EXAM PAPERS PRACTICE

GCSE OCR Math J560

Problem Solving with areas

Answers

"We will help you to achieve A Star "

Answer 1

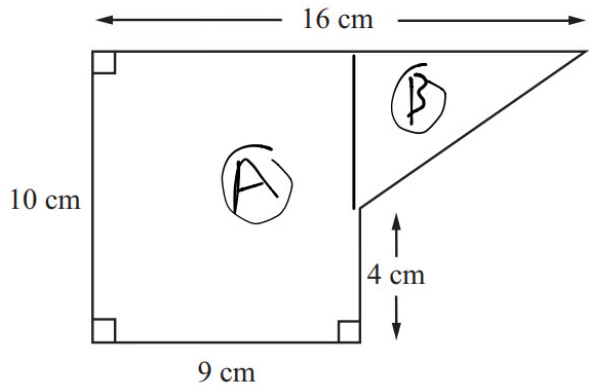


Diagram **NOT** accurately drawn

The diagram shows a shape.

Work out the area of the shape.

$A = 9 \times 10 = 90$

$B = \frac{1}{2} \times b \times h = \frac{1}{2}(10-4)(16-4)$

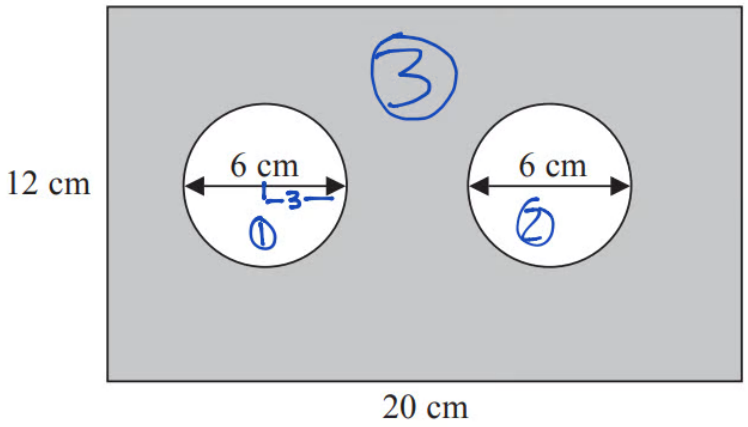
$= 21$

$A + B = 111$

111 cm^2

Answer 2

Diagram **NOT** accurately drawn



The diagram shows a metal plate in the shape of a rectangle.
The rectangle has length 20 cm and width 12 cm.
Two identical circles, each of diameter 6 cm, have been cut out of the plate.

Work out the area of the shaded region of the metal plate.
Give your answer correct to the nearest cm^2.

Area of the rectangle = 20 x 12 = 240

Area of each of the circle = $\pi r^2 = \pi(3)^2 = 9\pi$
So the two circles together = 18π

Shaded area = rectangle - the two circles
= $240 - 18\pi = 183.45$

183 ..... cm^2

Answer 3

Here are a rectangle and a square.

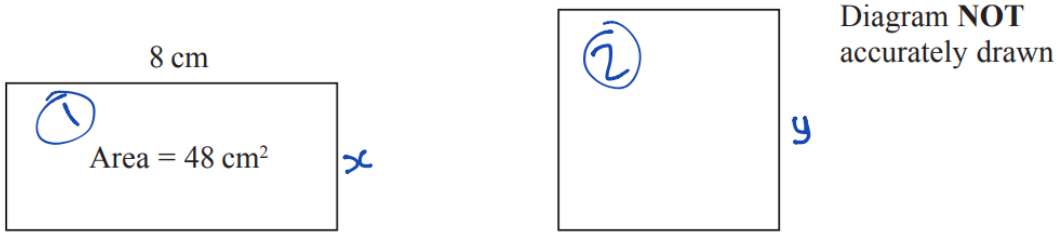


Diagram **NOT** accurately drawn

The rectangle has length 8 cm and area 48 cm²
The perimeter of the square is the same as the perimeter of the rectangle.

Calculate the area of the square.

Length x height = area
8 x X = 48

48/8 = X
6 = x

2(6) + 2(8) = perimeter of shape 1 = 28

Perimeter of shape 2 is also 28
4(y) = 28

y = 7

Area of square = (y)(y) = 49

49 cm²

Answer 4

The diagram shows a path around a pond.

