Year 10 Mock

Higher Tier

Summer Catch-up

Name	
School	

Contents

Circular Measure

Units, Area and Volume

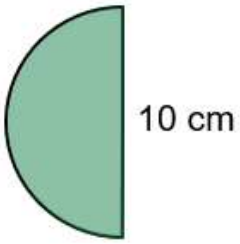
55s – Calculating the ***area*** or ***perimeter*** of a semi-circle or quadrant or work with ***circular measure*** in context

MET Website

Example 1

Give your answers correct to 1 decimal place

(a) Calculate the area of this semicircle.



..... cm² **(2)**

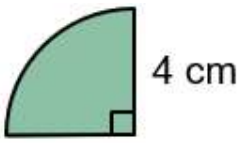
(b) Calculate the perimeter of the semicircle.

..... cm **(2)**

Example 2

Give your answers in terms of π

(a) Calculate the area of this sector.



..... cm² **(2)**

(b) Calculate the perimeter of the sector.

..... cm **(2)**

Example 3

The diagram shows a semicircle inside a sector of a circle, ABC.

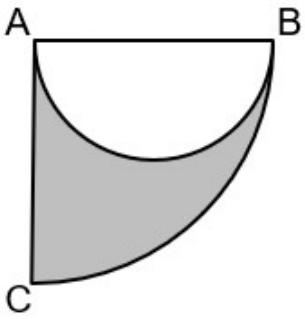
AB is the diameter of the semicircle.

Angle BAC = 90°

AB = 12 cm

Find the area of the shaded region.

Give your answer to 3 significant figures.



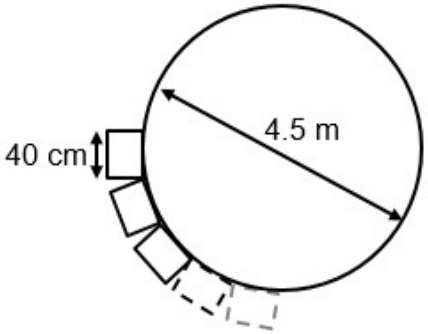
..... cm² **(4)**

Example 4

Ms Jones is going to place slabs around her pond.

Each slab takes up roughly 40 cm of the circumference of the circular pond.

Work out the maximum number of slabs Ms Jones can fit around her pond.



..... (4)

Question 1

A circle has a diameter of 140 cm.

Work out the circumference of the circle.

Give your answer correct to 3 significant figures.

..... cm

Question 2

A circle has a diameter of 19 cm.

Work out the area of the circle.

Give your answer correct to 3 significant figures.

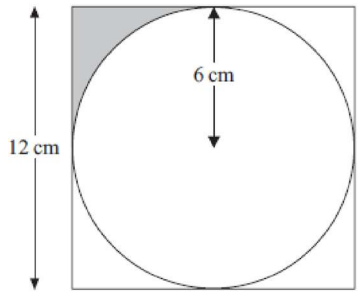
.....cm^2

Question 3

The diagram shows a circle drawn inside a square.

The circle has a radius of 6 cm.

The square has a side of length 12 cm.



Work out the shaded area.

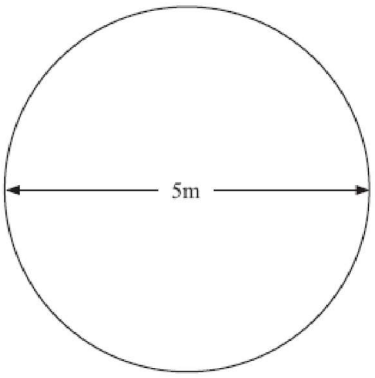
Give your answer correct to 3 significant figures.

.....cm^2

Question 4

Jon has a flower garden in the shape of a circle.

The diameter of the garden is 5 metres.



Jon wants to put fencing around the edge of the garden.

The fencing costs £1.80 per metre.

Work out the total cost of the fencing.

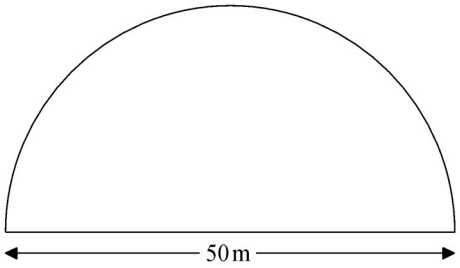
£ .....

Question 5

A farmer has a field in the shape of a semicircle of diameter 50 m.

The farmer asks Jim to build a fence around the edge of the field.

Jim tells him how much it will cost.



Total cost = £29.86 per metre of fence plus £180 for each day's work

Jim takes three days to build the fence.

Work out the total cost.

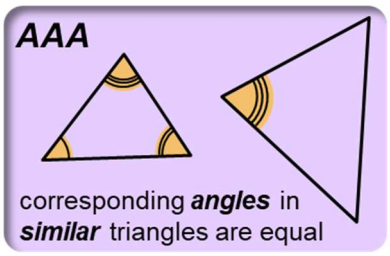
£ .....

