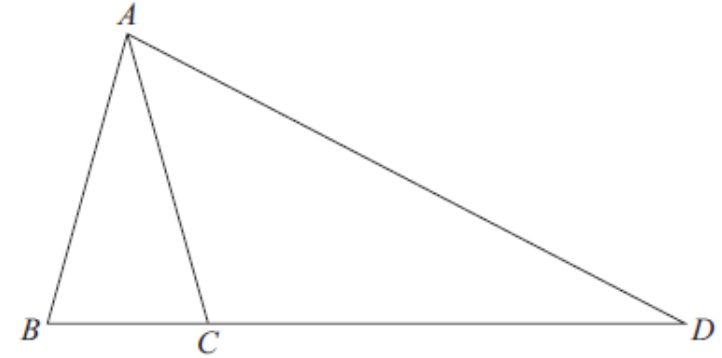
$$99x = 22.5 = \frac{22.5}{99} = \frac{7.5}{33}$$

$$\frac{5}{33} + \frac{7.5}{33} = \frac{12.5}{33} \quad m = 12.5$$

Mark	Mark scheme	Additional guidance
M1	for $0.1515... + 0.22727... (= 0.37878... \text{ or } 0.3\dot{7}\dot{8})$	
M1	for finding two correct recurring decimals that when subtracted would result in a terminating decimal or integer, eg $(1000x - 10x =) 378.7878... - 3.7878... (= 375) \text{ or } \frac{375}{990}$ or $(100x - x =) 37.8787... - 0.37878... (= 37.5) \text{ or } \frac{37.5}{99}$	Recurring decimal notation acceptable for this mark
C1	for correct working leading to $\frac{25}{66}$ OR	
M1	for start of a method to convert $0.1515...$ or $0.22727...$ to a fraction, eg $100x = 15.1515... \text{ or } \frac{15}{99} \text{ or } \frac{5}{33} \text{ oe}$ or $10y = 2.2727... \text{ or } 100y = 22.7272... \text{ or } 1000y = 227.2727...$ or $\frac{225}{990} \text{ or } \frac{22.5}{99} \text{ or } \frac{5}{22} \text{ oe}$	Recurring decimal notation acceptable for both M marks
M1	for a method to convert $0.1515...$ and $0.22727...$ to fractions, eg $(100x - x =) 15.1515... - 0.1515... (= 15) \text{ or } \frac{15}{99} \text{ or } \frac{5}{33} \text{ oe}$ and $(1000y - 10y =) 227.2727... - 2.2727... (= 225)$ or $(100y - y =) 22.7272... - 0.22727... (= 22.5)$ or $\frac{225}{990} \text{ or } \frac{22.5}{99} \text{ or } \frac{5}{22} \text{ oe}$	
C1	for correct working leading to $\frac{25}{66}$	

H P1 Q19

19



ABC and DAB are similar isosceles triangles.

$$AB = AC$$

$$AD = BD$$

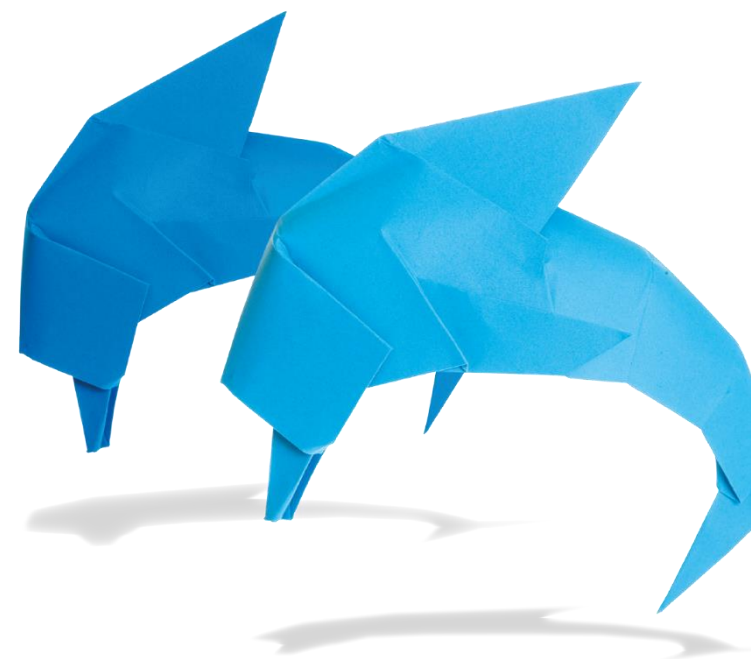
$$BC : CD = 4 : 21$$

Find the ratio $AB : AD$

2.5

ANSWER	MARKS	MARK SCHEME	ADDITIONAL GUIDANCE
2 : 5	P1	for using similar triangles to form an equation eg $\frac{AB}{BC} = \frac{AD}{AB}$ oe or $\frac{AB}{4} = \frac{25}{AB}$ oe or $\frac{AB}{4k} = \frac{25k}{AB}$ oe or $AB : 4 = 25 : AB$ oe or $BC \times sf = BD \div sf$ oe or $4 \times sf = 25 \div sf$ oe or for working with the perpendicular height of triangle ABC eg $(h^2 =) 25^2 - 23^2 (= 96)$ or $(h =) \sqrt{25^2 - 23^2} (= \sqrt{96})$	May use x or any other letter for AB Accept $AB = 4 \times sf$, $AB = 25 \div sf$
	P1	for process to find AB eg $(AB =) \sqrt{4 \times 25} (= 10)$ oe or $\sqrt{96} + 2^2 (= 10)$	
	A1	or for process to find the scale factor eg $\sqrt{\frac{25}{4}} (= \frac{5}{2})$ oe oe	

Foundation P2



Examiners Reports – F P2

This paper appears to have been accessible to the majority of students with evidence of clear working shown throughout the paper. Due to the differentiation and ramping of the level of demand, some questions, mainly towards the end of the paper, were not as well answered by students.

This paper requires the use of a calculator, and students are expected to have access to and have a reasonable working knowledge of how to use a calculator. Similarly to previous exam series, there is evidence that some students continue to try to use written methods even when they have a calculator. This often means that calculations take longer and there is an increased chance of final answers being inaccurate, often due to premature rounding as seen in Q23. Break-down or build-up methods were used in attempts to work with percentages and as with previous exam series, this approach is often far less successful than the more direct approach of using a calculator method.

Additionally, a ruler, protractor and compasses were required for this paper, with evidence suggesting that some students did not have access to all of these items. It is essential that students have a full set of the required equipment when sitting a GCSE mathematics paper.

Students should carefully read the question fully and ensure they read both the numbers given in the question and their own handwriting carefully. Inaccurate reading leads to inaccurate answers and will mean that students lose marks unnecessarily. Similarly, poor handwriting and layout of work remains a big problem. The inclusion of working out to support answers is essential to gain full credit but remains an issue for many. Working out not only needs to be shown, it also needs to be shown in a clear and logical manner, demonstrating the processes of calculation that are used. This is most important in longer questions, and in “show that” questions. Contradictory work also remains a common cause of lost marks due to a range of approaches being attempted and the method intended to be marked was not always clearly identified but this was less apparent in this series, which was pleasing to note.

F P2 Q7c

(c) In the space below, draw a hexagon.



(c)

6-sided shape

B1

for a 6-sided shape

Allow free hand drawing

F P2 Q9

- 9 Anil has a job as a driver.
He is paid for each mile he drives.
He is also paid expenses.

One week Anil writes down the distance readings from his car.

Start of week:	4	7	2	4	1	miles
End of week:	4	7	8	7	9	miles

For this week, Anil is paid 47p for each mile he drives.
He is also paid expenses of £80

Work out the total amount that Anil is paid.
Give your answer in pounds.

$$4 - 4 = 0$$

$$7 - 7 = 0$$

$$8 - 2 = 6$$

$$7 - 4 = 3$$

$$9 - 1 = 8$$

$$6 + 3 + 8 = 17$$

$$0.47 \times 17 = 7.99$$

$$7.99 + 80$$

$$= 87.99$$

379.86	P1	for process to work with number of miles or cost, eg $47879 - 47241 (= 638)$ or $47879 \times 47 (= 2250313)$ or $47241 \times 47 (= 2220327)$ or $[\text{mileage}] \times 47$	working may be seen in £ or pence throughout
	P1	for process to work with miles and cost, eg $"638" \times 47 (= 29986)$ or $"638" \times 0.47 (= 299.86)$ or $"2250313" - "2220327" (= 29986)$	
	B1	(indep) for converting between pence and pounds, eg $"29986" \div 100$ or $47 \div 100 (= 0.47)$ or 80×100 OR miles divided by 100, eg $"638" \div 100 (= 6.38)$ or $47879 \div 100 (= 478.79)$ and $47241 \div 100 (= 472.41)$	$[\text{mileage}]$ is any value they consider to be mileage
	A1	for 379.86	

F P2 Q9

- 9 Anil has a job as a driver.
He is paid for each mile he drives.
He is also paid expenses.

