2021 Assessment resources
GCSE Mathematics

Geometry - Common

Answers and commentaries

The question numbers in this resource reflect the question numbers from the original papers and match the question numbers in the corresponding 2021 assessment materials.

Question 13
Please see the mark scheme.

Commentary
Take notice of the Additional Guidance if it is not immediately clear what mark to give.

Question 10
No examples available

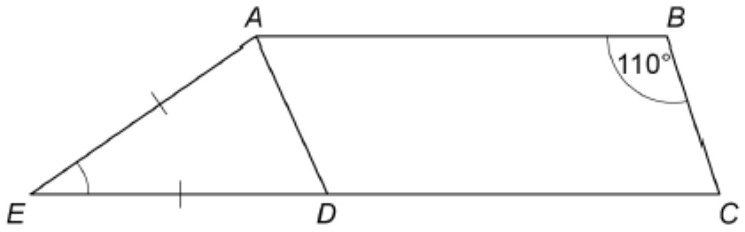
Commentary
If both values are correct it is not necessary to see any method.

Question 8
No examples available

Question 15

15 Trapezium *ABCE* is made from parallelogram *ABCD* and isosceles triangle *ADE*.

AE = *DE*



Not drawn accurately

Work out the size of angle *AED*.

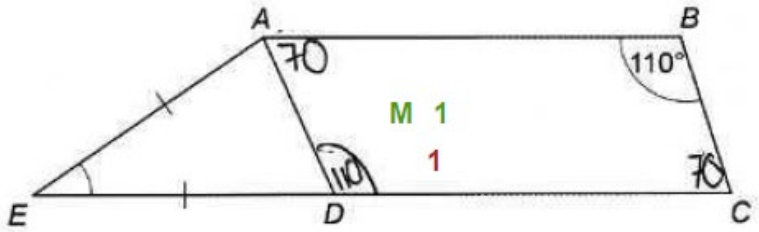
[3 marks]

Answer _____ degrees

Student A

15 Trapezium *ABCE* is made from parallelogram *ABCD* and isosceles triangle *ADE*.

AE = *DE*



Not drawn accurately

Work out the size of angle *AED*.

[3 marks]

180 - 110 - 70 = 70 X 2 = 140

Mdep 0 180 - 140 = 20

Answer 20 degrees

Commentary

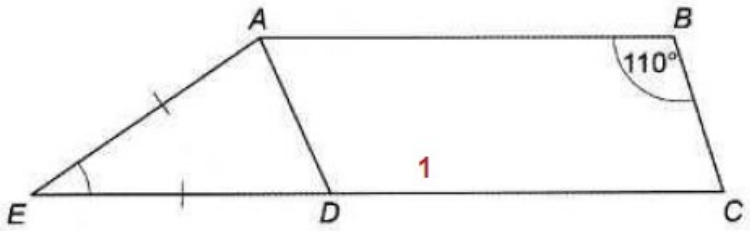
The first line of Additional Guidance gives information about how angles need to be identified. Note also that when there are many ways to award a mark, only one of them is needed. Here angle *ADC* is identified on the diagram as 110° and angle *BAD* is identified on the diagram as 70°. Either of these scores the first M mark, but do not award 2 marks even though there are 2 angles correct. Neither of the angles required for the second mark are identified.

1 mark

Student B

15 Trapezium *ABCE* is made from parallelogram *ABCD* and isosceles triangle *ADE*.

AE = *DE*



Not drawn accurately

Work out the size of angle *AED*.

[3 marks]

180 - 110 = 70. M 0

Answer 70 degrees

Commentary

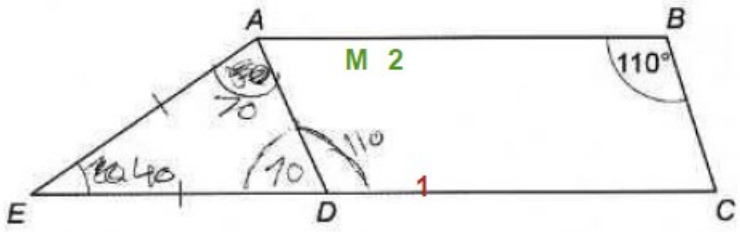
No angle is identified through notation or on the diagram.

0 marks

Student C

15 Trapezium *ABCE* is made from parallelogram *ABCD* and isosceles triangle *ADE*.

AE = *DE*



Not drawn accurately

Work out the size of angle *AED*.

[3 marks]

180 − 70 = 110 − 70 = 40

4120

ABC

180 − 130 = 50

Answer 70 A 0 degrees

Commentary

Angle *ADC* is identified on the diagram (first M mark).
Angle *EDA* (and angle *EAD*) is identified on the diagram (second M mark).
Although 40° is seen in working the student has selected 70 as their answer.
2 marks

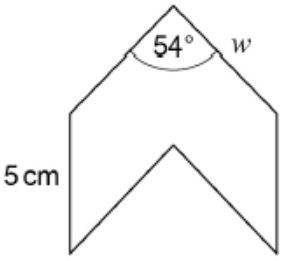
Question 6

6 A and B are similar shapes.

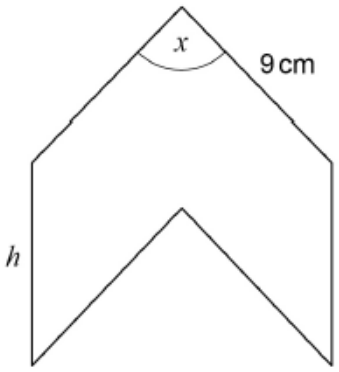
B is an enlargement of A with scale factor 1.5

Not drawn accurately

A



B



Work out the values of x, h and w.

