EXAM PAPERS PRACTICE

GCSE OCR Math J560 Area - Triangles & Quadrilaterals Answers

"We will help you to achieve A Star "

Answer 1

The diagram shows a triangle.

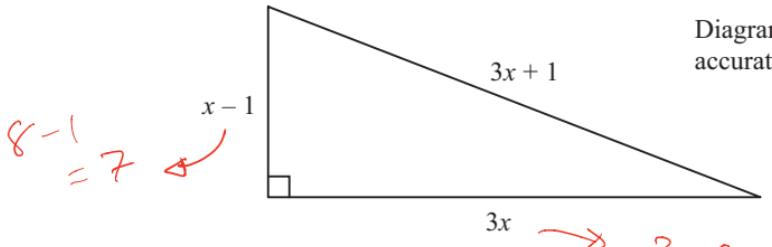


Diagram **NOT** accurately drawn

8 − 1 = 7

3 × 8 = 24

In the diagram, all the measurements are in metres.

The perimeter of the triangle is 56 m.
The area of the triangle is A m².

Work out the value of A.

" = "

P = 56

$3x + x - 1 + 3x + 1 = 56$

$\frac{7x}{7} = \frac{56}{7}$

$x = 8$

AREA OF TRIANGLE

$A = \frac{1}{2} \times$ BASE $\times$ HEIGHT

(EASY IN RIGHT-ANGLED TRIANGLE...

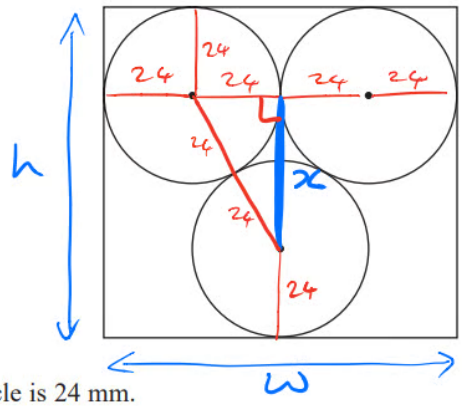
$A = \frac{1}{2} \times 24 \times 7$

$= 12 \times 7$

$= 84$ m^2

Answer 2

The diagram shows 3 identical circles inside a rectangle.
Each circle touches the other two circles and the sides of the rectangle, as shown in the diagram.



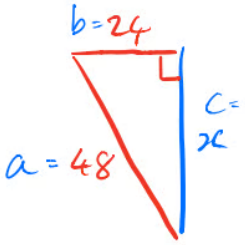
$h = 48 + x$

$\text{AREA} = w \times h$

The radius of each circle is 24 mm.

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

$w = 4 \times 24 = 96 \text{ mm}$



PYTHAGORAS:

$a^2 = b^2 + c^2$

$48^2 = 24^2 + x^2$

$-24^2 \quad -24^2$

$x^2 = 48^2 - 24^2$

$x = \sqrt{48^2 - 24^2}$

$= 24\sqrt{3}$

PYTHAGORAS THEOREM

$a^2 = b^2 + c^2$

$h = 48 + x = 48 + 24\sqrt{3}$

$\text{AREA} = w \times h = 96 \times (48 + 24\sqrt{3})$

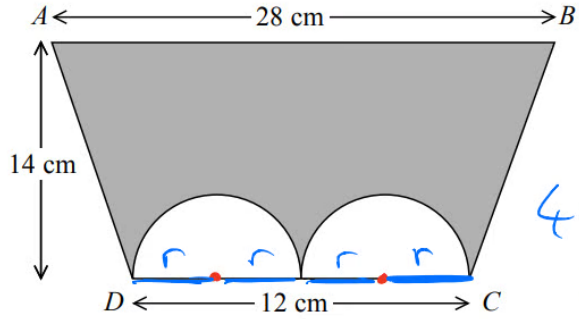
$= 8598.648$

≥ 5 ROUND UP

$= 8600 \text{ mm}^2$

Answer 3

The diagram shows a trapezium $ABCD$ and two identical semicircles.



$4r = 12$

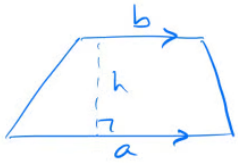
$r = \frac{12}{4} = 3\text{ cm}$

The centre of each semicircle is on DC.