One week Anil writes down the distance readings from his car.

Start of week:	4	7	2	4	1	miles
End of week:	4	7	8	7	9	miles

For this week, Anil is paid 47p for each mile he drives.
He is also paid expenses of £80

Work out the total amount that Anil is paid.
Give your answer in pounds.

458 miles

$$\begin{array}{r} 47241 \\ - 47879 \\ \hline 458 \end{array}$$

$$458 \times 0.47 = 215.26$$

$$215.26 + 80 = \text{£}295.26$$

379.86	P1	for process to work with number of miles or cost, eg $47879 - 47241 (= 638)$ or $47879 \times 47 (= 2250313)$ or $47241 \times 47 (= 2220327)$ or [mileage] $\times 47$	working may be seen in £ or pence throughout
	P1	for process to work with miles and cost, eg " 638 " $\times 47 (= 29986)$ or " 638 " $\times 0.47 (= 299.86)$ or " 2250313 " - " 2220327 " $(= 29986)$	[mileage] is any value they consider to be mileage
	B1	(indep) for converting between pence and pounds, eg " 29986 " $\div 100$ or $47 \div 100 (= 0.47)$ or 80×100 OR miles divided by 100, eg " 638 " $\div 100 (= 6.38)$ or $47879 \div 100 (= 478.79)$ and $47241 \div 100 (= 472.41)$	
	A1	for 379.86	

F P2 Q9

- 9 Anil has a job as a driver.
He is paid for each mile he drives.
He is also paid expenses.

One week Anil writes down the distance readings from his car.

Start of week:	4	7	2	4	1	miles
End of week:	4	7	8	7	9	miles

For this week, Anil is paid 47p for each mile he drives.
He is also paid expenses of £80

Work out the total amount that Anil is paid.
Give your answer in pounds.

$$8 \times 0.47 = 3.76$$

$$14 \times 0.47 = 6.58$$

$$10 \times 0.47 = 4.7$$

$$11 \times 0.47 = 5.17$$

$$10 \times 0.47 = 4.7$$

$$\underline{24.91}$$

$$24.91 + 80$$

$$= \underline{104.91}$$

379.86	P1	for process to work with number of miles or cost, eg $47879 - 47241 (= 638)$ or $47879 \times 47 (= 2250313)$ or $47241 \times 47 (= 2220327)$ or [mileage] $\times 47$	working may be seen in £ or pence throughout
	P1	for process to work with miles and cost, eg $"638" \times 47 (= 29986)$ or $"638" \times 0.47 (= 299.86)$ or $"2250313" - "2220327" (= 29986)$	
	B1	(indep) for converting between pence and pounds, eg $"29986" \div 100$ or $47 \div 100 (= 0.47)$ or 80×100 OR miles divided by 100, eg $"638" \div 100 (= 6.38)$ or $47879 \div 100 (= 478.79)$ and $47241 \div 100 (= 472.41)$	[mileage] is any value they consider to be mileage
	A1	for 379.86	

F P2 Q10

10 Anita throws a coin 3 times.

Each time the coin can land on heads (H) or tails (T).

List all the possible outcomes.

H T T T T H H H
H H T T H H T T
H H H T T T T H

(Total for Question 10 is 2 marks)

HHH, HHT, HTH,
HTT, THH, THT,
TTH, TTT

M1

for at least 3 correct outcomes from HHH, HHT, HTH, HTT, THH, THT, TTH, TTT ignoring extras and repeats

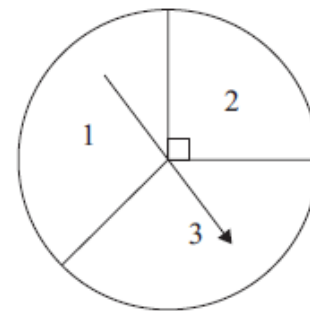
May be written in words

A1

for all 8 outcomes with no extras or repeats

F P2 Q11

11 Majid has a spinner.



Majid is going to spin the arrow.

The arrow can land on 1 or on 2 or on 3

Majid says,

“The probability that the arrow will land on 2 is $\frac{1}{3}$ because the spinner has three sections.”

Is Majid correct?

You must give a reason for your answer.

he is kinda right. Yes, it has 3 sections but the sections aren't equal

Answer	Mark	Mark scheme
No with reason	C1	<p>No with reason</p> <p>Acceptable reasons:</p> <p>(The sections are) not the same size or the angles are not the same</p> <p>(The arrow is) more likely to land on 1 or 3 than on 2</p> <p>(The probability for) 2 should be $\frac{1}{4}$</p> <p>2 has a 90° angle but 1 and 3 both have obtuse angles or 135° each</p> <p>2 has a 90° angle but the others are bigger</p> <p>2 has a smaller area</p> <p>(the sections have) different sizes/angles/areas</p> <p>(the spinner is) not split equally</p> <p>(the angle for) 2 would be 120 not 90</p> <p>(The angle for) 2 would be 120 or all angles would be 120</p> <p>(landing on) 2 is less than a third</p> <p>the chances for the other two are higher than (for) 2</p> <p>Not acceptable:</p> <p>Yes with any reason given</p> <p>No it should be $\frac{2}{3}$</p> <p>(No because) 2 has a 90° angle</p> <p>the bigger the angle the more likely</p>

F P2 Q12

2 Saira buys 24 bars of chocolate.

$\frac{2}{3}$ of the 24 bars are white chocolate.

The rest of the 24 bars are milk chocolate.

Each milk chocolate bar has a weight of 35 grams.

Work out the total weight of the milk chocolate bars that Saira buys.

$$\begin{aligned} \frac{2}{3} &= 0.6 & 24 \times 0.6 &= 14 \\ \text{white} &= 14 & 10 \times 35 &= \\ \text{milk} &= 10 & \underline{350g} & \end{aligned}$$

280	P1	for process to find the number of bars of white chocolate or milk chocolate, eg $24 \div 3 \times 2$ oe (= 16) or $24 \div 3$ (= 8) or for process to work with total weight of chocolate, eg 24×35 (= 840)	Allow use of 0.66.. or better or 0.33.. or better for both process marks
	P1	for complete process, eg $(24 - "16") \times 35$ or $"8" \times 35$ or $"840" \div 3$	Award P2 for an answer of 560
	A1	cao	

F P2 Q12

2 Saira buys 24 bars of chocolate.

$\frac{2}{3}$ of the 24 bars are white chocolate.

The rest of the 24 bars are milk chocolate.

Each milk chocolate bar has a weight of 35 grams.

Work out the total weight of the milk chocolate bars that Saira buys.

$$\begin{array}{r} 12 \\ 2 \overline{) 24} \end{array}$$

$$\begin{array}{r} 12 \\ \times 35 \\ \hline 60 \\ 360 \\ \hline 420 \end{array}$$

$$\underline{420g}$$

280	P1	for process to find the number of bars of white chocolate or milk chocolate, eg $24 \div 3 \times 2$ oe (= 16) or $24 \div 3$ (= 8) or for process to work with total weight of chocolate, eg 24×35 (= 840)	Allow use of 0.66.. or better or 0.33.. or better for both process marks
	P1	for complete process, eg $(24 - "16") \times 35$ or $"8" \times 35$ or $"840" \div 3$	Award P2 for an answer of 560
	A1	cao	

F P2 Q13b

$$T = x + 2y$$

$$x = 3 \text{ and } y = -4$$

(b) Work out the value of T .

$$-4 \times 2 = -8$$

$$3 + -8 = -5$$

$$T = \dots\dots\dots$$

(b)	- 5	M1	for $3 + 2 \times -4 (= 3 - 8)$
		A1	cao

F P2 Q14a

14 On Monday, Lizzie cycled 36 kilometres in 3 hours.

(a) Work out Lizzie's average speed.

$$36 \div 3 = 12$$

$$36 \times 3 = 108$$

108 kilometres per hour
(2)

12

M1

for method to find speed, eg $36 \div 3$ or $\frac{36}{3}$

Condone $36 \div (3 \times 60)$

A1

cao

F P2 Q15

15 £3500 is invested in a bank for 6 years.
The bank pays **simple** interest at a rate of 2.5% per year.

