AQA
Realising potential

GCSE Maths: Answers and commentaries

Higher Tier – Paper 3

A closer look at the live questions from summer 2022

v1.0

Contents

Help prepare your GCSE Maths students with confidence

Every year in GCSE Maths exams, students often misread, misunderstand or misinterpret questions and don't always do what the question is asking them to do.

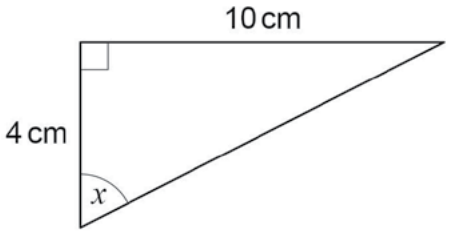
This booklet has been designed by our curriculum experts for you to use with your students to explore real responses. Inside you'll find best practice approaches, example responses, examiner commentaries and tips on how to access more marks.

Higher Tier – Paper 3

Question 4

4 Use trigonometry to work out the size of angle x.

Not drawn accurately

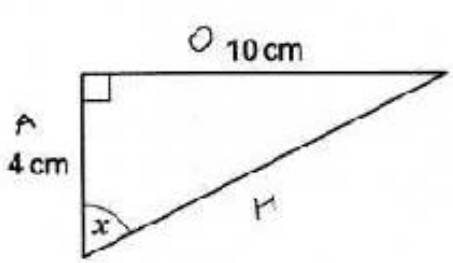


[3 marks]

$x =$ _____ °

Question 4, response 1

4 Use trigonometry to work out the size of angle x.



Not drawn accurately

[3 marks]

$4^2+10^2=116$ $\sqrt{116}=10.770329\ldots$

$\frac{\sin A}{a}=\frac{\sin B}{b}$ $\frac{\sin 90}{\sqrt{116}}\times 10=0.928$

$\sin^{-1}(0.928476\ldots)=68.2$

$x=$ 68.2 °

Commentary

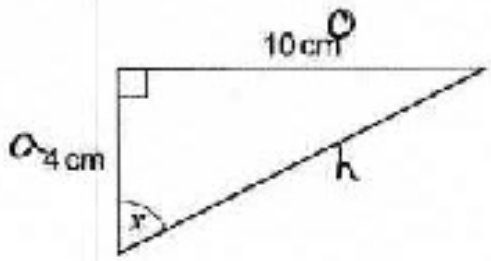
This is a fully correct solution, but inefficient. The student spotted early on to use the tan function, but then chose to use Pythagoras and the sine rule.

The sine rule is very unlikely to be assessed this early in the paper as it's a Higher tier only topic.

3 marks

Question 4, response 2

4 Use trigonometry to work out the size of angle x.



Not drawn accurately

[3 marks]

$\tan x = \frac{10}{4}$

$x = \tan^{-1}\left(\frac{10}{4}\right)$

$x = 68.1986$

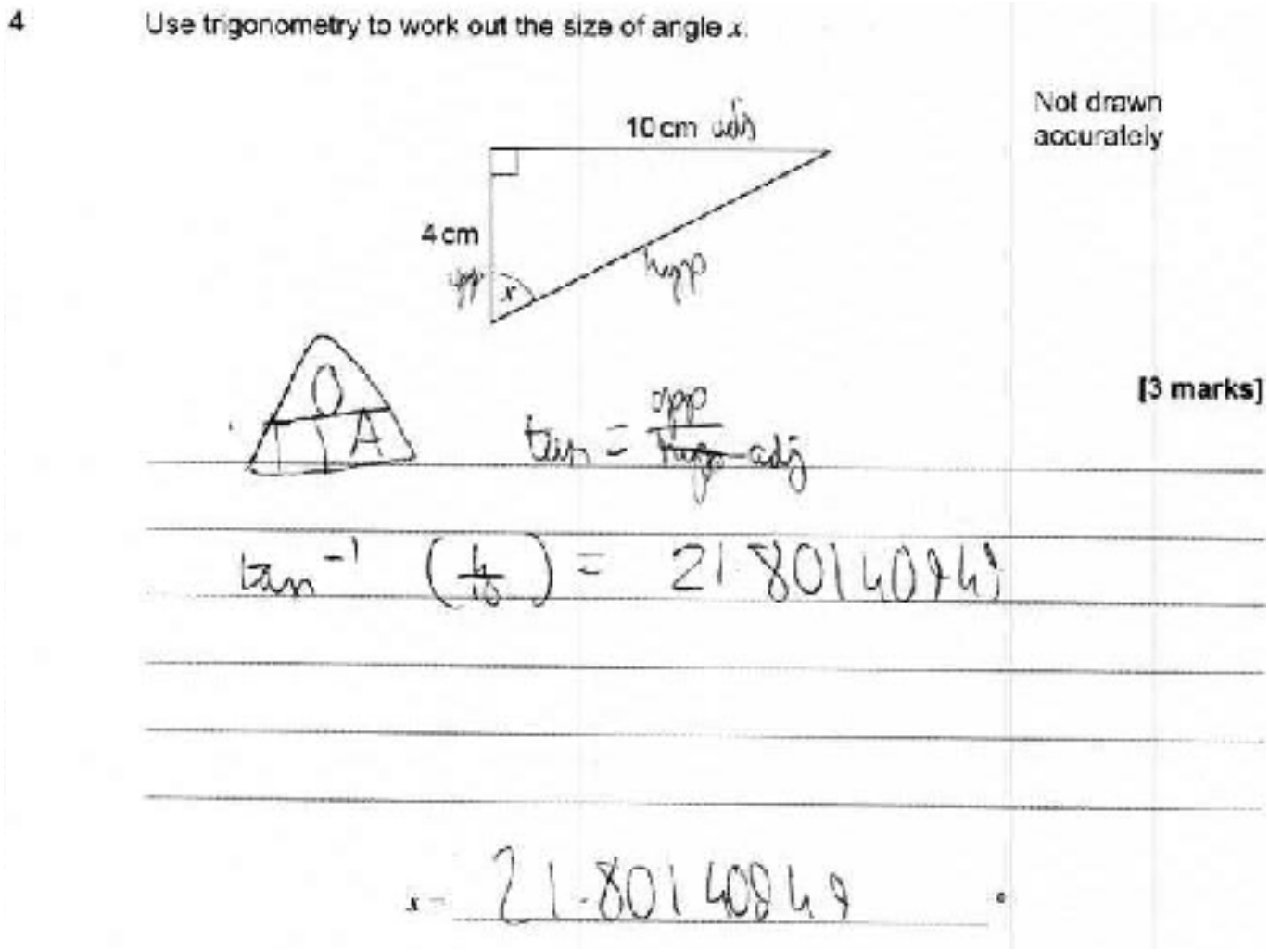
$x =$ 68.199 °

Commentary

This is a fully correct and efficient solution.

3 marks

Question 4, response 3



Commentary

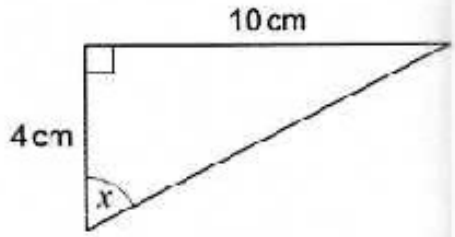
A common mistake was to label the triangle incorrectly.

Had the student labelled it correctly, they would have scored full marks.

1 mark

Question 4, response 4

4 Use trigonometry to work out the size of angle x.



Not drawn accurately

[3 marks]

$10^2 + 4^2 = x^2$

$10^2 + 4^2 = 116^2$

$\sqrt{116} = 10.8$

$x = 10.8$ °

Commentary

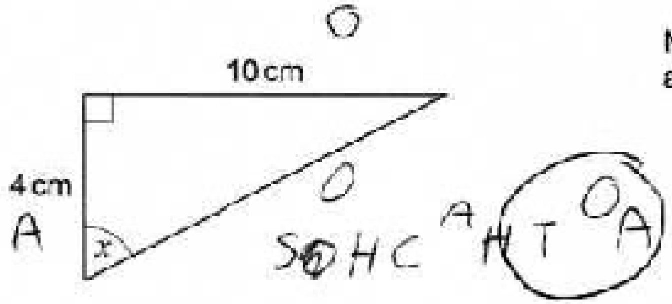
Remind your students to read the question carefully.

This question told the student to use trigonometry. There are no marks available for working out the missing side using Pythagoras' theorem.

0 marks

Question 4, response 5

4 Use trigonometry to work out the size of angle x.



Not drawn accurately

[3 marks]

$\frac{10}{4} = 2.5$

tan (2.5)

$x =$ 0.04366094291 °

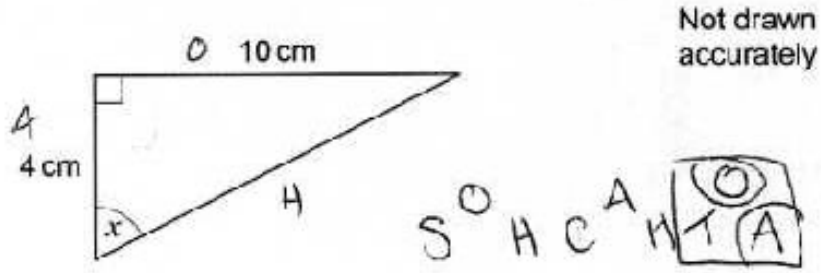
Commentary

The student gains a mark for knowing to use tan, but it's important to know the full equation so that it can be rearranged to work out the missing information.

1 mark

Question 4, response 6

4 Use trigonometry to work out the size of angle x.



[3 marks]

Sin =
Tan = 10 ÷ 4 = 0.04366609
= 0.04

$x =$ 0.04 °

Commentary

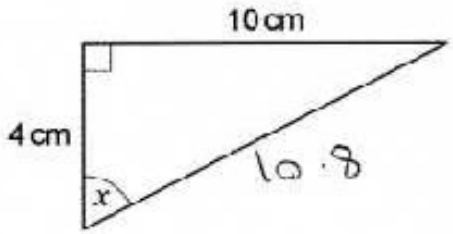
The student gains a mark for knowing to use tan, but they have not formed a correct equation. The x is missing, so no further marks.

1 mark

Question 4, response 7

4 Use trigonometry to work out the size of angle x.

Not drawn accurately



[3 marks]

$10^2 + 4^2 = 116$

$\sqrt{116} = 10.8$

$\frac{\sin 90}{10.8} = \frac{\sin x}{10}$

$10\left(\frac{\sin 90}{10.8}\right) = \sin x = 0.925$

$\sin^{-1}(0.925) = 67.8$

$x =$ 67.8 °

Commentary

This student has used an inefficient method and has rounded too early. Their final answer is inaccurate and doesn't gain the final mark.

Advising students to use the 'previous answer' button on the calculator can help to avoid this error.

2 marks

Question 5

5 Laura works in a shop.

The table shows the number of hours she works on two weekends.

	Saturday	**Sunday**
Weekend 1	3	2
Weekend 2	$5\frac{1}{2}$	$3\frac{1}{2}$

Work out the percentage increase in her **total** hours from Weekend 1 to Weekend 2

[3 marks]

Answer _____ %

Question 5, response 1

5 Laura works in a shop.

The table shows the number of hours she works on two weekends.

	Saturday	Sunday
Weekend 1	3	2
Weekend 2	$5\frac{1}{2}$	$3\frac{1}{2}$

Work out the percentage increase in her **total** hours from Weekend 1 to Weekend 2

[3 marks]

3+2=5 3+2=5

W1= 5h $5\frac{1}{2}+3\frac{1}{2}=9$ 5+5½+3½=9

W2= 9h 9

9÷5=1.8

5 4 54 9/100 = 4/100

Answer 1.8 %

Commentary

This student has done the correct calculations, but does not gain the final mark. They have not interpreted the decimal 1.8 to mean an 80% increase.

2 marks

Question 5, response 2

5 Laura works in a shop.

The table shows the number of hours she works on two weekends.

	Saturday	Sunday
Weekend 1	3	2
Weekend 2	$5\frac{1}{2}$	$3\frac{1}{2}$

5

9

Work out the percentage increase in her **total** hours from Weekend 1 to Weekend 2

[3 marks]

weekend 1 = 5

weekend 2 = 9

9 ÷ 5 = 1.8

1.8 x 100 = 180%

Answer 180% %

Commentary

This student has done the correct calculations and interpreted the 1.8 as a percentage, but they have not stated this as an 80% change.

It's important to remind students to refer back to the question to ensure they are doing what they are asked.

2 marks

Question 5, response 3

5 Laura works in a shop.

The table shows the number of hours she works on two weekends.

	Saturday	Sunday
Weekend 1	3	2
Weekend 2	$5\frac{1}{2}$	$3\frac{1}{2}$

5 old

9 new

Work out the percentage increase in her **total** hours from Weekend 1 to Weekend 2

[3 marks]

3+2=5

$\frac{9-5}{5} \times 100 = 80\%$

$5\frac{1}{2} + 3\frac{1}{2} = 9.$

Answer 80 %

Commentary

Students who were clearly using the percentage change formula had a high success rate.

3 marks

Question 5, response 4

5 Laura works in a shop.

The table shows the number of hours she works on two weekends.

	Saturday	Sunday	
Weekend 1	3	2	= 5hrs
Weekend 2	$5\frac{1}{2}$	$3\frac{1}{2}$	= 9hrs

Work out the percentage increase in her **total** hours from Weekend 1 to Weekend 2

[3 marks]

$\frac{9-5}{9} \times 100 = 44.4\ \%$

3+2 = 5hrs

5·5+3·5 = 9hrs

$\frac{\text{new} - \text{old}}{\text{new}} \times 100$

Answer 44.4 %

Commentary

When using the percentage change formula, a common misconception was to put the new value as the denominator.

1 mark

Question 5, response 5

5 Laura works in a shop.

The table shows the number of hours she works on two weekends.

	Saturday	Sunday
Weekend 1	3	2
Weekend 2	$5\frac{1}{2}$	$3\frac{1}{2}$

5 5+2=7
1+1/2=1 = 9

Work out the percentage increase in her **total** hours from Weekend 1 to Weekend 2

[3 marks]

Weekend 1 - 5 hours

Weekend 2 - 9 hours

$\frac{5}{9} \times 100 = 55.\dot{5}\%$

Answer 55.$\dot{5}$ %

Commentary

A very common error was to write the fraction upside down.

Credit is given for finding the values 5 and 9.

1 mark

Question 7

7 A is an **arithmetic** progression.

Here are the first four terms.

13 16 19 22

G is a **geometric** progression.

Here are the first four terms.

2 4 8 16

nth term of A = 8th term of G

Work out the value of n.

[4 marks]

$n =$ _____

Question 7, response 1

7 A is an **arithmetic** progression.

Here are the first four terms.

13 16 19 22

G is a **geometric** progression.

Here are the first four terms.

2 4 8 16 32 64 128 256

*n*th term of A = 8th term of G

Work out the value of n.

[4 marks]

256 − 13 = 243

243 ÷ 3 = 81

$n =$ 81

Commentary

This student has calculated that there are 81 more terms from 13 to 256.

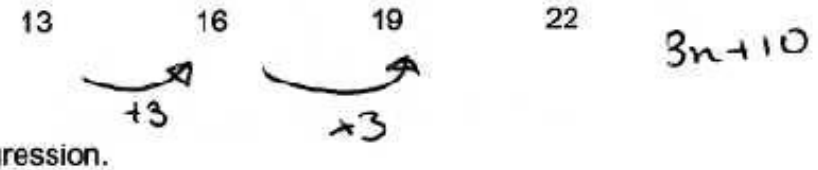
They've not gone the final step of stating that it is the 82nd term.

3 marks

Question 7, response 2

7 A is an **arithmetic** progression.

Here are the first four terms.



G is a **geometric** progression.

Here are the first four terms.

*n*th term of A = 8th term of G

Work out the value of n.

[4 marks]

G equation = 2n

G 8th term = 5: 32, 6: 64, 7: 128, 8: 256

256 = nth term of A

3n + 10 ~~3×8 + 10 = 34~~

n = 256

Commentary

This student knows the 8th term of G is 256.

They know the common difference of A is 3 and have got the correct nth term: $3n + 10$.

They have not got the third mark because they have not put these together to create the equation stated in the box: $3n + 10 = 256$.

2 marks

Question 7, response 3

7 A is an **arithmetic** progression.

Here are the first four terms.

13 16 19 22 $3n+10$

+3 +3 +3

G is a **geometric** progression.

Here are the first four terms.

2 4 8 16 2^n

×2

nth term of A = 8th term of G

Work out the value of n.

[4 marks]

$3n + 10 = 2^8$

$3n + 10 = 16$

$3n = 6$

$n = 2$

$n =$ 2

Commentary

The 8th term of G is incorrect, but the student still gets credit for knowing the nth term of A and forming what would be the correct equation.

