8 **a** ≈ 252 mL **b** **i** ≈ 189 mL **ii** 3.25 cm

9 35 truck loads

10 **a** $\approx 110\,000$ mm^3

b The external surface area and internal surface area of a container may be different.

c **i** $1\,870\,000$ mm^3 **ii** 1.87 L **iii** $\approx 502\,000$ mm^3

REVIEW SET 6A

1 **a** ≈ 18.3 cm **b** ≈ 38.3 cm **c** ≈ 91.6 cm^2

2 ≈ 10.4 cm

3 **a** ≈ 377.0 cm^2 **b** ≈ 339.8 cm^2 **c** ≈ 201.1 cm^2

4 **a** 71 m^2 **b** \$239.25

5 **a** ≈ 4.99 m^3 **b** 853 cm^3 **c** ≈ 0.452 m^3

6 ≈ 3.22 m^3 **7** $\approx 82\,400$ cm^3 **8** ≈ 1470 m^3

9 **a** 734.44 mL **b** ≈ 198 L **10** ≈ 68.4 mm

11 **a** height $= 3.3$ m $- 1.8$ m $- 0.8$ m $= 0.7$ m $= 70$ cm

b ≈ 1.06 m **c** ≈ 15.7 m^2

d **Hint:** Volume of silo
$=$ volume of hemisphere $+$ volume of cylinder $+$ volume of cone

e ≈ 5.2 kL

REVIEW SET 6B

1 **a** $\theta^\circ \approx 76.6^\circ$ **b** ≈ 14.3 cm^2

2 **a** ≈ 29.1 cm **b** ≈ 25.1 cm^2

3 **a** ≈ 84.7 cm^2 **b** ≈ 7110 mm^2 **c** ≈ 8.99 m^2

4 ≈ 23.5 m^2 **5** ≈ 434 cm^2

6 **a** ≈ 164 cm^3 **b** 120 m^3 **c** $\approx 10\,300$ mm^3

7 **a** 0.52 m^3 **b** 5.08 m^2 **8** ≈ 5680 L **9** ≈ 1.03 m

10 **a** $\approx 6.08 \times 10^{18}$ m^2 **b** $\approx 1.41 \times 10^{27}$ m^3

11 **a** ≈ 56.5 cm^3 **b** 3 cm **c** ≈ 96.5 cm^2

EXERCISE 7A

1 **a** **i** $\frac{4}{5}$ **ii** $\frac{3}{5}$ **iii** $\frac{4}{3}$

b **i** $\frac{5}{8}$ **ii** $\frac{\sqrt{39}}{8}$ **iii** $\frac{5}{\sqrt{39}}$

c **i** $\frac{7}{\sqrt{65}}$ **ii** $\frac{4}{\sqrt{65}}$ **iii** $\frac{7}{4}$

d **i** $\frac{5}{\sqrt{61}}$ **ii** $\frac{6}{\sqrt{61}}$ **iii** $\frac{5}{6}$

2 **a** XY ≈ 4.9 cm, XZ ≈ 3.3 cm, YZ ≈ 5.9 cm

b **i** ≈ 0.83 **ii** ≈ 0.56 **iii** ≈ 1.48

3 **a** **Hint:** Base angles of an isosceles triangle are equal, and sum of all angles in a triangle is 180°.

b AB $= \sqrt{2} \approx 1.41$ m

c **i** $\frac{1}{\sqrt{2}} \approx 0.707$ **ii** $\frac{1}{\sqrt{2}} \approx 0.707$ **iii** 1

4 The OPP and ADJ sides will always be smaller than the HYP. So, the sine and cosine ratios will always be less than or equal to 1.

5 **a** **i** $\frac{a}{c}$ **ii** $\frac{b}{c}$ **iii** $\frac{a}{b}$ **iv** $\frac{b}{c}$ **v** $\frac{a}{c}$ **vi** $\frac{b}{a}$

b $A = 90^\circ - B$

c **i** $\sin\theta = \cos(90^\circ - \theta)$ **ii** $\cos\theta = \sin(90^\circ - \theta)$

iii $\tan\theta = \dfrac{1}{\tan(90^\circ - \theta)}$

6 **a** ≈ 7.50 m **b** ≈ 7.82 cm **c** ≈ 4.82 cm

d ≈ 5.17 m **e** ≈ 6.38 m **f** ≈ 4.82 cm

7 **a** $x \approx 3.98$ **b** **i** $y \approx 4.98$ **ii** $y \approx 4.98$

8 **a** $x \approx 2.87$, $y \approx 4.10$ **b** $x \approx 16.40$, $y \approx 18.25$

c $x \approx 10.77$, $y \approx 14.50$

9 **a** perimeter ≈ 23.2 cm, area ≈ 22.9 cm^2

b perimeter ≈ 17.0 cm, area ≈ 10.9 cm^2

10 ≈ 21.7 cm

EXERCISE 7B

1 **a** $\theta \approx 53.1^\circ$ **b** $\theta \approx 45.6^\circ$ **c** $\theta \approx 13.7^\circ$

d $\theta \approx 52.4^\circ$ **e** $\theta \approx 76.1^\circ$ **f** $\theta \approx 36.0^\circ$

