2021 ASSESSMENT MATERIALS

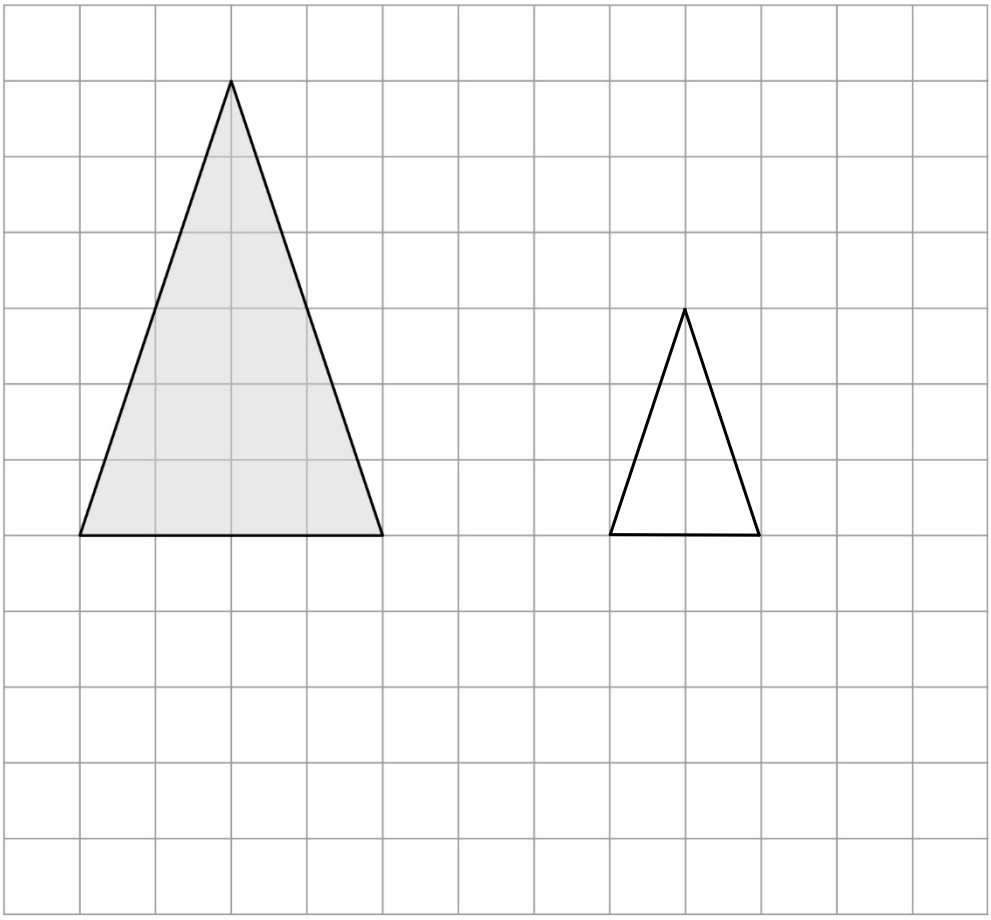
GCSE
MATHEMATICS (8300)
HIGHER

Geometry

Total number of marks: 39 per optional item

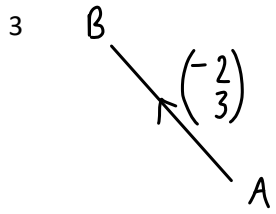
Q5

On the grid, draw an enlargement of the triangle with scale factor $\frac{1}{2}$



(Total 2 marks)

Q2



The vector $\begin{pmatrix}-2\\3\end{pmatrix}$ translates A to B.

Circle the vector that translates B to A.