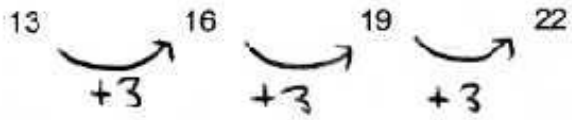
The student then shows a correct method to solve the equation, so it's likely they would have scored full marks had they known the 8th term of G.

2 marks

Question 7, response 4

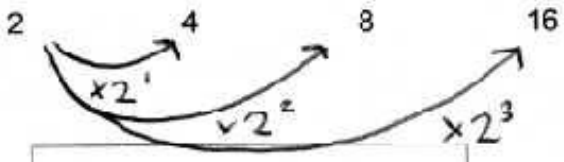
7 A is an **arithmetic** progression.

Here are the first four terms.



G is a **geometric** progression.

Here are the first four terms.



*n*th term of A = 8th term of G

Work out the value of n.

[4 marks]

A is $3n + 10$

G is $2 \times 2^{n-1}$

8th Term of G is $2 \times 2^{8-1}$

256

$3n + 10 = 256$

$3n = 246$

$n = 82$

$n = 82$

Commentary

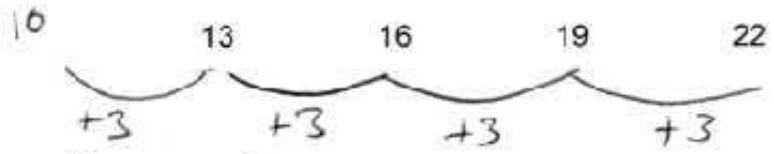
A neat example of a solution worth full marks.

4 marks

Question 7, response 5

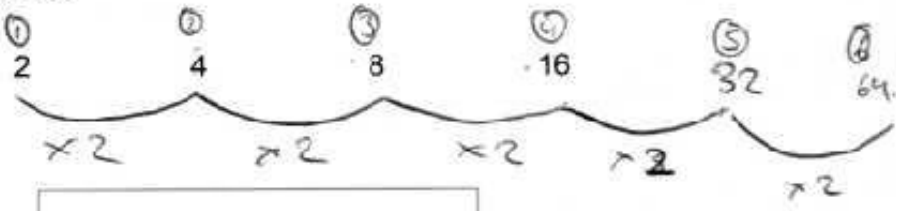
7 A is an **arithmetic** progression.

Here are the first four terms.



G is a **geometric** progression.

Here are the first four terms.



*n*th term of A = 8th term of G

Work out the value of n.

[4 marks]

n^{th} term of A = $3n - 10$

$64 \times 2 = 128$ (7)

$128 \times 2 = 256$ (8)

$3n - 10 = 256$

$+10 \quad +10$

266

8^{th} term = 256

$\frac{3n = 266}{3}$

$n = 88.6$

$n =$ 88.6

Commentary

The student shows the 256 and a common difference of 3.

An incorrect nth term for A means no further marks can be awarded.

2 marks

Question 7, response 6

7 A is an **arithmetic** progression.

Here are the first four terms.

13 (+3) 16 (+3) 19 (+3) 22

G is a **geometric** progression.

Here are the first four terms.

2 (×2) 4 (×2) 8 (×2) 16

*n*th term of A = 8th term of G

Work out the value of *n*.

[4 marks]

8th term of G = 2, 4, 8, 16, 32, 64, 128, 256

~~Nth term of G = 8n~~

n = 256

Commentary

For this question, one mark is gained by working out the 8th term of G (256).

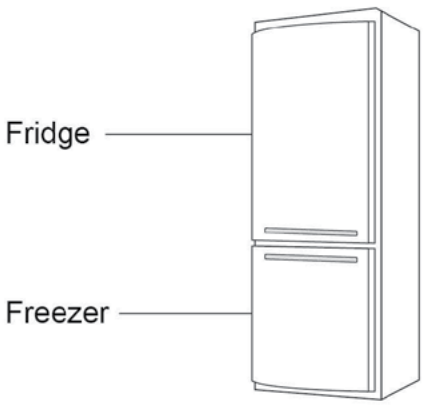
Another mark is gained by showing the common difference of A – annotating the sequence is a valid way of doing this.

2 marks

Question 8

8 Information about two fridge-freezers, A and B, is shown.

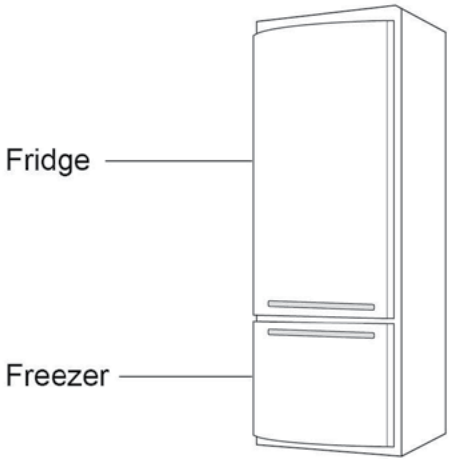
A



Total capacity is 330 litres

fridge capacity : freezer capacity = 3 : 2

B



Fridge capacity is 294 litres

fridge capacity : freezer capacity = 7 : 3

Grace buys one of these fridge-freezers.

She buys the one with the greater **freezer** capacity.

Which one does she buy?

You **must** show your working.

[4 marks]

Answer _____

Question 8, response 1

Grace buys one of these fridge-freezers.

She buys the one with the greater **freezer** capacity.

Which one does she buy?

You **must** show your working.

[4 marks]

A -> Freezer capacity: 132 Litres

3+2=5 330 ÷ 5 = 66

66 × 2 = 132

B -> Freezer capacity = 88.2 litres

7+3=10 294 ÷ 10 = 29.4

29.4 × 3 = 88.2

∴ She buys fridge freezer A, as 132 > 88.2

Answer Fridge-Freezer A

Commentary

This student has treated both capacities as though they were the total capacity.

Advise your students to look carefully at the words in bold.

2 marks

Question 8, response 2

Grace buys one of these fridge-freezers.

She buys the one with the greater **freezer** capacity.

Which one does she buy?

You **must** show your working.

[4 marks]

A) 330 ÷ 5 = 66

66 × 3 = 198 L fridge

66 × 2 = 132 L freezer

B) 7 : 3

294 : x = 126

294 ÷ 7 = 42

42 × 3 = 126

294 fridge 126 freezer

Answer fridge-freezer A

Commentary

A nicely set out solution worth full marks.

4 marks

Question 9

9 Tom and Adil are the two runners in a 200-metre race.

Tom completes the race in 24 seconds.

Adil completes the race at an average speed of 28.8 kilometres per hour.

Who wins the race?

You **must** show your working.

[3 marks]

Answer _____

Question 9, response 1

9 Tom and Adil are the two runners in a 200-metre race.

Tom completes the race in 24 seconds.

Adil completes the race at an average speed of 28.8 kilometres per hour.

Who wins the race?

You **must** show your working.

[3 marks]

Tom → 900÷24= 8.3 m/s

24 seconds

Adil → 28.8 x 1000 = 28,800m in 1 hour

28800 ÷ 2 = 14400m in half hour

14400 ÷ 30 = 480m in 1 minute

480 ÷ 60 = 8m in 1 second

Answer Adil

Commentary

This student has worked out the correct speeds but then given an incorrect answer.

Some students made the mistake of thinking the lower speed is better.

2 marks

Question 9, response 2

9 Tom and Adil are the two runners in a 200-metre race.

Tom completes the race in 24 seconds.

Adil completes the race at an average speed of 28.8 kilometres per hour.

Who wins the race?

You **must** show your working.

[3 marks]

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

Tom's speed $= \frac{200}{24} = 8.\dot{3}$ m/s

Adil's speed 28.8 km/h ↓ ×1000

28800 m/h ↓ ÷60×60

8 m/s

$8.\dot{3}$ m/s > 8 m/s

Answer Tom wins the race.

Commentary

This student found the correct speeds and gave the correct answer.

This was a common method which had a high success rate.

3 marks

Question 9, response 3

9 Tom and Adil are the two runners in a 200-metre race.

Tom completes the race in 24 seconds.

Adil completes the race at an average speed of 28.8 kilometres per hour.

Who wins the race?

You **must** show your working.

[3 marks]

28.8 x 1000 = 28800m per hour
28800 ÷ 60 = 480m per minute
480 ÷ 60 = 8 m/s
200 ÷ 8 = 25 seconds

24 < 25
Tom < Adil

Answer Tom

Commentary

Another method with high success rate was to calculate the time they both took.

3 marks

Question 9, response 4

9 Tom and Adil are the two runners in a 200-metre race.

Tom completes the race in 24 seconds.

Adil completes the race at an average speed of 28.8 kilometres per hour.

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

Who wins the race?

You **must** show your working.

[3 marks]

Tom = $\frac{200}{24}$ = 8.3

$4250 = 4 \times 10^3$

$\frac{200}{4 \times 10^3} = 50000$

Adil = $28.8 \times 200 = 5760$

$5760 \div 60 = 96s$

$t = 5 \times d$

Answer Adil

Commentary

This student calculated Tom's speed correctly, but then incorrectly rearranged the formula for speed.

1 mark

Question 9, response 5

9 Tom and Adil are the two runners in a 200-metre race.

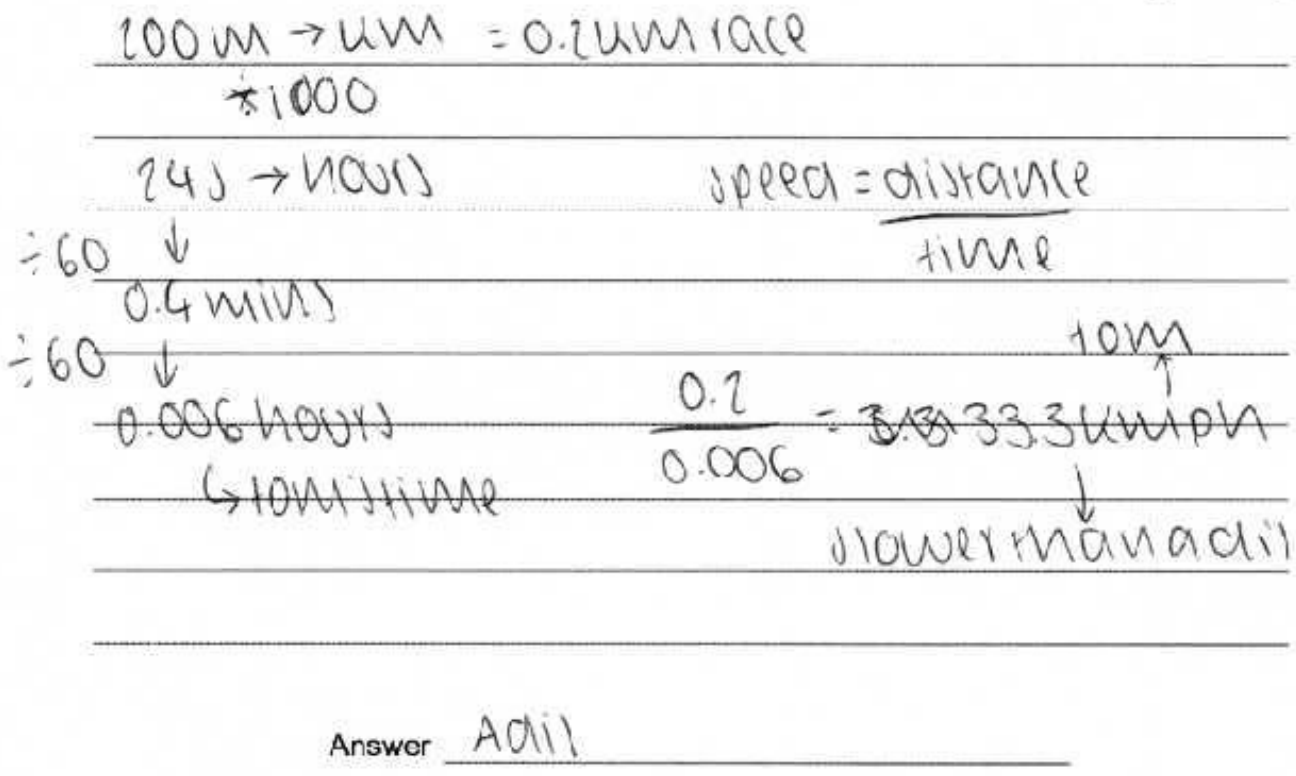
Tom completes the race in 24 seconds.

Adil completes the race at an average speed of 28.8 kilometres per hour.

Who wins the race?

You **must** show your working.

[3 marks]



Answer Adil

Commentary

This student has rounded too early. The value for hours should be 0.00666... instead of 0.006. This means that the speed for Tom is incorrect (it should be 30 km/h).

The student then goes on to misinterpret what a higher speed means. If they had give Tom as their answer they would not gain the final mark as their speed is inaccurate.

2 marks

Question 9, response 6

9 Tom and Adil are the two runners in a 200-metre race.

Tom completes the race in 24 seconds.

Adil completes the race at an average speed of 28.8 kilometres per hour.

Who wins the race?

You **must** show your working.

[3 marks]

Tom = Distance / Time

= 200 / 24

Tom = 8.3

Adil = distance / speed

= 200 / 28.8

Adil = 6.94 seconds

Answer Adil

Commentary

Remind your students to take care when working with different units.

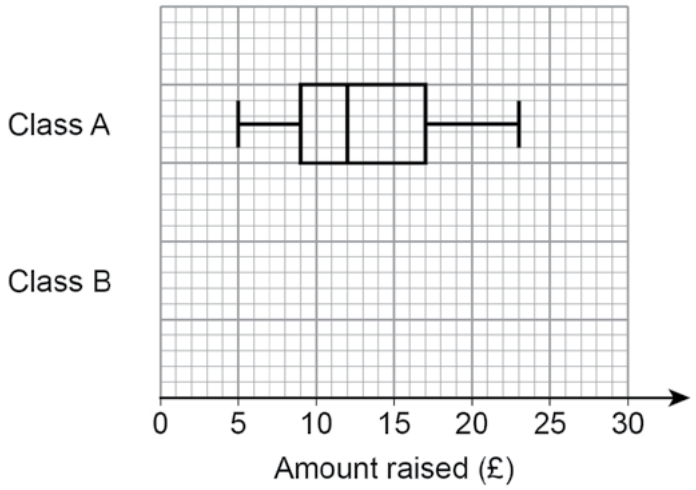
Many students used the speed formula without considering the conversion.

1 mark (for either)

Question 14

14 Students in two classes, A and B, raised money for charity.

The box plot for class A is shown on the grid.



For class B,

- the lowest amount was £3 and the highest amount was £26
- the lower quartile was £11
- the median was £2 greater than the class A median
- the interquartile range was $1\frac{1}{2}$ times greater than the class A interquartile range.

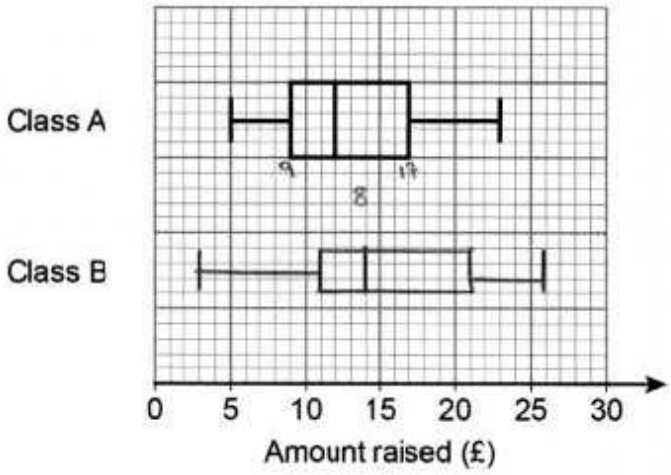
Draw the box plot for class B on the grid.

[4 marks]

Question 14, response 1

14 Students in two classes, A and B, raised money for charity.

The box plot for class A is shown on the grid.



For class B,

- the lowest amount was £3 and the highest amount was £26
- the lower quartile was £11
- the median was £2 greater than the class A median
- the interquartile range was $1\frac{1}{2}$ times greater than the class A interquartile range.

Draw the box plot for class B on the grid.

[4 marks]

class a median = 12

so class B = 14

interquartile range

A = 8

so B = 8 × 1½ = 12

11 + 12 = 21

Commentary

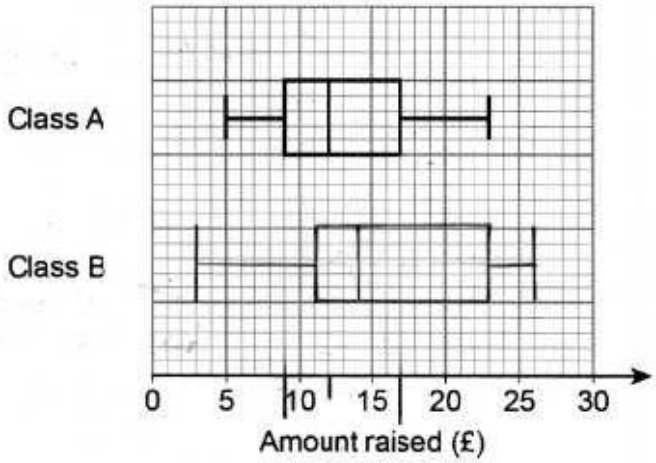
Remind your students to check their work. A basic arithmetic error cost this student a mark here.