Work out the total amount of simple interest paid.

$$3500 = 100\%$$

$$350 = 10\%$$

$$35 = 1\%$$

$$17.5 = 0.5\%$$

$$2\% = 70$$

$$2.5\% = 87.5$$

$$87.5 \times 6 = 525$$

525

525	M1	for method to find the interest after one year, eg $3500 \times 2.5 \div 100 (= 87.5)$ oe or $0.025 \times 6 (= 0.15)$ oe or for a complete method, eg $3500 \times 2.5 \times 6 \div 100$ oe or for 4025 or 2975	May be implied by, eg 3587.5(0) Award M1 for 3500×1.025^n
	A1	cao	

F P2 Q15

15 £3500 is invested in a bank for 6 years.
The bank pays **simple** interest at a rate of 2.5% per year.

Work out the total amount of simple interest paid.

$$2.5 \times 6 = 15$$

$$3500 \div 15 = 233.3$$

$$\underline{233.30}$$

525

M1

for method to find the interest after one year,
eg $3500 \times 2.5 \div 100 (= 87.5)$ oe
or $0.025 \times 6 (= 0.15)$ oe
or for a complete method, eg $3500 \times 2.5 \times 6 \div 100$ oe
or for 4025 or 2975

A1

cao

May be implied by, eg 3587.5(0)
Award M1 for 3500×1.025^n

F P2 Q19

19 (a) Work out the value of $\frac{\sqrt{35.2 + 1.7^3}}{4.6^2 - 8.91}$

Write down all the numbers on your calculator display.

5.149969259

(2)

(b) Write your answer to part (a) correct to 2 significant figures.

5.1

(1)

(Total for Question 19 is 3 marks)

(a)	0.517(0189759)	M1	for any correct partial calculation, eg 40.113 or 6.333(482454) or 12.25 or answer of 0.51 or 0.52 or digits 517...	Answer must be given to at least 3 decimal places rounded or truncated. Check first 3 significant figures only.
		A1	for 0.517(...)	
(b)	0.52	B1	for 0.52 or ft their answer to part (a) correctly rounded to 2 sf, provided part (a) has at least 3 sf	Do not accept trailing 0, eg 0.520

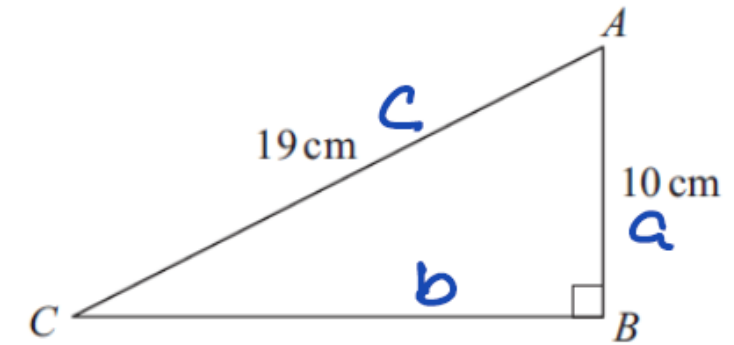
Foundation / Higher Crossover P2



F P2 Q20

H P2 Q1

0 ABC is a right-angled triangle.



Work out the length of CB .

Give your answer correct to 3 significant figures.

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

$$19^2 - 10^2 = 261$$

$$\sqrt{261} = 16.15549442$$

$$= 16.6$$

16.6

16.2	M1	for a correct first step to find BC , eg $19^2 = 10^2 + BC^2$ or $19^2 - 10^2 (= 261)$ or $\sqrt{19^2 - 10^2}$ or $\sqrt{261}$ or $3\sqrt{29}$	Can use alternative letter for BC provided intention is clear If using an alternative method using trigonometry must have BC as the only unknown
	A1	for answer in the range 16.1 to 16.2	ISW incorrect rounding if answer given in range

F P2 Q21a
H P2 Q2a

(a) Write 90 as a product of its prime factors.

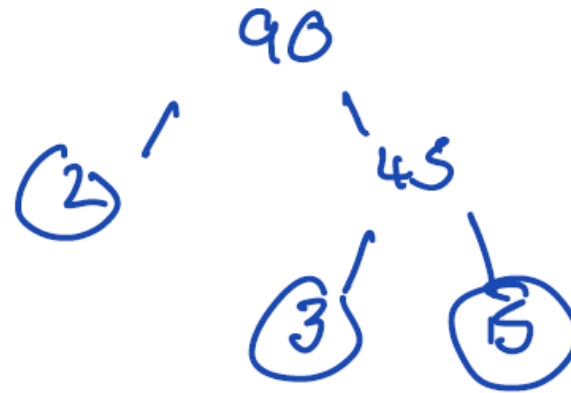


$$\underline{5 \times 2 \times 3 \times 3}$$

(a)	$2 \times 3 \times 3 \times 5$	M1	for a complete method to find prime factors; could be shown on a complete factor tree with no more than one error or by division by prime factors with no more than one error or for 2, 3, 3, 5	Condone the inclusion of 1 for this mark
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F P2 Q21a
H P2 Q2a

(a) Write 90 as a product of its prime factors.



$$\underline{2 \times 3 \times 5}$$

(a)	$2 \times 3 \times 3 \times 5$	M1	for a complete method to find prime factors; could be shown on a complete factor tree with no more than one error or by division by prime factors with no more than one error or for 2, 3, 3, 5	Condone the inclusion of 1 for this mark
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F P2 Q22

H P2 Q3

2 The number of hours, H , that some machines take to make 5000 bottles is given by

$$H = \frac{72}{n} \quad \text{where } n \text{ is the number of machines.}$$

On Monday, 6 machines made 5000 bottles.

On Tuesday, 9 machines made 5000 bottles.

The machines took more time to make the bottles on Monday than on Tuesday.

How much more time?

Handwritten solution:

$$\begin{aligned} \text{Monday } H &= \frac{5000}{6} = 833\frac{1}{3} \text{ or } \frac{2500}{3} \\ \text{Tuesday } H &= \frac{5000}{9} = 555\frac{5}{9} \\ \text{Difference} &= 833\frac{1}{3} - 555\frac{5}{9} = 277\frac{2}{9} \text{ hours} \end{aligned}$$

Alternative method:

$$\begin{aligned} 72 \div 6 &= 12 \text{ hours Monday} \\ 72 \div 9 &= 8 \text{ hours Tuesday} \\ \text{Difference} &= 12 - 8 = 4 \text{ hours} \end{aligned}$$

Final answer: 36 hours

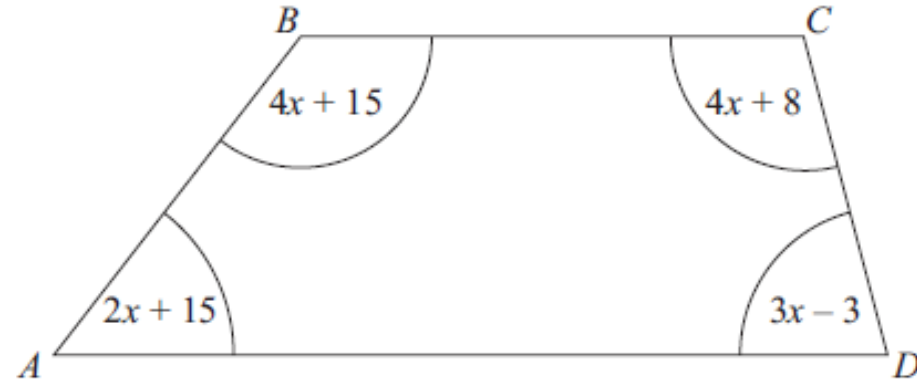
(Total for Question 22 is 2 marks)

4	M1	for method to use formula, eg $72 \div 6 (= 12)$ or $72 \div 9 (= 8)$	Can be implied by $\frac{72}{6}$ or $\frac{72}{9}$
	A1	cao	

F P2 Q26

H P2 Q7

$ABCD$ is a quadrilateral.



All angles are measured in degrees.