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

AREA OF TRAPEZIUM

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



AREA OF CIRCLE

$A = \pi r^2$

AREA =  − 

$= \frac{1}{2} \times (12+28) \times 14 - \pi \times 3^2$

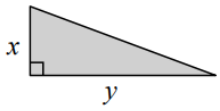
$= 251.7256661$

≥ 5 ROUND UP

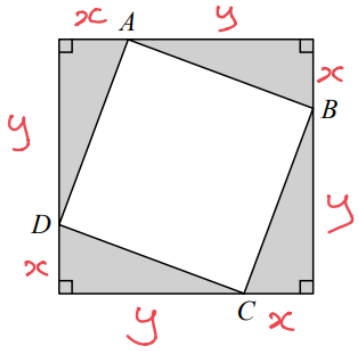
$= 252\text{ cm}^2$

Answer 4

Here is a right-angled triangle.



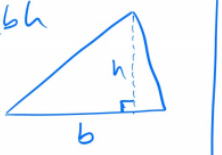
Four of these triangles are joined to enclose the square $ABCD$ as shown below.



Show that the area of the square $ABCD$ is $x^2 + y^2$

AREA OF TRIANGLE

$A = \frac{1}{2}bh$



AREA OF ABCD $= (x+y)^2 - 4 \times \frac{1}{2} \times y \times x$

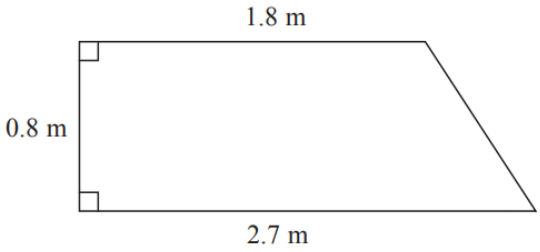
F O I L

$= x^2 + xy + xy + y^2 - 2xy$

$= x^2 + y^2$

Answer 5

The diagram shows a wall in the shape of a trapezium.



Karen is going to cover this part of the wall with tiles.
Each tile is rectangular, 15 cm by 7.5 cm → 0·15m × 0·075m

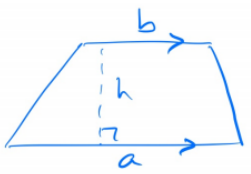
Tiles are sold in packs.
There are 9 tiles in each pack.

Karen divides the area of this wall by the area of a tile to work out an estimate for the number of tiles she needs to buy.

(a) Use Karen's method to work out the estimate for the number of packs of tiles she needs to buy.

AREA OF TRAPEZIUM

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



$$\text{NO OF TILES} = \frac{\text{AREA OF WALL}}{\text{AREA OF TILE}}$$

$$= \frac{\frac{1}{2} \times (2.7 + 1.8) \times 0.8}{0.15 \times 0.075}$$

$$= 160 \text{ TILES}$$

$$\text{NO OF PACKS} = \frac{160}{9} = 17.\dot{7}$$

SHE MUST BUY 18 PACKS

Answer 6

Karen is advised to buy 10% more tiles than she estimated.
Buying 10% more tiles will affect the number of the tiles Karen needs to buy.

She assumes she will need to buy 10% more packs of tiles.

(b) Is Karen's assumption correct?
You must show your working.

PACKS: 18 PACKS +10% = 18 + 1·8 = 19·8 PACKS

SO SHE MUST BUY 20 PACKS

TILES: 160 TILES + 10% = 160 + 16 = 176 TILES

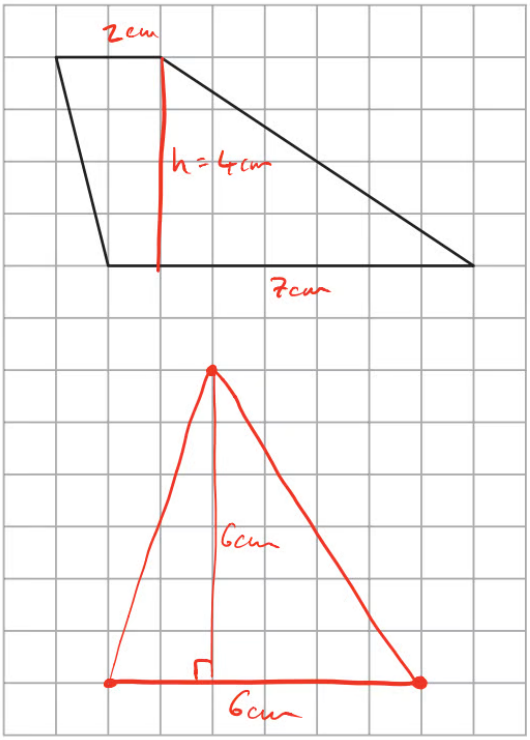
NO OF PACKS = $\frac{176}{9} = 19.\dot{5}$

SO SHE MUST BUY 20 PACKS

YES, SHE IS CORRECT.