[3 marks]

x = _____ degrees

h = _____ cm

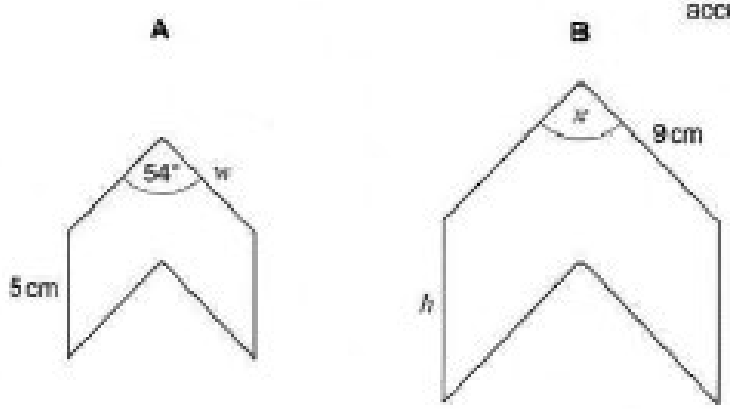
w = _____ cm

Student A

6 A and B are similar shapes.

B is an enlargement of A with scale factor 1.5

Not drawn accurately



Work out the values of x, h and w.

[3 marks]

5 x w

9 x 1.5 = 13.5

5 x 1.5 = 7.5

81 x 1.5 = 87

x = 81 degrees

h = 7.5 B 1 cm

w = 13.5 cm

Commentary

The answer lines allow 1 mark.

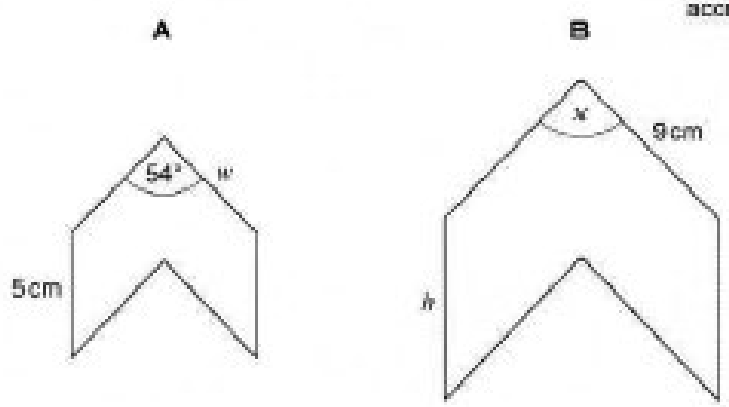
1 mark

Student B

6 A and B are similar shapes.

B is an enlargement of A with scale factor 1.5

Not drawn accurately



Work out the values of x, h and w.

[3 marks]

$\frac{9}{5} = 1.8$

$h = 5 \times 1.8 = 9$

$w = 9 \div 1.8 = 5$

$x = 54 \times 1.8 = 97.2$

$h = 5 \times 1.5 = 7.5$ B 1

$w = 9 \div 1.5 = 6$

$x = 54 \times 1.5 = 81$ B 1

$x =$ 7.5 degrees

$h =$ 9 6 cm

$w =$ 5 81 cm

Commentary

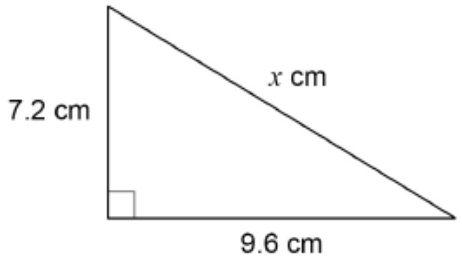
Although the answer lines are incorrect, the first line of Additional Guidance allows for transcription errors. The working clearly has h = 7.5 and w = 6 so 2 marks can be awarded.

2 mark

Question 19

19 Here is a right-angled triangle.

Not drawn accurately



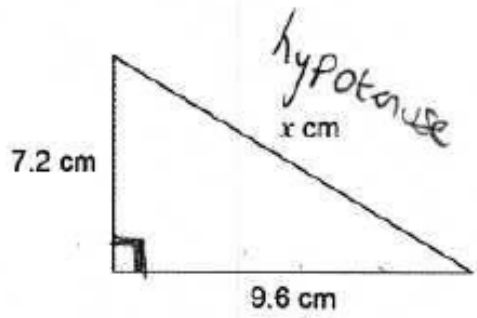
Show that $x = 12$

[2 marks]

Student A

19 Here is a right-angled triangle.

Not drawn accurately



Show that $x = 12$ **[2 marks]**

Triangle = 180°

180 − 90 = 90 M 2

$A^2 + B^2 = C^2$

$9.6^2 + x = 7.2^2$ B 1

$92.16 + x = 51.84$

Commentary

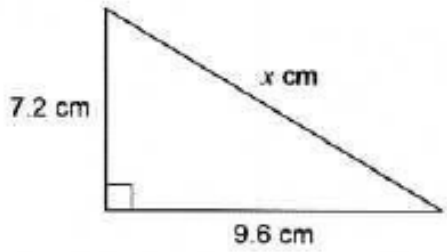
Although the penultimate line of working is not correct, sight of 9.6^2 and 7.2^2 is sufficient to award B1.