3 marks

Question 14, response 2

14 Students in two classes, A and B, raised money for charity.

The box plot for class A is shown on the grid.



For class B,

- the lowest amount was £3 and the highest amount was £26 ✓
- the lower quartile was £11 ✓
- the median was £2 greater than the class A median ✓
- the interquartile range was $1\frac{1}{2}$ times greater than the class A interquartile range.

Draw the box plot for class B on the grid.

[4 marks]

lowest = 3 ✓ highest = 26 ✓

lower quartile = 11

median = 12 + 2 = 14

IQR = 9 → 17 , (17 − 9) × 1·5

= 8 × 1·5 = 12

higher quartile = 11 + 12 = 23

Commentary

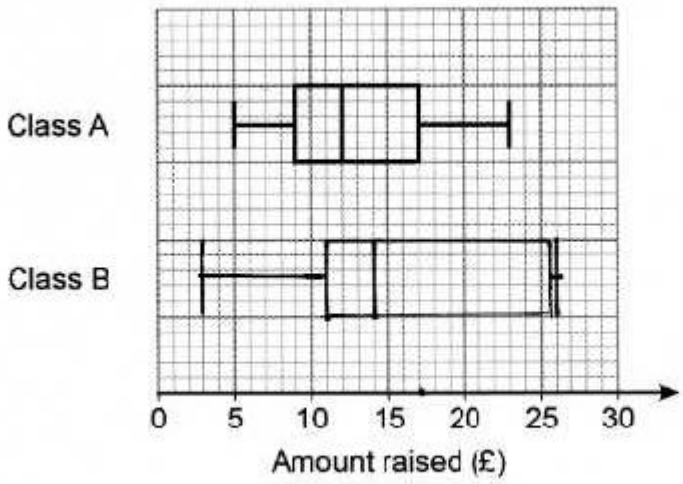
Whilst it wasn't necessary to show any calculations, this student has taken the time to write them out. This would make it much easier to check their answer if they had made a mistake and award method marks accordingly.

4 marks

Question 14, response 3

14 Students in two classes, A and B, raised money for charity.

The box plot for class A is shown on the grid.



For class B,

- the lowest amount was £3 and the highest amount was £26
- the lower quartile was £11
- the median was £2 greater than the class A median
- the interquartile range was $1\frac{1}{2}$ times greater than the class A interquartile range.

Draw the box plot for class B on the grid.

[4 marks]

17 x 1.5 = 25.5

Commentary

There were several students who multiplied the wrong value by 1.5.

Here is an example where the student has done 1.5x the upper quartile of A.

Credit is given for showing the other information correctly in a box plot.

3 marks

Question 15

15 A town has

a population density of 278 people per km^2

and

a population of 158 460

$$\text{population density} = \frac{\text{population}}{\text{area}}$$

The population increases to 168 720

Work out the population density after the increase.

[3 marks]

Answer _____ people per km^2

Question 15, response 1

15 A town has

a population density of 278 people per km^2

and

a population of 158 460

$$\text{population density} = \frac{\text{population}}{\text{area}}$$

The population increases to 168 720

Work out the population density after the increase.

[3 marks]

~~278~~ 158 460 ÷ 278 = 570 ~~km~~

$$\frac{168720}{578} = 291.80$$

Answer 292 people per km^2

Commentary

Remind your students to check their working.

The first calculation should have an answer of 570. This would then lead through to the correct answer, but unfortunately the final answer is not accurate here.

2 marks

Question 15, response 2

15 A town has

a population density of 278 people per km^2

and

a population of 158 460

$$\text{population density} = \frac{\text{population}}{\text{area}}$$

The population increases to 168 720

Work out the population density after the increase.

[3 marks]

158460 ÷ 278 = 570

168720 ÷ 570 = 296

Answer 296 people per km^2

Commentary

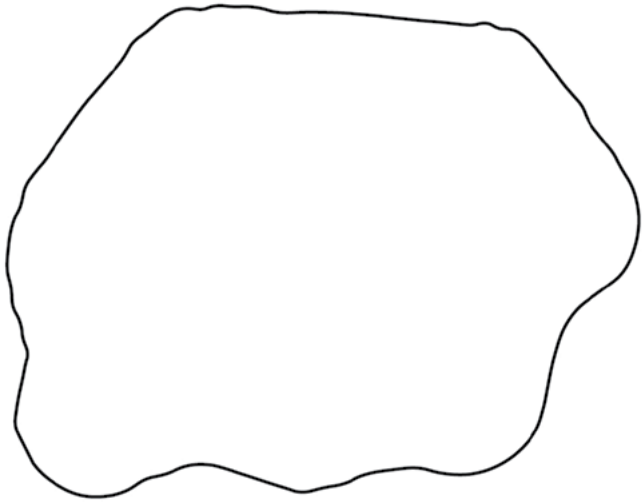
An efficient method and a solution worth full marks.

3 marks

Question 16

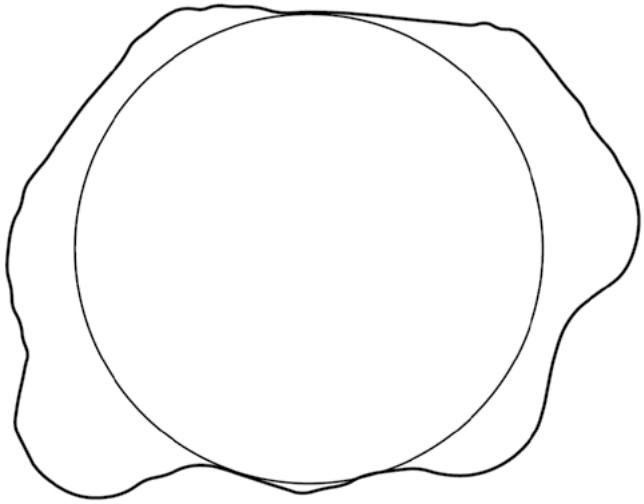
16 Here is a scale drawing of a reservoir.

Scale: 1 cm represents 500 m



Virat wants to estimate the volume of water in the reservoir.

He draws on the scale drawing a circle with radius 3 cm



16 (a) Virat estimates the volume of the reservoir by assuming that

- the reservoir is a cylinder whose cross section is the circle
- the depth of the reservoir is 17 metres.

Work out Virat's estimate in cubic metres.

[3 marks]

Answer _____ m^3

16 (b) In fact,

- the depth of the reservoir is 13.8 metres
- the reservoir is **not** a cylinder (see diagram).

Which statement about the actual volume of the reservoir is correct?

Tick **one** box.

☐ It is less than Virat's estimate

☐ It is greater than Virat's estimate

☐ It could be less than or greater than Virat's estimate

Give a reason for your answer.

[2 marks]

Question 16(a), response 1

16 (a) Virat estimates the volume of the reservoir by assuming that

- the reservoir is a cylinder whose cross section is the circle
- the depth of the reservoir is 17 metres.

Work out Virat's estimate in cubic metres.

[3 marks]

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

$= \pi \times 3^2 \times 17$

$= 153\pi$

$= 480.66$

Answer 480.66 m^3

Commentary

3 is the scale size, so it needs to be converted to actual size before using it in the formula.

This student knows the formula for the volume of a cylinder, and can use it correctly. Some credit can be given as we ensure we don't penalise students more than once for the same mistake.

1 mark

Question 16(a), response 2

16 (a) Virat estimates the volume of the reservoir by assuming that

- the reservoir is a cylinder whose cross section is the circle
- the depth of the reservoir is 17 metres.

Work out Virat's estimate in cubic metres.

[3 marks]

~~325~~ 3x500 = 1500

$\pi r^2 h$ = $1500^2 \times 17 \times \pi$ = 3 8 2 5 0 0 0 0 π

= 1 2 0 1 6 5 9 1 9

Answer 1 2 0 1 6 5 9 1 9 m^3

Commentary

Fully correct.

3 marks

Question 16(a), response 3

16 (a) Virat estimates the volume of the reservoir by assuming that

- the reservoir is a cylinder whose cross section is the circle
- the depth of the reservoir is 17 metres.

Work out Virat's estimate in cubic metres.

[3 marks]

$\pi r^2 h$

$\pi \times 3^2 \times 17 = 153\pi \times 500$

$= 240331.838$

$= 240332$

Answer 240 332 m^3

Commentary

This student has tried to scale the volume using the length scale factor.

This is not a correct method and we can't award any marks.

0 marks

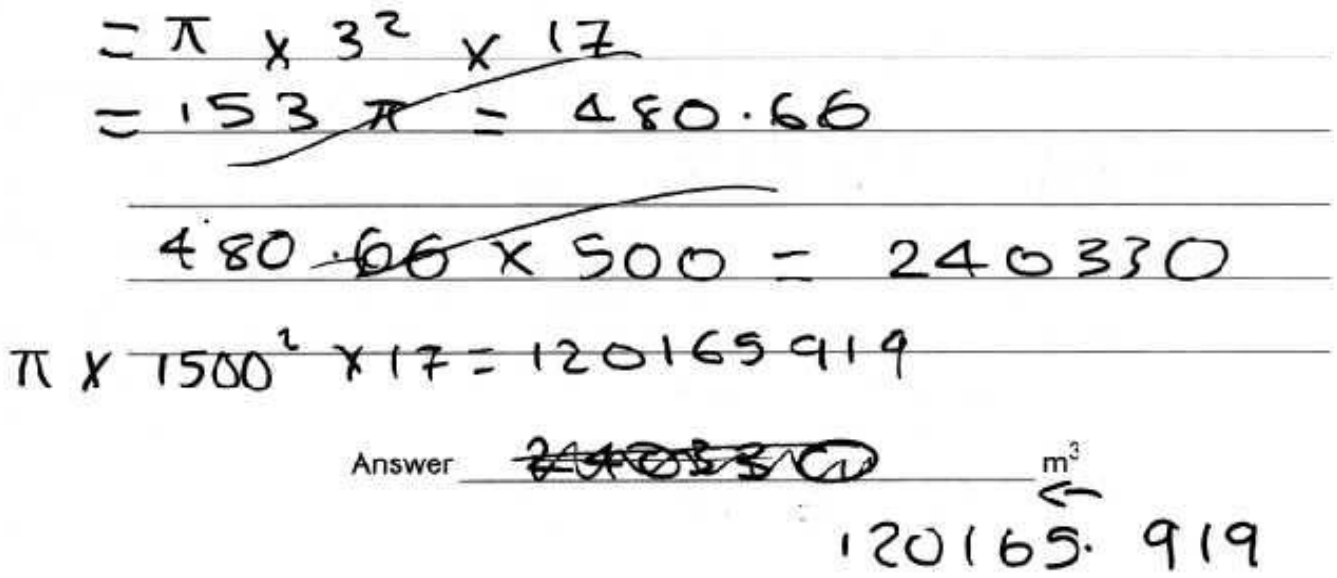
Question 16(a), response 4

16 (a) Virat estimates the volume of the reservoir by assuming that

- the reservoir is a cylinder whose cross section is the circle
- the depth of the reservoir is 17 metres.

Work out Virat's estimate in cubic metres.

[3 marks]



Commentary

After converting using the scale, this student then tried to convert back again after the correct answer was seen. This lost the final accuracy mark.

2 marks

Question 16(a), response 5

16 (a) Virat estimates the volume of the reservoir by assuming that

- the reservoir is a cylinder whose cross section is the circle
- the depth of the reservoir is 17 metres.

Work out Virat's estimate in cubic metres.

[3 marks]

Reservoir = 6 × 500 = 3000m × 17 = 51000

Answer 51000 m^3

Commentary

Credit can only be given for converting the radius correctly, not the diameter. It's the radius that is needed for the method to continue.

0 marks

Question 16(a), response 6

16 (a) Virat estimates the volume of the reservoir by assuming that

- the reservoir is a cylinder whose cross section is the circle
- the depth of the reservoir is 17 metres.

Work out Virat's estimate in cubic metres.

[3 marks]

3×500 = 1500m × π r² = 1500π² × 17 = 255 000

Answer 255000 m^3

Commentary

This student has converted the radius correctly, but then used an incorrect formula for the volume.

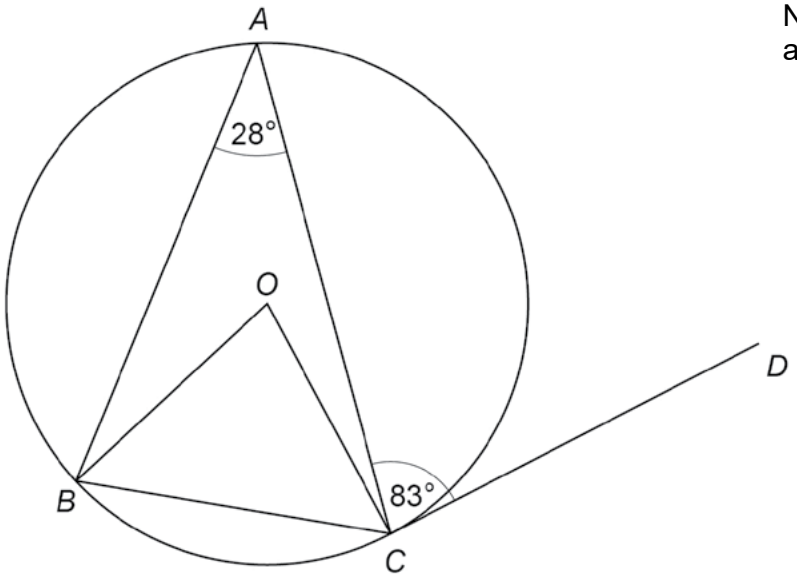
Only the first part of the method is correct.

1 mark

Question 18

18 *A*, *B* and *C* are points on a circle, centre *O*.

DC is a tangent to the circle.



Not drawn accurately

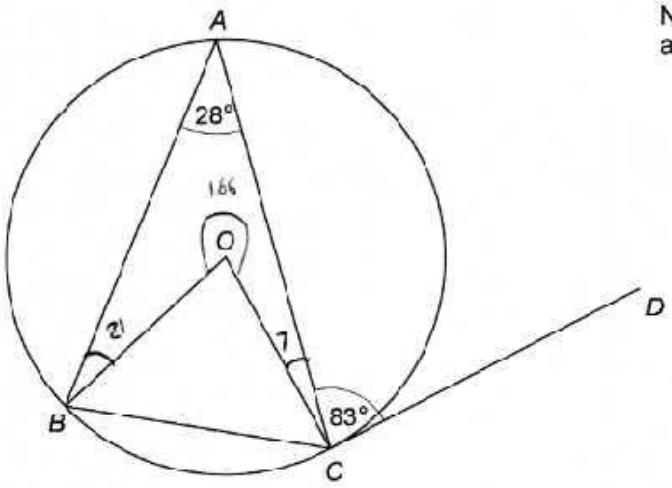
Show that angle *ABO* : angle *ACO* = 3 : 1

[5 marks]

Question 18, response 1

18 *A*, *B* and *C* are points on a circle, centre *O*.

DC is a tangent to the circle.



Not drawn accurately

Show that angle *ABO* : angle *ACO* = 3 : 1

[5 marks]

90 - 83 = 7 ACO = 7° (angles at a tangent to a circle are 90°)

ABO : ACO 7 × 3 = 21°

3 : 1

21° : 7°

Commentary

Students are asked to show the ratio is correct. They cannot use it to find any missing angles (as this would be a circular argument).

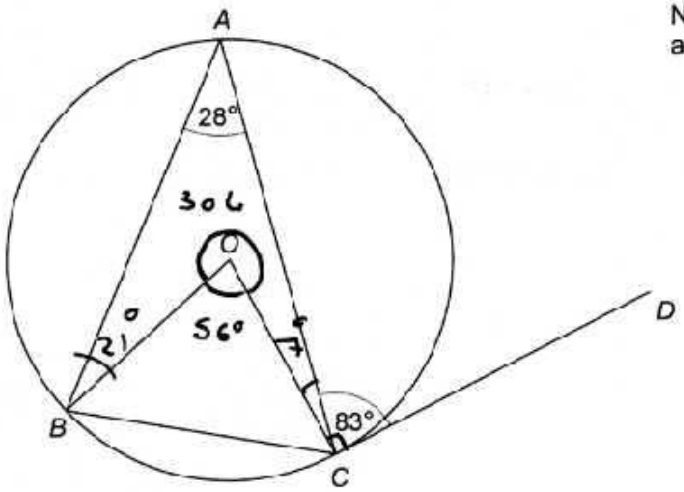
This student has worked out angle *ACO* correctly so can gain 1 mark.

1 mark

Question 18, response 2

18 *A*, *B* and *C* are points on a circle, centre *O*.

DC is a tangent to the circle.



