

M4 PAPER A

NI TUTORING SCHOOL

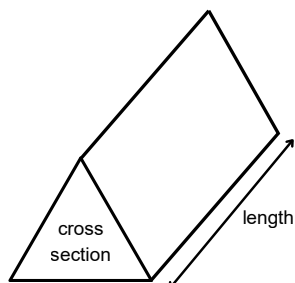
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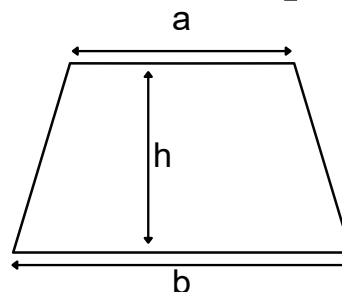


Formula Sheet

Volume of prism = area of cross section $\times$ length

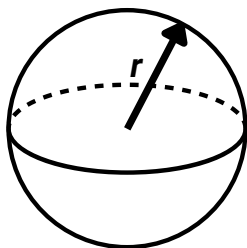


Area of a trapezium = $\frac{1}{2}(a + b)h$



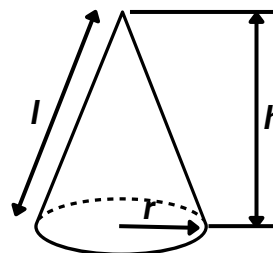
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$

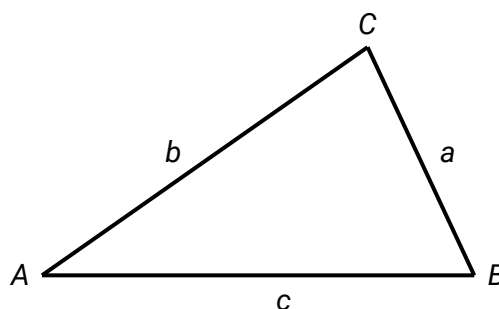


Quadratic Equation

The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

In any triangle ABC



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

Cosine Rule: $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle: $\frac{1}{2}ab \sin C$



- 1 An expression is written as

$$\frac{3x}{x+2} - \frac{x-5}{x-1}$$

Simplify the expression to a single fraction whose numerator is a quadratic expression.

Answer: _____ [5]



2 Simplify

$$\frac{12 + 3x + 4y + xy}{48 - 3x^2}$$

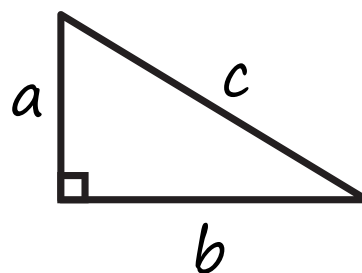
Answer: _____ [5]

3 Calculate the upper bound for b.

a = 5.4cm correct to the nearest mm

c = 7.6cm correct to the nearest mm

You must show your working.



