

# Fully-Worked Solutions

## CHAPTER 4 Scale Drawings

### UPSKILL 4.1A

- 1 (a) No (b) Yes (c) No (d) Yes  
 2 Pentagon *B*: The length of each side of *B* is twice the length of the corresponding side of *A*.

$$\text{Scale} = 1 : \frac{1}{2}$$

Pentagon *C*: The length of each side of *C* is  $\frac{1}{2}$  of the length of the corresponding side of *A*.  
 Scale = 1 : 2

3 (a) Scale =  $\frac{5}{100} = 1 : 20$

(b) Scale =  $\frac{6}{1.5} = 4 : 1$   
 $= 1 : \frac{1}{4}$

(c) Scale =  $\frac{12}{8} = 3 : 2$   
 $= 1 : \frac{2}{3}$

(d)  $RS = \sqrt{18 \times 2}$   
 $= 6 \text{ cm}$

$$UV = \sqrt{450 \times 2}$$

$$= 30 \text{ cm}$$

$$\text{Scale} = \frac{6}{30} = \frac{1}{5}$$

$$= 1 : 5$$

4 Scale =  $\frac{7}{14 \times 2}$   
 $= \frac{7}{28}$   
 $= \frac{1}{4}$   
 $n = 4$

5 Scale =  $\frac{\text{Grid size of scale drawing}}{\text{Grid size of object}} = \frac{0.4}{0.8}$   
 $= \frac{1}{2}$

∴ The scale used is 1 : 2.

6 Scale =  $\frac{\text{Grid size of scale drawing}}{\text{Grid size of object}} = \frac{0.6}{0.2}$   
 $= \frac{3}{1}$   
 $= \frac{1}{\frac{1}{3}}$

∴ The scale used is 1 :  $\frac{1}{3}$ .

7 Length of scale drawing =  $\frac{1}{4} \times 18$   
 $= 4.5 \text{ cm}$

8 Length of object =  $\frac{8.4}{3}$   
 $= 2.8 \text{ cm}$

9  $AC = \sqrt{21^2 + 28^2}$   
 $= \sqrt{1\,225}$   
 $= 35 \text{ cm}$

$$\text{Length of hypotenuse on scale drawing} = \frac{1}{5} \times 35$$

$$= 7 \text{ cm}$$

10  $PS = \sqrt{15^2 + 8^2}$   
 $= \sqrt{289}$   
 $= 17 \text{ cm}$

$$\text{Perimeter in scale drawing} = 6 + 15 + 14 + 17$$

$$= 52 \text{ cm}$$

$$\text{Actual perimeter} = 52 \times 50$$

$$= 2\,600 \text{ cm}$$

$$= 26 \text{ m}$$

11 Length of actual side =  $9 \times 20$   
 $= 180 \text{ cm}$

$$\text{Actual area} = 180 \times 180$$

$$= 32\,400 \text{ cm}^2$$

$$= 3.24 \text{ m}^2$$

12 Circumference of the actual circle =  $2 \times \frac{22}{7} \times \frac{7}{2}$   
 $= 22 \text{ mm}$   
 $= 2.2 \text{ cm}$

$$\text{Circumference of the circle on scale drawing} = 2.2 \times 20$$

$$= 44 \text{ cm}$$

13 (a) Actual length of road =  $\frac{\text{Length of road on the map}}{\text{Scale}}$   
 $= \frac{4}{\left(\frac{1}{4\,000\,000}\right)}$

$$= 16\,000\,000 \text{ cm}$$

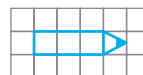
$$= 160 \text{ km}$$

(b) Length of road on the map = Scale  $\times$  Actual length of road  
 $= \frac{1}{2\,500\,000} \times 16\,000\,000$   
 $= 6.4 \text{ cm}$

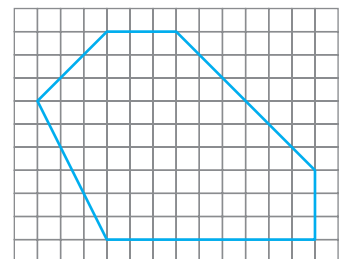
14 Scale =  $\frac{3.6}{1\,080\,000}$   
 $= \frac{1}{300\,000}$   
 $= 1 : 300\,000$

### UPSKILL 4.1B

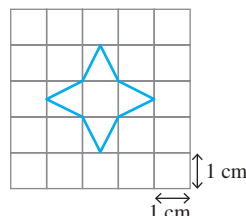
1 (a)



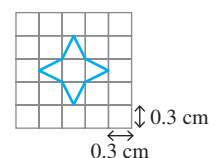
(b)