$\begin{pmatrix}-2\\3\end{pmatrix}$ $\begin{pmatrix}-3\\2\end{pmatrix}$ $\begin{pmatrix}3\\-2\end{pmatrix}$ $\begin{pmatrix}2\\-3\end{pmatrix}$

(Total 1 mark)

Q10

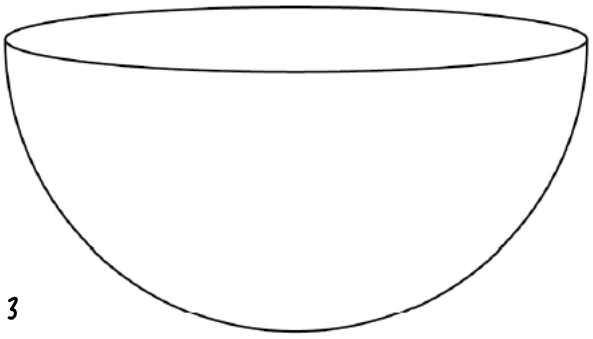
Volume of a sphere = $\frac{4}{3}\pi r^3$ where r is the radius

A container is a hemisphere of radius 30 cm

$V = \frac{4}{3}\pi(30)^3 \div 2$

$= \frac{113097.336\ cm^3}{2}$

$= 56548.668\ cm^3$



Sand fills the container at a rate of 4000 cm^3 per minute.

Does it take **less than** a quarter of an hour to fill the container?

You **must** show your working.

↳ 15 minutes

in 15 minutes $\Rightarrow$ 4000 x 15 = 60 000 cm^3 **(Total 3 marks)**

so yes, it takes less than a quarter of an hour to fill the container.

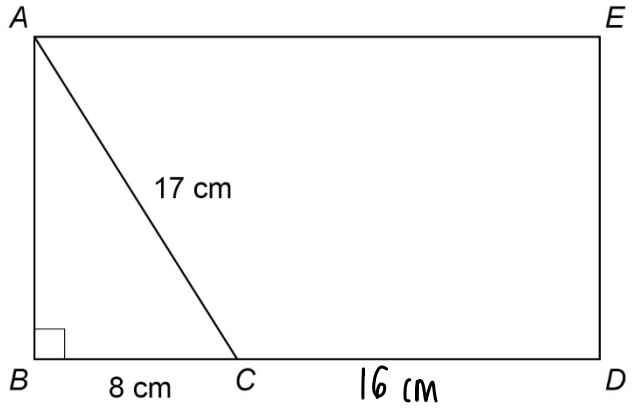
Q7

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*.

Answer 360 cm^2

(Total 4 marks)