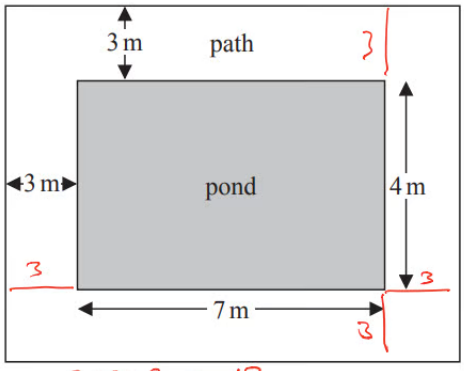


Diagram **NOT** accurately drawn

3+4+3

= 10m

The pond is in the shape of a rectangle with length 7 m and width 4 m.
The path is 3 m wide.

Ali is going to cover the path with gravel.
One bag of gravel will cover 10 m^2 of the path.

How many bags of gravel does Ali need to buy?
You must show your working.

AREA OF PATH =  − 

= 13 × 10 − 7 × 4

= 130 − 28

= 102 m^2

NO OF BAGS = $\frac{102}{10}$ = 10.2 BAGS

ALI NEEDS TO BUY 11 BAGS

Answer 5

The diagram shows the path of an athlete on a running track.

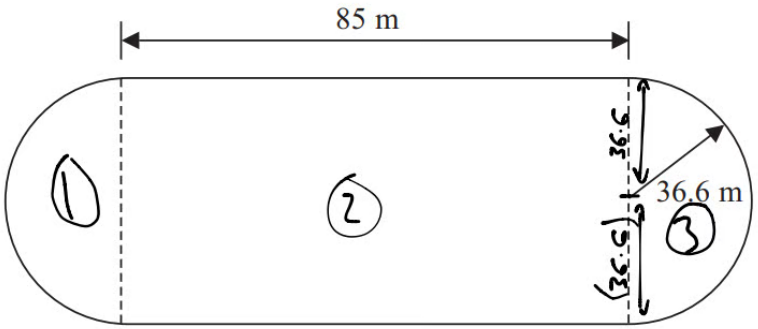


Diagram **NOT** accurately drawn

The path consists of two straight lengths and a semicircle at each end.
Each straight length is 85 metres.
Each semicircle has a radius of 36.6 metres.

Calculate the area enclosed by the path.
Give your answer correct to 3 significant figures.

Add 1 and 3 and you get a circle of radius 36.6

$A_c = \pi r^2$

$A_c = \pi (36.6)^2 = 4208.35\ldots$

Area of 2 = $2(36.6) \times 85$

$= 6222$

Total area = circle + rectangle

$4208.3\ldots + 6222$

≈ 10400

10 400 ..... m^2

Answer 6

The diagram shows the plan of a playground.

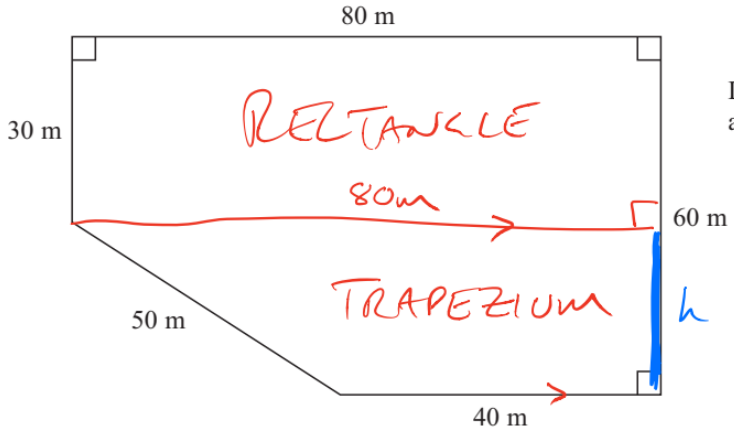


Diagram **NOT** accurately drawn

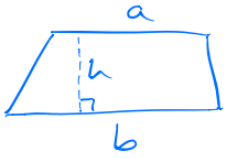
Bill is going to cover the playground with tarmac.
It costs £2.56 to cover each square metre with tarmac.

Work out the total cost of the tarmac Bill needs.