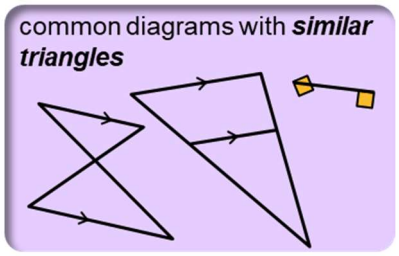
Similar 2D Shapes

Units, Area and Volume

65s – Calculate lengths in ***similar*** 2D shapes

MET Website



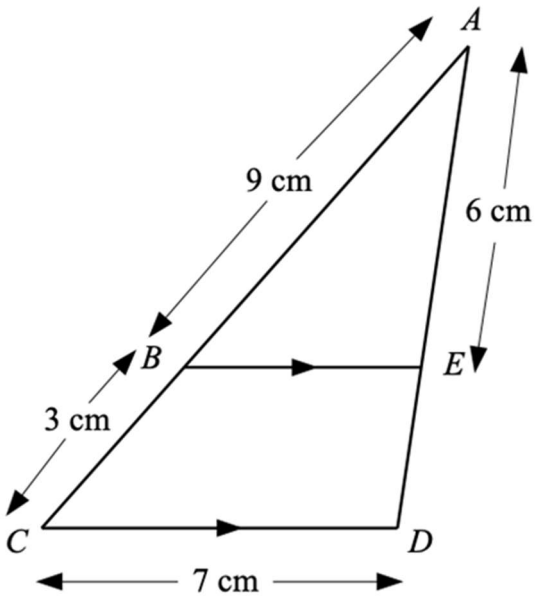


Example 1

BE is parallel to CD.

AB = 9 cm, BC = 3 cm,
CD = 7 cm, AE = 6 cm.

(a) Explain why ABE and ACD are similar triangles.



(3)

(b) Calculate the length of ED.

..... cm (2)

(c) Calculate the length of BE.

..... cm (2)

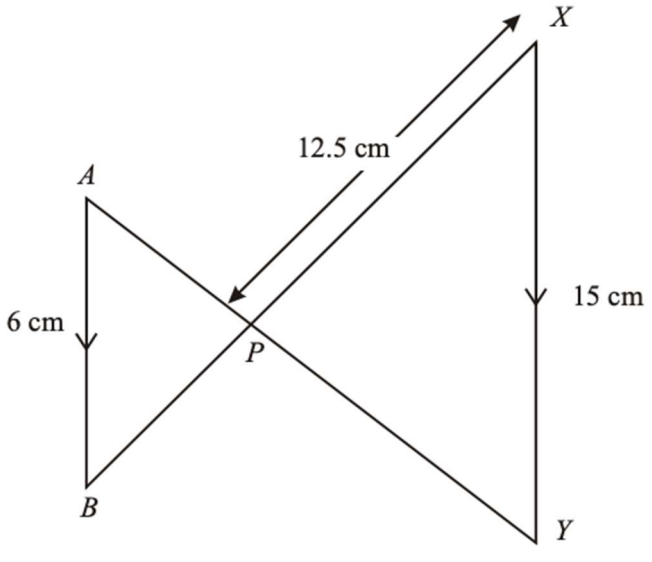
Example 2

AB is parallel to XY.

The lines AY and BX intersect at P.

AB = 6 cm, XP = 12.5 cm, XY = 15 cm.

Work out the length of BP.



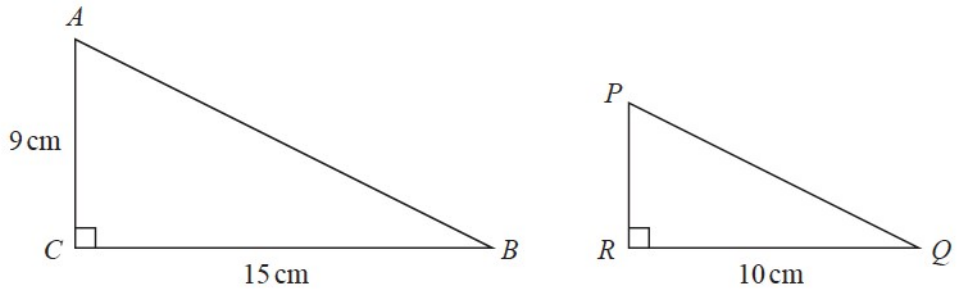
..... cm (2)

Question 1

ABC and PQR are similar right-angled triangles.

angle ABC = angle PQR

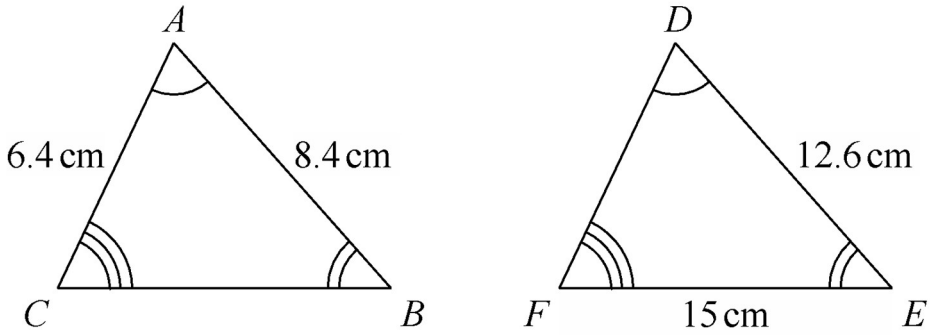
(a) Work out the length of PR.