Answer 7

Here is a trapezium drawn on a centimetre grid.



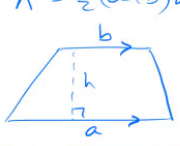
On the grid, draw a triangle equal in area to this trapezium.

AREA $= \frac{1}{2}(7+2) \times 4$

$= 18\ cm^2$

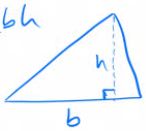
AREA OF TRAPEZIUM

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



AREA OF TRIANGLE

$A = \frac{1}{2}bh$



TRIANGLE

AREA $= \frac{1}{2}bh$

$2 \times 18 = \frac{1}{2}bh \times 2$

$b \times h = 36$

CHOOSE

$b = 6$

$h = 6$

Answer 8

The diagram shows the plan of a small field.

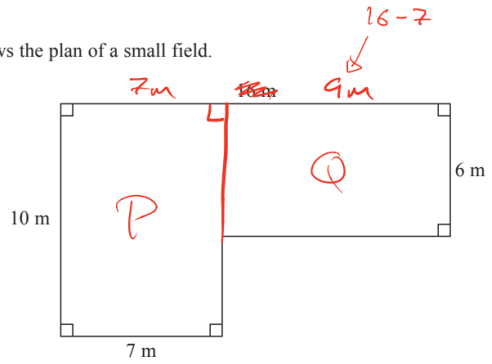


Diagram **NOT** accurately drawn

Kevin is going to keep some pigs in the field.
Each pig needs an area of 36 square metres.

Work out the greatest number of pigs Kevin can keep in the field.

FIND AREA

$A = P + Q$

$= 10 \times 7 + 9 \times 6$

$= 70 + 54$

$= 124\ m^2$

36×
1: 36
2: 72
3: 108
4: 144

$\text{NO OF PIGS} = \frac{124}{36}$

4 PIGS NEED $144m^2$, 3 NEED $108m^2$

SO KEVIN CAN KEEP 3 PIGS

Answer 9

Here is a diagram of Jim's garden.

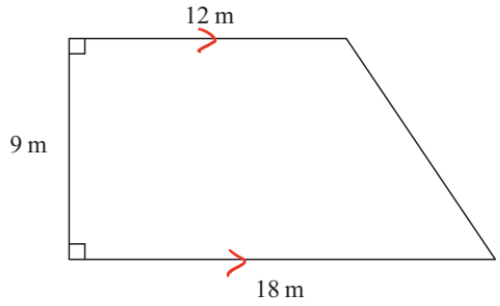


Diagram **NOT** accurately drawn

Jim wants to cover his garden with grass seed to make a lawn.

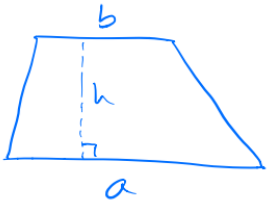
Grass seed is sold in bags.
There is enough grass seed in each bag to cover 20 m^2 of garden.

Each bag of grass seed costs £4.99

Work out the least cost of putting grass seed on Jim's garden.

TRAPEZIUM

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



AREA $= \frac{1}{2}(18+12)\times 9$

$= \frac{1}{2}\times 30 \times 9$

$= 15 \times 9$

$= 135 m^2$

$9\times15 = 10\times15 - 15$

$= 150 - 15$

$= 135$

NO OF BAG $= \frac{135}{20}$

NEED 7 BAGS

$7\times20 = 140$
$6\times20 = 120$

COST $= 7\times4.99 = 7\times5 - 0.07$

$= 35 - 0.07 =$ £ 34.93

Answer 10

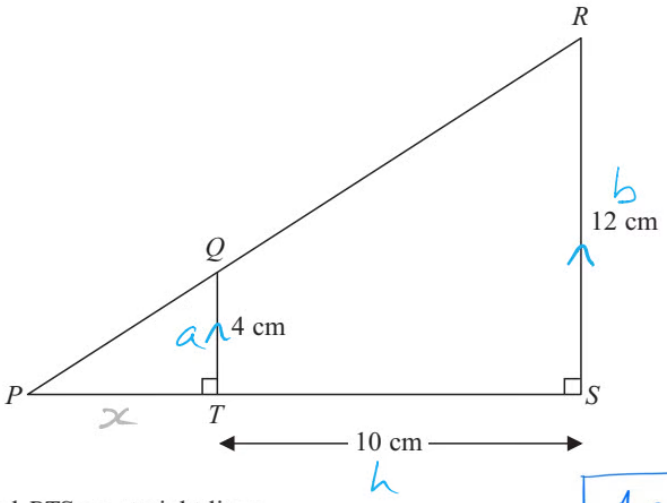


Diagram **NOT** accurately drawn

PQR and *PTS* are straight lines.
Angle *PTQ* = Angle *PSR* = 90°
QT = 4 cm
RS = 12 cm
TS = 10 cm