AREAS

RECTANGLE = L × W

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



TOTAL AREA = RECTANGLE + TRAPEZIUM

$A = 80 \times 30 + \frac{1}{2}(80+40) \times 30$

$(= 4200 m^2)$

COST = 2.56 × A

$= 2.56 \times [80 \times 30 + \frac{1}{2}(80+40) \times 30]$

= £10752

Answer 7

(a) Here is a shape made from a rectangle and a semicircle.

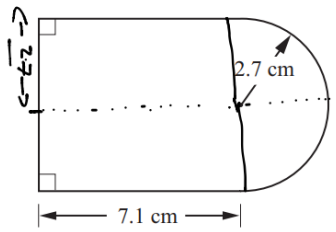


Diagram **NOT** accurately drawn

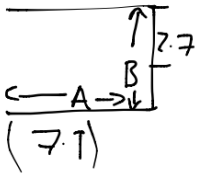
The length of the rectangle is 7.1 cm.
The radius of the semicircle is 2.7 cm.

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

area of a circle $= \pi r^2$

$\therefore$ area of a semi-circle $= \frac{1}{2}\pi r^2$

$r = 2.7 \therefore A_c = \frac{(2.7)^2 \pi}{2} = 3.645\pi$



$A_r = A \times B$

$= (7.1) \times (2 \times 2.7)$

$= 38.34$

49.8 cm²

Total area $= A_c + A_r$

$= 3.645\pi + 38.34$

$\simeq 49.8$

Answer 8

A square hole is cut from a circular piece of card.

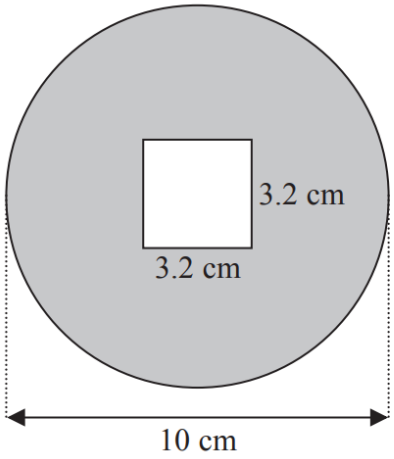


Diagram **NOT** accurately drawn

The square has sides of length 3.2 cm.
The diameter of the circular piece of card is 10 cm.

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

Area of disc is $\pi r^2 = \pi \left(\frac{10}{2}\right)^2 = 25\pi$

Area of square is 3.2 x 3.2 = 10.24

Area of disc - area of square = shaded region

$25\pi - 10.24\ldots \approx 68.3$

68.3 cm^2

Answer 9

Mr Weaver's garden is in the shape of a rectangle.

In the garden

there is a patio in the shape of a rectangle
and two ponds in the shape of circles with diameter 3.8 m.

The rest of the garden is grass.

$\Rightarrow r = 3.8 \div 2 = 1.9\text{m}$

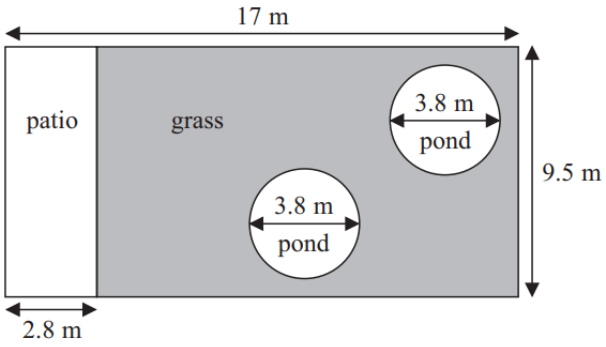


Diagram **NOT** accurately drawn

Mr Weaver is going to spread fertiliser over all the grass.
One box of fertiliser will cover 25 m² of grass.

How many boxes of fertiliser does Mr Weaver need?
You must show your working.

RECTANGLE
AREA = L × W

CIRCLE
AREA = πr^2

GARDEN = PATIO + 2×POND + GRASS

GRASS = GARDEN − PATIO − 2×POND

AREA OF GRASS = $17 \times 9.5 - 2.8 \times 9.5 - 2 \times \pi \times 1.9^2$

$= 112.21\ldots \text{ m}^2$

NO. OF BOXES = $\frac{112.21}{25} \simeq 4.488\ldots$

SO NEED 5 BOXES.

Answer 10

The diagram shows the plan of a floor.

