EXAM PAPERS PRACTICE

2D Perimeters & Areas

Model Answer

Question 1

The base of a triangle is 9 cm correct to the nearest cm.
The area of this triangle is 40 cm^2 correct to the nearest 5 cm^2.

Calculate the upper bound for the perpendicular height of this triangle. [3]

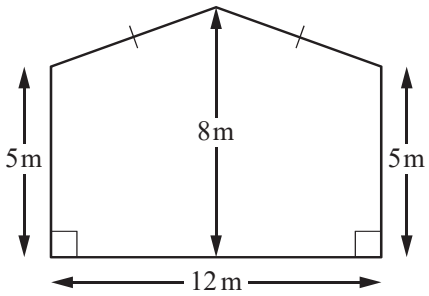
The area of a triangle is $(1/2)$ base $\times$ height, so the height of the triangle is $\frac{2\times \text{ area}}{\text{base}}$.
The upper bound for the area is $40 + 5 = 45$ cm2
and the lower bound for the base is $9 - 0.5 = 8.5$ cm
so the upper bound for the height is $\frac{2\times 45}{8.5} = 10.6$ cm.

Question 2

The scale on a map is 1 : 20 000.
The area of a lake on the map is 1.6 square centimetres.

Calculate the actual area of the lake.
Give your answer in square metres. [3]

64, 000 square meters



NOT TO SCALE

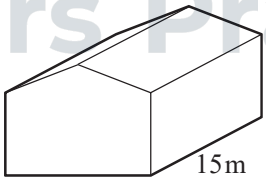
The diagram shows the front face of a barn.
The width of the barn is 12m.
The height of the barn is 8m.
The sides of the barn are both of height 5m.

(a) Work out the area of the front face of the barn. [3]

We can divide the front face of the barn into two trapeziums,
each with parallel sides of 5 m and 8 m, and height of 12 m/2 = 6 m.
The area of a trapezium is given by the formula:
Area = 1/2 * sum of parallel sides * height
Therefore, the area of each trapezium is:
Area = $1/2 * (5m + 8m) * 6m = 39m^2$
The total area of the front face of the barn is the sum of the areas of the two trapeziums:
Total area = 2 * 39 m^2 = 78 m^2
Therefore, the area of the front face of the barn is 78 square meters.

(b) The length of the barn is 15 m.

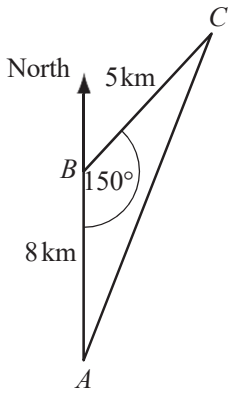
Work out the volume of the barn.



NOT TO SCALE

[1]

The volume of the barn is 15128 = 1440 m^3.



NOT TO SCALE

A helicopter flies 8 km due north from A to B. It then flies 5km from B to C and returns to A. Angle $ABC = 150°$.

(a) Calculate the area of triangle ABC. [2]

$$S_{\triangle ABC} = \frac{1}{2} AB \times BC \times \sin 150° = \frac{1}{2} \times 8 \times 5 \times \frac{1}{2} = 10 \text{ km}^2$$

(b) Find the bearing of B from C. [2]

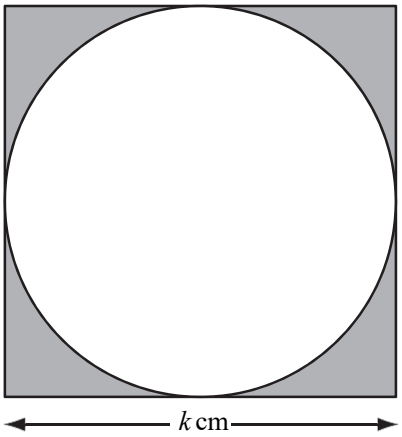
{ Make a straight line parallel to AB through point C}

So $\angle A = \angle 1$

$\angle 2 + \angle A = 180° - 150° = 30°$

$So \angle 1 + \angle 2 = 30°$

B is 30 degrees south by west of C. and ... 5 km away from C.



The diagram shows a square of side k cm.

The circle inside the square touches all four sides of the square.

(a) The shaded area is A cm^2.

Show that $4A = 4k^2 - \pi k^2$. [2]

$A =$ Aren of square $-$ Area of circle

$= k^2 - \pi\left(\frac{k}{2}\right)^2$

$= k^2 - \frac{\pi k^2}{4}$

So $4A = 4k^2 - \pi k^2$

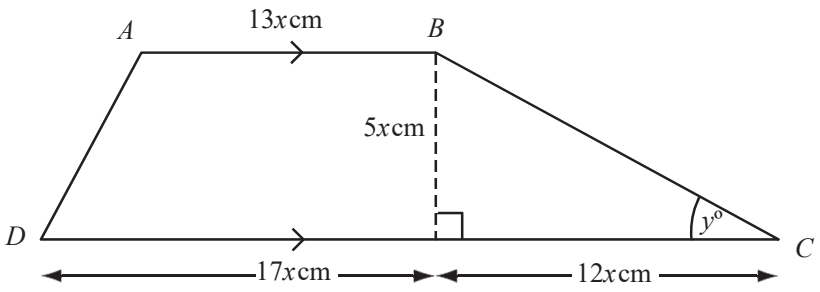
(b) Make k the subject of the formula $4A = 4k^2 - \pi k^2$. [3]

$4A = 4k^2 - \pi k^2$

$4A = (4 - \pi)k^2$ {merge congeners }

$K^2 = \frac{4\theta}{4-\pi}$

$K = 2\sqrt{\frac{A}{4-\pi}}$



NOT TO SCALE

ABCD is a trapezium.

(a) Find the area of the trapezium in terms of x and simplify your answer. [2]

$$\frac{1}{2} \times (13x + 17x + 12x) \times 5x$$
$$= \frac{1}{2} \times 42x \times 5x$$
$$= 21x \cdot 5x$$
$$= 105x^2 \text{ cm}^2$$

[2]

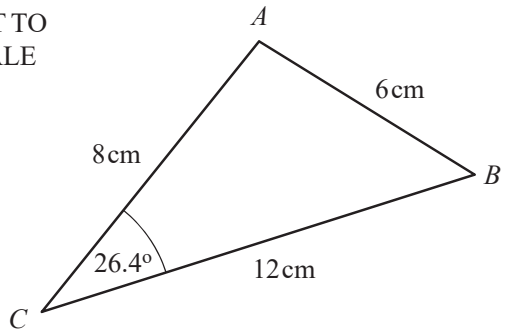
(b) Angle $BCD = y°$. Calculate the value of y.

$$\tan y° = \frac{5x}{12x} = \frac{5}{12}$$
$$y° = \arctan \frac{5}{12} = 22.62$$
{tangeno ratio}

In triangle ABC, $AB = 6$ cm, $AC = 8$ cm and $BC = 12$ cm. Angle $ACB = 26.4°$.
Calculate the area of the triangle ABC.

[2]

NOT TO SCALE



$$\begin{aligned}\text{area} &= \frac{1}{2}CA \times CB \times \sin \angle C \\ &= \frac{1}{2} \times 8 \times 12 \times \sin 26.4° \\ &= \frac{1}{2} \times 8 \times 12 \times 0.445 \\ &= 21.34 \text{ cm}^2\end{aligned}$$