$AB^2 = AC^2 - BC^2$

$= 17^2 - 8^2$

$AB^2 = 225$

$AB = 15$

Area $= 24 \times 15$

$= 360$

Q5

Using ruler and compasses, show the region inside the grid that is

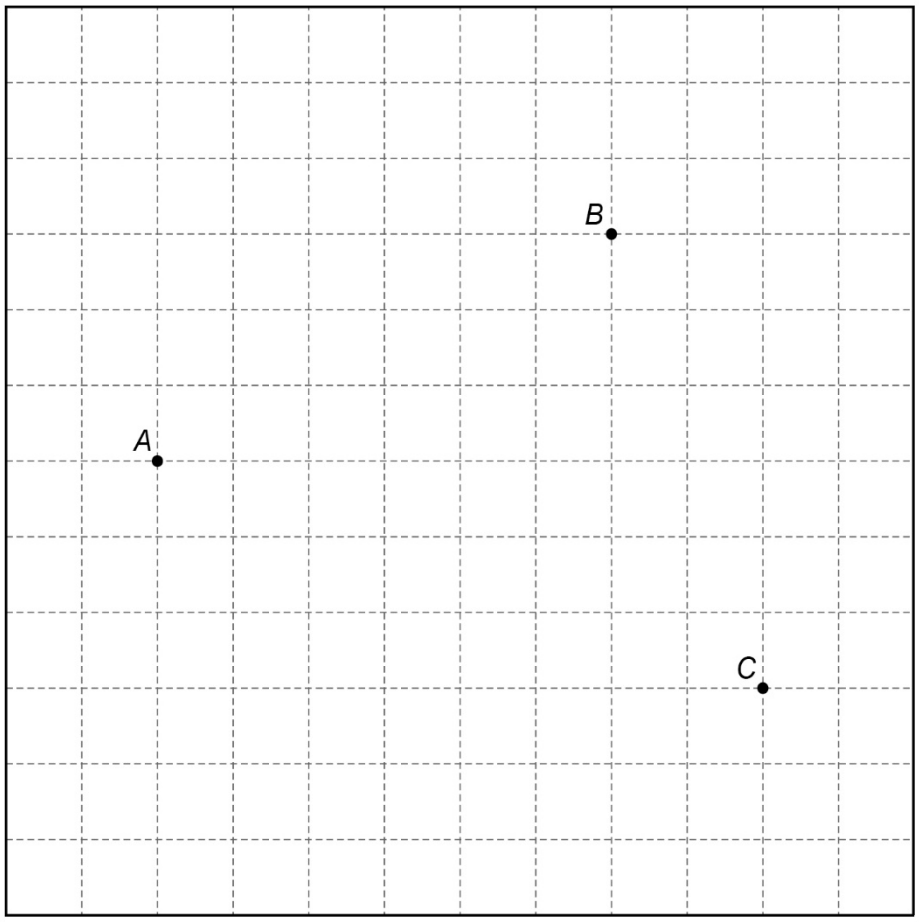
less than 4 cm from *A*

and

nearer to *B* than to *C*.

Label the region R.

Show all your construction lines.

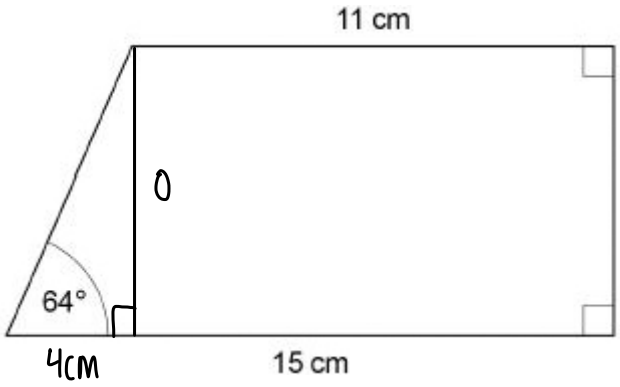


(Total 3 marks)

Q19

Work out the area of the trapezium.

Not drawn accurately



$A = \frac{1}{2}(a+b)h$

$= \frac{1}{2}(11+15)(8.201)$

$A = 106.616$

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

Answer 107 cm²

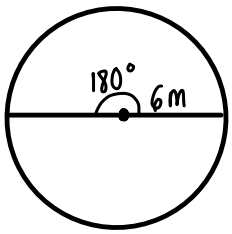
(Total 4 marks)

$\tan(64) = \frac{O}{4} \Rightarrow O = 8.201\,cm$

Q3

Work out the arc length, in metres, of a semicircle of radius 6 metres.

Circle your answer.



3π 6π 12π 18π

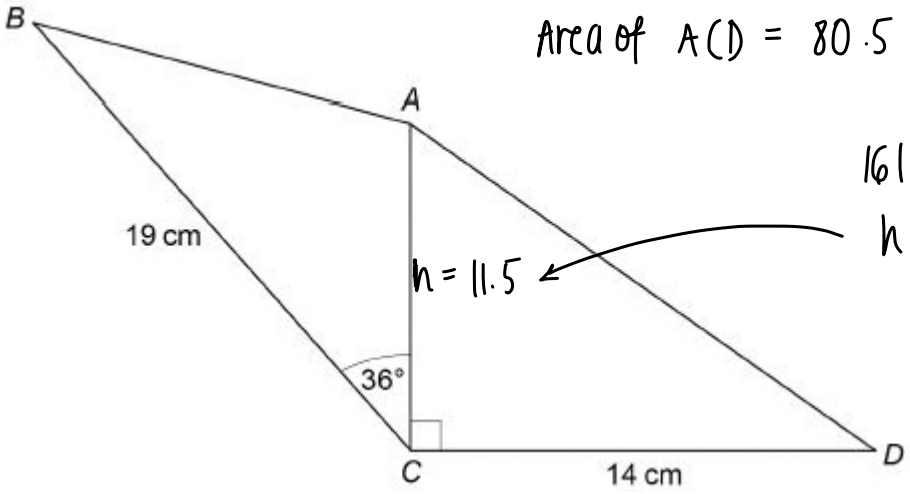
(Total 1 mark)

$\text{arc length} = \frac{\theta}{360} \times 2\pi r \Rightarrow \frac{180}{360} \times 2\pi(6) = \frac{1}{2} \times 12\pi = 6\pi$

Q16

ABC and *ACD* are triangles.