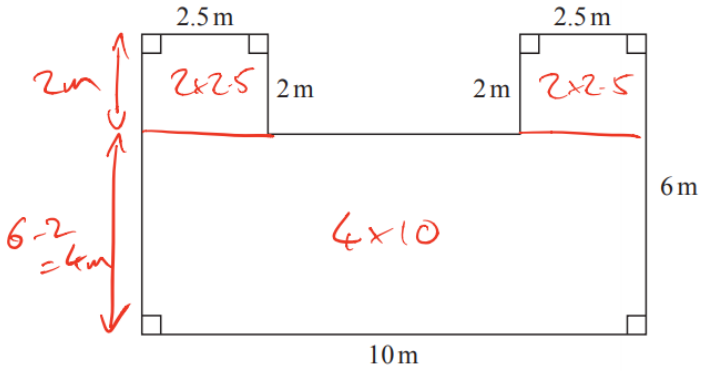


Diagram **NOT** accurately drawn

Angie is going to varnish the floor.

She needs 1 litre of varnish for 5 m² of floor.
There are 2.5 litres of varnish in each tin of varnish.

Angie has 3 tins of varnish.

Does she have enough varnish for all the floor?
You must show all your working.

AREA = 2×2·5 + 2×2·5 + 4×10

= 5 + 5 + 40

= 50 m²

VARNISH NEEDED = $\frac{50}{5}$ = 10 Litres

VARNISH OWNED = 3×2·5 = 7·5 Litres

SO ANGIE DOES NOT HAVE ENOUGH VARNISH (7·5 < 10)

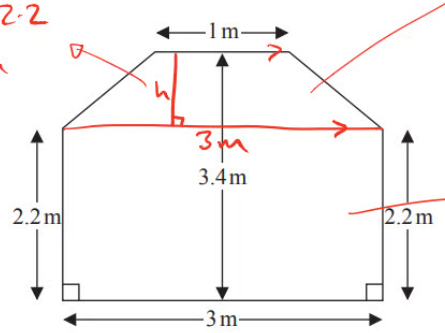
2×2·5 = 5

5+2·5 = 7·5

Answer 11

The diagram shows the floor plan of Mary's conservatory.

$h = 3.4 - 2.2$
$= 1.2\text{m}$



TRAPEZIUM

Diagram **NOT** accurately drawn

RECTANGLE

Mary is going to cover the floor with tiles.

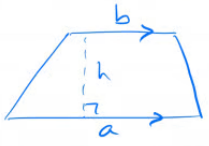
The tiles are sold in packs.
One pack of tiles will cover 2m^2
A pack of tiles normally costs £24.80
Mary gets a discount of 25% off the cost of the tiles.
↳ SHE PAYS 75% OR $\frac{3}{4}$

Mary has £100

Does Mary have enough money to buy all the tiles she needs?
You must show all your working.

AREA OF TRAPEZIUM

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



$\text{AREA} = \frac{1}{2} \times (3+1) \times 1.2 + 3 \times 2.2$

$= 2.4 + 6.6 = 9\text{m}^2$

$\text{NO OF PACKS} = \frac{9}{2} = 4.5 \rightarrow 5 \text{ PACKS}$

$\text{COST} = 5 \times 24.80 \times \frac{3}{4}$

$= 5 \times 6.2 \times 3$

$= 10 \times \frac{1}{2} \times 6.2 \times 3$

$= 31 \times 3$

$= £93$ $< £100$ SO MARY HAS ENOUGH MONEY

$\frac{24.8}{2} = 12.4$

$\frac{12.4}{2} = 6.2$

SO

$\frac{24.8}{4} = 6.2$

Answer 12

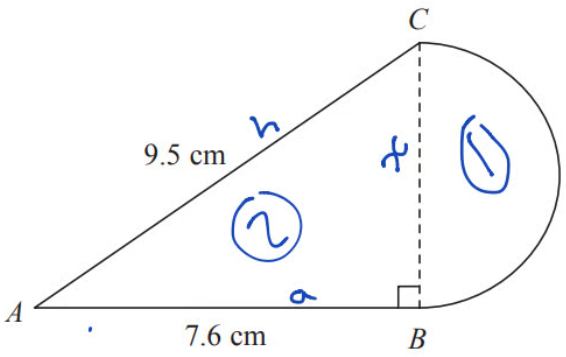


Diagram **NOT** accurately drawn

The diagram shows a shape made from triangle ABC and a semicircle with diameter BC.
Triangle ABC is right-angled at B.
$AB = 7.6$ cm and $AC = 9.5$ cm.