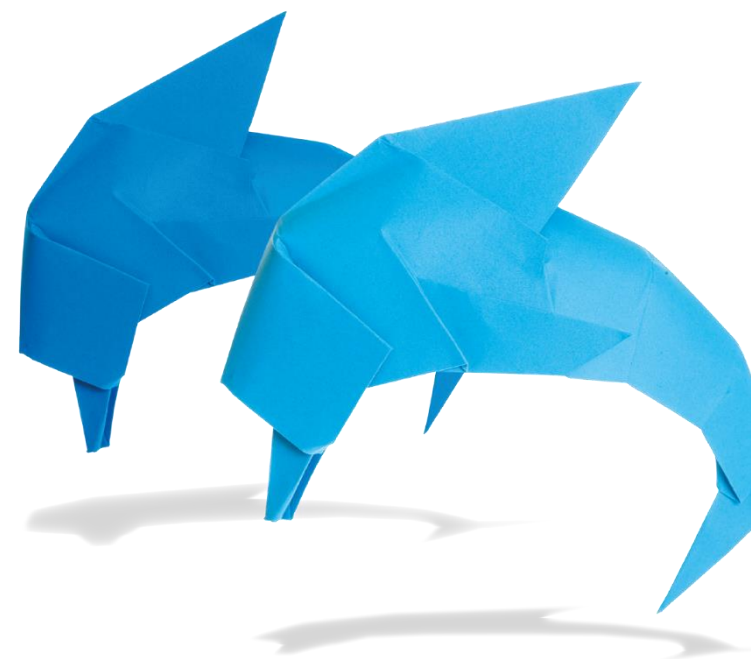
Show that $ABCD$ is a trapezium.

$$4x + 4x + 2x + 3x = 15 + 15 + 8 + 3 =$$

$$\begin{aligned} 13x + 35 &= 360 \\ - 35 &\quad - 35 \\ \hline 13x &= 325 \\ \frac{325}{13} &= 25 \\ x &= 25 \end{aligned}$$

Shown with reason given	M1	for deriving a suitable equation, eg $4x + 15 + 2x + 15 + 4x + 8 + 3x - 3 = 360$ or $13x + 35 = 360$ or $4x + 15 + 2x + 15 = 180$ or $6x + 30 = 180$ or $4x + 8 + 3x - 3 = 180$ or $7x + 5 = 180$	May be seen in an equation
	M1	(dep) for a method to isolate terms in x , eg $4x + 2x + 4x + 3x = 360 - 15 - 15 - 8 + 3$ or $4x + 2x = 180 - 15 - 15$ or $4x + 3x = 180 - 8 + 3$	
	A1	for solving equation to $x = 25$	
	C1	for substituting $x = 25$ into $A + B$ or $C + D$ and showing $= 180$, and gives a suitable statement, eg co-interior/allied angles (sum to 180), or since $A + B = 180$ the lines are parallel	If starting with an equation $= 180$ need to substitute into the opposite pair.
Shown	M1	Alternative solution assuming it is a trapezium for deriving a suitable equation, eg $4x + 15 + 2x + 15 = 4x + 8 + 3x - 3$ or $6x + 30 = 7x + 5$	
	M1	(dep) for a method to isolate terms in x , eg $15 + 15 - 8 + 3 = 4x + 3x - 4x - 2x$	
	A1	for solving equation to $x = 25$	
	C1	for a fully correct statement, eg since $A + B = 180$ the lines are parallel	

Higher P2



Examiners Reports – H P2

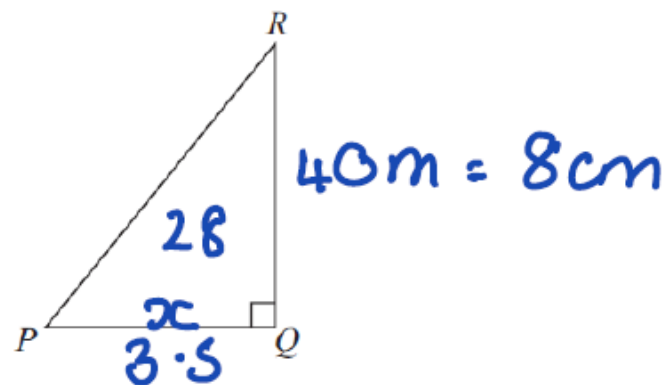
Most students showed attempts to answer most questions, and very few stopped early in the paper. This is really pleasing to see as it indicates that students are being appropriately entered at the appropriate tier of entry. There were questions of familiar style and content and this allowed the weakest to have some successes, whilst the harder questions allowed differentiation of the very strongest students.

Students continue to improve their ability to access problem solving questions, however, there is real evidence of students struggling to articulate their mathematics competently. Practice of mathematical discussions to aid the writing of explanations would benefit many.

As has been the case for a number of years now, there is little to no evidence of students being disadvantaged by a lack of equipment, and students continue to improve their skills on calculators. Students should be mindful to show all the stages of their working out, including that calculations they are entering into their calculator,

H P2 Q8

A playground is in the shape of a right-angled triangle.



Dan makes a scale drawing of the playground.

He uses a scale of 1 cm represents 5 m

The area of the playground on the scale drawing is 28 cm^2

The real length of QR is 40 m

Work out the real length of PQ .

$$\frac{40}{5} = 8$$

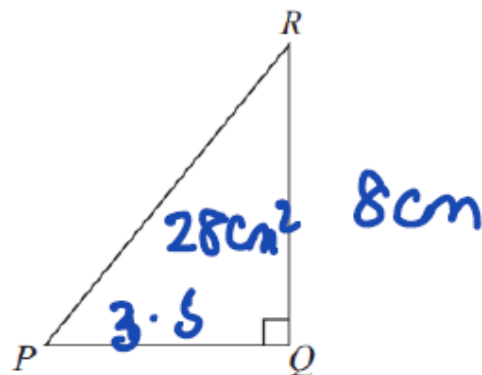
$$\frac{28}{8} = 3.5 \times 5 = 17.5\text{m}$$

17.5

Answer	Mark	Mark scheme	Additional guidance
35	P1	for one correct use of the given scale, eg $40 \div 5 (= 8)$ or $28 \times 5^2 (= 700)$	Can award these marks in either order
	P1	for process to use area of triangle, eg $28 = \frac{1}{2} \times PQ \times [QR]$ or $[area] = \frac{1}{2} \times PQ \times 40$	$[QR]$ must be clearly identified as the drawing length, and cannot be 40 $[area]$ must be clearly identified as the real area, and cannot be 28
	A1	cao	

H P2 Q8

A playground is in the shape of a right-angled triangle.



Dan makes a scale drawing of the playground.
He uses a scale of 1 cm represents 5 m

The area of the playground on the scale drawing is 28 cm^2

The real length of QR is 40 m

Work out the real length of PQ.

$$40 \div 5 = 8$$

$$28 \div 8 = 3.5$$

$$3.5 \times 8 = 28$$

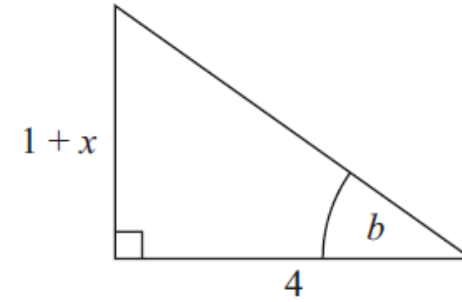
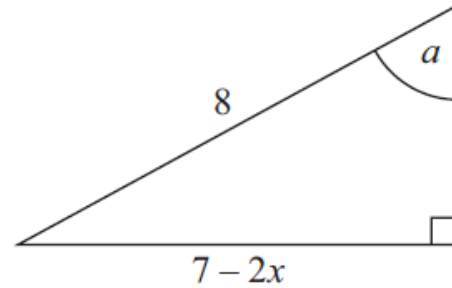
$$3.5 \times 5 = 17.5$$

$$\underline{17.5}$$

Answer	Mark	Mark scheme	Additional guidance
35	P1	for one correct use of the given scale, eg $40 \div 5 (= 8)$ or $28 \times 5^2 (= 700)$	Can award these marks in either order
	P1	for process to use area of triangle, eg $28 = \frac{1}{2} \times PQ \times [QR]$ or $[\text{area}] = \frac{1}{2} \times PQ \times 40$	$[QR]$ must be clearly identified as the drawing length, and cannot be 40 $[\text{area}]$ must be clearly identified as the real area, and cannot be 28
	A1	cao	

H P2 Q10

The diagram shows two right-angled triangles.



All lengths are measured in centimetres.