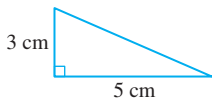
2 (a)



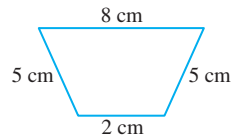
(b)



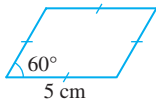
3 (a) Scale 1 : 1



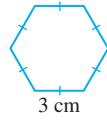
(b) Scale 1 : 5



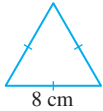
(c) Scale 1 : 8



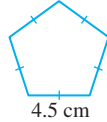
(d) Scale 1 : 50



(e) Scale 1 :  $\frac{1}{2}$



(f) Scale 1 :  $\frac{1}{10}$



$$4 \text{ Scale} = \frac{16}{800} = \frac{1}{50}$$

$$n = 50$$

5 (a) Scale =  $\frac{4.5}{36} = 1 : 8$

(b) Actual width =  $3.5 \times 8$   
= 28 cm

6 Area of floor in drawing =  $\frac{36}{8} \times \frac{32}{8}$   
=  $4.5 \times 4$   
= 18 cm<sup>2</sup>

7 (a) Scale =  $\frac{2}{320}$   
=  $\frac{1}{160}$   
= 1 : 160

(b) Actual length of plot B =  $160 \times 3$   
= 480 cm  
= 4.8 m

(c) Actual area of plot A =  $(4 \times 1.6) \times (1 \times 1.6)$   
= 10.24 m<sup>2</sup>

8 (a) Scale =  $\frac{3}{15} = \frac{1}{n}$   
 $3n = 15$   
 $n = 5$

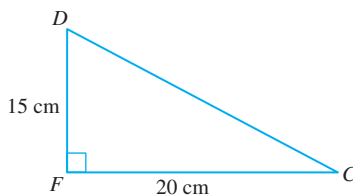
(b) Using Pythagoras' theorem,

$$CD^2 = FC^2 + FD^2$$

$$= 20^2 + 15^2$$

$$CD = \sqrt{625} \text{ cm}$$

$$= 25 \text{ cm}$$



Length of CD in the scale drawing =  $\frac{1}{5} \times 25$   
= 5 cm

## Summative Practice 4

### Section A

1 Answer: B

2 Scale =  $\frac{32}{4} = 8 : 1$   
= 1 :  $\frac{1}{8}$

Answer: B

3  $AC = \sqrt{2^2 + 4.8^2}$   
= 5.2 cm  
Actual length of AC =  $5.2 \times 50$   
= 260 cm = 2.6 m

Answer: C

4  $PR = \sqrt{7.5^2 - 4.5^2}$   
= 6 cm  
Actual length of PQ =  $4.5 \times 3$   
= 13.5 cm  
Actual length of PR =  $6 \times 3$   
= 18 cm

Actual area =  $\frac{1}{2} \times 18 \times 13.5$   
= 121.5 cm<sup>2</sup>

Answer: C

5 Actual perimeter =  $2\left(\frac{6.4}{4} + \frac{10}{4}\right)$   
= 8.2 cm

Answer: C

6 Scale =  $\frac{\sqrt{25}}{\sqrt{2025}} = \frac{5}{45}$   
=  $\frac{1}{9}$

Answer: D

7 Scale: 10 cm represents 1 cm  
8 cm represents 0.8 cm  
Diameter of 16 cm represents 1.6 cm

Answer: D

8 Actual perimeter =  $6(12 \times 8)$   
=  $6 \times 96$   
= 576 cm  
= 5.76 m

Answer: A

9 Actual length =  $2.5 \times 180\,000$   
= 450 000 cm  
= 4.5 km

Answer: B

10 Distance on the map =  $\frac{1}{5\,000\,000} \times 10\,000\,000$   
= 2 cm

Answer: B

### Section B

1 (a) Actual measurement =  $\frac{\text{Measurement of scale drawing}}{\text{Scale}}$   
=  $\frac{20}{\frac{1}{4}}$   
=  $20 \times \frac{4}{1}$   
= 80 cm

(b) Scale =  $\frac{\text{Measurement of scale drawing}}{\text{Actual measurement}} = \frac{6}{1.5}$   
=  $\frac{4}{1} = \frac{1}{\frac{1}{4}}$   
= 1 :  $\frac{1}{4}$

(c) Measurement of scale drawing = Scale  $\times$  Actual measurement  
=  $\frac{1}{30} \times 36$   
= 1.2 cm