..... cm **(2)**

Question 2

Triangle ABC and triangle DEF are similar.



(*a*) Work out the length of DF.

..... cm **(2)**

(*b*) Work out the length of CB.

..... cm **(2)**

Question 3

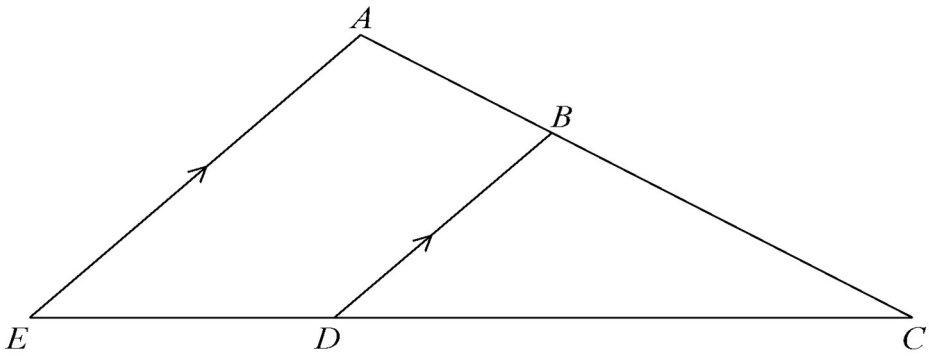
ABC and EDC are straight lines.

EA is parallel to DB.

EC = 8.1 cm.

DC = 5.4 cm.

DB = 2.6 cm.



(*a*) Work out the length of AE.

..... cm **(2)**

AC = 6.15 cm.

(*b*) Work out the length of AB.

..... cm **(2)**

Trigonometry Problem Solving

Pythagoras and Trigonometry

71s – Solve problems requiring multiple steps of ***SOH CAH TOA Trigonometry*** and/or ***Pythagoras' Theorem***

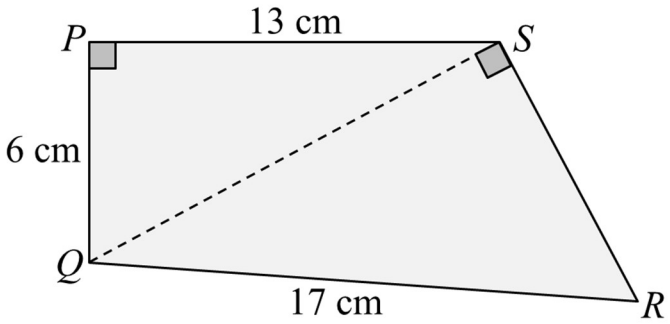
MET Video

This video will show you how to complete these examples.

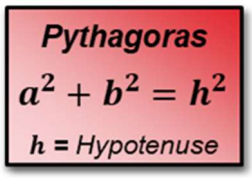
Example 1

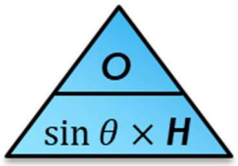
Work out the size of angle of QRS.

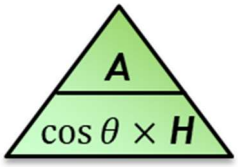
Give your answer correct to 3 significant figures

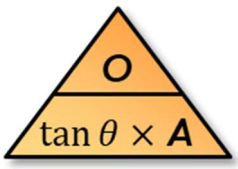


.....° (4)







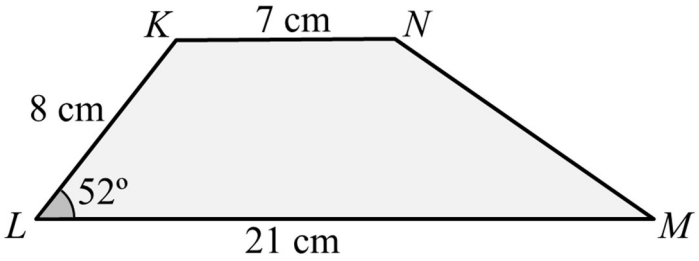


Example 2

KN is parallel to LM.

Work out the perimeter of this trapezium.

Give your answer correct to 3 significant figures.