Given that

$$\sin a = \tan b$$

work out the value of x .

$$\sin(a) = \frac{7-2x}{8}$$

$$\tan(b) = \frac{1+x}{4}$$

$$\sin^{-1}\left(\frac{7-2x}{8}\right) = \tan^{-1}\left(\frac{1+x}{4}\right)$$

Answer	Mark	Mark scheme	Additional guidance
1.25	B1	for $(\sin a =) \frac{7-2x}{8}$ or $(\tan b =) \frac{1+x}{4}$	
	P1	for start of a process to solve $\frac{7-2x}{8} = \frac{1+x}{4}$, eg $4(7-2x) = 8(1+x)$ or $28-8x = 8+8x$ or $7-2x = 2(1+x)$ or $7-2x = 2+2x$ or $\frac{7-2x}{8} = \frac{2(1+x)}{8}$ or $\frac{7-2x}{8} = \frac{2x+2}{8}$	Must come from a correct equation
	A1	for 1.25 oe	

H P2 Q12

12 f is inversely proportional to d^2

$$f = 3.5 \text{ when } d = 8$$

(a) Find an equation for f in terms of d .

$$f \propto \frac{1}{d^2} \quad F = \frac{224}{d^2}$$

$$f = \frac{k}{d^2}$$

$$3.5 = \frac{k}{8^2}$$

$$k = 3.5 \times 64$$

$$f = \frac{224}{d^2}$$

(2)

(b) Find the positive value of d when $f = 10$

Give your answer correct to 3 significant figures.

$$10 = \frac{224}{d^2}$$

$$\begin{aligned} d^2 &= \frac{224}{10} \\ d^2 &= 22.4 \\ &= 4.73286 \\ d &= 4.73 \end{aligned}$$

(2)

Question	Answer	Mark	Mark scheme	Additional guidance
(a)	$f = \frac{224}{d^2}$	M1	for $3.5 = \frac{k}{8^2}$ oe ($k = 224$)	Accept use of \propto for the M mark
		A1	for $f = \frac{224}{d^2}$ oe	
(b)	4.73	M1	for $10 = \frac{224}{d^2}$ or $d^2 = "224" \div 10$ or ft their value for k provided $f = \frac{k}{d^2}$ is used	
		A1	for answer in range 4.73 to 4.733	

H P2 Q16

i Solve $(4x - 3)(x + 5) < 0$

$$4x - 3 = 0$$

$$+3 \quad +3$$

$$4x = 3$$

$$\div 4 \quad \div 4$$

$$x = \frac{3}{4}$$

$$\frac{3}{4} = 0.75$$

$$x + 5 = 0$$

$$-5 \quad -5$$

$$x = -5$$

$$-5 < x < \frac{3}{4}$$

M1

for critical values -5 and $\frac{3}{4}$ oe

A1

oe

Could be written as two
separate expressions,
eg $x > -5$ and $x < \frac{3}{4}$ oe

H P2 Q16

i Solve $(4x - 3)(x + 5) < 0$

$$4x^2 + 20x - 3x - 15 < 0$$

$$4x^2 + 17x - 15 < 0$$

$$x < 0.75$$

$$x < -0.5$$

$$x < 0.75 \text{ or } x < -5$$

$$-5 < x < \frac{3}{4}$$

M1

for critical values -5 and $\frac{3}{4}$ oe

A1

oe

Could be written as two separate expressions,
eg $x > -5$ and $x < \frac{3}{4}$ oe

H P2 Q17

L, M and P are three similar solid cylinders made from the same material.



L has a mass of 64 g

M has a mass of 125 g

M has a total surface area of 144 cm^2

P has a total surface area of 16 cm^2

Work out

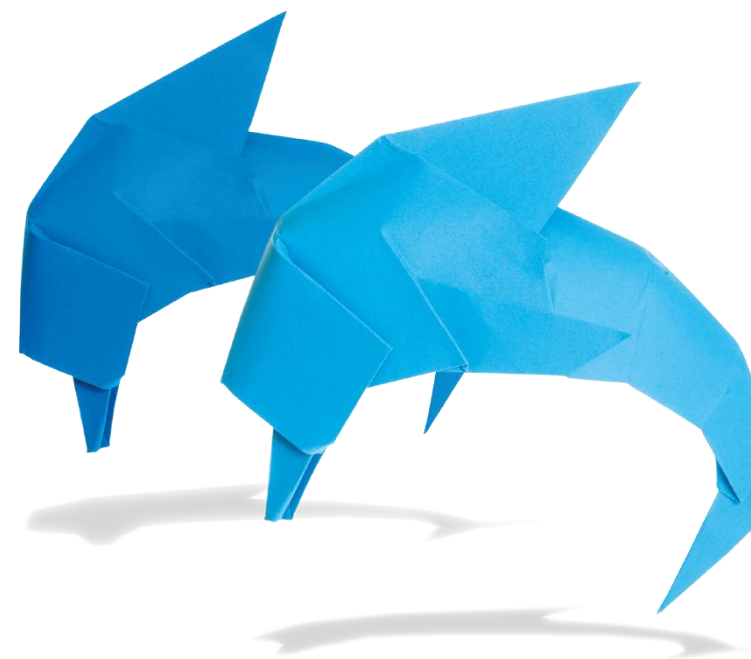
height of cylinder L : height of cylinder M : height of cylinder P

$\times 9$ area S.F.
 $\sqrt{\times 3} \div \text{height SF}$

m : p
 3 : 1

12 : 15 : 5	P1	for process to find ratio of heights of L and M eg $\sqrt[3]{64} : \sqrt[3]{125} (= 4 : 5)$ oe or $\sqrt[3]{\frac{64}{64}} : \sqrt[3]{\frac{125}{64}} (= 1 : 1.25)$ oe or $\sqrt[3]{\frac{64}{125}} : \sqrt[3]{\frac{125}{125}} (= 0.8 : 1)$ oe	Condone not written as a ratio as long as clear $\frac{125}{64} = 1.953... \quad \frac{64}{125} = 0.512$
	P1	for process to find ratio of heights of M and P eg $\sqrt{144} : \sqrt{16} (= 12 : 4 = 3 : 1)$ oe or $\sqrt{\frac{144}{16}} : \sqrt{\frac{16}{16}} (= 3 : 1)$ oe or $\sqrt{\frac{144}{144}} : \sqrt{\frac{16}{144}} (= 1 : 0.3)$ oe	Condone not written as a ratio as long as clear $\frac{144}{16} = 9 \quad \frac{16}{144} = 0.1$
	P1	(dep on P2) for process to find ratio of heights of all 3, eg "(4 : 5)" $\times 3$ and "(3 : 1)" $\times 5$ or $(1 : 1.25) \times 12$ and $(3 : 1) \times 5$ or $(0.8 : 1)$ and $(1 : 0.3)$	
	A1	for 12 : 15 : 5 oe	Can ISW incorrect simplification of a correct ratio

Foundation P3



Examiners Reports – F P3

This paper provided good coverage across the specification and allowed students the opportunity to demonstrate their ability across the grades. Plenty of success was seen across the early part of the paper as students showed confidence picking up marks in the first half of the paper. Students generally performed best on questions involving numerical processes, for example Q13 (two-way tables), Q15 (percentages of amounts) and Q17 (recipe problem).

Challenges arose when questions contained a context and with it, large amounts of text; extracting the key pieces of information and applying it using the correct mathematical processes are an area for improvement. The two questions that required a written explanation (Q18b and Q24a) also scored lowly and future cohorts should target this as an area for improvement. In general, the use of a calculator was evident, and the standard of responses continue to improve as a result. There were still a number of students choosing not to use their calculator; it was not clear if this was by choice or due to the absence of the correct equipment. It was felt that there were fewer students giving no response to questions than in previous years.

F P3 Q8

Aisha was born in 1993

There was an election in the year of Aisha's 18th birthday.

There is an election every 5 years.

Will there be an election in 2030?

You must show how you get your answer.

$$\begin{array}{r}
 1993 \\
 1994 \\
 1995 \\
 1996 \\
 1997 \\
 \hline
 98 \\
 99 \\
 2000 \\
 2001 \\
 2002 \\
 \hline
 3 \\
 4 \\
 5 \\
 6 \\
 7 \\
 \hline
 8 \\
 9 \\
 10 \\
 11
 \end{array}$$

$$\begin{array}{r}
 23 \\
 24 \\
 25 \\
 26 \\
 27 \\
 \hline
 28 \\
 29 \\
 30 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 2012 \\
 \hline
 13 \\
 14 \\
 15 \\
 16 \\
 17 \\
 \hline
 18 \\
 19 \\
 20 \\
 21 \\
 22 \\
 \hline
 \end{array}$$

No election in 2030

Answer	Mark	Mark Scheme	Additional guidance
No from correct figures	P1	for process to find year of Aisha's 18th birthday, eg $1993 + 18 (= 2011)$ or for process to find Aisha's age in 2030, eg $2030 - 1993 (= 37)$	
	P1	for process to find years of future elections, eg writes down 2011, 2016, 2021, 2026, 2031 or for $2011 + 4 \times 5 (= 2031)$ or or for process to find Aisha's age in years when there is an election, eg writes down 18 in 2011, 23 in 2016, 28 in 2021, 33 in 2026 and 38 in 2031 or for process to find years between 18th birthday and election eg $2030 - 2011 (= 19)$	At least 3 correct values needed At least 3 correct values needed, condone years missing eg 18, 23, 28,... without 2011, 2016, 2021...
	A1	for No with correct figures eg 2011 and 2026 or 2031 or for No with eg 37 and 33 or 38 or for No with 2011 (2016, 2021, ...) and explanation that election years end in 1 or 6, not 0 or for No with 2011 and explanation that 19 is not divisible by 5	

F P3 Q8

Aisha was born in 1993

There was an election in the year of Aisha's 18th birthday.

There is an election every 5 years.

Will there be an election in 2030?

You must show how you get your answer.