Not drawn accurately

Show that angle *ABO* : angle *ACO* = 3 : 1

[5 marks]

28 × 2 = 56

360 − 56 = 304

304 + 28 = 332

360 − 332 = 28

90 − 83 = 7°

332 + 7 = 339

360 − 339 = 21

7 × 3 = 21

ABO = 21°

ACO = 7°

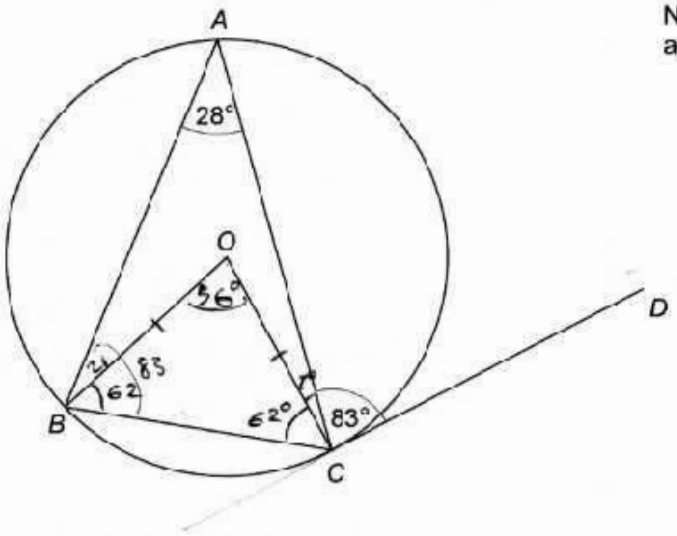
Commentary

This student has found all the required angles (shown in the correct position) but has not completed the final step of showing that the ratio is correct.

4 marks

Question 18, response 3

18 *A*, *B* and *C* are points on a circle, centre *O*.
DC is a tangent to the circle.



Not drawn accurately

Show that angle *ABO* : angle *ACO* = 3 : 1

[5 marks]

∠BOC = 56° (angle at centre = 2x angle at circumference)
(180 - 56) ÷ 2 (isosceles triangle). = 62° = ∠OBC = ∠OCB
90 - 83 = 7° = ∠ACO (angle where radius meets tangent = 90°)
62 + 7 + 28 = 97
180 - 97 = 83 = ∠ABC (angles in a triangle = 180°)
83 - 62 = 21 = ∠ABO
∠ABO : ∠ACO = 21 : 7 = 3 : 1
7 7

Commentary

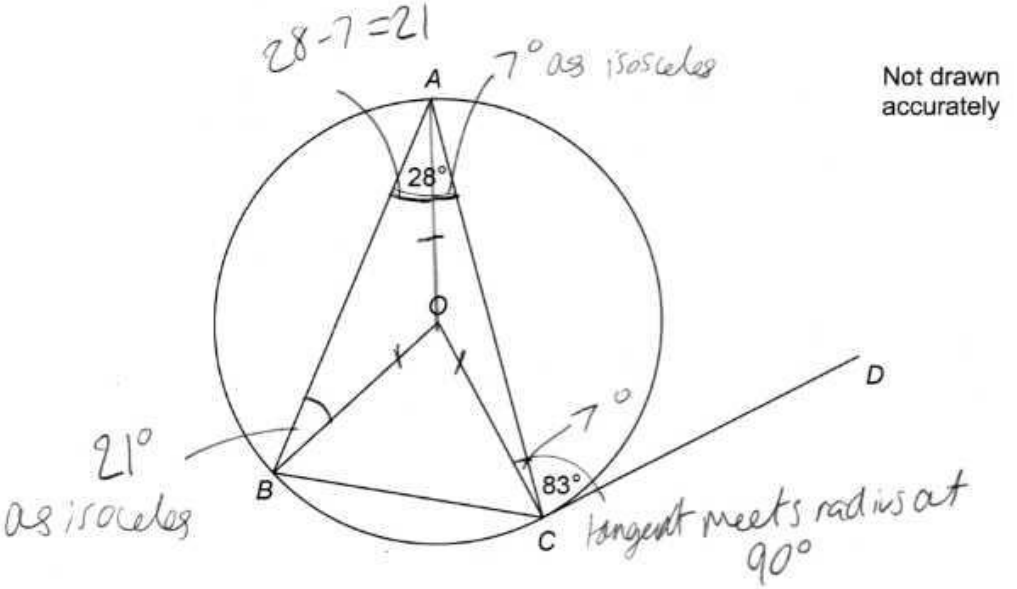
Students were not required to provide reasons, but many students did so. Those that did had a high success rate in answering the question. It may be that thinking of the reasons helped students navigate their way through the problem.

5 marks

Question 18, response 4

18 *A*, *B* and *C* are points on a circle, centre *O*.

DC is a tangent to the circle.



Not drawn accurately

Show that angle *ABO* : angle *ACO* = 3 : 1

[5 marks]

21 : 7

3 : 1

AO = BO = CO as all are radii

∠OCA = 7° as tangent meets radius at 90°

(90 − 83 = 7)

∠OAC = 7° as it's an isosceles triangle (so they're the same)

∠OAB = 21° as 28 − 7 = 21

∠ABO = 21° as isosceles so they're the same angle

ABO : ACO

21 : 7 2 ÷ 7

3 : 1

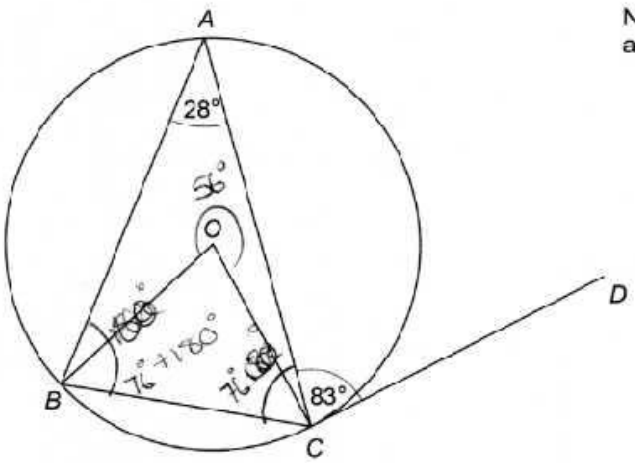
Commentary

Another successful method.

5 marks

Question 18, response 5

18 *A*, *B* and *C* are points on a circle, centre *O*.
DC is a tangent to the circle.



Not drawn accurately

Show that angle *ABO* : angle *ACO* = 3 : 1

[5 marks]

28×2 = 56

180 − 25 = 152.

152 − 97 = 55

180 − 83 = 97°

~~180 − 28 =~~

~~97 − 19 = 78~~

~~78 × 2 = 156~~

~~63 + 21 + 28~~

~~180 ÷ 4~~

or

180 − 28 = 152

152 ÷ 4 = 38

38 × 3 = 114

38 × 1 = 38

114 + 38 + 28 = 180

97 − 21 = 76

76 × 2 = 152

180 − 152 = 28

Commentary

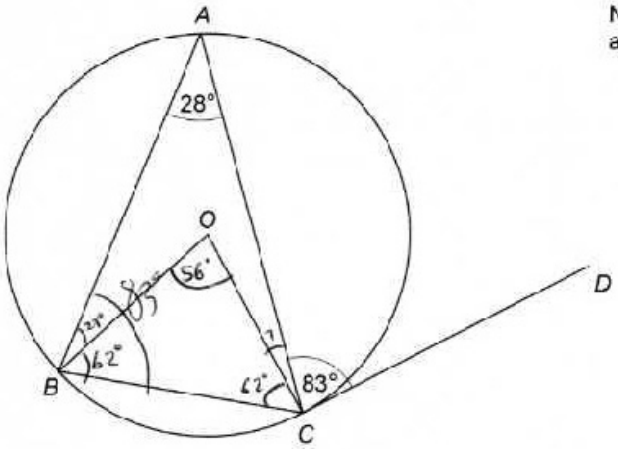
Here the 56 is positioned incorrectly, so scores 0 marks. This is why we require students to use the correct 3-letter code or label the diagram correctly. We can't just accept the correct value seen.

0 marks

Question 18, response 6

18 *A*, *B* and *C* are points on a circle, centre *O*.

DC is a tangent to the circle.



Not drawn accurately

Show that angle *ABO* : angle *ACO* = 3 : 1

[5 marks]

BAC = 28 , 28 × 2 = 56 = BOC

180 − 56 = 124 ÷ 2 = 62

83 − 62 = 21

28 + 83 = 111

180 − 111 = 69 − 62 = 7

angle ABO = 21 : 7 angle ACO =

÷7 (=) ÷7

3 : 1

Commentary

Methods that don't precisely match any of the methods given in the mark scheme will still be awarded credit where appropriate.

The student has not used 3-letter codes but the values are in the correct position on the diagram.

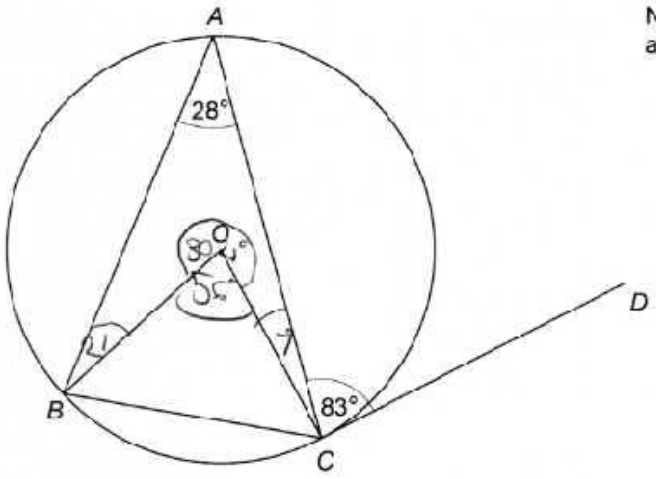
We can condone some weaknesses in presentation as the method is clear.

5 marks

Question 18, response 7

18 *A*, *B* and *C* are points on a circle, centre *O*.

DC is a tangent to the circle.



Not drawn accurately

Show that angle *ABO* : angle *ACO* = 3 : 1

[5 marks]

BOC = 28 × 2 = 56° quadrilateral with one point at centre has exterior angle double

DCO = 90° tangent meeting radius

90 − 83 = 7°

360 − 56 = 304° angles in full circle

360 − (304 + 7 + 28) = 21 angles in quadrilateral

7 × 3 = 21

Commentary

The angles are correctly positioned on the diagram.

Writing 3 x 7 = 21 is not enough for the final mark. As this is a 'show that' question, the student must show the ratio is correct. They must not work with what the ratio means (iethat one angle is 3 times the other).

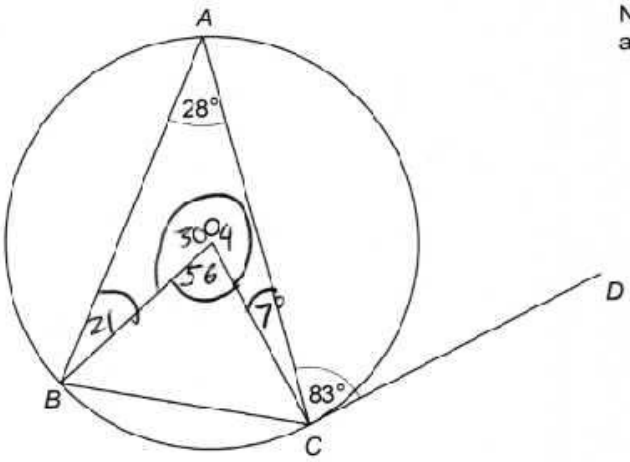
A concluding statement would be needed, such as
"7 x 3 = 21, therefore the ratio is 3 : 1".

4 marks

Question 18, response 8

18 *A*, *B* and *C* are points on a circle, centre *O*.

DC is a tangent to the circle.



Not drawn accurately

Show that angle *ABO* : angle *ACO* = 3 : 1

[5 marks]

- ∠ACO = 90 - 83 = 7° because tangent is perpendicular to radius at that point
- ∠BOC (acute) = 28 × 2 = 56° because angle at centre is twice that at circumference
- ∠BOC (reflex) = 360 - 56 = 304° because angles on a point sum to 360°
- ∠ABO = 360 - 304 - 28 - 7 = 21° because angles in quadrilateral sum to 360°

∠ABO : ∠ACO = 21 : 7, which simplifies to 3 : 1

Commentary

This solution is fully correct.

This would still score 5 marks if the diagram had not been labelled. The student has used the correct 3-letter codes for each angle and has distinguished between the acute and reflex angles *BOC*.

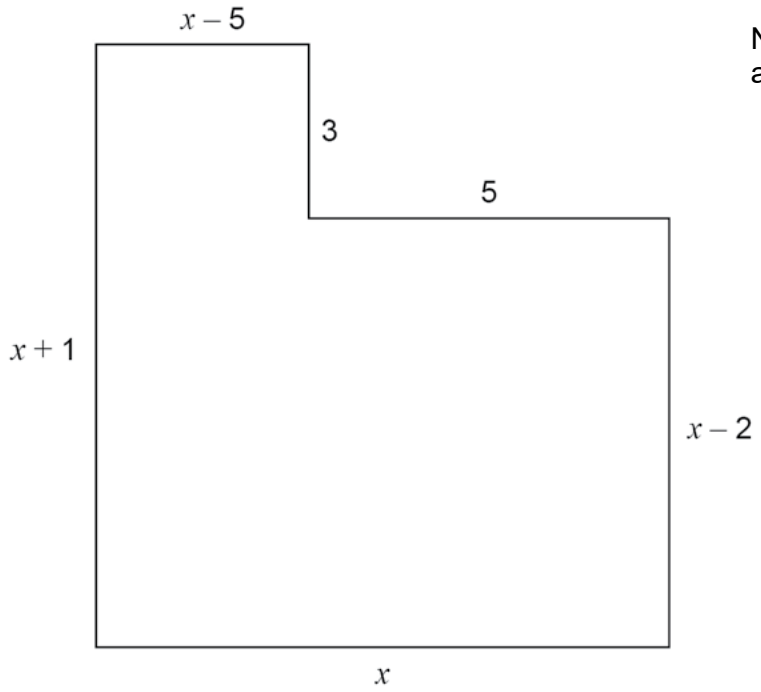
5 marks

Turn over for next question

Questions 19(a) and 19(b)

19 Here is the plan of the floor of an L-shaped room.

All lengths are in metres.



Not drawn accurately

19 (a) The area of the floor is $75\,m^2$

Show that $x^2 + x - 90 = 0$

[3 marks]

19 (b) By factorising $x^2 + x - 90$ work out the value of x.

You **must** show your working

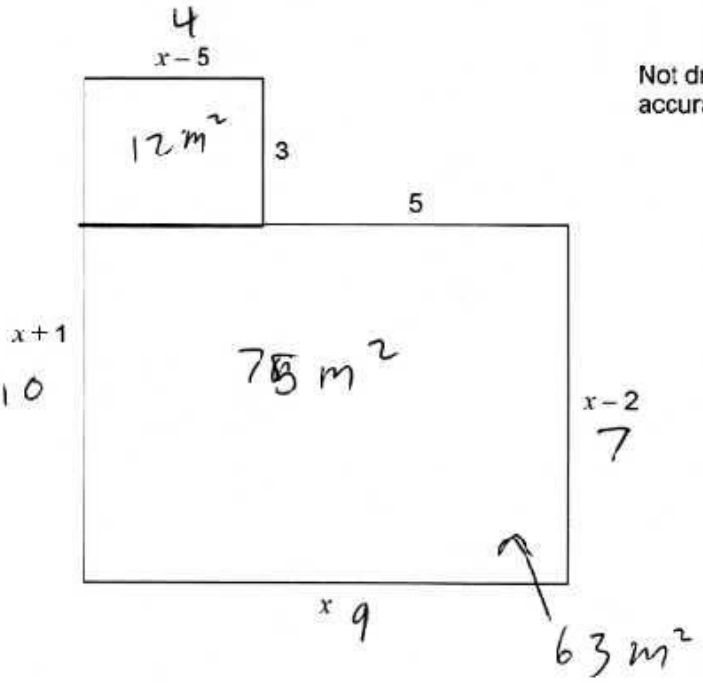
[2 marks]

$x =$ _____

Question 19(a), response 1

19 Here is the plan of the floor of an L-shaped room.

All lengths are in metres.