Not drawn accurately



Area of ACD = 80.5 = $\frac{1}{2}(14 \times h)$

161 = 14h

h = 11.5

The area of *ACD* is 80.5 cm^2

Work out the area of *ABC*.

Give your answer to 3 significant figures.

Area of ABC = $\frac{1}{2}ab\sin C$

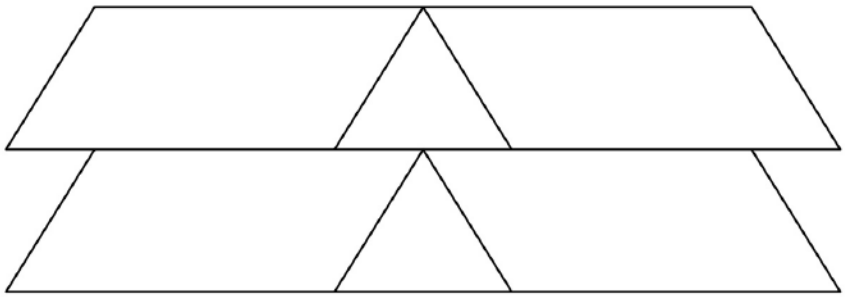
= $\frac{1}{2}(19 \times 11.5)\sin(36)$

Answer 64.2 cm^2

(Total 4 marks)

Q8a

This shape is made from two triangles and four congruent parallelograms.



Not drawn accurately

Tick the correct box.

The triangles are equilateral.

☐ Must be true

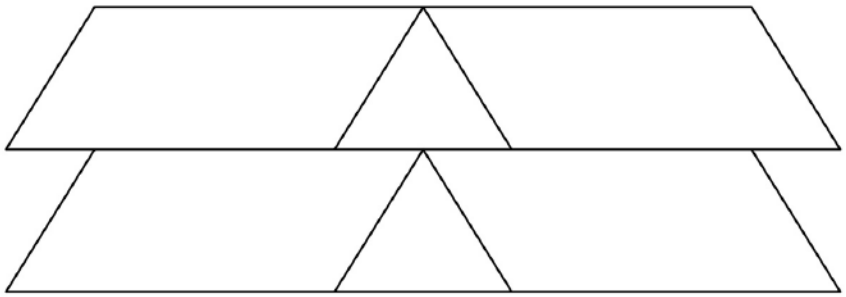
☑ Could be true

☐ Must be false

(Total 1 mark)

Q8b

This shape is made from two triangles and four congruent parallelograms.



Not drawn accurately

Tick the correct box.

The triangles are congruent.

☑ Must be true

☐ Could be true

☐ Must be false

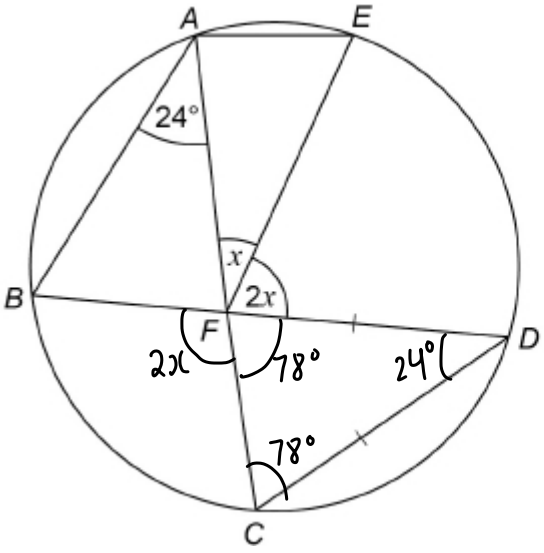
(Total 1 mark)

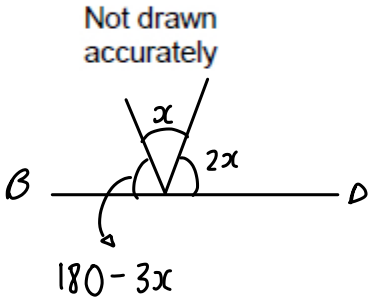
Q19

A, *B*, *C*, *D* and *E* are points on a circle.