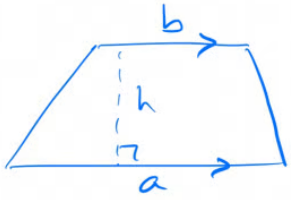
(a) Work out the area of the trapezium *QRST*.

AREA $= \frac{1}{2}(4+12) \times 10$

$= 80\text{cm}^2$

AREA OF TRAPEZIUM

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



Answer 11

Here is a parallelogram.

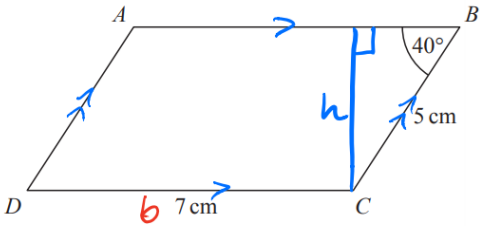


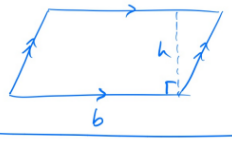
Diagram **NOT** accurately drawn

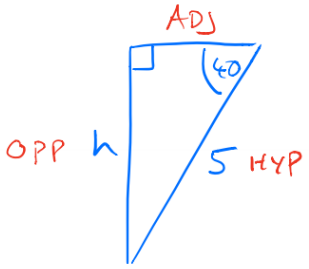
$DC = 7$ cm
$CB = 5$ cm
Angle ABC is 40°

Work out the area of the parallelogram.
Give your answer correct to 1 decimal place.

AREA OF PARALLELOGRAM

$A = b \times h$



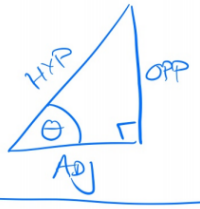


SOHCAHTOA

$\sin\theta = \frac{OPP}{HYP}$

$\cos\theta = \frac{ADJ}{HYP}$

$\tan\theta = \frac{OPP}{ADJ}$



$OPP = \sin\theta \times HYP$

$h = \sin 40 \times 5$

$h = 5 \times \sin 40$

$AREA = b \times h$

$= 7 \times 5 \times \sin 40$

$= 22.4975...$

$= 22.5\text{ cm}$

Answer 12

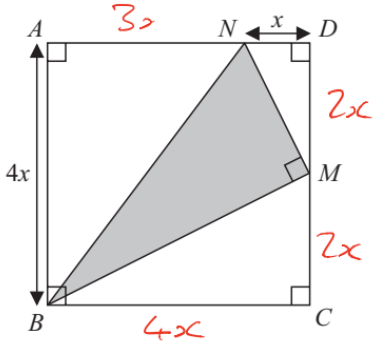


Diagram **NOT** accurately drawn

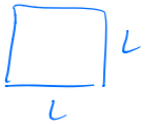
ABCD is a square with a side length of $4x$
M is the midpoint of *DC*.
N is the point on *AD* where $ND = x$

BMN is a right-angled triangle.

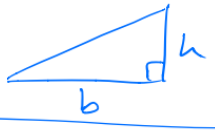
Find an expression, in terms of x, for the area of triangle *BMN*.
Give your expression in its simplest form.

AREAS

SQUARE = L^2



TRIANGLE = $\frac{1}{2}bh$.



AREA OF ΔBMN = AREA OF SQUARE − OTHER THREE Δs

A OF $\Delta BMN = (4x)^2 - \frac{1}{2} \times 4x \times 3x - \frac{1}{2} \times 2x \times x - \frac{1}{2} \times 4x \times 2x$

$= 16x^2 - 6x^2 - x^2 - 4x^2$

$= \underline{5x^2}$

Answer 13

The diagram shows a triangle *DEF* inside a rectangle *ABCD*.