Not drawn accurately

19 (a) The area of the floor is 75 m²

Show that $x^2 + x - 90 = 0$

[3 marks]

$x = 9$

~~$x^2 + x$~~

$9^2 + 9 = 90 - 90 = 0$

$9^2 = 81$

$81 + 9 = 90$

$90 - 90 = 0$

63

+ 12

75 m²

Commentary

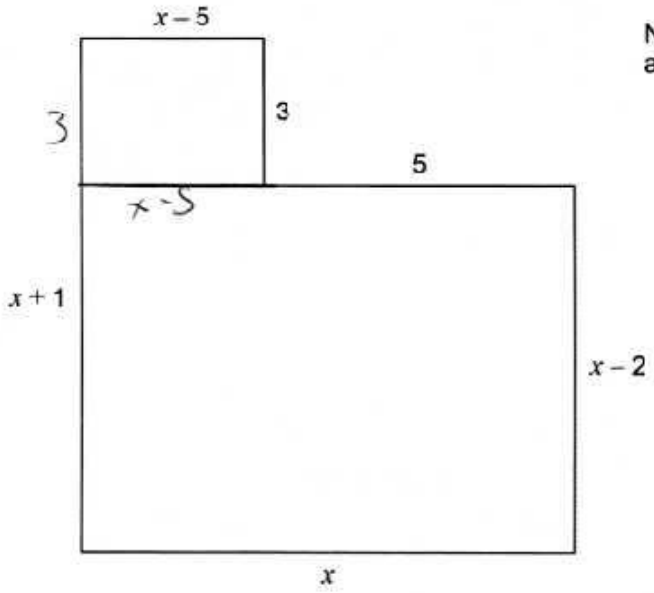
A common mistake that several students made was to try to find a solution to the equation rather than showing that the equation is correct.

0 marks

Question 19(a), response 2

19 Here is the plan of the floor of an L-shaped room.

All lengths are in metres.



Not drawn accurately

19 (a) The area of the floor is 75 m^2

Show that $x^2 + x - 90 = 0$

[3 marks]

$x - 5 + 5 = x$

$x - 2 \times x = x^2 - 2x$

$x - 5 \times 3 = 3x - 15$

$x^2 - 2x + 3x - 15 = x^2 + x - 15 = 75$ | -75

$x^2 + x - 90 = 0$

Commentary

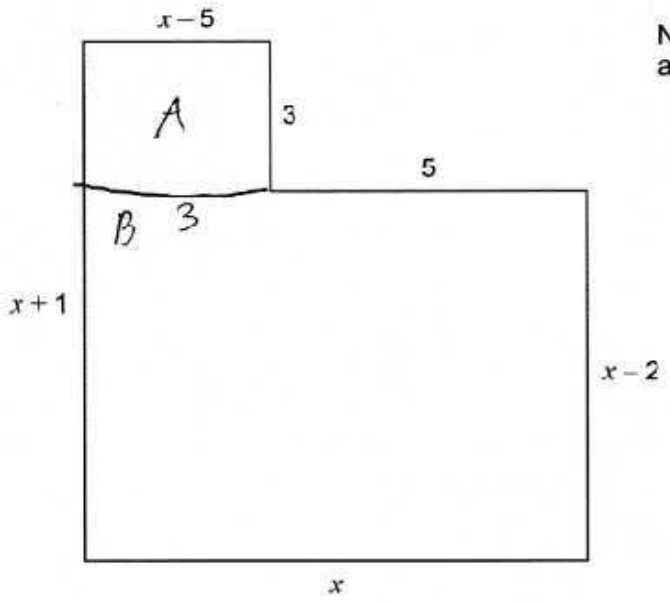
We can condone the missing brackets here as the correct expansion is seen.

3 marks

Question 19(a), response 3

19 Here is the plan of the floor of an L-shaped room.

All lengths are in metres.



Not drawn accurately

19 (a) The area of the floor is $75\,m^2$

Show that $x^2 + x - 90 = 0$

[3 marks]

A $x-5 \times 3$

B $x \times x-2$

$x = 8$

$64 + 8 - 90$

Commentary

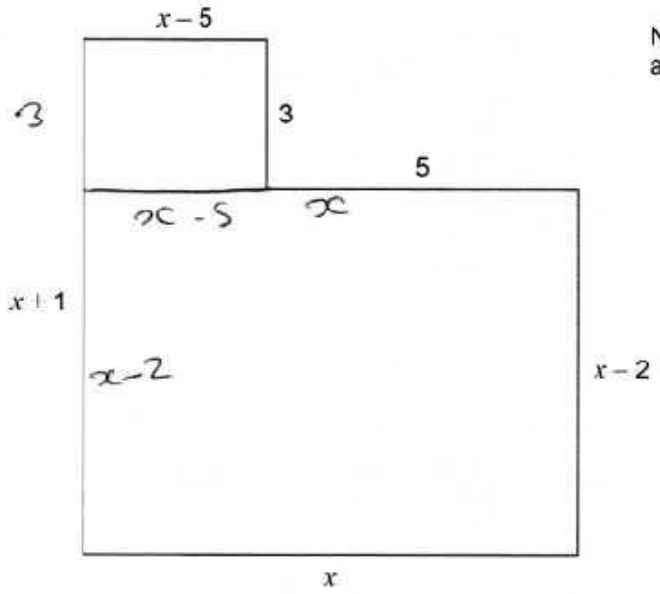
Here we can't condone the missing brackets as the correct expansion isn't seen.

0 marks

Question 19(a), response 4

19 Here is the plan of the floor of an L-shaped room.

All lengths are in metres.



Not drawn accurately

19 (a) The area of the floor is 75 m^2

Show that $x^2 + x - 90 = 0$

[3 marks]

$x-2 \times x = x(x-2)$

$x^2 - 2x$

$3(x-5)$

$3x - 15 + x^2 - 2x$

$x^2 - 2x + 3x - 15$ $\quad 75+15 = 90$

$x^2 + x - 15$

$x^2 + x - 90 = 0$

Commentary

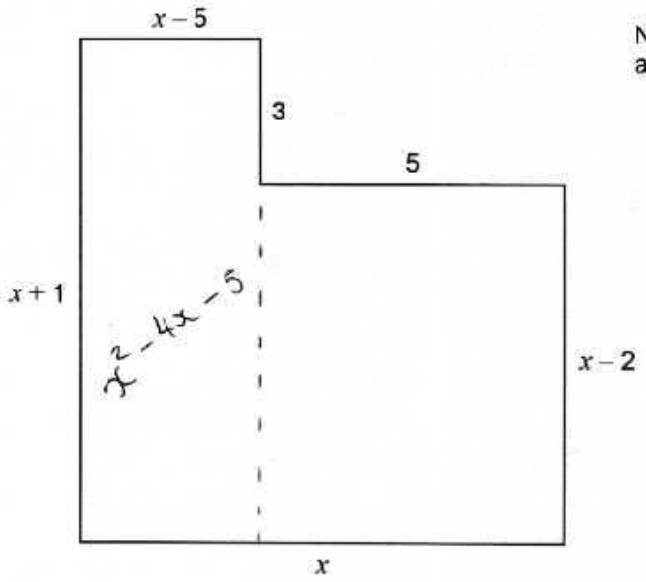
The student has missed a line in their working. We haven't seen the algebraic expression for the area set equal to the numerical value for the area.

2 marks

Question 19(a), response 5

19 Here is the plan of the floor of an L-shaped room.

All lengths are in metres.



19 (a) The area of the floor is 75 m^2

Show that $x^2 + x - 90 = 0$

[3 marks]

$(x + 1) \times (x - 5) = x^2 - 5x + 1x - 5$

$x^2 - 4x - 5$

Commentary

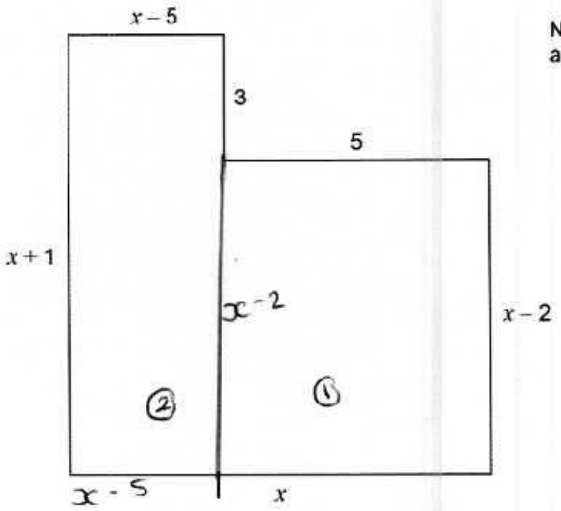
This student has missed out on the first mark. They haven't shown the correct expression for all the partial areas.

0 marks

Question 19(a), response 6

19 Here is the plan of the floor of an L-shaped room.

All lengths are in metres.

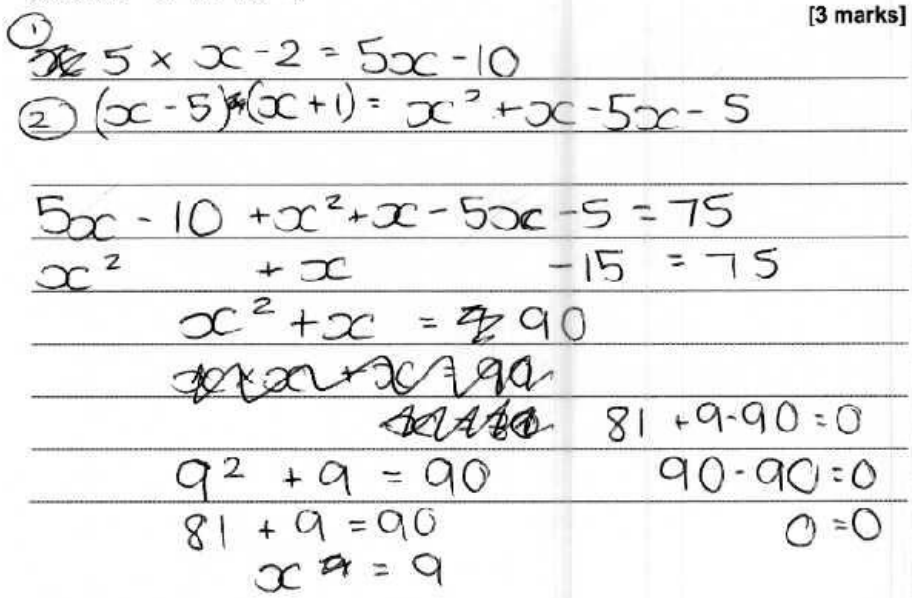


No: drawn accurately

19 (a) The area of the floor is 75 m²

Show that $x^2 + x - 90 = 0$

[3 marks]



Commentary

This answer misses the final mark as the student didn't rearrange the equation to show the correct form. Instead, they tried to solve the equation.

As it's a 'show that' question, the student must show that the equation rearranges to the required form.

2 marks

Question 19(b), response 1

19 (b) By factorising $x^2 + x - 90$ work out the value of x.

You **must** show your working

[2 marks]

$(x + 10)(x - 9)$

$x =$ 10 or -9

Commentary

The context of the question is lengths and area, which means that only a positive solution is acceptable.

Students can look for clues as well: the question asks for the **value** of x, not **values**.

1 mark

Question 19(b), response 2

19 (b) By factorising $x^2 + x - 90$ work out the value of x.

You **must** show your working

[2 marks]

$(x + 10)(x - 9)$

$x = -10, 9$

$\therefore x = 9$, as you can't have a negative length.

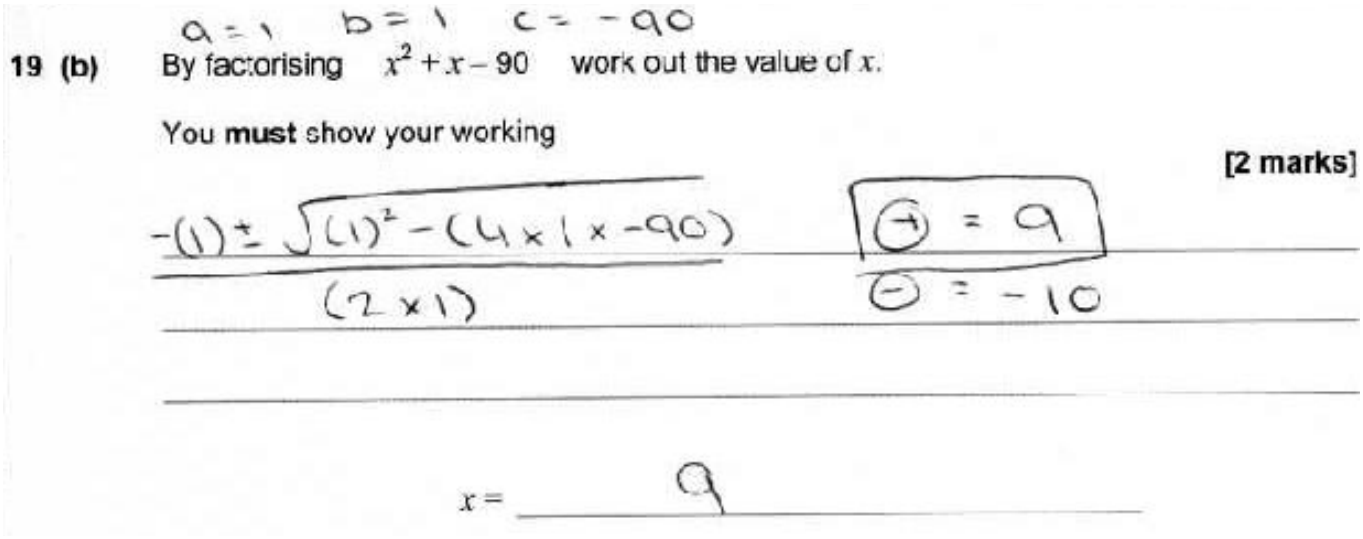
$x =$ 9

Commentary

This student knows to exclude the negative solution and so gets both marks.

2 marks

Question 19(b), response 3



Commentary

The question tells students to factorise. Only 1 mark can be awarded for using a different method and knowing to discount the negative solution.

1 mark

Question 20

20 £2448 is invested in an account at a rate of compound interest.

One year after the investment there is £2496.96 in the account.

How much is in the account four years after the investment?

[3 marks]

Answer £ _____

Question 20, response 1

20 £2448 is invested in an account at a rate of compound interest.
One year after the investment there is £2496.96 in the account.

How much is in the account four years after the investment?

[3 marks]

~~2448 £2496.96~~

2496.96 ÷ 2448 = 1.02
(2%)

~~2496~~ 2496.96 × 1.02⁴
= 2702.80

Answer £ 2702.80

Commentary

This student has calculated the amount 4 years from now, rather than 4 years from investment.

This was a common mistake.

2 marks

Question 20, response 2

20 £2448 is invested in an account at a rate of compound interest.

One year after the investment there is £2496.96 in the account.

How much is in the account four years after the investment?

[3 marks]

2448 → 2496.96 1 year

×1.02

2546.8992 2

×1.02

2597.837184 3

×1.02

2649.79392 8 4

Answer £ 2649.793928

Commentary

Remind your students to think about the context of the question. Money answers must be given to 2dp. This solution can't be awarded the final accuracy mark.

2 marks

Question 20, response 3

20 £2448 is invested in an account at a rate of compound interest.
One year after the investment there is £2496.96 in the account.

How much is in the account four years after the investment?

[3 marks]

2496.96 − 2448 = 48.96

48.96 × 4 = 195.84

2448 + 195.84 = £2643.84

Answer £ 2643.84

Commentary

The question states that this is compound interest. Working out how much has been added each year and adding on the same amount for every year (simple interest) does not score.

0 marks

Question 20, response 4

20 £2448 is invested in an account at a rate of compound interest.
One year after the investment there is £2496.96 in the account.

How much is in the account four years after the investment?

[3 marks]

£ 2496.96 ÷ 2448 = 1.02

2% interest rate anually

year 2 = 2546.8992

year 3 = 2597.837184

year 4 = 2649.793928

2% interest x 4 = 8% increase over 4 years

2448 x 8% = 2643.84

Answer £ ~~2649.793928~~ 2643.84

Commentary

This student has crossed out the correct answer (compound interest) and switched to a simple interest method. 1 mark is still awarded for the 2% or 1.02.

1 mark

Question 20, response 5

20 £2448 is invested in an account at a rate of compound interest.

One year after the investment there is £2496.96 in the account.

How much is in the account four years after the investment?

[3 marks]

$\frac{2496.96 - 2448}{2448} \times 100 = 2$

interest = 2%

$2448\left(1 + \frac{2}{100}\right)^4 = 2649.793928$

Answer £ 2649.79

Commentary

This is a neat and correct method using the formula for compound interest.

3 marks

Question 20, response 6

20 £2448 is invested in an account at a rate of compound interest.
One year after the investment there is £2496.96 in the account.

How much is in the account four years after the investment?

[3 marks]

$2496.96 \div 2448 = 1.02$

$(1.02)^4 \times 2448 = 2649.79$

Answer £ 2649.79

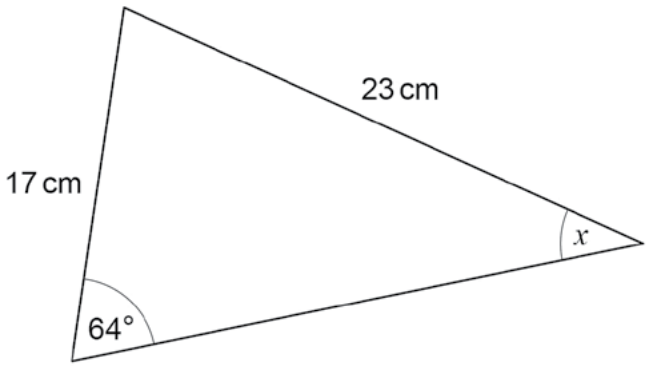
Commentary

This is a correct method using a repeated multiplier.