1 mark

Student B

19 Here is a right-angled triangle.

Not drawn accurately



Show that $x = 12$ **[2 marks]**

M 2

B 1

$7.2^2 + 9.6^2 =$

$51.84 + 92.16 = \sqrt{144} = 12$

Commentary

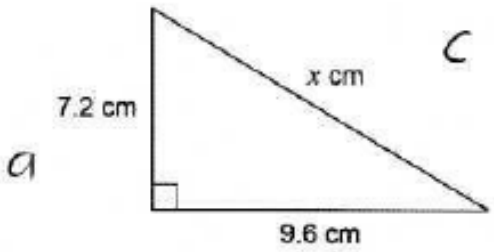
In a 'show that' question students who arrive at (in this case) 12 do not always score full marks. Here, the 3rd line of Additional Guidance shows that this response does not score B2 because there is an incorrect statement.

1 mark

Student C

19 Here is a right-angled triangle.

Not drawn accurately



Show that $x = 12$ M 2

[2 marks]

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

$a^2 = 7.2 \times 7.2 = 51.84$ ①

$b^2 = 9.6 \times 9.6 = 92.16$

B 1 $144 = 12 = 12$

Commentary

This student obtains 12 but the working is not fully correct. The 12 was given in the question and the question is a 'show that'.

1 mark

Question 19

No examples available

Commentary

Note that all three boxes need to be correct for 2 marks.

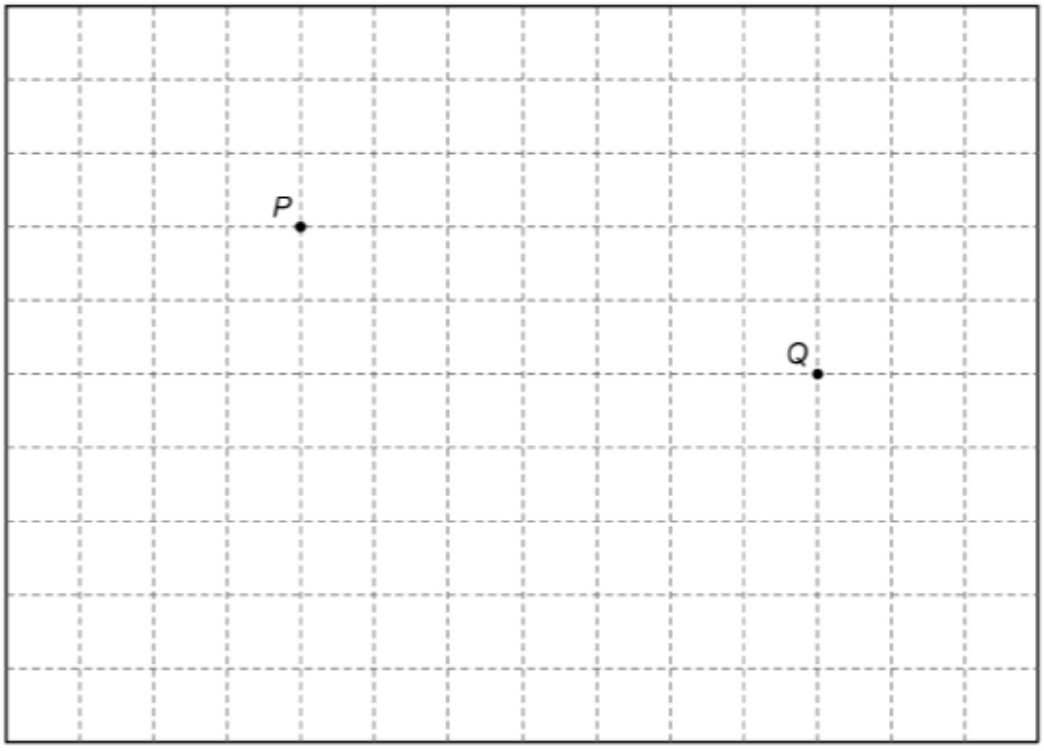
Question 14

14 The scale drawing represents a garden.

Water from a sprinkler at *P* reaches up to 20 metres from *P*.

Water from a sprinkler at *Q* reaches up to 25 metres from *Q*.

Scale: 1 cm represents 5 m



Using a pair of compasses,

show the region that water from **both** sprinklers reaches.

[2 marks]