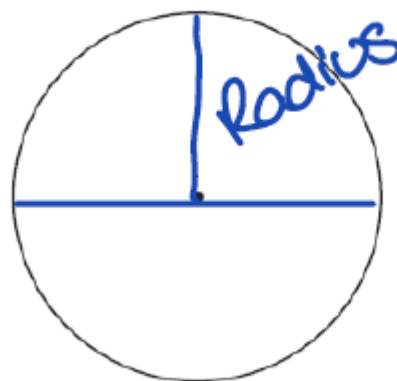
$$\begin{array}{r}
 1993 + 18 = 2011 \\
 \quad \quad \quad +5 \\
 2015 \\
 \quad \quad \quad +5 \\
 2020 \\
 \quad \quad \quad +5 \\
 2025 \\
 \quad \quad \quad +5 \\
 2030 .
 \end{array}$$

Yes there is an election
in 2030

Answer	Mark	Mark Scheme	Additional guidance
No from correct figures	P1	for process to find year of Aisha's 18th birthday, eg $1993 + 18 (= 2011)$ or for process to find Aisha's age in 2030, eg $2030 - 1993 (= 37)$	
	P1	for process to find years of future elections, eg writes down 2011, 2016, 2021, 2026, 2031 or for $2011 + 4 \times 5 (= 2031)$ oe or for process to find Aisha's age in years when there is an election, eg writes down 18 in 2011, 23 in 2016, 28 in 2021, 33 in 2026 and 38 in 2031 or for process to find years between 18th birthday and election eg $2030 - 2011 (= 19)$	At least 3 correct values needed At least 3 correct values needed, condone years missing eg 18, 23, 28,... without 2011, 2016, 2021...
	A1	for No with correct figures eg 2011 and 2026 or 2031 or for No with eg 37 and 33 or 38 or for No with 2011 (2016, 2021, ...) and explanation that election years end in 1 or 6, not 0 or for No with 2011 and explanation that 19 is not divisible by 5	

F P3 Q10a

10 Here is a circle.



(a) On the diagram above, draw a radius of the circle.

(1)

radius drawn	B1	for radius drawn	May be drawn freehand provided intention is clear
--------------	----	------------------	---

F P3 Q11

- 11 There are 8 episodes in a TV series.
Each episode lasts 45 minutes.

Work out the total time that the 8 episodes last.
Give your answer in hours.

$$8 \times 45 = 360$$

360 hours

(Total for Question 11 is 2 marks)

6

M1

for start to method, eg $45 \times 8 (= 360)$ or $(45 \text{ mins} =) 0.75$ oe (hours)

A1

cao

F P3 Q12

12 Write down three prime numbers that are between 20 and 40

21, 23, 25

3 of 23, 29, 31, 37	M1	for two correct and not more than one incorrect, eg 23, 27, 29	May be shown in working space. Ignore numbers less than 20 or greater than 40
	A1	for three correct and no incorrect	Accept 4 correct and no incorrect

F P3 Q12

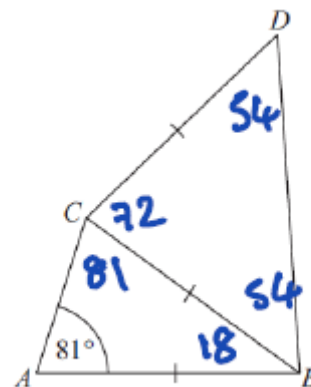
12 Write down three prime numbers that are between 20 and 40

23, 23, 31

3 of 23, 29, 31, 37	M1	for two correct and not more than one incorrect, eg 23, 27, 29	May be shown in working space. Ignore numbers less than 20 or greater than 40
	A1	for three correct and no incorrect	Accept 4 correct and no incorrect

ABC and BCD are isosceles triangles.

F P3 Q20



$AB = BC = CD$
Angle $CAB = 81^\circ$

Angle $BCD = 4 \times \text{angle } ABC$

Find

the size of angle ABC : the size of angle CBD

Give your answer in the form $1:n$

You must show all your working.

$$81 \times 4 =$$

$$81 + 81 = 162$$

$$180 - 162 = 18$$

$$4 \times 18 = 72$$

$$180 - 72 = 108$$

$$108 \div 2 = 54$$

$$18 : 54$$

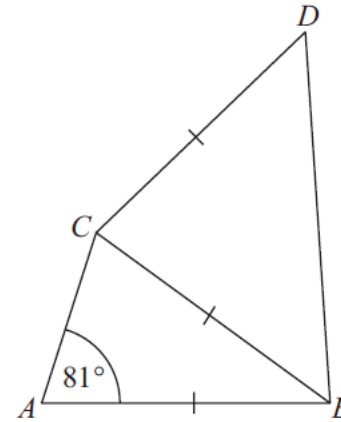
$$3 : n$$

$$\underline{3:n}$$

Answer	Mark	Mark scheme	Additional guidance
1 : 3	M1	for method to find angle ABC , eg $180 - 2 \times 81 (= 18)$ oe	Award first 3 marks for angles 18, 72, 54 marked on diagram provided not ambiguous
	M1	for method to find angle BCD , eg " $18 \times 4 (= 72)$ "	
	M1	for method to find angle CBD , eg $\frac{180 - "72"}{2} (= 54)$	
	M1	(dep M3) for writing as ratio, eg " $18 : 54$ " or for an answer of $1 : 3n$ or $3 : 1$	
	A1	(dep M3) for $1 : 3$ from correct working	Accept $n = 3$ $1 : 3$ or $n = 3$ without working scores 0 marks

ABC and BCD are isosceles triangles.

F P3 Q20



$$81 \times 4 = 324$$

$AB = BC = CD$
Angle $CAB = 81^\circ$

Angle $BCD = 4 \times \text{angle } ABC$

Find

the size of angle ABC : the size of angle CBD

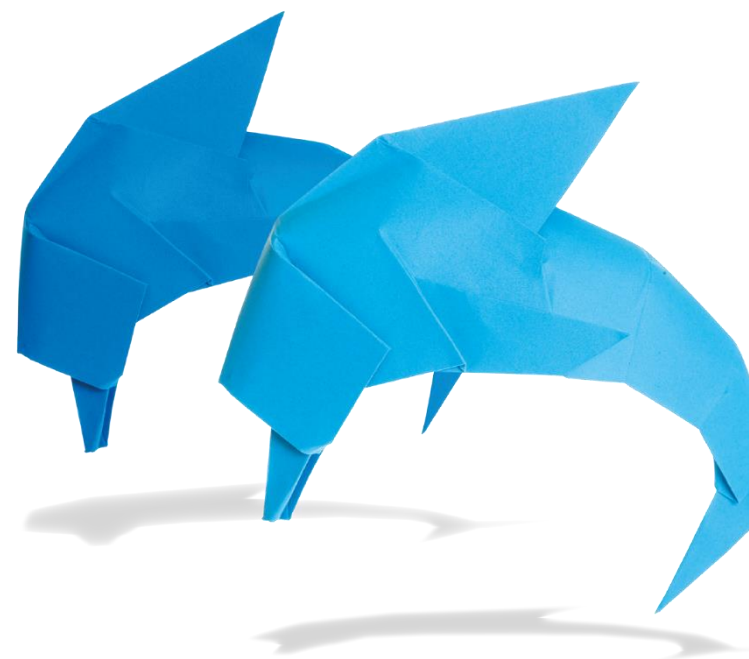
Give your answer in the form $1:n$

You must show all your working.

$$\underline{1:4}$$

Answer	Mark	Mark scheme	Additional guidance
1 : 3	M1	for method to find angle ABC , eg $180 - 2 \times 81 (= 18)$ oe	Award first 3 marks for angles 18, 72, 54 marked on diagram provided not ambiguous
	M1	for method to find angle BCD , eg " 18 " $\times 4 (= 72)$	
	M1	for method to find angle CBD , eg $\frac{180 - "72"}{2} (= 54)$	
	M1	(dep M3) for writing as ratio, eg " 18 " : " 54 " or for an answer of $1 : 3n$ or $3 : 1$	
	A1	(dep M3) for $1 : 3$ from correct working	Accept $n = 3$ $1 : 3$ or $n = 3$ without working scores 0 marks

Foundation / Higher Crossover P3



F P3 Q23b
H P3 Q2b

(b) Calculate the value of $9.7 \times 10^6 + 2.45 \times 10^7$
Give your answer in standard form.