3 marks

Question 21

21



Not drawn accurately

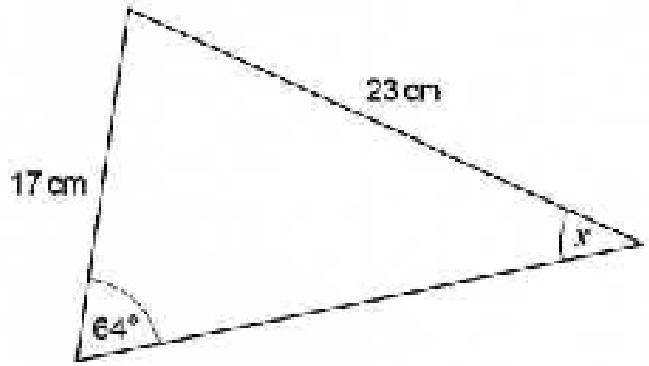
Use the sine rule to work out the size of angle x.

[3 marks]

$x =$ _____ °

Question 21, response 1

21



Not drawn accurately

Use the sine rule to work out the size of angle x.

[3 marks]

$\frac{23}{\sin 64} = \frac{17}{\sin x}$ $\frac{\sin 64}{23} = \frac{\sin x}{17}$

$\sin^{-1}\left(\frac{\sin 64}{23} \times 17\right) = 41.630649133$

41.63 2dp

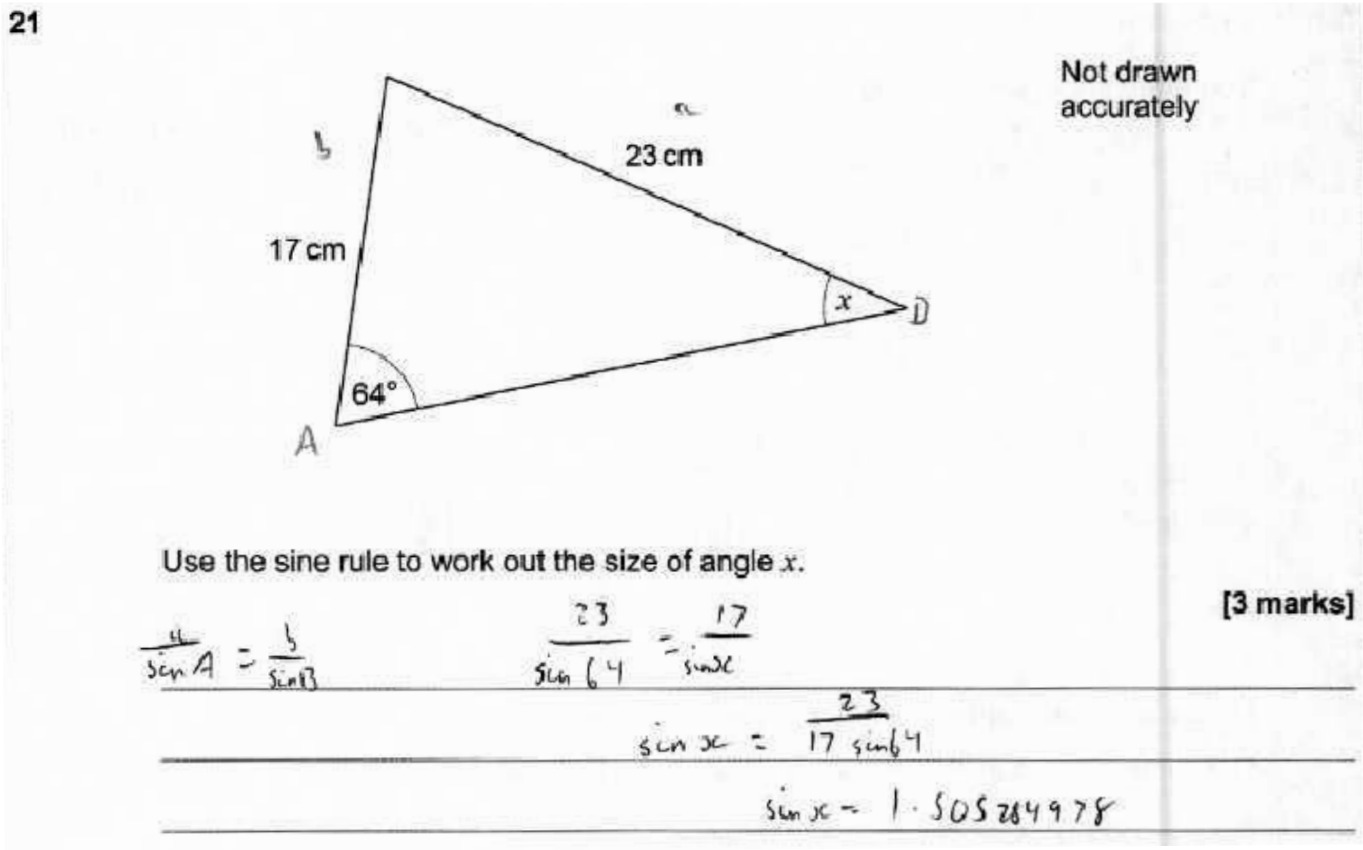
$x =$ 41.63 °

Commentary

This student has used the sine rule with the angles in the numerator and has rearranged the formula without premature rounding.

3 marks

Question 21, response 2



Commentary

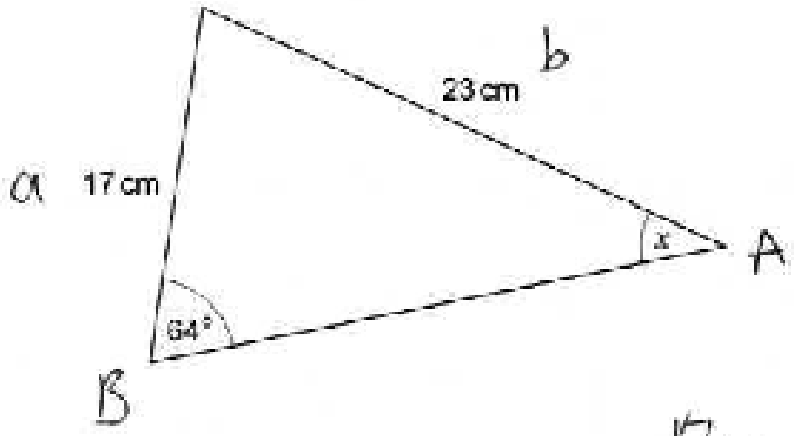
This student has used the sine rule with the angles in the denominator, which is not the most efficient version for calculating a missing angle. Very few students using the formula this way round had complete success.

Not understanding that the $\sin(x)$ stays in the denominator when moving the 17 was a common error.

1 mark

Question 21, response 3

21



Use the sine rule to work out the size of angle x.

[3 marks]

$\frac{\sin A}{a} = \frac{\sin B}{b}$

$\frac{\sin x}{17} = \frac{\sin 64}{23}$

$\frac{\sin 64 \times 17}{23} = 0.66432$

$x = 0.664326034$

Commentary

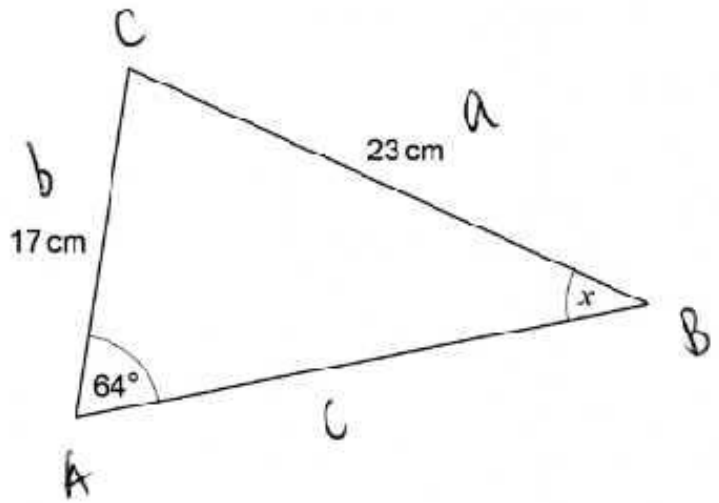
This student scores 1 mark for substituting values correctly into the sine rule.

They have just missed out on the second mark as they haven't rearranged to get x =.... We need to see $\sin^{-1}(0.66...)$.

1 mark

Question 21, response 4

21



Not drawn accurately

Use the sine rule to work out the size of angle x.

[3 marks]

SAS

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

$\frac{23}{\sin(64)} = 25.58$?

$x =$ _____ °

Commentary

This student hasn't done enough to gain the first mark. They've not formed a correct equation by substituting the given information in to two fractions.

0 marks

Question 23

23 Here are two simultaneous equations.

$$y = x^2 + 7x - c$$

and

$$y = 3x + d$$

There is a solution when $x = 5$

Work out the value of $c + d$

[3 marks]

Answer _____

Question 23, response 1

23 Here are two simultaneous equations.

$y = x^2 + 7x - c$

and

$y = 3x + d$

There is a solution when $x = 5$

Work out the value of $c + d$

[3 marks]

$x^2 + 7x - C = 3x + d$

$(5)^2 + (7 \times 5) - C = (3 \times 5) + d$

$25 + 35 - C = 15 + d$

$60 - C = 15 + d$

$C = 60 \quad d = 15$

Answer _____

Commentary

This student has substituted correctly and equated the expressions, but missed out on the final mark as they didn't rearrange to $c + d$ as required.

Remind your students to check they've answered the question.

2 marks

Question 23, response 2

23 Here are two simultaneous equations.

$y = x^2 + 7x - c$

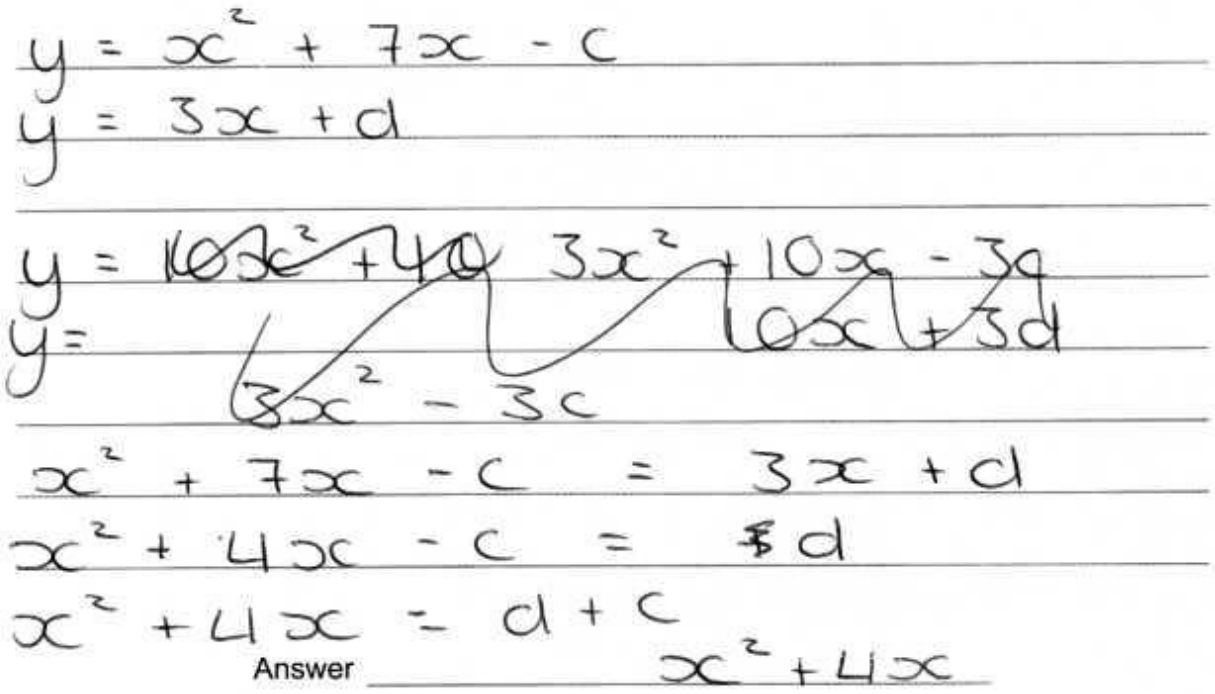
and

$y = 3x + d$

There is a solution when $x = 5$

Work out the value of $c + d$

[3 marks]



Commentary

This student has equated the expressions and rearranged to get $c + d$, but doesn't get the second mark as they haven't substituted in $x = 5$.

1 mark

Question 23, response 3

23 Here are two simultaneous equations.

$y = x^2 + 7x - c$

and

$y = 3x + d$

There is a solution when $x = 5$

Work out the value of $c + d$

[3 marks]

$y = 10 + 35 - c$

$y = 15 + d$

$45 - 6c = 15 + d$

Answer _____

Commentary

The first mark can be gained by substituting $x = 5$ into both expressions. Here the student has tried to do that without showing the working but has made an error. No marks can be awarded.

0 marks

Question 23, response 4

23 Here are two simultaneous equations.

$y = x^2 + 7x - c$ $y = 5^2 + (7 \times 5) - c$

and

$y = 3x + d$ $y = (3 \times 5) + d$

There is a solution when $x = 5$

Work out the value of $c + d$

[3 marks]

$y = 5^2 + (7 \times 5) - c$

$y = 25 + 35 - c$

$y = 60 - c$

$y = (3 \times 5) + d$

$y = 15 + d$

$60 - c = 15 + d$ $+c$

$60 = 15 + d + c$ -15

$45 = d + c$

$c + d = 45$

Answer 45

Commentary

Fully correct.

Substituting x = 5 then equating the expressions.

3 marks

Question 23, response 5

23 Here are two simultaneous equations.

$y = x^2 + 7x - c$

and

$y = 3x + d$

There is a solution when $x = 5$

Work out the value of $c + d$

[3 marks]

$y = x^2 + 7x - c \qquad y = 3x + d.$

$x^2 + 7x - c = 3x + d$

$x^2 + 4x - c = d$

$x^2 + 4x = c + d.$

$5^2 + 4 \times 5 = c + d$

$25 + 20 = 45 = c + d$

$c + d = 45$

Answer 45

Commentary

This solution is fully correct. They've equated the expressions and then substituted $x = 5$.

3 marks

Question 23, response 6

23 Here are two simultaneous equations.

$y = x^2 + 7x - c$

and

$y = 3x + d$

There is a solution when $x = 5$

Work out the value of $c + d$

[3 marks]

$y = 3(5) + d$

$y = 15 + d$

$y = (15)^2 + 7(15) - c$

$y = 225 + 105 - c$

$y = 330 - c$

$y = 15 + 330 + d - c$

$y = 345 + d - c$

Answer 10

Commentary

This student has made the mistake of substituting different values for x.

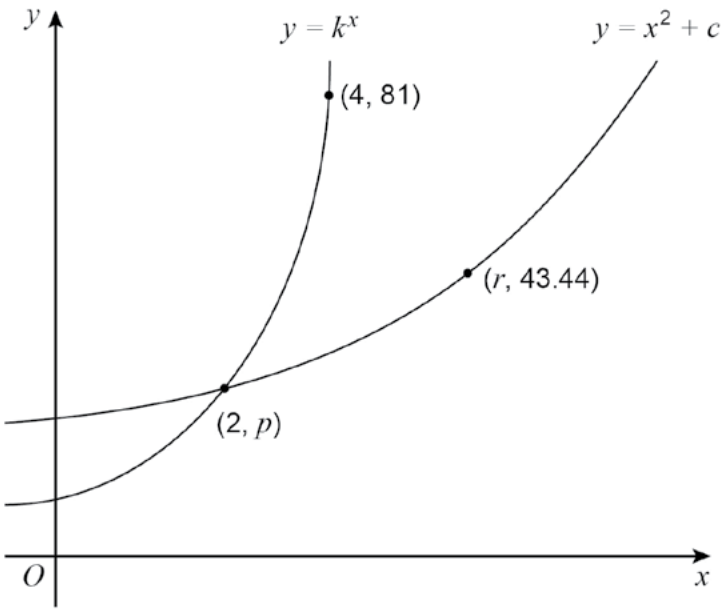
The question states $x = 5$ so this should be used for all occurrences of x in the question.

0 marks

Question 24

24 Here is a sketch of the graphs of $y = k^x$ and $y = x^2 + c$

k and c are positive constants.



Work out the value of r.