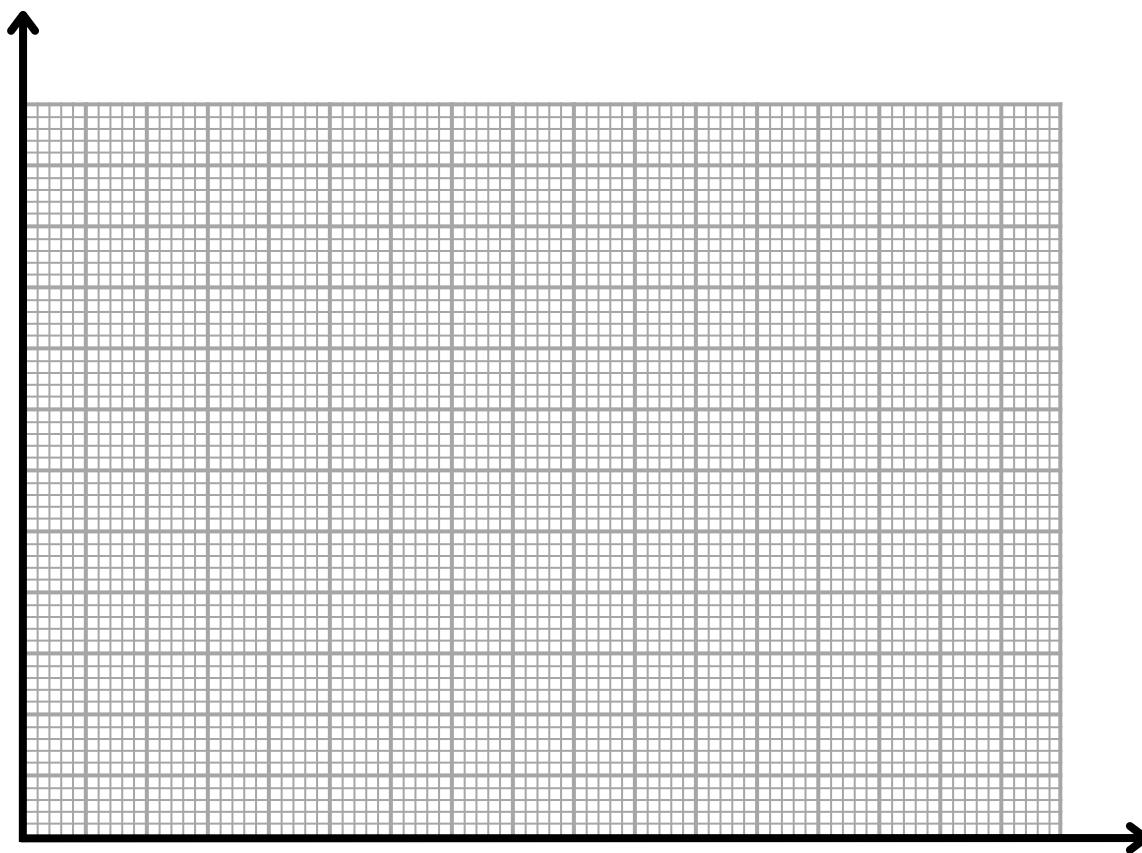
Answer: _____ [4]



- 4 The table shows the time taken, t minutes, for a group of pupils to travel to school.

Time, t minutes	Frequency
$0 < t \leq 10$	25
$10 < t \leq 25$	54
$25 < t \leq 35$	50
$35 < t \leq 50$	75
$50 < t \leq 80$	96

Draw a histogram on the axes provided to illustrate the data.



[4]



- b)** Use your histogram to estimate the median time taken. Give your answer in minutes.

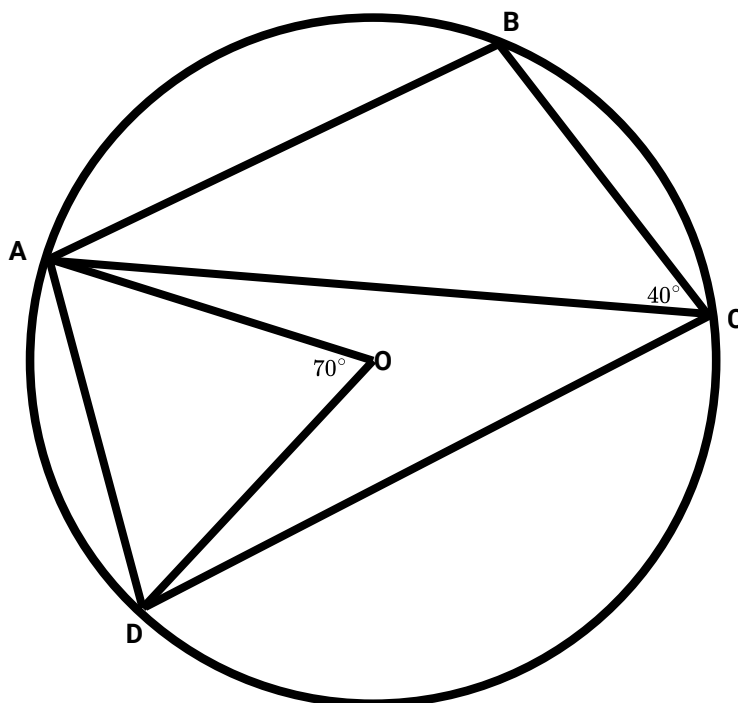
Answer: _____ [3]

- c)** Use your histogram to estimate the percentage of pupils who take more than 40 minutes to travel to school.

Answer: _____ [3]



- 5** The diagram shows a cyclic quadrilateral $ABCD$ inside a circle with centre O .
Angle $AOD = 70^\circ$
Angle $ACB = 40^\circ$



- a)** Find angle ACD . Give a reason for your answer.