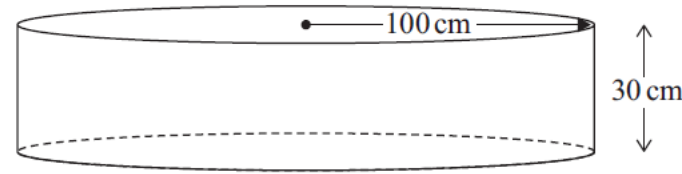
34200000

(b)	3.42×10^7	M1	<p>for 9 700 000 + 24 500 000 (= 34 200 000) or 3.42×10^n ($n \neq 7$) oe or 3.4×10^7 or correct answer in incorrect form eg 34.2×10^6 or both in a form ready for addition, eg $9.7 \times 10^6 + 24.5 \times 10^6$</p>
		A1	cao

F P3 Q28

H P3 Q7

A paddling pool is in the shape of a cylinder.



The pool has radius 100 cm.

The pool has depth 30 cm.

The pool is empty.

It is then filled with water at a rate of 250 cm^3 per second.

Work out the number of minutes it takes to fill the pool completely.

Give your answer correct to the nearest minute.

You must show all your working.

$$\begin{aligned}\text{area of circle} &= \pi r^2 \\ &= \pi \times 100^2 \\ &= 31415.92654\end{aligned}$$

$$\begin{aligned}31415.9262... \times 300 \\ = 942477.7961 \text{ cm}^3\end{aligned}$$

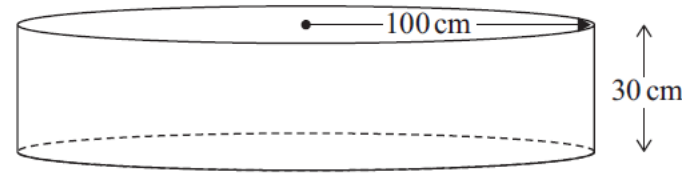
$$\begin{aligned}942477.7961 \div 250 \\ = 3769.91184 \\ = \underline{3770}\end{aligned}$$

63	P1	for process to find volume, eg $\pi \times 100^2 \times 30$ ($= 300000\pi$ or $942477(.796...)$)	1 (volume \Rightarrow) 942478 implies P1
	P1	for process to find time in seconds, eg " $942477(.796...)$ " \div 250 ($= 1200\pi$ or $3769(.911...)$) or [volume] \div 250 or for converting rate to minutes, eg 250×60 ($= 15000$)	(time \Rightarrow) 3770 implies P2 [volume] \neq 30, 60, 100, 250
	P1	for complete process, eg " $3769(.911...)$ " \div 60 ($= 20\pi$) or " $942477(.796...)$ " \div " 15000 " ($= 20\pi$)	
	A1	for answer in the range 62 to 63	A correct answer with no supportive working gets 0 marks If an answer is shown in the range in working and then incorrectly rounded award full marks

F P3 Q28

H P3 Q7

A paddling pool is in the shape of a cylinder.



The pool has radius 100 cm.

The pool has depth 30 cm.

The pool is empty.

It is then filled with water at a rate of 250 cm^3 per second.

Work out the number of minutes it takes to fill the pool complete!

Give your answer correct to the nearest minute.

You must show all your working.

$$\begin{aligned} \text{vol of cylinder} &= \pi r^2 \times \text{length} \\ &= 10000\pi \times 30 \\ &= 300000 \text{ cm}^3 \end{aligned}$$

$$\begin{aligned} 18 \times 250 \text{ cm}^3 &= 300000 \text{ cm}^3 \\ \frac{250x}{250} &= \frac{300000}{250} \end{aligned}$$

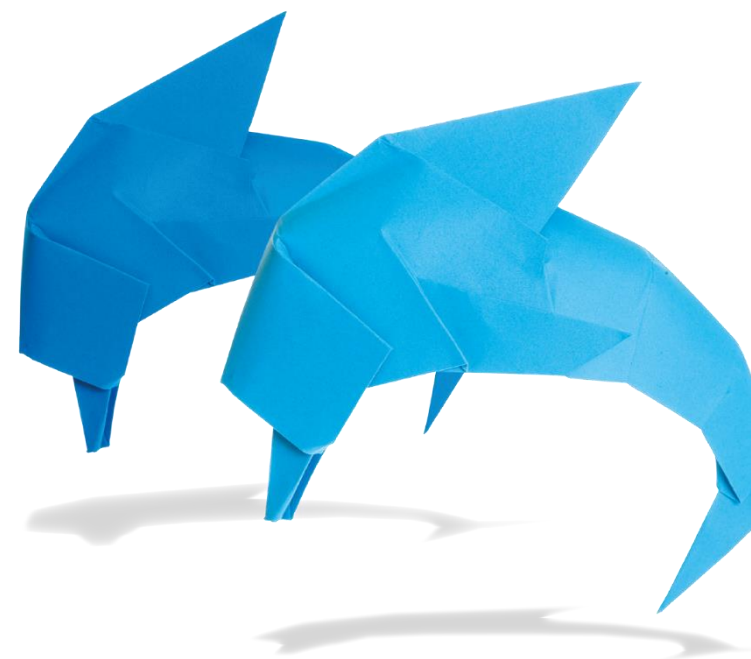
$$x = 1200 \text{ s}$$

$$60 \text{ s} = 1 \text{ min}$$

$$1200 \div 60 = 20 \text{ minutes}$$

63	P1	for process to find volume, eg $\pi \times 100^2 \times 30$ ($= 300000\pi$ or $942477(.796\dots)$)	(volume \Rightarrow) 942478 implies P1
	P1	for process to find time in seconds, eg " $942477(.796\dots) \div 250$ " ($= 1200\pi$ or $3769(.911\dots)$) or [volume] \div 250 or for converting rate to minutes, eg 250×60 ($= 15000$)	(time \Rightarrow) 3770 implies P2 [volume] \neq 30, 60, 100, 250
	P1	for complete process, eg " $3769(.911\dots) \div 60$ " ($= 20\pi$) or " $942477(.796\dots) \div 15000$ " ($= 20\pi$)	
	A1	for answer in the range 62 to 63	A correct answer with no supportive working gets 0 marks If an answer is shown in the range in working and then incorrectly rounded award full marks

Higher P3



Examiners Reports – H P3

Students generally were able to attempt many of the questions in the time available and to demonstrate their understanding of many of the topics that were being tested. It appeared that most students had been entered appropriately for the higher tier and as expected the first part of the paper was very well answered. Student's solutions were generally clearly and logically presented; this should be greatly encouraged as clear work and showing method and processes means that students have an increased access to marks, particularly those questions where the mark scheme allows for follow through of an incorrect value in the awarding of subsequent process marks (as denoted by square brackets in the mark scheme).

Given that this is a calculator paper, we still saw too many students seemingly not using a calculator when appropriate, or not using efficient calculator methods. For example, when calculating percentages, some students spent valuable time working out calculations by hand, such as 3.5% of a quantity, rather than inputting this into a calculator.

Whilst methods may have been learnt, students are still struggling applying that knowledge to those questions with a problem-solving element. We would encourage students to carefully read each question. All the information needed to answer problem-solving questions in particular, are presented in the text.

H P3 Q17

A ball is thrown upwards and reaches a maximum height.

The ball then falls and bounces repeatedly.

After the n th bounce, the ball reaches a height of h_n

After the next bounce, the ball reaches a height given by $h_{n+1} = 0.55h_n$

After the 1st bounce, the ball reaches a height of 8 metres.

What height does the ball reach after the 4th bounce?

$$1st \quad 0.55 \times 8 = 4.4$$

$$2nd \quad 0.55 \times \text{ANS} = 2.42$$

$$3rd \quad 0.55 \times \text{ANS} = 1.331$$

$$4th \quad 0.55 \times \text{ANS} = 0.73205$$

so 0.732

1.331	M1	for method to find height after 2nd bounce, eg $0.55 \times 8 (= 4.4)$	Award this mark for $0.55^n \times 8$ where $n > 1$
	M1	for method to find height after 3rd bounce, eg $0.55 \times "4.4" (= 2.4(2))$ or for method to find height after 4th bounce, eg $0.55^3 \times 8$ or for method to find height after 5th bounce, eg $0.55^4 \times 8 (= 0.73(205))$	
	A1	for 1.331, accept 1.33, 1.3 oe mixed number	If a correct answer is shown and then incorrectly rounded award full marks

H P3 Q17

A ball is thrown upwards and reaches a maximum height.

The ball then falls and bounces repeatedly.

After the n th bounce, the ball reaches a height of h_n

After the next bounce, the ball reaches a height given by $h_{n+1} = 0.55h_n$

After the 1st bounce, the ball reaches a height of 8 metres.