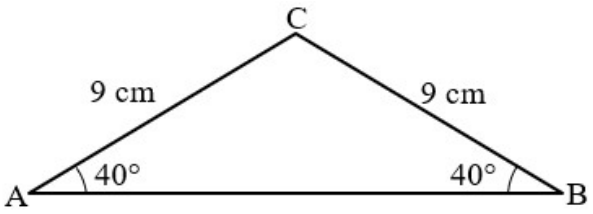


..... cm (5)

Question 1

Calculate the **perimeter** of triangle *ABC*.

Give your answer correct to 3 significant figures.

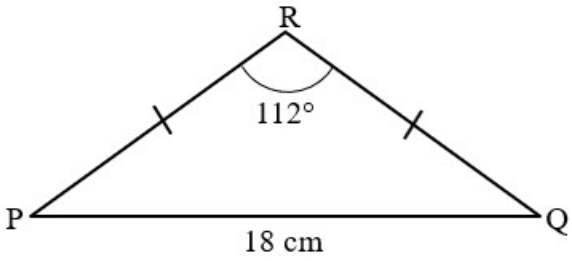


..... cm (3)

Question 2

Calculate the **area** of triangle *PRQ*.

Give your answer correct to 3 significant figures.

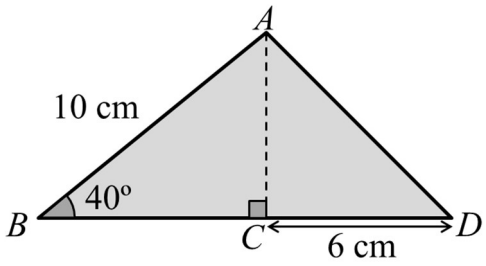


..... cm (4)

Question 3

Work out the length of *AD*.

Give your answer correct to 3 significant figures.

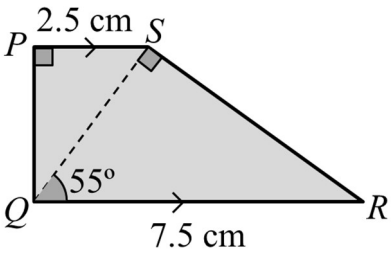


..... cm (4)

Question 4

Work out the length of *PQ*.

Give your answer correct to 3 significant figures.

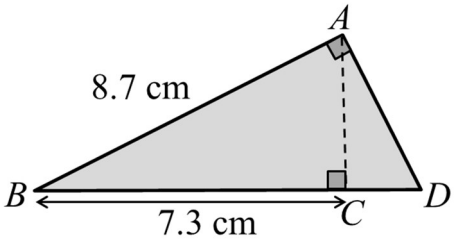


..... cm (4)

Question 5

Work out the length of BD.

Give your answer correct to 3 significant figures.

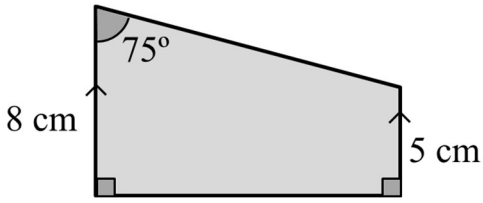


..... cm (4)

Question 6

Work out the area of this trapezium.

Give your answer correct to 3 significant figures.



..... cm^2 (4)

Sine Rule

Pythagoras and Trigonometry

82s – Know ***Sine rule*** and use it to calculate sides in non-right-angled triangles

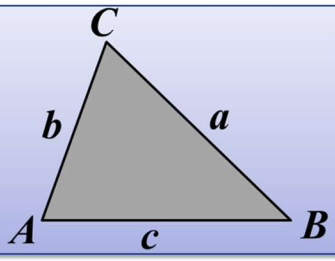
MET Video

This video will show you how to complete these examples.

Sine Rule

For *any triangle ABC*

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

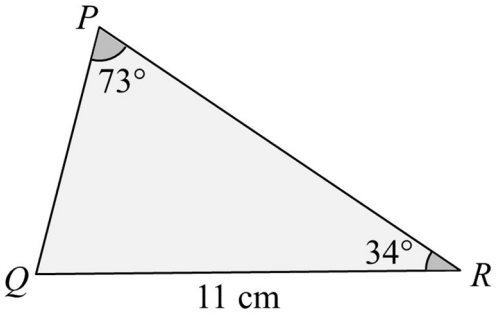


to use it you need…

a side and the angle opposite

Example 1

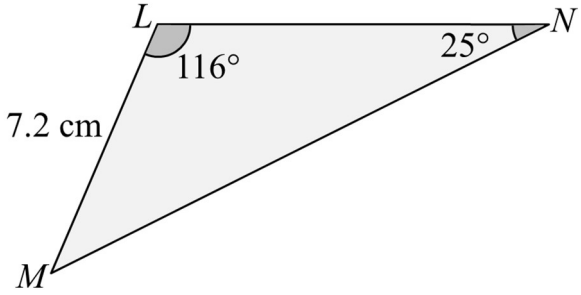
Work out the length of PQ.
Give your answer correct to 3 significant figures.