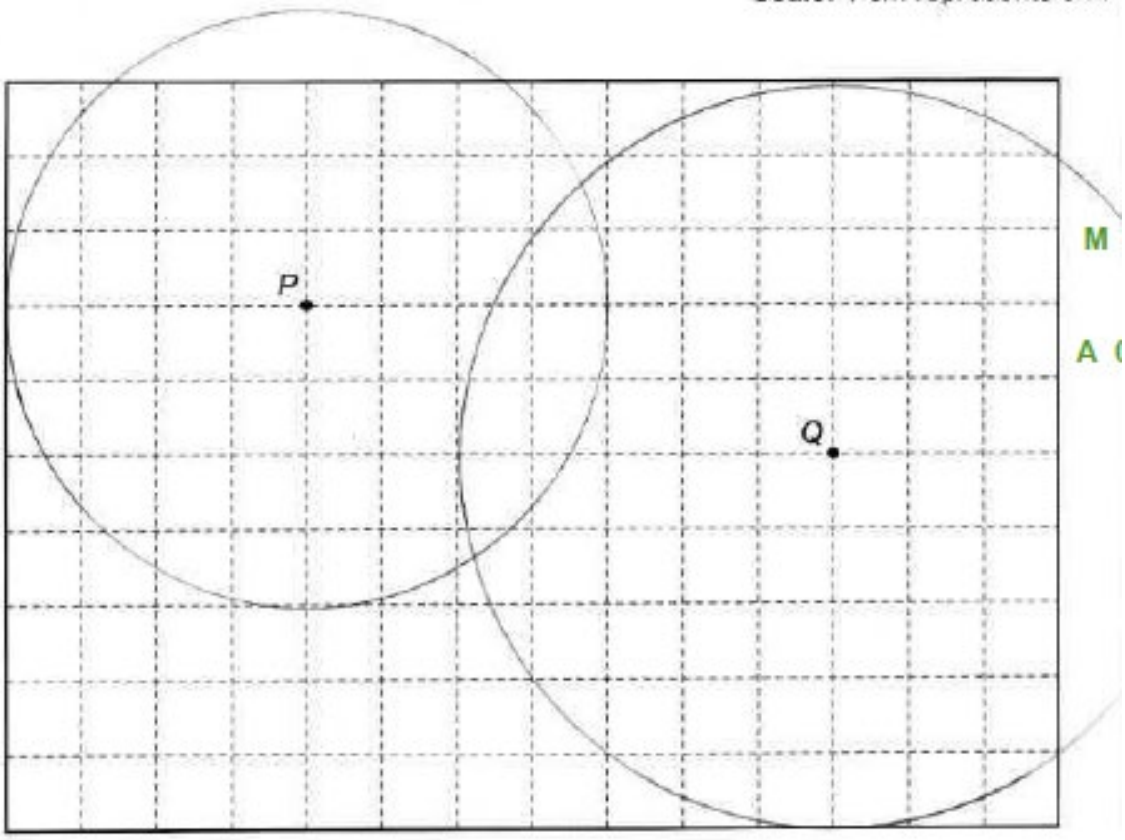
Student A

14 The scale drawing represents a garden.

Water from a sprinkler at P reaches up to 20 metres from P.

Water from a sprinkler at Q reaches up to 25 metres from Q.

Scale: 1 cm represents 5 m



Using a pair of compasses,

show the region that water from **both** sprinklers reaches.

[2 marks]

Commentary

Both arcs correct but the region is not identified.

1 mark

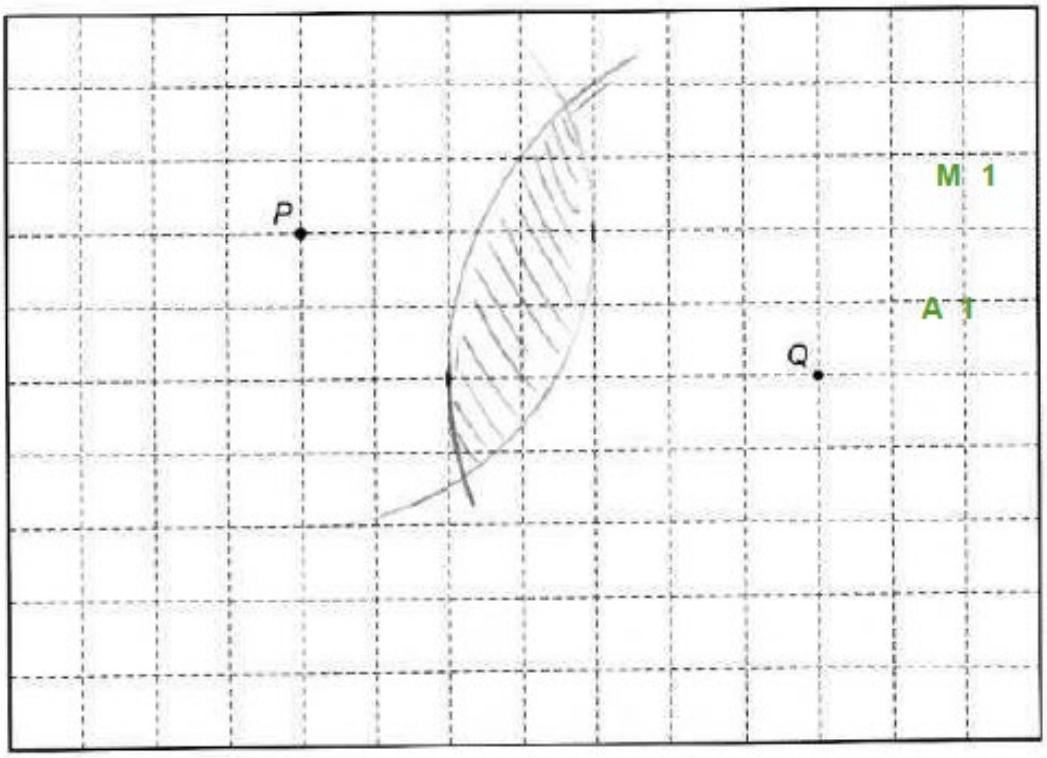
Student B

14 The scale drawing represents a garden.

Water from a sprinkler at *P* reaches up to 20 metres from *P*.

Water from a sprinkler at *Q* reaches up to 25 metres from *Q*.

Scale: 1 cm represents 5 m



Using a pair of compasses,

show the region that water from **both** sprinklers reaches.

[2 marks]

Commentary

Full circles are not required. The Additional Guidance (line 2) gives information about how the student can identify the region.