What height does the ball reach after the 4th bounce?

$$0.55 \times 8 + 1 = 5.4$$

$$0.55 \times 5.4 + 1 = 3.97$$

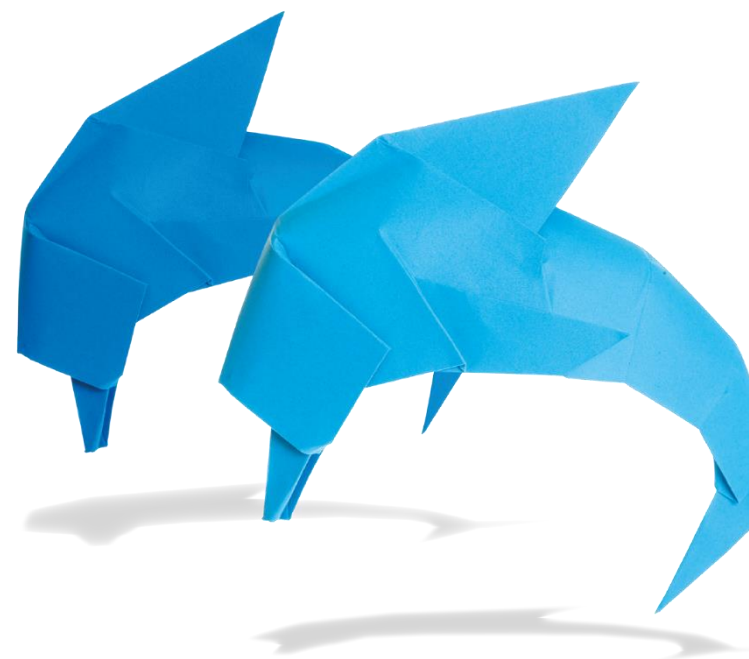
$$0.55 \times 3.97 + 1 = 3.1835$$

$$0.55 \times 3.1835 + 1 = 2.750925$$

$$\approx \underline{2.750925}$$

1.331	M1	for method to find height after 2nd bounce, eg $0.55 \times 8 (= 4.4)$	
	M1	for method to find height after 3rd bounce, eg $0.55 \times "4.4" (= 2.4(2))$ or for method to find height after 4th bounce, eg $0.55^3 \times 8$ or for method to find height after 5th bounce, eg $0.55^4 \times 8 (= 0.73(205))$	Award this mark for $0.55^n \times 8$ where $n > 1$
	A1	for 1.331, accept 1.33, 1.3 or mixed number	If a correct answer is shown and then incorrectly rounded award full marks

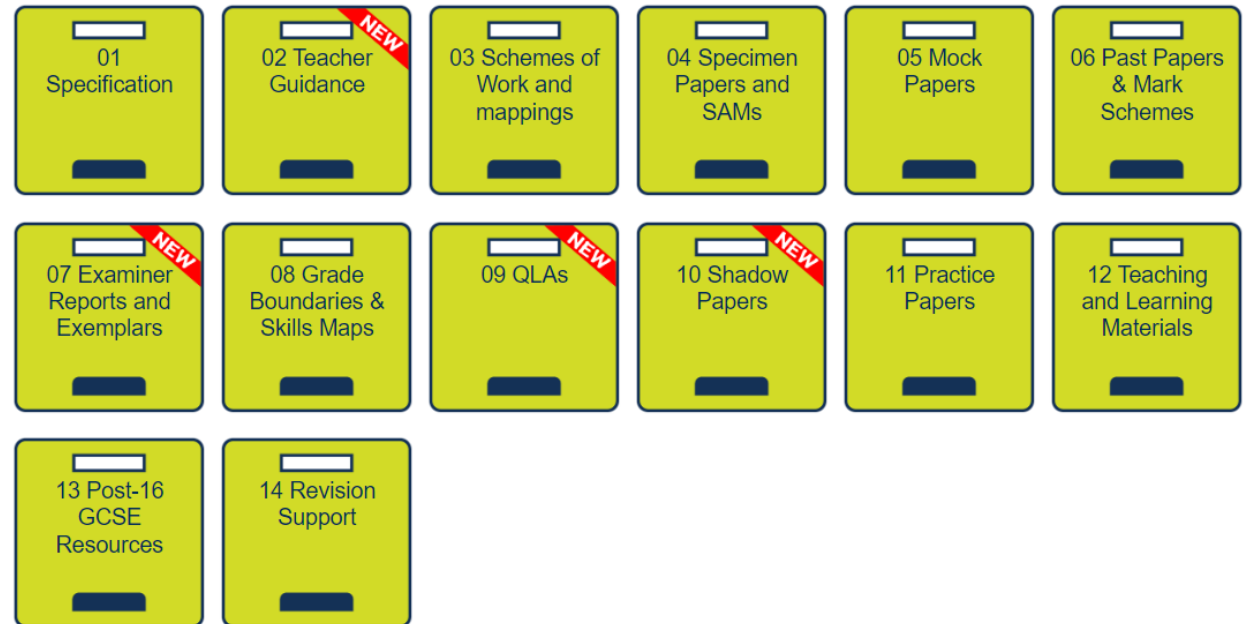
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Question 25 – Response A

3/4

25 Andy, Luke and Tina share some sweets in the ratio 1:6:14

Tina gives $\frac{3}{7}$ of her sweets to Andy.

Tina then gives $12\frac{1}{2}\%$ of the rest of her sweets to Luke.

Tina says,

“Now all three of us have the same number of sweets.”

Is Tina correct?

You must show how you get your answer.

C0

Tina is correct

A = ~~4.5~~ 31.5

L = ~~27~~ 31.5

T = ~~63~~ 31.5

27 + 4.5 = 31.5

100 ÷ 21 = 4.5

63 ÷ 7 = 9 × 3 = 27

53 - 27 = 30

30 - 4.5 = 31.5

4.5 + 27 = 31.5

P1

P1

P1

100% = 30

10% = 3.0

1% = 0.30

2% = 0.72

0.5% = 0.18

4.5%

12.5% = 4.5

Note: Students are allowed to choose a number for the total sweets they may have. Hopefully, it is a multiple of 21. If not, then you can allow decimal answers, rounded or truncated to 2 decimal places.

P1 Clearly shown process of 100/21 to find one share but there is an arithmetic error, it should be 4.76. Then correctly finds 3/7 of 63 = 27 as number given to Andy. The value 63 is Tina's 14 x 4.5).

P1 Subtracts this value from Tina's share and finds 12.5% of the remainder and adds to Luke.

P1 Finds all the final amounts for the three people.

C0 Not supported by correct figures due to the initial arithmetic error.

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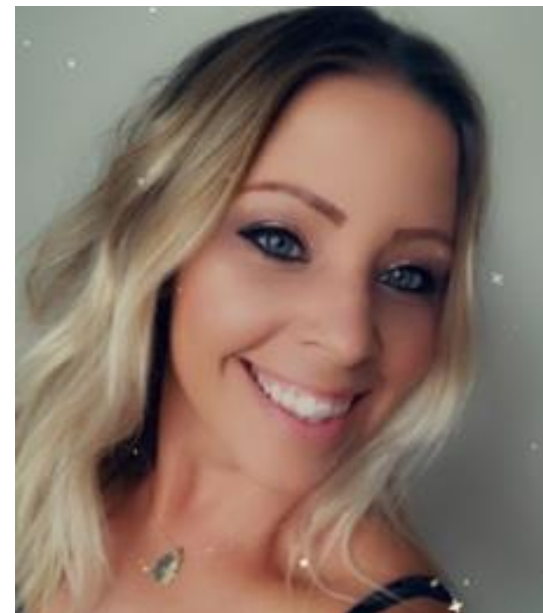
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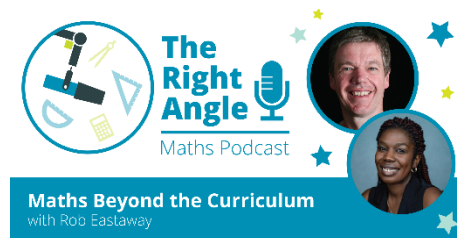
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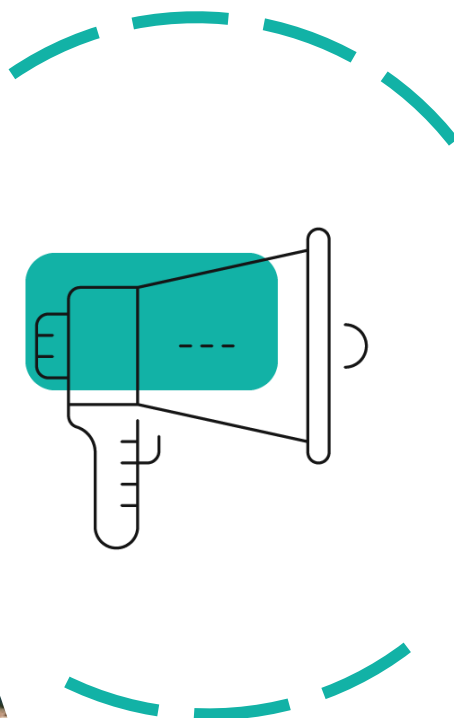
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