…… cm (3)

Example 2

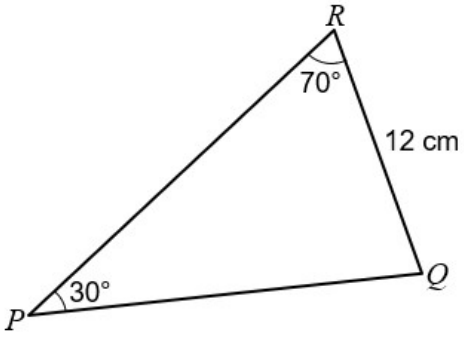
Work out the length of LN.
Give your answer correct to 3 significant figures.



…… cm (3)

Question 1

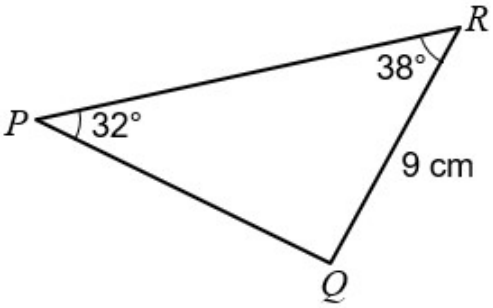
Work out the length of PQ.
Give your answer correct to 3 significant figures.



…… cm (3)

Question 2

Work out the length of PR.
Give your answer correct to 3 significant figures.



…… cm (3)

Cosine Rule

Pythagoras and Trigonometry

MET Video

This video will show you how to complete these examples.

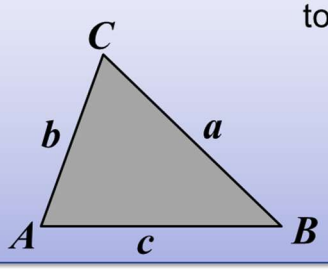
83s – Know ***Cosine rule*** and use it to calculate sides in non-right-angled triangles

Cosine Rule

For *any triangle ABC*

$$c^2 = a^2 + b^2 - 2ab\cos C$$

the side you want — the other two sides — the angle between



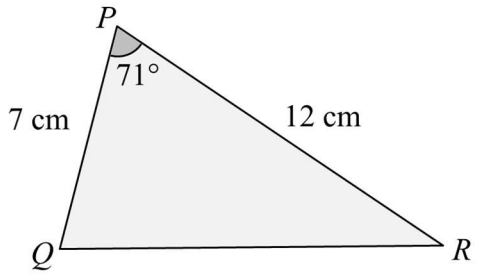
to use it you need…

two sides and the angle between

Example 1

Work out the length of QR.

Give your answer correct to 3 significant figures.

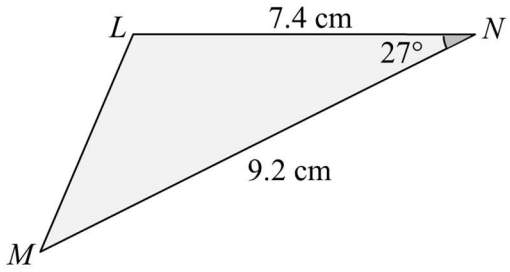


…… cm (3)

Example 2

Work out the length of LM.

Give your answer correct to 3 significant figures.

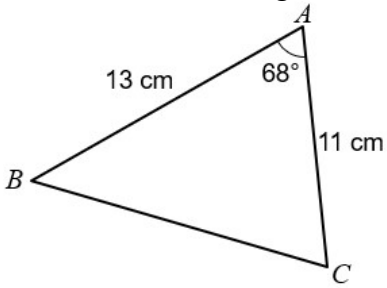


…… cm (3)

Question 1

Work out the length of PQ.

Give your answer correct to 3 significant figures.

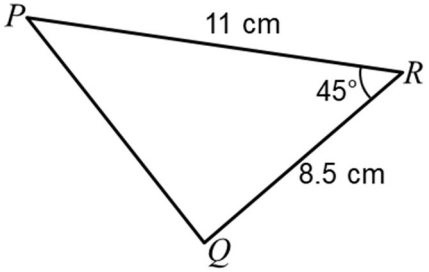


…… cm (3)

Question 2

Work out the length of PQ.

Give your answer correct to 3 significant figures.



…… cm (3)

Area of a Triangle $\frac{1}{2}ab\sin C$

Pythagoras and Trigonometry

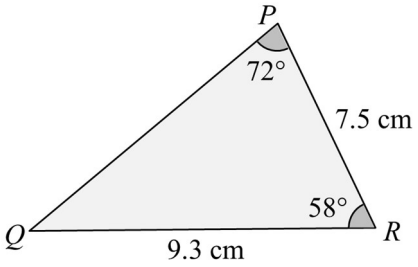
84s – Use the ***area of a triangle*** formula $\frac{1}{2}ab\sin C$ including finding the ***area of a segment***

MET Video

This video will show you how to complete these examples.

