Area and perimeter

1. A model of a ship is made to a scale of $3:400$
   The surface area of the model is $7200\ cm^2$
   Calculate, in m^2, the surface area of the ship.

$3 : 400$

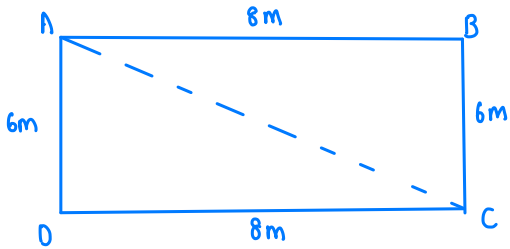
$(3\text{ cm})^2 : (4m^2)$

$9\text{ cm}^2 : 16\text{ m}^2$

$(\times\frac{16}{9})\ 7200 : 12800\text{ m}^2$

Surface area (ship) = 12800 m^2

2. $ABCD$ is a rectangle with perimeter 28 m.
The length of AB is 8m.
Calculate the length, in m, of the diagonal AC of the rectangle.

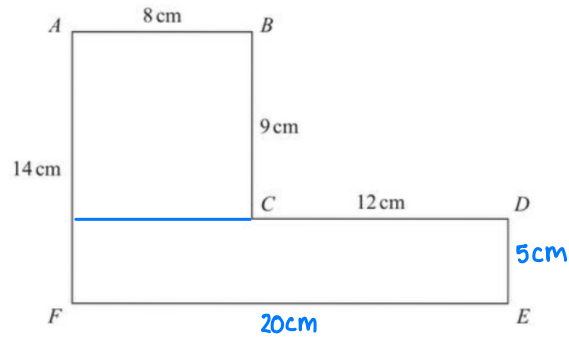


$AC^2 = 6^2 + 8^2$

$AC = \sqrt{36 + 64}$

$= 10m$

3. Here is hexagon $ABCDEF$.



All the corners of $ABCDEF$ are right angles.

$AB = 8cm$ $AF = 14cm$ $BC = 9cm$ $CD = 12\,cm$

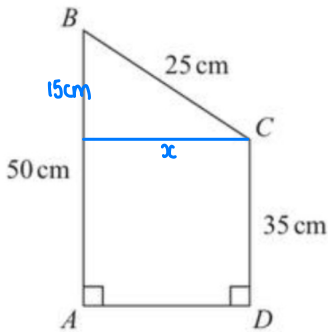
Calculate the area, in cm^2, of $ABCDEF$.

area (1) = 8 × 9
= 72cm²

area (2) = 5 × 20
= 100cm²

total area = 72 + 100
= 172cm²

4.



The diagram shows a quadrilateral $ABCD$ in which

$BC = 25\,cm \quad AB = 50cm \quad CD = 35\,cm \quad angle\,BAD = angle\,CDA = 90°$

Calculate the perimeter, in cm, of quadrilateral $ABCD$.

$x = \sqrt{25^2 - 15^2}$

$= 20cm$

perimeter $= 20 + 35 + 25 + 50$

$= 130cm$

5. The volume of a solid right circular cylinder is $225\ cm^3$
The height of the cylinder is 7 cm.

Work out the total surface area, in cm^2 to 3 significant figures of the cylinder.

$$\text{Vol} = \pi r^2 h$$

$$\pi \times r^2 \times 7 = 225$$

$$r^2 = 10.231$$

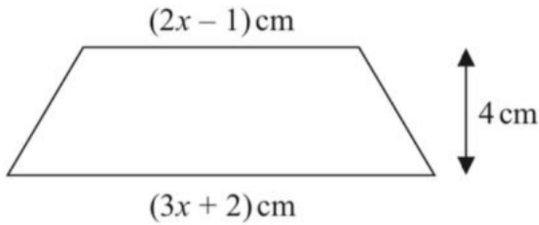
$$r = 3.2$$

$$SA = 2\pi r^2 + 2\pi rh$$

$$= 2 \times \pi \times 3.2^2 + (2 \times \pi \times 3.2 \times 7)$$

$$= 205 cm^2$$

6. The diagram shows a trapezium.



The lengths of the parallel sides of the trapezium are $(3x + 2)\ cm$ and $(2x - 1)cm$.
The height of the trapezium is 4 cm.

Given that the area of the trapezium is $28\ cm^2$

find the value of x

$\frac{1}{2}(a+b)h = 28$

$\frac{1}{2}(2x-1+3x+2)4 = 28$

$5x + 1 = 14$

$5x = 13$

$x = \frac{13}{5}$

$= 2.6$

7. A and B are two similar solids.

The volume of A is $500\ cm^3$

The volume of B is $32\ cm^3$

The total surface area of A is $250\ cm^2$

Calculate the total surface area, in cm^2, of B.

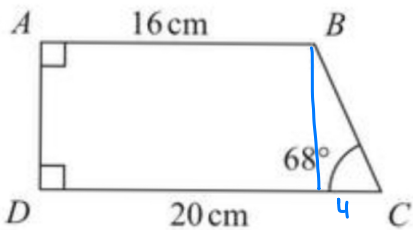
$$\left(\frac{x}{250}\right)^3 : \left(\frac{32}{500}\right)^2$$

$$\frac{x^3}{15625\ 000} = \frac{64}{15625}$$

$$x^3 = 64\,000$$

$$x = 40\ cm^2$$

8.



The diagram shows trapezium $ABCD$ in which

$AB = 16cm \quad DC = 20\,cm \quad \angle BCD = 68^{\circ} \quad \angle BAD = \angle CDA = 90°$

Calculate the area, in cm^2 to 3 significant figures, of trapezium $ABCD$

$\tan(68^{\circ}) = \frac{AD}{4}$

$AD = 9.9\,cm$

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

$= \frac{1}{2}(16+20)9.9$

$= 178.2\,cm^2$

$\approx 178\,cm^2$

9.

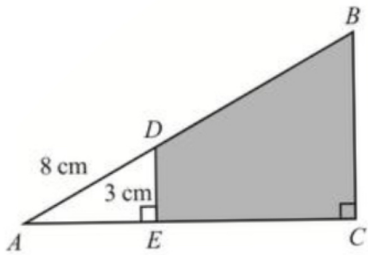


Figure 1 shows triangle ABC

The point D lies on AB and the point E lies on AC such that DE and BC are parallel.

$AD = 8\,cm \quad DE = 3cm \quad AE:EC = 1:2 \quad \angle DEA = \angle BCA = 90°$

Calculate the area, in cm^2 to 2 significant figures, of the region $BCED$ shown shaded in the diagram.

$AE^2 = 8^2 - 3^2$

$AE = \sqrt{64 - 9}$

$= 7.42cm$

$EC = 7.42 \times 2$

$= 14.84\,cm$

$\sin(DAE) = \frac{3}{8}$

$DAE = 22.02°$

$\tan(22.02°) = \frac{0}{7.42 + 14.84}$

$= 8.999$

≈ 9

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

$= \frac{1}{2}(3 + 9)\,14.84$

$= 88.98 \approx 89\,cm^2$

$\left[\text{Area of trapezium} = \frac{1}{2}(a+b)h\right]$