Calculate the area of the shape.
Give your answer correct to 3 significant figures.

$a^2 + x^2 = h^2$

$7.6^2 + x^2 = (9.5)^2$

$x^2 = 9.5^2 - 7.6^2$

$x = \sqrt{9.5^2 - 7.6^2}$

$x = \sqrt{32.49}$

$x = 5.7$

area of 2 :

$\frac{1}{2}$(base)(height)

$\frac{1}{2}(7.6)(5.7) = 21.66$

area of 1 :

Half area of a circle of diameter x

$\frac{1}{2}\pi\left(\frac{D}{2}\right)^2$

$\frac{1}{2}\pi\left(\frac{5.7}{2}\right)^2 = 12.8$

Area 1 + 2 = 21.66 + 12.8 = 34.4

34.4 cm^2

Answer 13

(b) Work out the length of AQ.
Give your answer correct to 3 significant figures.

Apply Pythagoras theorem

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

$5^2 + 14^2 = c^2$

$\sqrt{221} = c = 14.9$ (3sf)

14.9 ..... cm

Answer 14

The diagram shows the floor of a village hall.

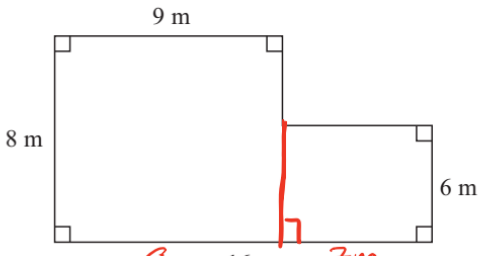


Diagram **NOT** accurately drawn

The caretaker needs to polish the floor.

One tin of polish normally costs £19

One tin of polish covers 12 m² of floor.

There is a discount of 30% off the cost of the polish.

The caretaker has £130

Has the caretaker got enough money to buy the polish for the floor?
You must show all your working.

WE WANT 70%
SO MULTIPLY BY $\frac{70}{100}$

AREA OF FLOOR = $8 \times 9 + 6 \times 7$

$= 72 + 42$

$= 114 \text{ m}^2$

12×

7×12=84
8×12=96
9×12=108
10×12=120

NEED 10 TINS OF POLISH.

FULL PRICE = $19 \times 10 = £190$

DISCOUNTED PRICE = $190 \times \frac{70}{100} = 19 \times 7$

$= £133$

20×7
= 140
− 7
133

SINCE 133 > 130 HE DOES NOT HAVE ENOUGH MONEY

Answer 15

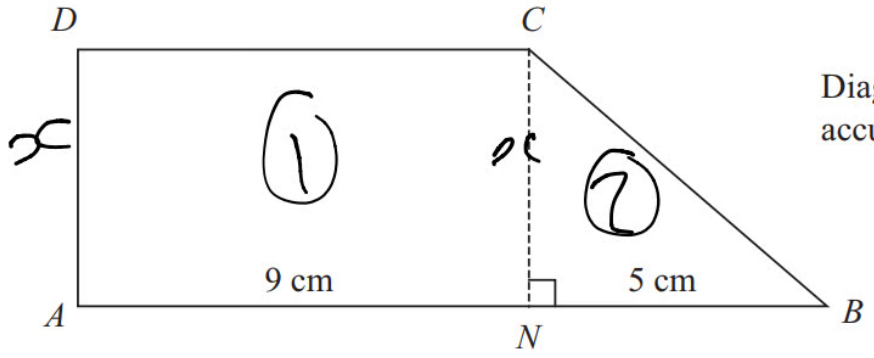


Diagram **NOT** accurately drawn

The shape *ABCD* is made from a rectangle *ANCD* and the right-angled triangle *NBC*.
ANB is a straight line.
AN = 9 cm.
NB = 5 cm.
The area of rectangle *ANCD* is 36 cm^2

Work out the area of shape *ABCD*.

Total area = ① + ②

area ①: $36 = x \times 9$

$\frac{36}{9} : x = 4$

area ② $= \frac{1}{2}(x)(5) = 10\text{ cm}^2$

Total A = 46 cm^2