Example 1

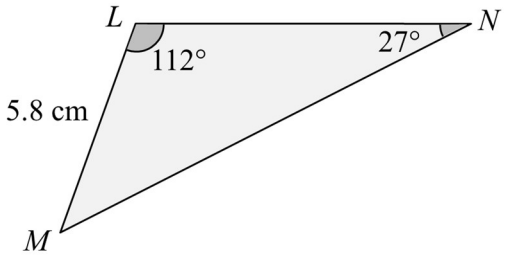
Work out the area of triangle PQR.
Give your answer correct to 3 significant figures.



..... cm² (2)

Example 2

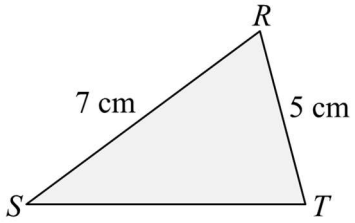
Work out the area of triangle LMN.
Give your answer correct to 3 significant figures.



..... cm² (4)

Example 3

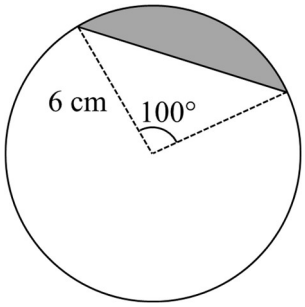
Triangle RST has an area of 15 cm^2.
Work out the perimeter of triangle RST to 3 s.f.



..... cm (4)

Example 4

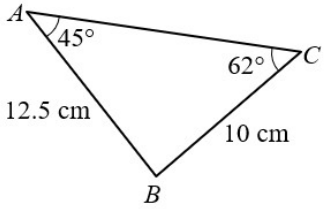
Work out the area of shaded segment.
Give your answer correct to 3 significant figures.



..... cm² (4)

Question 1

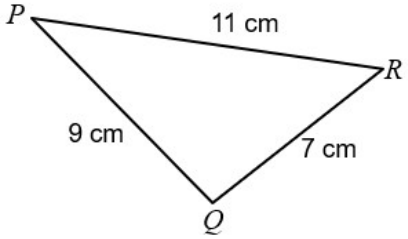
Work out the area of triangle ABC.



..... cm² (3)

Question 2

Work out the area of triangle PQR.



..... cm² (4)

Combining Index Laws

Indices

66a – Simplifying expressions by applying ***index laws*** more than once or to several terms

MET Website

$x^a \times x^b = x^{a+b}$ $\quad x^a \div x^b = x^{a-b}$ $\quad (x^a)^b = x^{ab}$

Example 1

Simplify $\frac{n^5 \times n^7}{n^4}$

..... (2)

Example 2

Simplify $5x^7y^4 \times 4xy^{-3}$

..... (2)

Example 3

Simplify $(4r^5)^3$

..... (2)

Example 4

Simplify $\frac{48p^5q}{3p^2q^4}$

..... (2)

Example 5

Simplify $\frac{(a-b)^5}{a-b}$

..... (2)

Example 6

Simplify $\sqrt{\frac{10^3 \times 10^9}{10^2}}$

..... (2)

Question 1

Simplify $\frac{w^6 \times w}{w^3}$

..... (2)

Question 2

Simplify $(m^7)^2$

..... (2)

Question 3

Simplify $6k^5n^3 \times 4k^3n^8$

..... (2)

Question 4

Simplify $\frac{36g^9h^3}{9g^4h^4}$

..... (2)

Question 5

Simplify $(5e^7)^3$

..... (2)

Question 6

Simplify $7a^2b^5 \times 3a^{-5}b$

..... (2)

Question 7

Simplify $\frac{(t+2)^5}{(t+2)^2}$

..... (2)

Question 8

Simplify $\left(2d^5f^{\frac{1}{2}}\right)^4$

..... (2)

Question 9

Simplify $\sqrt[3]{\frac{k^2}{k^9 \times k^5}}$

..... (2)

Proportion Formulae

Graphs

79a – Form and use an equation for ***direct proportion*** to square / cube / square root or ***inverse proportion***

MET Video

This video will show you how to complete these examples.

Example 1

y is proportional to x
When $x = 4$, $y = 12$
Create a formula for y in terms of x

(2)

Example 2

y is inversely proportional to x^2
When $x = 5$, $y = 2$
Create a formula for y in terms of x

(2)

Example 3

$\boldsymbol{y}$ is proportional to $\sqrt{\boldsymbol{x}}$
When $\boldsymbol{x} = 9$, $\boldsymbol{y} = 6$
What is the value of $\boldsymbol{y}$ when $\boldsymbol{x} = 25$?

(3)

Example 4

$\boldsymbol{y}$ is inversely proportional to $\boldsymbol{x}$
When $\boldsymbol{x} = 10$, $\boldsymbol{y} = 2$
What is the value of $\boldsymbol{x}$ when $\boldsymbol{y} = 5$?

(3)

Example 5

Visibility whilst under water is inversely proportional
to the square root of the depth of the water at that point
At a depth of 25m, visibility is 60%
What will the visibility be at a depth of 100m?