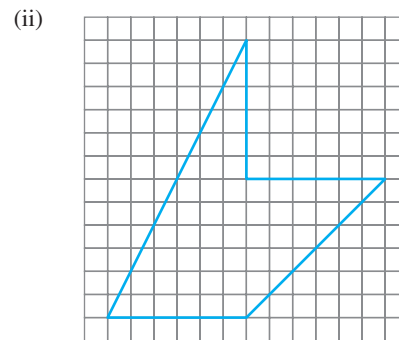
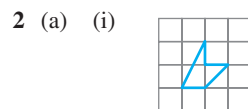
(d) Scale =  $\frac{\text{Measurement of scale drawing}}{\text{Actual measurement}} = \frac{9.6 \times 10}{1.2}$   
=  $\frac{80}{1} = \frac{1}{\frac{1}{80}}$   
= 1 :  $\frac{1}{80}$

- 2 (a) (i) Scale =  $\frac{3.6}{1.2} = \frac{3}{1}$   
 $= 1: \frac{1}{3}$
- (ii) Length of  $CD = \frac{1}{3} \times 6$   
 $= 2 \text{ cm}$
- (b) (i)  $\frac{1 \text{ cm}}{500\,000 \text{ cm}} = \frac{4}{\text{Actual length}}$   
 Actual length =  $\frac{4 \times 500\,000 \text{ cm}}{1 \text{ cm}}$   
 $= 20 \text{ km}$
- (ii)  $\frac{1 \text{ cm}}{500\,000 \text{ cm}} = \frac{\text{Length on map}}{2.5 \text{ km}}$   
 $\frac{1 \text{ cm}}{500\,000 \text{ cm}} = \frac{\text{Length on map}}{250\,000}$   
 Length on map =  $\frac{250\,000}{500\,000}$   
 $= 0.5 \text{ cm}$
- 3 (a) Width of scale drawing = Scale  $\times$  Actual width  
 $= \frac{2}{1} \times 6$   
 $= 12 \text{ cm}$
- (b) Actual length of diagonal =  $\sqrt{6^2 + 8^2} = \sqrt{100}$   
 $= 10 \text{ cm}$   
 Length of diagonal of scale drawing  
 $= \text{Scale} \times \text{Actual length of diagonal}$   
 $= \frac{2}{1} \times 10 = 20 \text{ cm}$
- (c) Actual perimeter =  $2(6 + 8) = 28 \text{ cm}$   
 Perimeter of scale drawing = Scale  $\times$  Actual perimeter  
 $= \frac{2}{1} \times 28$   
 $= 56 \text{ cm}$
- (d) Length of scale drawing = Scale  $\times$  Actual length  
 $= \frac{2}{1} \times 8$   
 $= 16 \text{ cm}$   
 Area of scale drawing =  $12 \times 16$   
 $= 192 \text{ cm}^2$
- 4 (a)  $\times$  (b)  $\checkmark$  (c)  $\times$  (d)  $\checkmark$

### Section C

- 1 (a) Scale =  $\frac{6.5}{10.4 \times 100}$   
 $= \frac{1}{160}$   
 $\therefore$  Scale of plan is 1 : 160
- (b) Largest room is room 1.  
 Length =  $(4.5 \times 160) = 720 \text{ cm}$   
 Width =  $(3 \times 160) = 480 \text{ cm}$   
 Actual dimensions:  $7.2 \text{ m} \times 4.8 \text{ m}$

- (c) Actual area of room 2 =  $(3.5 \times 160) \times (3 \times 160)$   
 $= 560 \times 480$   
 $= 268\,800 \text{ cm}^2$   
 $= 26.88 \text{ m}^2$
- Actual area of room 3 =  $(4 \times 160) \times (2.5 \times 160)$   
 $= 640 \times 400$   
 $= 256\,000 \text{ cm}^2$   
 $= 25.6 \text{ m}^2$
- Difference =  $26.88 - 25.6$   
 $= 1.28 \text{ m}^2$
- (d) Actual length =  $\frac{3.2}{4}$   
 $= 0.8 \text{ m}$   
 $= 80 \text{ cm}$
- Area of plan of photocopy machine =  $\left(\frac{80}{160}\right)^2$   
 $= 0.25 \text{ cm}^2$



- (b) (i) Distance on the map =  $(350 \times 100\,000) \times \frac{1}{5\,000\,000}$   
 $= 7 \text{ cm}$
- (ii)  $\frac{1}{n} = \frac{10}{350 \times 100\,000}$   
 $n = 3\,500\,000$
- (c) Scale drawing:  $\frac{22}{7} \times r^2 = 154$   
 $r = \sqrt{154 \times \frac{7}{22}}$   
 $= 7 \text{ cm}$   
 Circumference =  $2 \times \frac{22}{7} \times 7$   
 $= 44 \text{ cm}$   
 Actual circumference =  $\frac{1}{5} \times 44$   
 $= 8.8 \text{ cm}$