2 marks

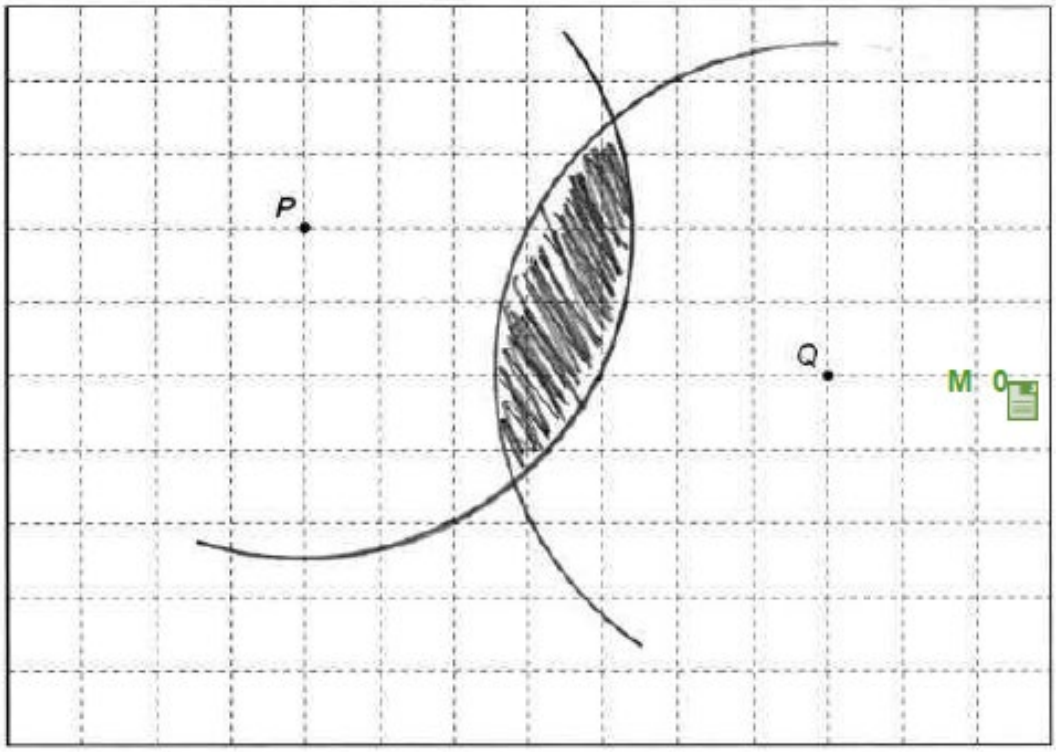
Student C

14 The scale drawing represents a garden.

Water from a sprinkler at *P* reaches up to 20 metres from *P*.

Water from a sprinkler at *Q* reaches up to 25 metres from *Q*.

Scale: 1 cm represents 5 m



Using a pair of compasses,

show the region that water from **both** sprinklers reaches.

[2 marks]

Commentary

Neither arc has a radius within the required range.

0 marks

Question 11

No examples available

Commentary

25.8… means that 25.8 is acceptable as is any answer that starts 25.8 eg 25.827

Question 7

No examples available

Commentary

Note that an answer in terms of pi is needed for both marks to be scored.

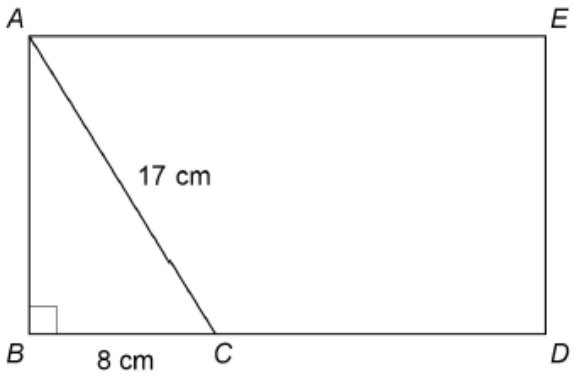
Question 7

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 17 cm

BC = 8 cm

Not drawn accurately



BC : *CD* = 1 : 2

Work out the area of rectangle *ABDE*.

[4 marks]

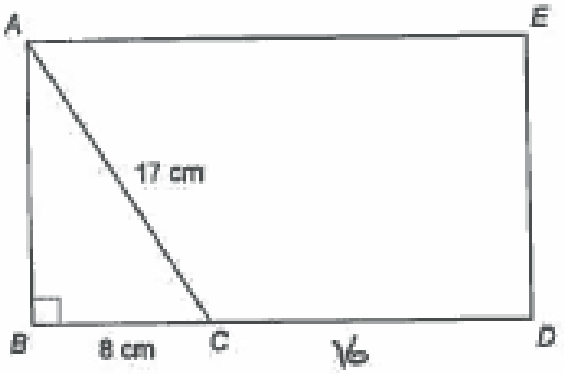
Student A

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 17 cm

BC = 8 cm

Not drawn accurately



BC : *CD* = 1 : 2

Work out the area of rectangle *ABDE*.

[4 marks]

$8^2 + 17^2 = 353$

$\sqrt{353} = 18.8$ to 1dp. SC2

$8 + 16 = 24$

$18.8 \times 24 = 451.2\ cm^2$

B1

to 1dp.

Answer 451.2 cm^2

Commentary

The working would score M1M0M0A0 but there is a special case (SC) and this answer is in the range given. When there is a choice of 1 mark from the scheme or 2 marks from the special case, always award the higher mark.