(3)

Question 1

y is inversely proportional to the square of x.
$y = 12$ when $x = 1.5$
Find the negative value of x when $y = 3$

(3)

Question 2

y is proportional to the square root of x.
$y = 6$ when $x = 1.44$
Find the value of y when $x = 2.25$

(2)

Question 3

A is inversely proportional to B
B is directly proportional to C
Given that $A = 5$ and $C = 0.4$ when $B = 2$.
Find a formula for A in terms of C

(4)

Question 4

The time period (T) of a clock pendulum is proportional to the square root of its length (L)
If a 9cm pendulum has a time period of 4 seconds
How long does the pendulum have to be to have a time period of 6 seconds?

(2)

Cumulative Frequency

Presenting and Interpreting Data

79d – Plot a ***cumulative frequency*** graph
80d – Read ***median*** and ***frequency*** above or below a given value from a ***cumulative frequency*** graph

MET Website

The video will show you how to complete these examples.

Example

This table shows the time 72 students spent revising for a test

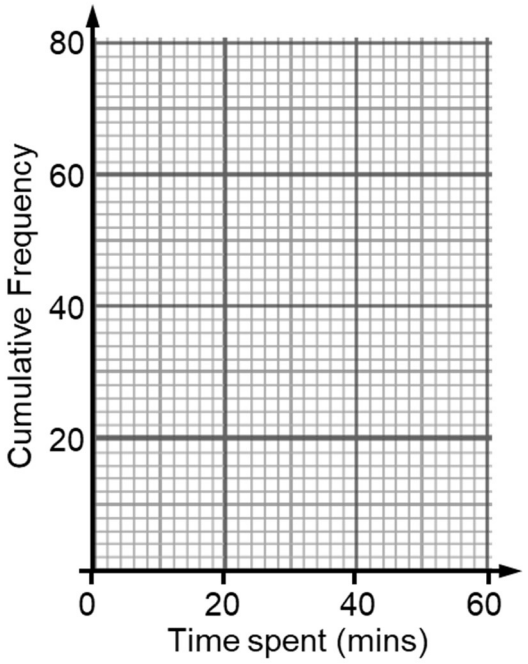
Time spent (t min)	**Frequency**
$0 < t \leq 10$	6
$10 < t \leq 20$	11
$20 < t \leq 30$	33
$30 < t \leq 40$	16
$40 < t \leq 60$	6

(a) Complete this cumulative frequency table

Time spent (t min)	**Frequency**
$0 < t \leq 10$	0
$0 < t \leq 20$	11
$0 < t \leq 30$	33
$0 < t \leq 40$	16
$0 < t \leq 60$	6

(1)

(b) Plot a cumulative frequency graph



(2)

(c) Estimate how many students spent more than 45 minutes revising

…… students (2)

(d) Estimate the median time spent revising.

…… minutes (1)

(e) Estimate the interquartile range.

…… minutes (2)

Question 1

The cumulative frequency graph shows some information about the heights, in cm, of 60 students.

(a) Use the graph to estimate the median height of the students.

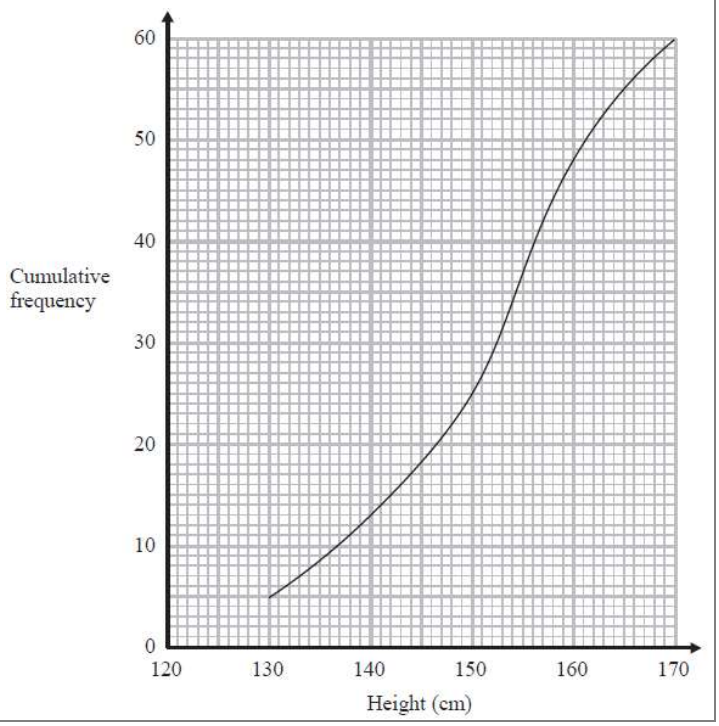
…… (1)

(b) Use the graph to estimate the inter quartile range.

…… (2)

(c) Work out an estimate for the number of these students with a height greater than 160 cm.