BFD and *AFC* are straight lines.

DC = *DF*





$180 - 3x = 78$

$\therefore x = 34°$

Work out the size of angle x.

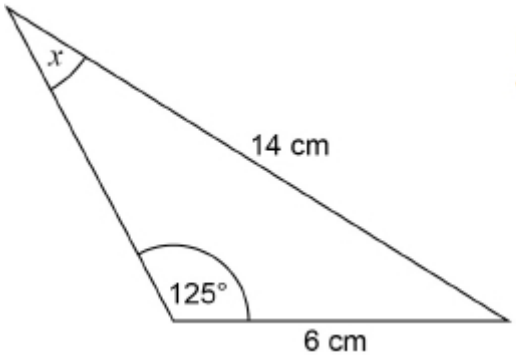
You **must** show your working which may be on the diagram.

Answer 34 degrees

(Total 4 marks)

Q20

Work out the size of angle x.



Not drawn accurately

$$\frac{6}{\sin x} = \frac{14}{\sin(125)}$$

$$\Rightarrow \sin x = 0.351$$

$$x = 20.6$$

Answer 20.6 degrees

(Total 3 marks)

Q7

The sum of the angles in any quadrilateral is 360°

For example, in a rectangle 4 × 90° = 360°

Zak writes,

5 × 90° = 450° so the sum of the angles in any pentagon must be 450°

Is he correct?

Tick a box.

☐ Yes ☑ No

Show working to support your answer.

(Total 2 marks)

the angles in a pentagon are not right angles

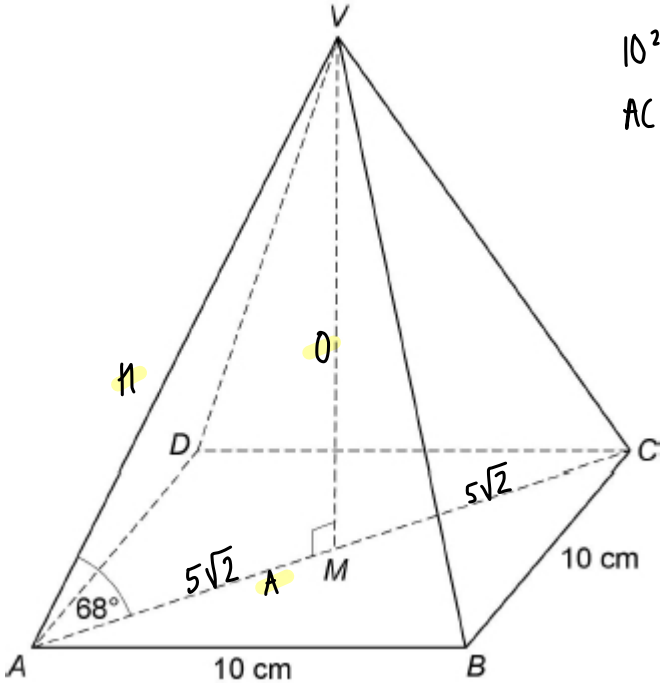
Q27

VABCD is a square-based pyramid.

The horizontal base *ABCD* has side length 10 cm and centre *M*.

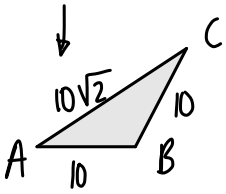
Angle *VMA* is 90°

Angle *VAM* is 68°



$10^2 + 10^2 = 200$

$AC = \sqrt{200} = 10\sqrt{2}$



Volume of pyramid = $\frac{1}{3}$ × area of base × perpendicular height

Work out the volume of the pyramid.

Answer 583 cm³

(Total 6 marks)

$\tan(68) = \frac{O}{5\sqrt{2}} \Rightarrow O = 5\sqrt{2}\tan(68)$

$O = 17.5\text{ cm}$

$\text{Volume} = \frac{1}{3} \times (10 \times 10) \times 17.5 \Rightarrow 583.38\ldots$