2 marks

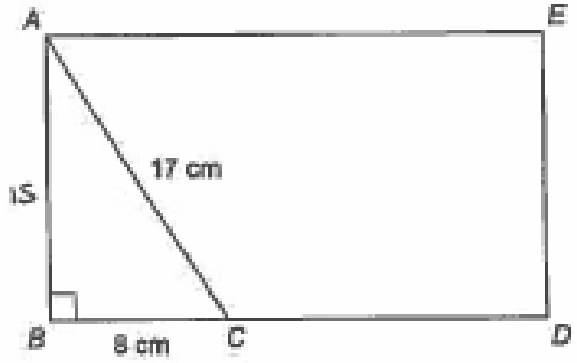
Student B

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 17 cm

BC = 8 cm

Not drawn accurately



BC : *CD* = 1 : 2

Work out the area of rectangle *ABDE*.

[4 marks]

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

$17^2 = a^2 + 8^2$ $a = 15$ $\frac{8 \times 15}{2} = 60$

$289 = a^2 + 64$ M1

$289 - 64 = 225$ M1

$\sqrt{225} = 15$ M0

A0

Answer 60 cm^2

Commentary

The student scores the first 2 marks but then only works out the area of the triangle.

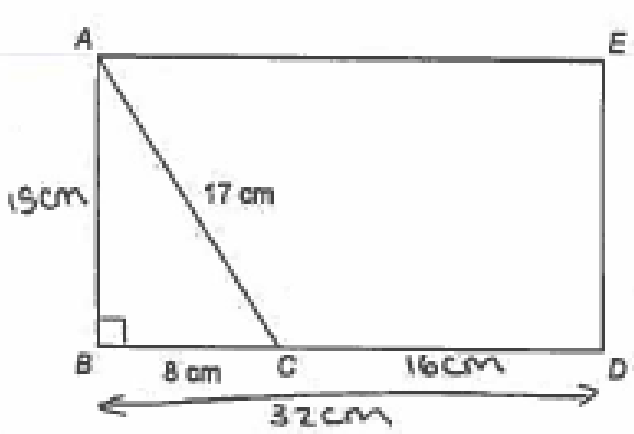
2 marks

Student C

7 The diagram shows rectangle *ABDE* and right-angled triangle *ABC*.

AC = 17 cm

BC = 8 cm



Not drawn accurately

BC : *CD* = 1 : 2

Work out the area of rectangle *ABDE*.

[4 marks]

8 x 2 = 16cm.

8 + 16 = 32cm

M

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

$c^2 - a^2 = b^2$ 15cm x 32cm = 480cm²

$17^2 - 8^2 = b^2$ M

$289 - 64 = b^2$

$b^2 = 225$ M

$b = \sqrt{225} = 15$

Answer 480 cm² A

Commentary

The first 2 marks are awarded. At first it appears that 15 x 32 is an incorrect method for the 3rd M mark. However on line 2 the student has shown their method but have made an arithmetic slip. Therefore, as the correct method is shown the 3rd M mark can be awarded.

3 marks

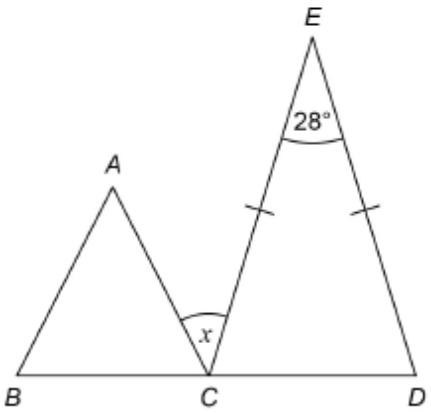
Question 16

16 (a) *BCD* is a straight line.

Triangle *ABC* is equilateral.

CE = *DE*

Not drawn accurately



Work out the size of angle x.

[4 marks]

Answer _____ degrees

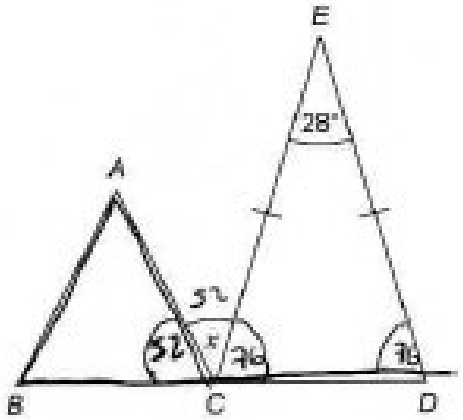
Student A

16 (a) *BCD* is a straight line.

Triangle *ABC* is equilateral.

CE = *DE*

Not drawn accurately



M 0

Work out the size of angle *x*.

[4 marks]

28 - 180 = 152

152 ÷ 2 = 76 M 1

180 - 76 = 104 Mdep 0

104 ÷ 2 = 52

A 0

Answer 52 degrees

Commentary

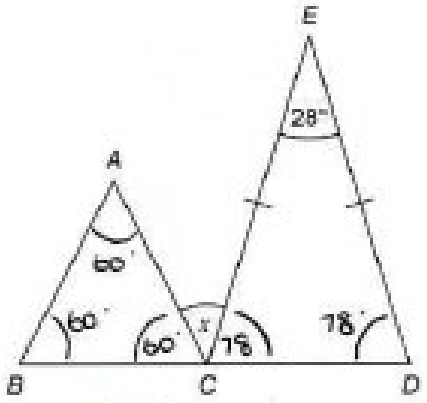
The 2nd M mark is not dependent on the first M mark so can be awarded. (M0M1M0A0)

1 mark

Student B

16 (a) *BCD* is a straight line.
Triangle *ABC* is equilateral.
CE = *DE*

Not drawn accurately



M 1

Work out the size of angle *x*.

