

20 The radius of a right circular cylinder is x cm.

The height of the cylinder is $\left(\frac{800}{\pi x} - x\right)$ cm.

The volume of the cylinder is V cm³

Find the maximum value of V

Give your answer correct to the nearest whole number.



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(Total for Question 20 is 5 marks)

Turn over for Question 21



21 The diagram shows the cross section of a circular water pipe.

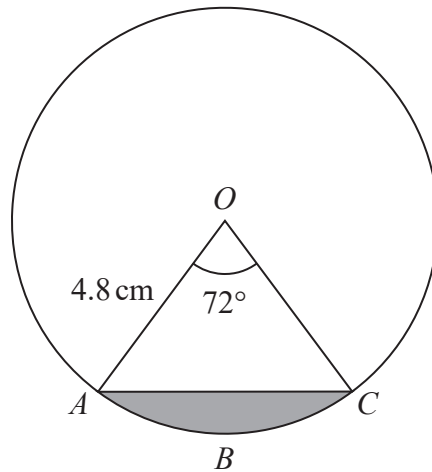


Diagram **NOT**
accurately drawn

OAC is a sector of the circle, centre O

The shaded region in the diagram represents the water flowing in the pipe.

The water flows at 14 cm/s in the pipe.

Work out the volume of water that has flowed through the pipe in 3 minutes.
Give your answer in cm^3 correct to 3 significant figures.

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..... cm³

(Total for Question 21 is 5 marks)

Turn over for Question 22



P 7 2 4 3 7 R A 0 2 5 3 2

- 22 The first term of an arithmetic series is $(2t + 1)$ where $t > 0$
The n th term of this arithmetic series is $(14t - 5)$

The common difference of the series is 3

The sum of the first n terms of the series can be written as $p(qt - 1)^r$ where p , q and r are integers.

Find the value of p , the value of q and the value of r
Show clear algebraic working.

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$p = \dots\dots\dots$ $q = \dots\dots\dots$ $r = \dots\dots\dots$

(Total for Question 22 is 4 marks)

Turn over for Question 23



23 $ABCD$ is a kite.

$$AB = AD \text{ and } CB = CD$$

The point B has coordinates $(k, 1)$ where k is a negative constant.

The point D has coordinates $(8, 7)$

The straight line L passes through the points B and D

The straight line L is parallel to the line with equation $5y - 3x = 6$

Find an equation of AC

Give your answer in the form $px + qy = r$ where p , q and r are integers.

Show your working clearly.



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(Total for Question 23 is 6 marks)

Turn over for Question 24



P 7 2 4 3 7 R A 0 2 9 3 2

24 $OAED$ is a quadrilateral.

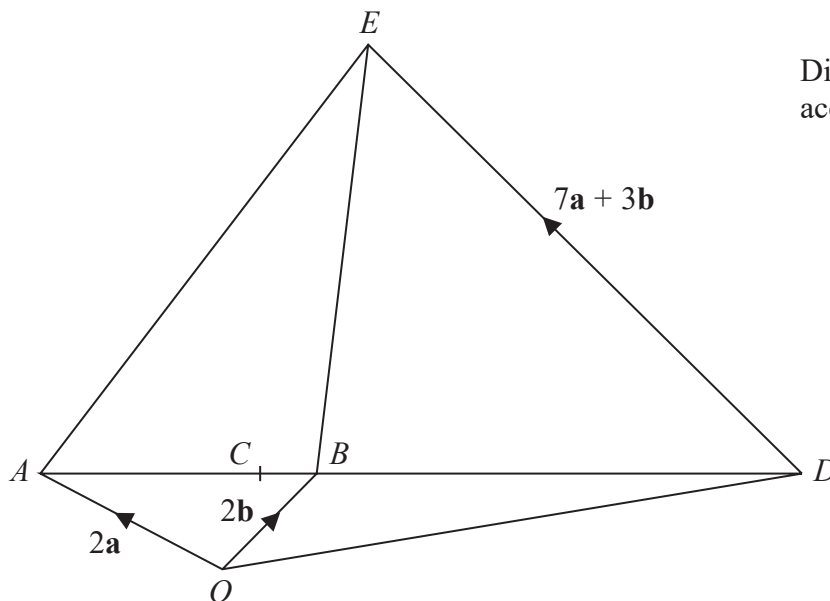


Diagram **NOT**
accurately drawn

$$\vec{OA} = 2\mathbf{a} \quad \vec{OB} = 2\mathbf{b} \quad \vec{DE} = 7\mathbf{a} + 3\mathbf{b}$$

$$AB:BD = 1:2$$

The point C on AB is such that OCE is a straight line.

Use a vector method to find the ratio of $OC:CE$

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(Total for Question 24 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS



P 7 2 4 3 7 R A 0 3 1 3 2