…… (2)

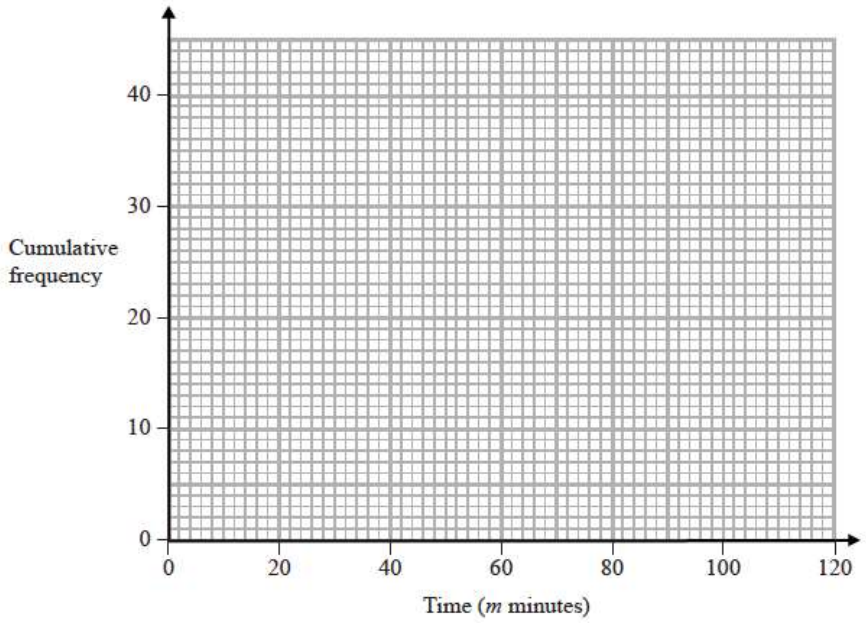


Question 2

The cumulative frequency table shows information about the times, in minutes, taken by 40 people to complete a puzzle.

Time (m minutes)	Cumulative frequency
$20 < m \leqslant 40$	5
$20 < m \leqslant 60$	25
$20 < m \leqslant 80$	35
$20 < m \leqslant 100$	38
$20 < m \leqslant 120$	40

(*a*) On the grid below, draw a cumulative frequency graph for this information.



(2)

(*b*) Use your graph to find an estimate for the interquartile range.

..... minutes (2)

One of the 40 people is chosen at random.

(*c*) Use your graph to find an estimate for the probability that this person took between 50 minutes and 90 minutes to complete the puzzle.

..... (2)

Question 3

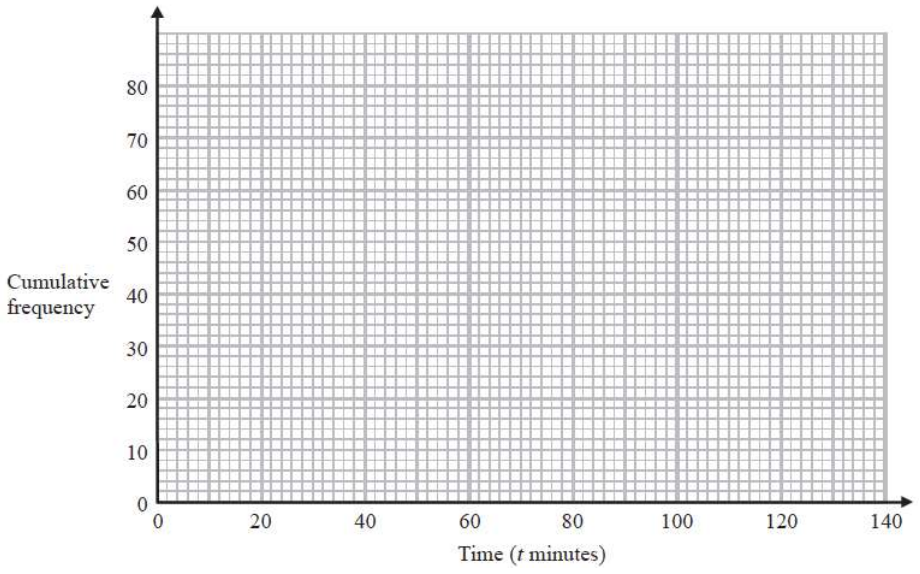
The grouped frequency table gives information about the times, in minutes, that 80 office workers take to get to work

Time (*t* minutes)	Frequency
$0 < t \leqslant 20$	5
$20 < t \leqslant 40$	30
$40 < t \leqslant 60$	20
$60 < t \leqslant 80$	15
$80 < t \leqslant 100$	8
$100 < t \leqslant 120$	2

(a) Complete the cumulative frequency table.

Time (*t* minutes)	Cumulative frequency
$0 < t \leqslant 20$	
$0 < t \leqslant 40$	
$0 < t \leqslant 60$	
$0 < t \leqslant 80$	
$0 < t \leqslant 100$	
$0 < t \leqslant 120$	

(1)



(b) On the grid, draw the cumulative frequency graph for this information.

(2)

(*c*) Use your graph to find an estimate for the percentage of these office workers who take more than 90 minutes to get to work.

.....% (3)