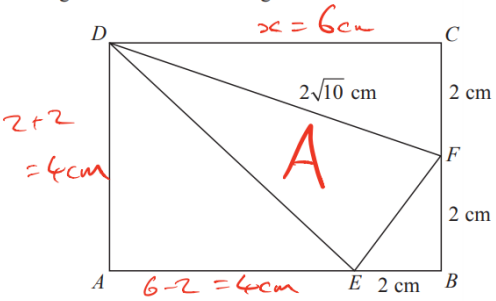
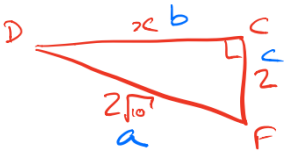


Diagram **NOT** accurately drawn

Show that the area of triangle *DEF* is 8 cm².
You must show all your working.



$a^2 = b^2 + c^2$

$(2\sqrt{10})^2 = x^2 + 2^2$

$40 = x^2 + 4$

$-4 \quad -4$

$36 = x^2$

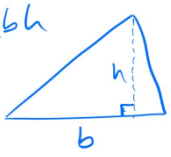
So $x = 6$

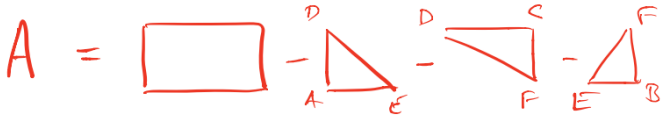
PYTHAGORAS THEOREM

$a^2 = b^2 + c^2$

AREA OF TRIANGLE

$A = \frac{1}{2}bh$



$A =$ 

$= 6 \times 4 - \frac{1}{2} \times 4 \times 4 - \frac{1}{2} \times 6 \times 2 - \frac{1}{2} \times 2 \times 2$

$= 24 - 8 - 6 - 2$

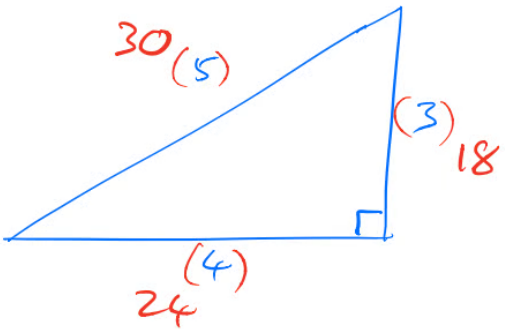
$= 8\text{cm}$

Answer 14

The perimeter of a right-angled triangle is 72 cm.
The lengths of its sides are in the ratio 3 : 4 : 5

Work out the area of the triangle.

DRAW IT!



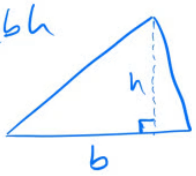
TOTAL

×6 (3 : 4 : 5 : 12) ×6

18 : 24 : 30 : 72

AREA OF TRIANGLE

$A = \frac{1}{2}bh$



$\text{AREA} = \frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 24 \times 18$ (12)

$= 12 \times 18$

$= 216\ cm^2$

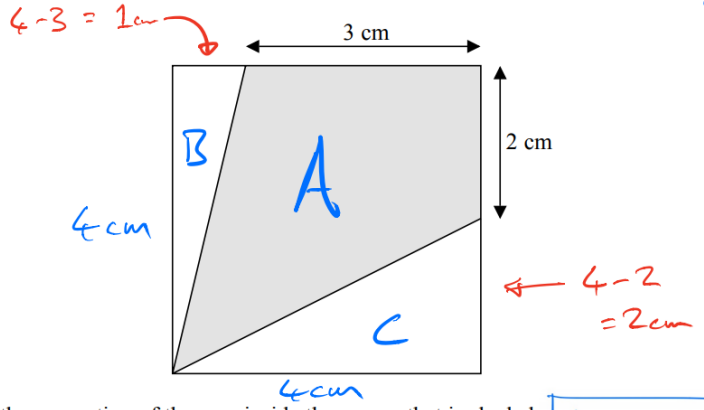
$10 \times 18 = 180$

$2 \times 18 = 36$ +

$12 \times 18 = 216$

Answer 15

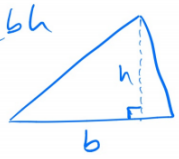
The diagram shows a square with perimeter 16 cm. → SIDE = $\frac{16}{4}$ = 4cm



Work out the proportion of the area inside the square that is shaded.

AREA OF TRIANGLE

$A = \frac{1}{2}bh$



PROPORTION SHADED = $\frac{\text{SHADED AREA}}{\text{TOTAL AREA}}$

A = □ − B − C

$= 4 \times 4 - \frac{1}{2} \times 4 \times 1 - \frac{1}{2} \times 4 \times 2$

$= 16 - 2 - 4$

$= 10\ cm^2$

PROPORTION SHADED = $\frac{10}{16} = \frac{5}{8}$