[4 marks]

M 1

$180 - 28 = 152$

$\frac{152}{2} = 78°$

Mdep 1

$180 - (78 + 60) = x$

$x = 42$ A 0

Answer 42 degrees

Commentary

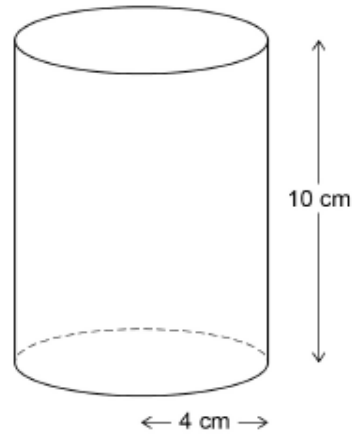
The 1st M mark is awarded as 60 is in an appropriate place on the diagram (see line 1 of Additional Guidance). The correct method is shown for the 2nd M mark so it doesn't matter that the calculation has been worked out incorrectly. The 3rd M mark also has the correct method shown as the student uses the correct angle of 60 and uses their 76 (which in this case is 78)
3 marks

Question 28

28 Here are two solids.

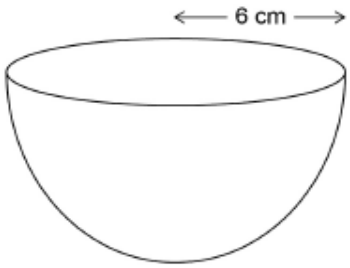
Cylinder

radius 4 cm height 10 cm



Hemisphere

radius 6 cm



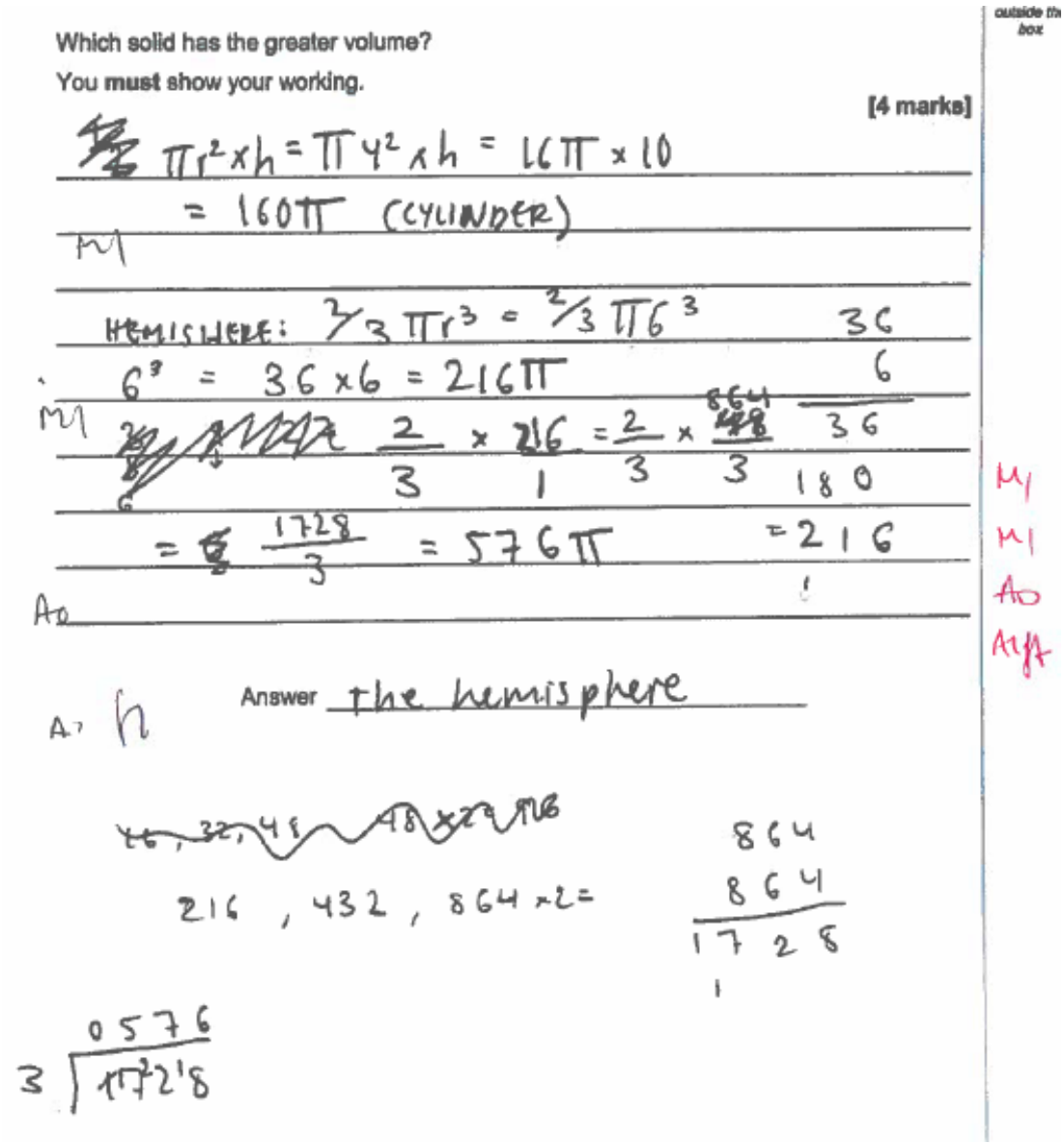
volume of a hemisphere $= \frac{2}{3}\pi r^3$ where r is the radius

Which solid has the greater volume?