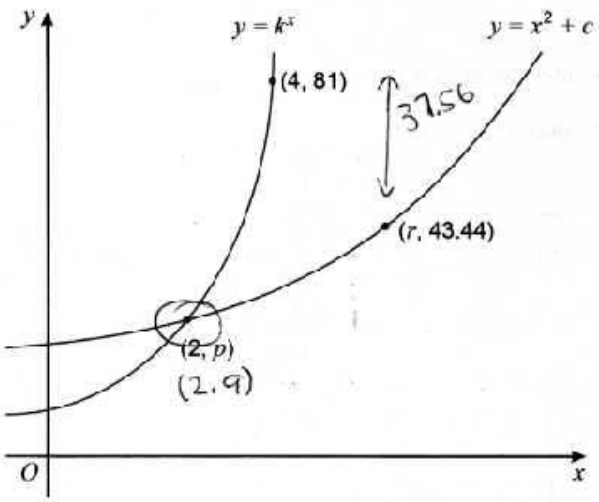
[4 marks]

$r =$ _____

Question 24, response 1

24 Here is a sketch of the graphs of $y = k^x$ and $y = x^2 + c$

k and c are positive constants.



Work out the value of r. **[4 marks]**

$43.44 = x^2 + C$

$y = k^x$

$81 = k^4$

$\sqrt[4]{\ }$ $3 = k$ $\sqrt[4]{\ }$

$y = 3^2 = 9$ (2, 9) $p = 9$

$43.44 \div 3 = 14.48$

$y = 2^2 + C$

-2^2 $y - 4 = C$ -2^2

-37.56

$81 \rightarrow 43.44$

$\times 2$ $\times 9$

$2 \rightarrow 4$ $9 \rightarrow 81$

$r = 14.48$

Commentary

The student gains a mark for knowing $k = 3$ and so $p = 9$.

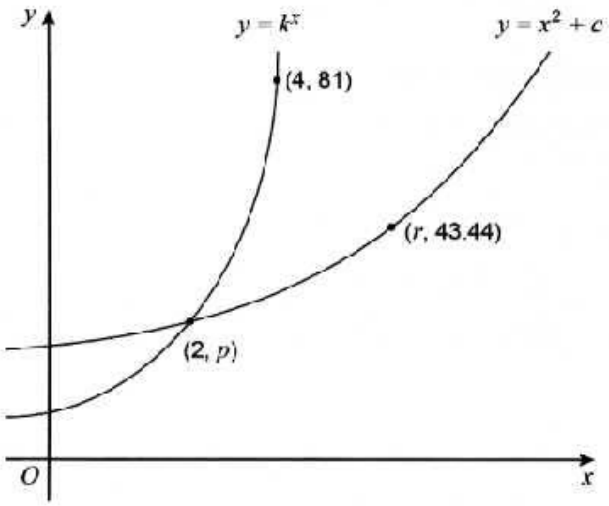
(2, 9) is a common point to both equations. Further marks are gained for substituting (2, 9) into the other equation.

1 mark

Question 24, response 2

24 Here is a sketch of the graphs of $y = k^x$ and $y = x^2 + c$

k and c are positive constants.



Work out the value of r.

[4 marks]

$81 = k^4$ $k = \sqrt[4]{81} = 3$

$3^2 = 9$ $p = 9$

$9 = 2^2 + c = 4 + c$ $c = 5$

$43.44 = r^2 + 5$

$r^2 = 38.44$

$r = \sqrt{38.44} = 6.2$

$r = 6.2$

Commentary

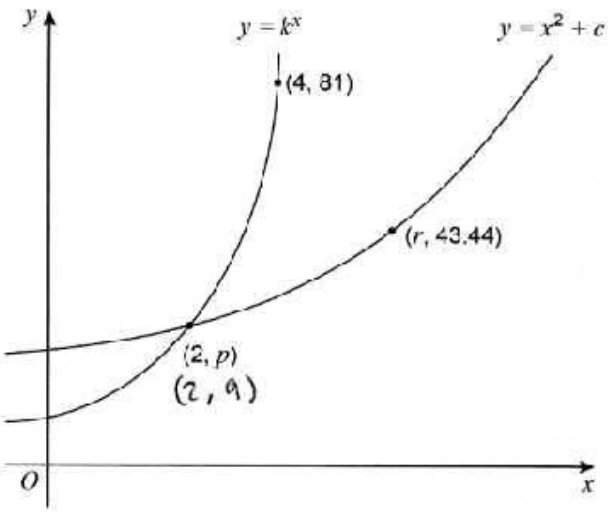
A clearly laid out solution worth full marks.

4 marks

Question 24, response 3

24 Here is a sketch of the graphs of $y = k^x$ and $y = x^2 + c$

k and c are positive constants.



Work out the value of r.

[4 marks]

$81 = k^4$

$k = 3$

$p = 3^2$

$p = 9$

$43.44 = r^2 + c$

$9 = 2^2 + c$

$9 = 4 + c$

$c = 5$

$43.44 = r^2 + 5$

$48.44 = r^2$

$6.96 = r$

$r =$ ~~6~~ 6.96

Commentary

This student has substituted values correctly in order to work out k, p and c.

They then make an error in trying to solve

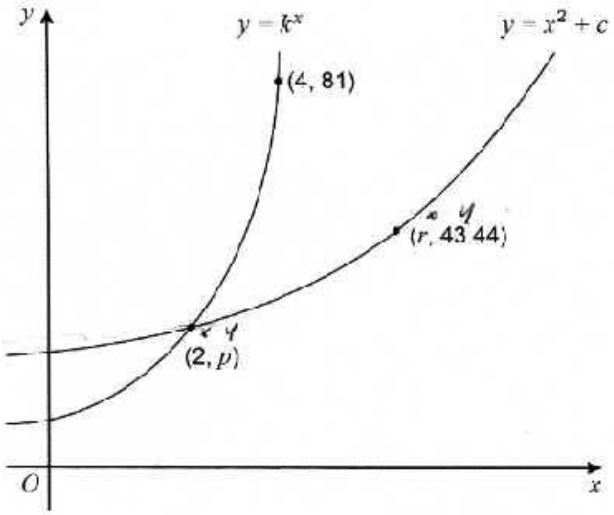
$43.44 = r^2 + 5$ so they miss out on the final mark.

3 marks

Question 24, response 4

24 Here is a sketch of the graphs of $y = k^x$ and $y = x^2 + c$

k and c are positive constants.



Work out the value of r.

[4 marks]

$y = 3^2 = 9$

$y = k^x$ → $x = 4$, $y = 81$

$81 = k^4$

$3^4 = 81$

$3 = k$

$y = mx + c$

$43.44 = x^2 + c$ $\quad p = 9$

$6.59 = x + c$

$6.59 = x + 9$

$-9 \quad -9$

$-2.41 = x$

$r =$ $\quad 2.41$

Commentary

A common mistake was to think that c and p have the same value.

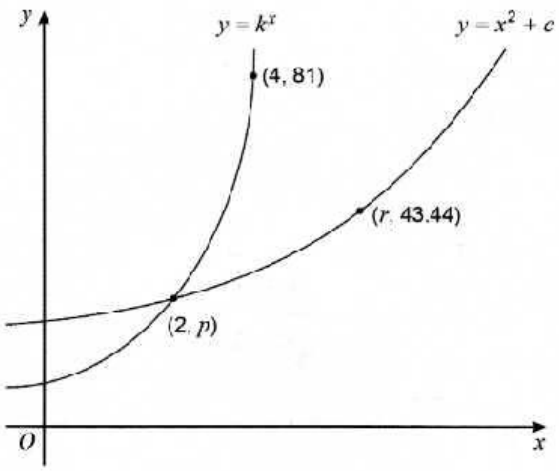
The second mark is for an equation using p that would lead to finding the value of c. The second mark cannot be awarded, and there are no further marks.

1 mark

Question 24, response 5

24 Here is a sketch of the graphs of $y = k^x$ and $y = x^2 + c$

k and c are positive constants.



Work out the value of r.

[4 marks]

$r =$ 3

Commentary

Encourage students to link their values to what they are working out.

As there are 3 values that need to be found, the students must link their value to the correct letter. This can be done through correct calculation or by writing $k = 3$.

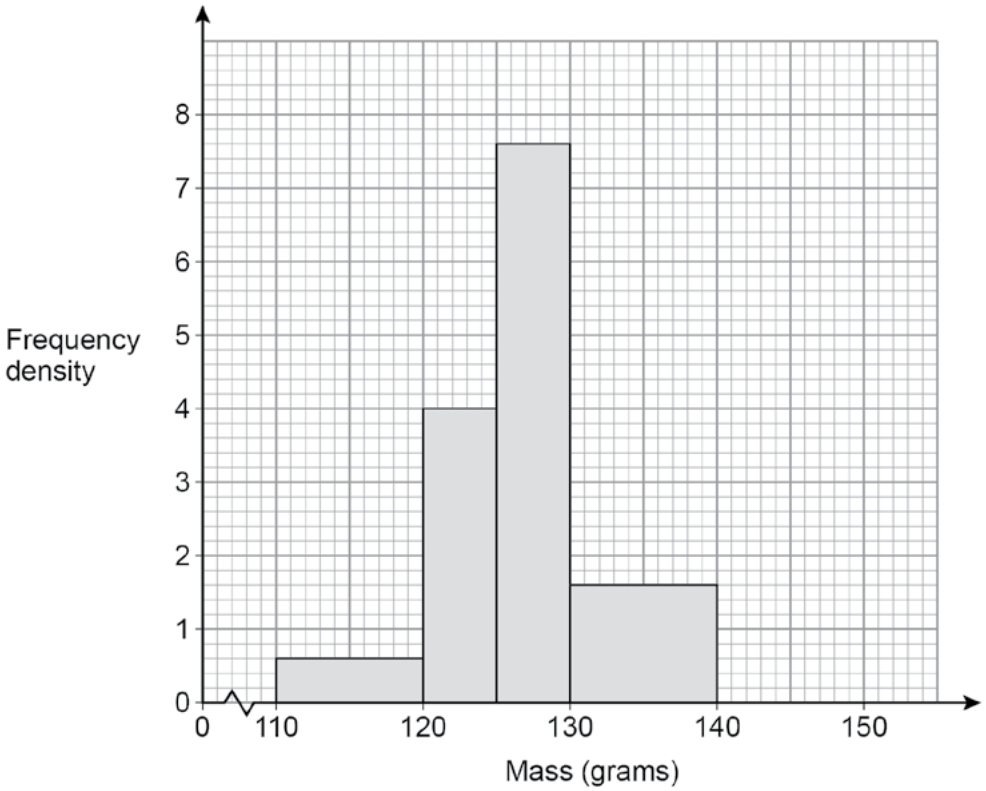
0 marks

Question 25

25 A company makes tubes of toothpaste.

The masses of 80 tubes are checked.

A histogram is drawn to represent the data.



The company makes 28 000 tubes each day.

Estimate how many tubes each day have a mass **less than** 122 grams.

[4 marks]

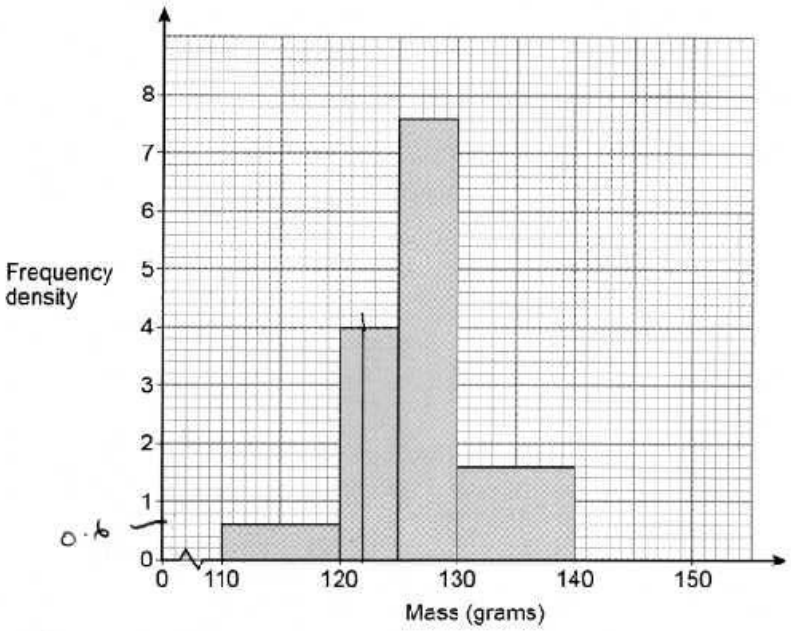
Answer _____

Question 25, response 1

25 A company makes tubes of toothpaste.

The masses of 80 tubes are checked.

A histogram is drawn to represent the data.



The company makes 28000 tubes each day.

Estimate how many tubes each day have a mass **less than** 122 grams.

[4 marks]

2 × 4 = 8

0·6 × 10 = 6 + 8 = 14

28000 ÷ 14 = 2000

Answer 14 2000

Commentary

This student has correctly worked out how many tubes are represented by the correct part of the histogram.

No further marks are awarded as they then don't show a correct method for scaling this up to 28 000.

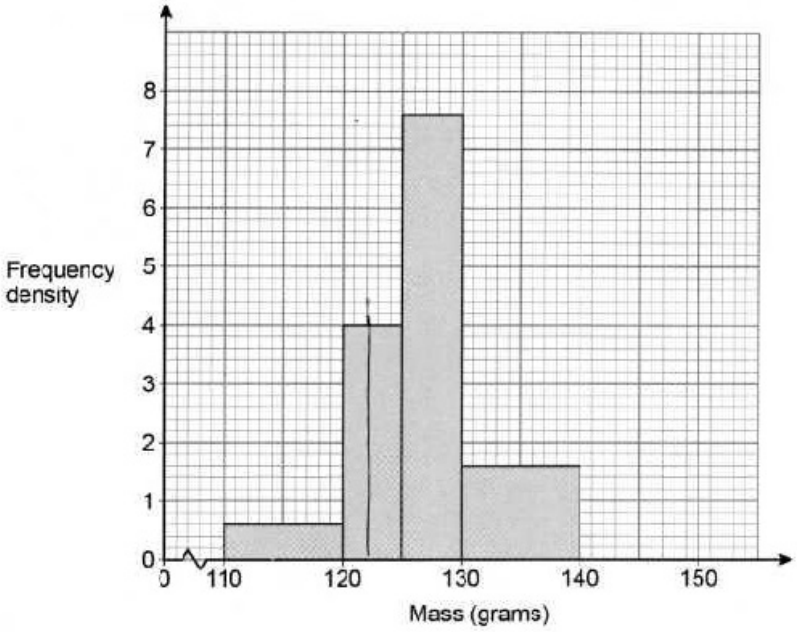
2 marks

Question 25, response 2

25 A company makes tubes of toothpaste.

The masses of 80 tubes are checked.

A histogram is drawn to represent the data.



The company makes 28 000 tubes each day.

Estimate how many tubes each day have a mass **less than** 122 grams.

[4 marks]

2 x 4 = 8 8 + 6 = 14 14 x 28000

10 x 0·6 = 6 80

= 4900

Answer 4900

Commentary

This solution is efficient and fully correct. This student has used the 14 to find the correct proportion of 28 000.

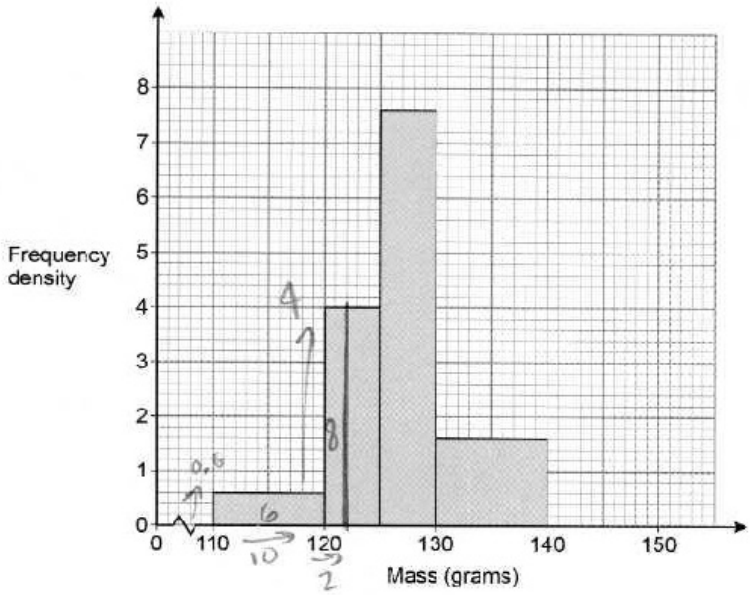
4 marks

Question 25, response 3

25 A company makes tubes of toothpaste.

The masses of 80 tubes are checked.

A histogram is drawn to represent the data.



The company makes 28000 tubes each day.

Estimate how many tubes each day have a mass **less than** 122 grams.

[4 marks]

$0.6 \times 10 = 6$

$2 \times 4 = 8$

$6 + 8 = 14$

$\frac{28,000}{80} = 350$

$350 \times 14 = 4900$

Answer 4,900

Commentary

This student has correctly scaled up from 80 to 28 000 and scored full marks.