Angle: _____

Reason: _____

[2]

- b)** Explain why triangle AOD is isosceles

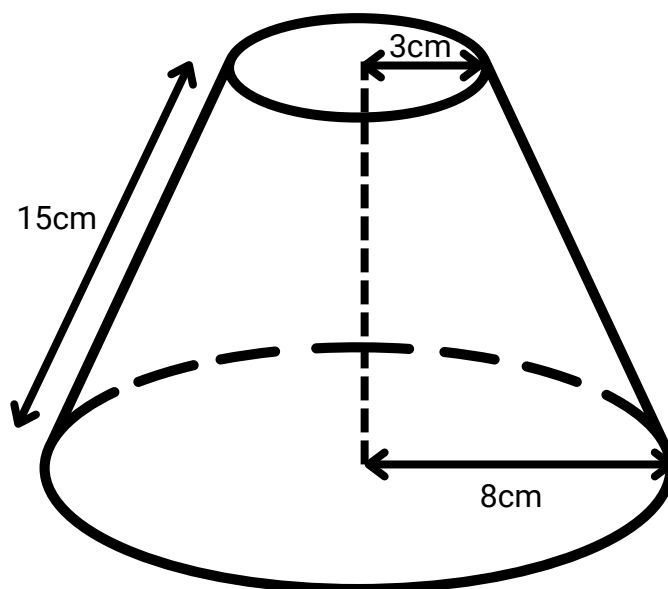
[1]

- c)** Find angle OAB

Answer: _____ [2]



- 6 The diagram represents the frustum of a solid cone formed when a small cone is removed from the top of a large cone.



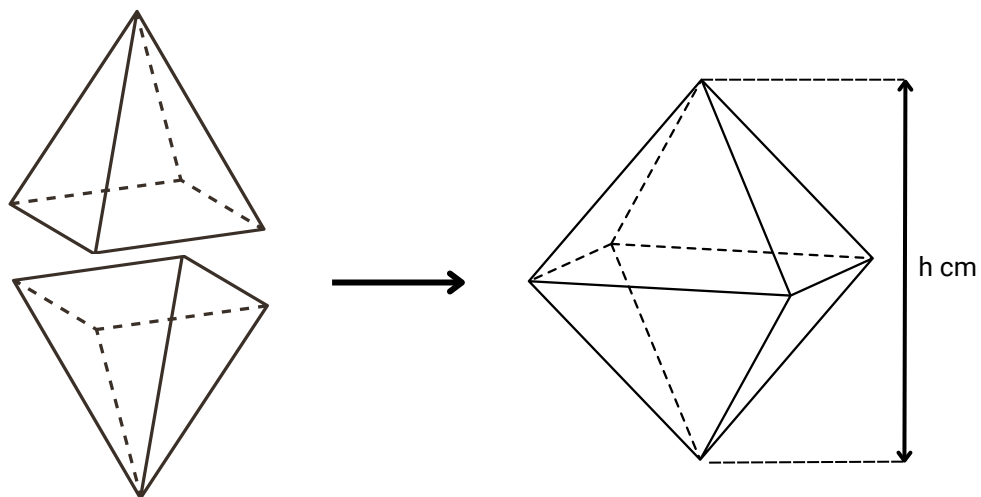
Work out the total surface area of the frustum.
You must show your working out.

Answer _____ [6]



7

An octahedron is formed from two identical square based pyramids.
The square bases are stuck together as shown.



The volume of the octahedron is 96cm^3

The length of the side of each pyramid's square base is 6 cm.

Work out the height h cm of the octahedron.

Answer _____ [4]



- 8 Find the equation of the straight line that passes through the point (4, -3) and is perpendicular to the straight line $2x - y = 5$

Answer _____ [4]

- 9 The table shows information about 300 employees in a company.

Department	Number of Women	Number of Men
Sales	18	42
Accounts	24	16
Marketing	20	10
Catering	28	22
Manufacturing	35	85



The manager decides to carry out a survey about a new staff uniform.

He decides to take a sample of 75 employees.

- a)** One option is to stand at the main entrance before work and select 75 employees.

Give two reasons why this may not produce a representative sample.

1. _____
2. _____

[2]

- b)** The manager decides to use a stratified sample of 75 employees instead.

Work out the number of women that would be in the sample.

Answer _____ [2]

- c)** How many employees from the accounts department should be in the sample?

Answer _____ [2]

- d)** Suggest one way the manager could achieve a more reliable sample.

[1]

Answers