You **must** show your working.

[4 marks]

Student A



Which solid has the greater volume?

You **must** show your working.

[4 marks]

$\pi r^2 \times h = \pi 4^2 \times h = 16\pi \times 10$

$= 160\pi$ (CYLINDER)

M1

HEMISPHERE: $\frac{2}{3}\pi r^3 = \frac{2}{3}\pi 6^3$

$6^3 = 36 \times 6 = 216\pi$

M1 $\frac{2}{3} \times \frac{216}{1} = \frac{2}{3} \times \frac{864}{3}$

$= \frac{1728}{3} = 576\pi$

A0

Answer the hemisphere

A1 h

216, 432, 864 ×2=

$$\begin{array}{r} 864 \\ 864 \\ \hline 1728 \\ 1 \end{array}$$

$$3\overline{)1728}\quad 0576$$

36 × 6 = 180 = 216

M1

M1

A0

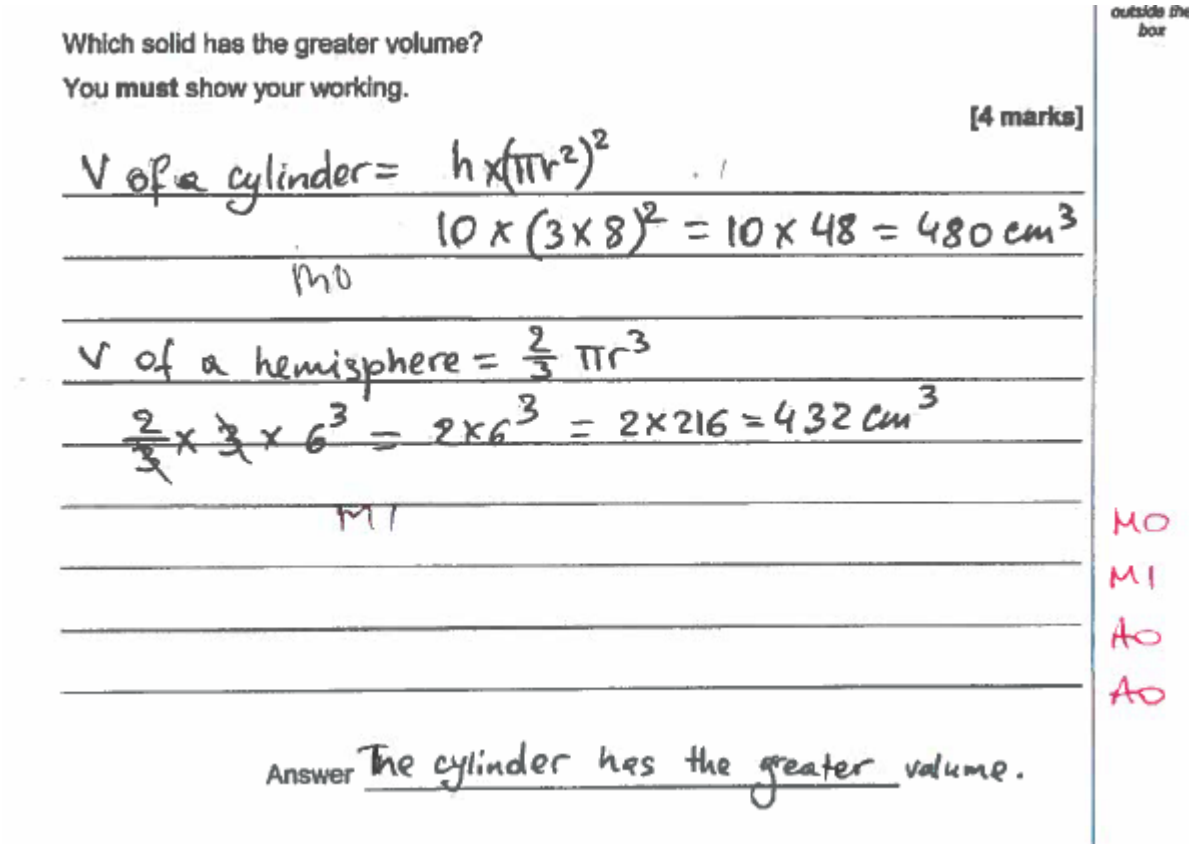
A1ft

Commentary

Method is correct for both volumes so the first 2 M marks are awarded. There is an arithmetic error processing the volume of the hemisphere so the first A mark is not awarded. As both M marks have been awarded there is a follow through (ft) A mark and this response qualifies for this mark.

3 marks

Student B



Which solid has the greater volume?

You **must** show your working.

[4 marks]

V of a cylinder = $h \times (\pi r^2)^2$

$10 \times (3 \times 8)^2 = 10 \times 48 = 480\ cm^3$

M0

V of a hemisphere = $\frac{2}{3}\pi r^3$

$\frac{2}{3} \times \frac{3}{1} \times 6^3 = 2 \times 6^3 = 2 \times 216 = 432\ cm^3$

M1

M0

M1

A0

A0

Answer The cylinder has the greater volume.

Commentary

An incorrect formula has been used for the cylinder's volume so the 1st M mark is not awarded. The 2nd M mark is not dependent on the 1st M mark. 3 is an acceptable value for pi in the 2nd M mark (see RHS of this mark in the mark scheme)

1 mark

Question 17

Please see the mark scheme