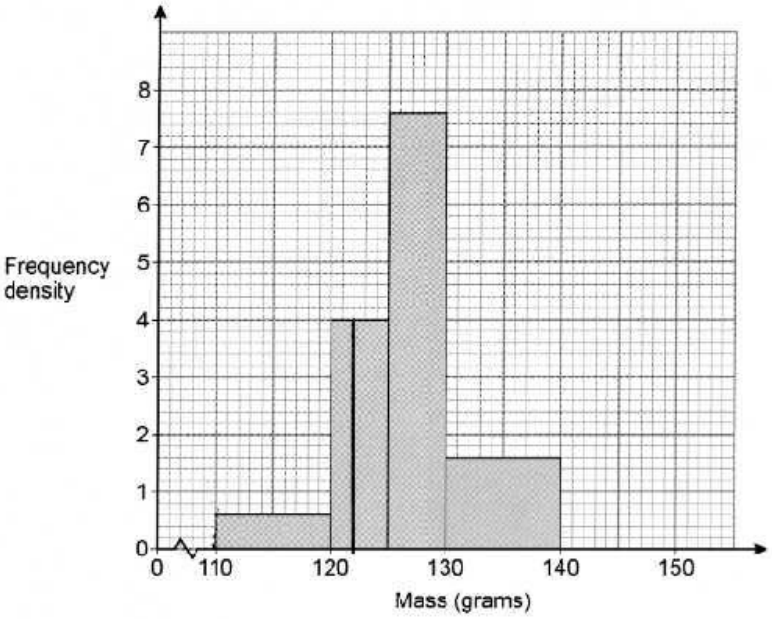
4 marks

Question 25, response 4

25 A company makes tubes of toothpaste.

The masses of 80 tubes are checked.

A histogram is drawn to represent the data.



The company makes 28000 tubes each day.

Estimate how many tubes each day have a mass **less than** 122 grams.

[4 marks]

1=10

0.3 0.6 × 10 = 6

4 × 2 = 8

28 8 16 = 14

28,000 ÷ 80 = 350

350 × 14 = 5250

Answer 5250

Commentary

Remind your students to check their work.

This student has missed out on the final mark as their answer to 350 x 14 is not correct.

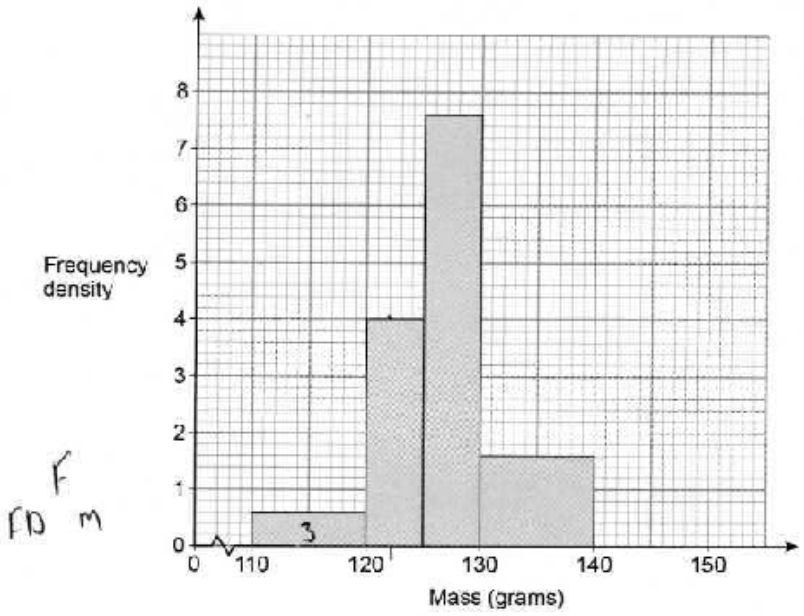
3 marks

Question 25, response 5

25 A company makes tubes of toothpaste.

The masses of 80 tubes are checked.

A histogram is drawn to represent the data.



The company makes 28 000 tubes each day.

Estimate how many tubes each day have a mass **less** than 122 grams.

[4 marks]

~~10 : 0.5~~

0·3 x 10 = 3

4 x 2 = 8

8 + 3 = 11

28 000 / 11 = 2545.45

Answer 2545

Commentary

Remind your students to check the scale rather than just counting the squares: each square is not 0.1

Credit is given for 4 x 2 as this is the correct frequency for 120 – 122 kg.

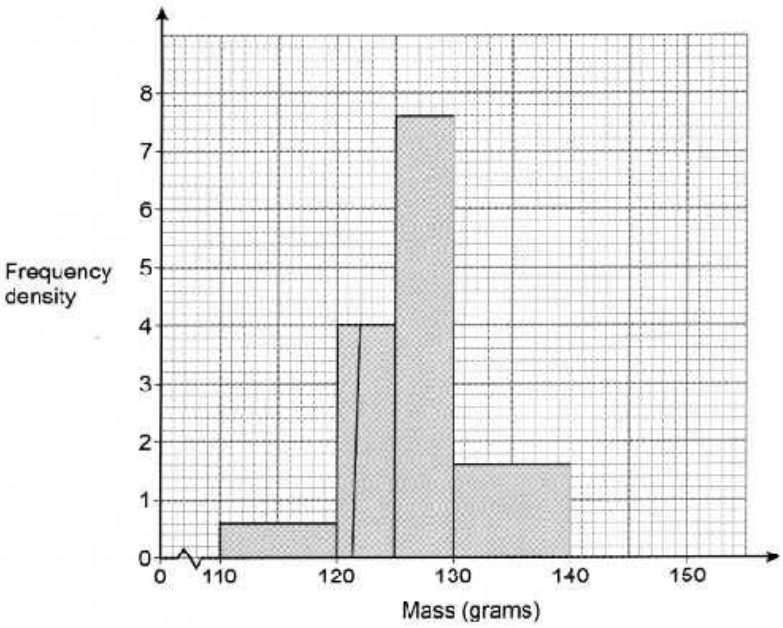
1 mark

Question 25, response 6

25 A company makes tubes of toothpaste.

The masses of 80 tubes are checked.

A histogram is drawn to represent the data.



The company makes 28000 tubes each day.

Estimate how many tubes each day have a mass **less than** 122 grams.

[4 marks]

4 + 0.6 = 4.6

28000 ÷ 80 = 350

4.6 × 350 = 350 ÷ 4.6 = 76.1

Answer 76.1

Commentary

A common mistake was to use the height of the bar as the frequency. This doesn't gain any marks.

0 marks

Question 27

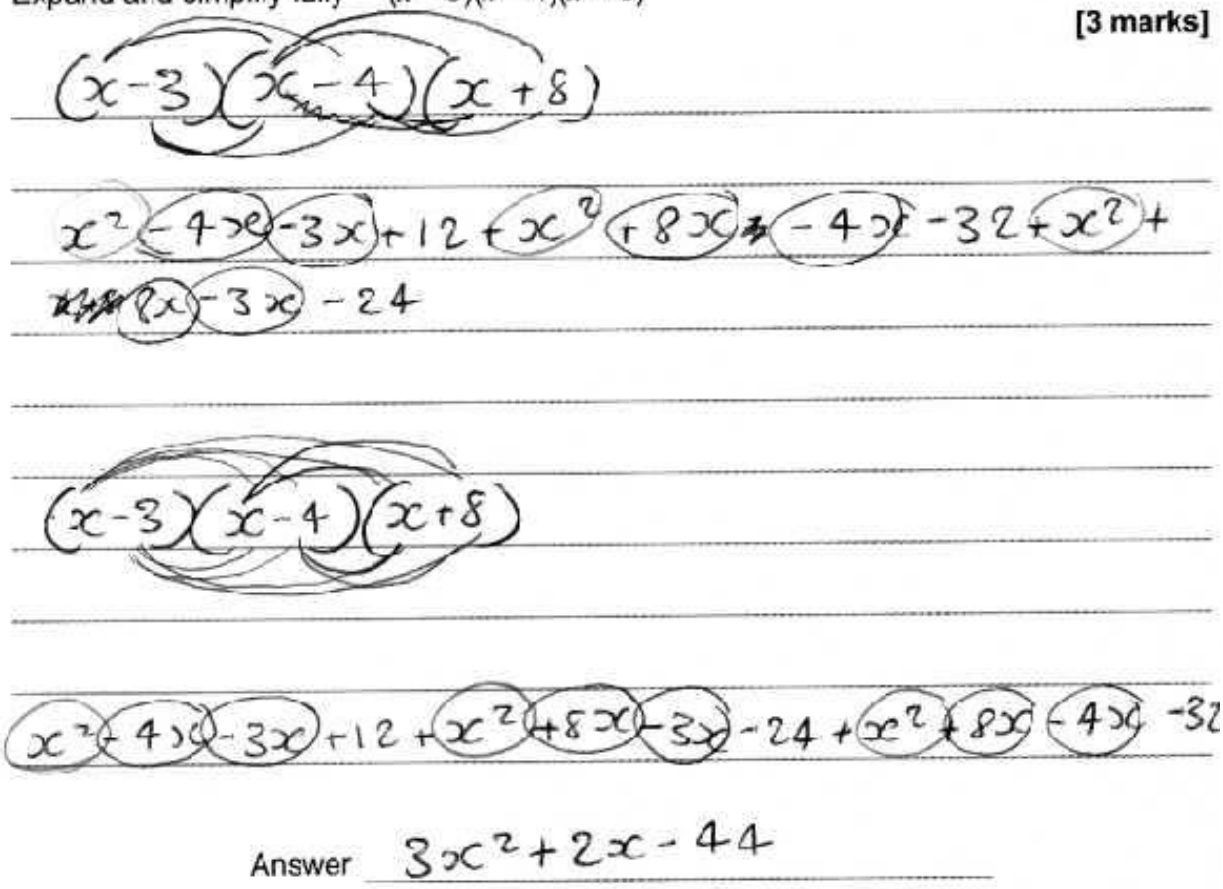
27 Expand and simplify fully $(x-3)(x-4)(x+8)$

[3 marks]

Answer _____

Question 27, response 1

27 Expand and simplify fully $(x-3)(x-4)(x+8)$ **[3 marks]**



Answer $3x^2+2x-44$

Commentary

This student has tried to multiply all possible pairs of brackets. This scores zero as it is not a method that leads to the correct answer.

0 marks

Question 27, response 2

27 Expand and simplify fully $(x-3)(x-4)(x+8)$ **[3 marks]**

$(x-3)(x-4) = x^2 - 4x - 3x + 12$

$= x^2 - 7x + 12$

$(x^2 - 7x + 12)(x+8) = x^3 + 8x^2 - 7x^2 - 56x + 12x + 96$

$= x^3 + x^2 - 44x + 96$

Answer $x^3 + x^2 - 44x + 96$

Commentary

This solution set out very neatly and scores full marks.

3 marks

Question 27, response 3

27 Expand and simplify fully $(x-3)(x-4)(x+8)$ **[3 marks]**

$(x-3)(x-4)(x+8)$

	x	-4
x	x^2	$-4x$
-3	$-3x$	12

	x	8
x^2	x^3	$8x^2$
$-7x$	$-7x^2$	$-56x$
12	$12x$	72

$x^3 + x^2 - 44x + 72$

Answer $x^3 + x^2 - 44x + 72$

Commentary

It is very important to remind your students to check their work.

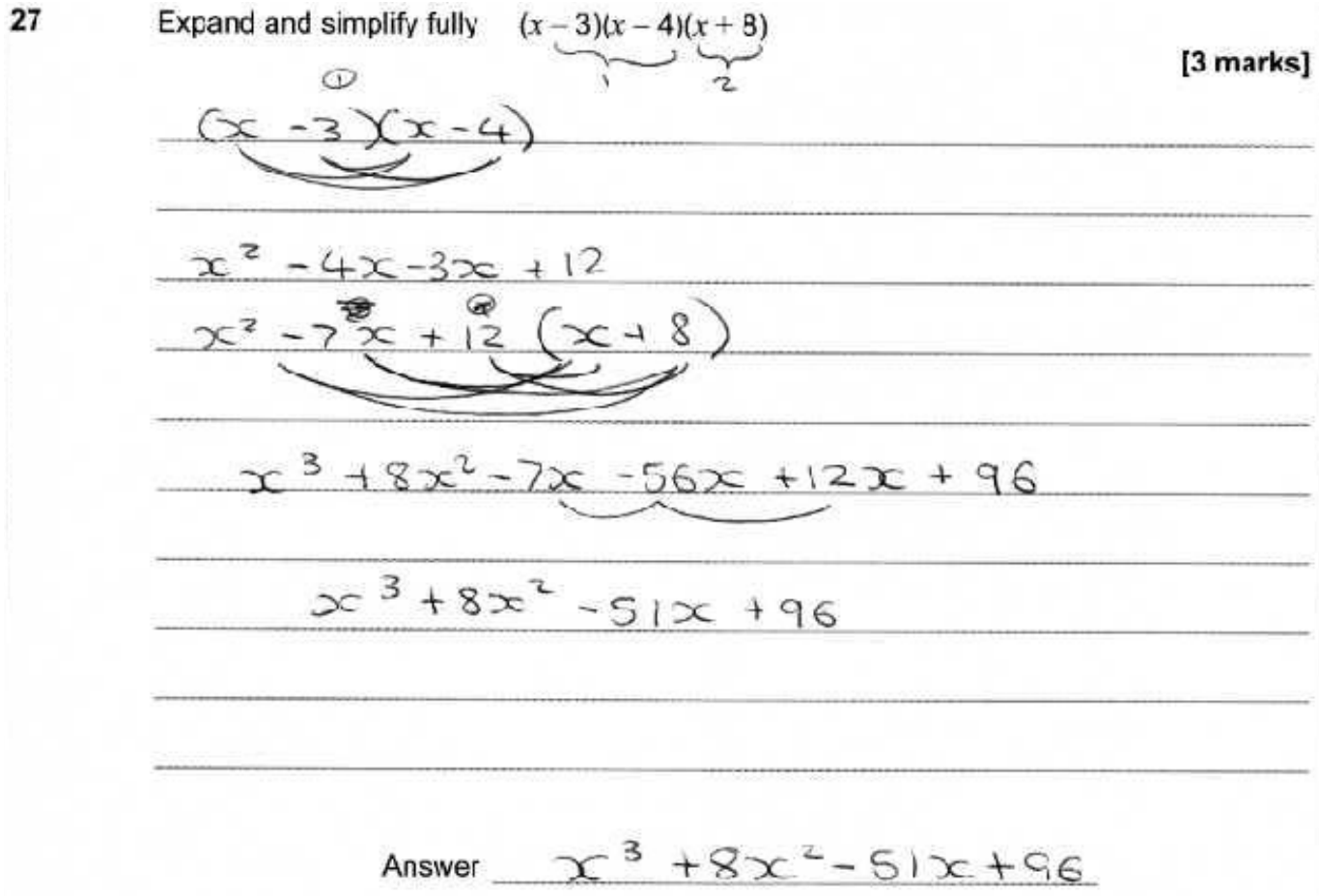
The second expansion must contain no errors.

Here an arithmetic slip (8 x 12 = 72) has cost the second mark.

1 mark

Question 27, response 4

27 Expand and simplify fully $(x-3)(x-4)(x+8)$ **[3 marks]**



Commentary

This student has made one mistake in the second expansion ($-7x$ instead of $-7x^{-2}$) and so has not scored the second method mark.

1 mark

Question 27, response 5

27 Expand and simplify fully $(x-3)(x-4)(x+8)$ [3 marks]

$x^2 - 4x - 3x + 12$

$x^2 - 7x + 12 \quad (x+8)$

~~$x^3 - 56$~~

$x^3 + 8x^2 - 7x^2 - 56x + 12x + 96$

$x^3 - 44x + 96$

Answer $x^3 - 44x + 96$

Commentary

This student has both expansions correct (condone the missing brackets as this is recovered), but has made an error in simplifying meaning. They miss out on the final mark.

2 marks

Question 27, response 6

27 Expand and simplify fully $(x-3)(x-4)(x+8)$

[3 marks]

$(x-3)(x-4) = x^2 - 4x - 3x - 12$

$(x^2 - 7x - 12)(x+8) =$

$x^3 + 8x^2 - 7x^2 - 56x - 12x - 96$

$x^3 + x^2 - 68x - 96$

Answer $x^3 + x^2 - 68x - 96$

Commentary

This student has made one mistake in expanding the first bracket.

This is then followed through correctly to a correct expansion of their quadratic with the remaining bracket, so they only drop one mark.

2 marks

AQA
Realising potential

Contact us

Our team of subject experts are here to help and support you as you deliver our specifications.

We're here to provide advice when you need it and respond to queries you might have to make sure you feel confident about guiding your students to fulfil their potential.

We understand the trust you put in us to provide great assessments for your students and we are committed to delivering on this.

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November 2022 Version 1.0

G02410_05