2 **a** $\theta \approx 56.3^\circ$ **b** **i** $\phi \approx 33.7^\circ$ **ii** $\phi \approx 33.7^\circ$

3 **a** $\theta \approx 39.7^\circ$, $\phi \approx 50.3^\circ$ **b** $\alpha \approx 38.9^\circ$, $\beta \approx 51.1^\circ$

c $\theta \approx 61.5^\circ$, $\phi \approx 28.5^\circ$

4 **a** The triangle cannot be drawn with the given dimensions.

b The triangle cannot be drawn with the given dimensions.

c The result is not a triangle, but a straight line of length 9.3 m.

5 **a** $x \approx 2.65$, $\theta \approx 37.1^\circ$

b $x \approx 6.16$, $\theta \approx 50.3^\circ$, $y \approx 13.0$

6 $\approx 135^\circ$ **7** $\alpha \approx 6.92$

EXERCISE 7C

1 **a** $x \approx 4.13$ **b** $\alpha \approx 75.5^\circ$ **c** $\beta \approx 41.0^\circ$

d $x \approx 6.29$ **e** $\theta \approx 51.9^\circ$ **f** $x \approx 12.6$

2 $\approx 22.4^\circ$ **3** ≈ 11.8 cm

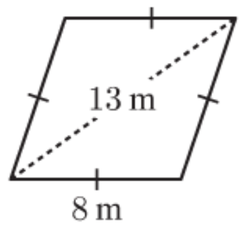
4 **a** ≈ 27.2 cm^2 **b** ≈ 153 m^2 **5** $\approx 119^\circ$

6 ≈ 36.5 cm **7** **a** $x \approx 45.4$ **b** $x \approx 2.24$

8 **a** $x \approx 3.44$ **b** $\alpha \approx 51.5^\circ$

9 **a** ≈ 12.3 cm^2 **b** ≈ 14.3 cm^2

10 **a**



b ≈ 9.33 m

c $\approx 71.3^\circ$

11 **a** ≈ 2.59 cm **b** ≈ 8.46 cm

12 **a** $\theta \approx 36.9^\circ$ **b** $r \approx 11.3$ **c** $\alpha \approx 61.9^\circ$

13 ≈ 7.99 cm **14** $\approx 89.2^\circ$ **15** $\approx 47.2^\circ$ **16** ≈ 6.78 cm^2

EXERCISE 7D

1 ≈ 18.3 m **2** **a** ≈ 46.4 m **b** ≈ 259 m

3 $\approx 1.58^\circ$ **4** **a** $\approx 26.4^\circ$ **b** $\approx 26.4^\circ$

5 ≈ 142 m **6** $\theta \approx 12.6^\circ$ **7** ≈ 9.56 m

8 ≈ 46.7 m **9** $\beta \approx 129^\circ$ **10** ≈ 10.9 m

11 ≈ 104 m **12** ≈ 962 m **13** ≈ 3.17 km

14 ≈ 43.8 m **15** **a** ≈ 18.4 cm **b** $\approx 35.3^\circ$

16 **a** ≈ 10.8 cm **b** $\approx 36.5^\circ$ **c** ≈ 9.49 cm **d** $\approx 40.1^\circ$

17 **a** ≈ 82.4 cm **b** ≈ 77.7 L

18 **a** **i** 2 m **ii** ≈ 2.01 m **b** $\approx 6.84^\circ$

19 **a** ≈ 10.2 m **b** no **20** **a** ≈ 73.4 m **b** $\approx 16.2^\circ$

21 $\approx 67.0^\circ$

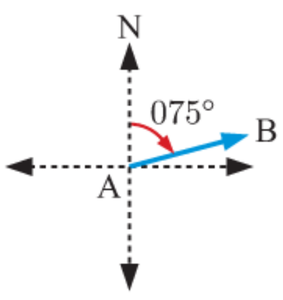
22 **a** ≈ 1.49 m^3 **b** ≈ 0.331 m^3 **c** ≈ 88.9 cm^3

23 **a** **Hint:** Consider

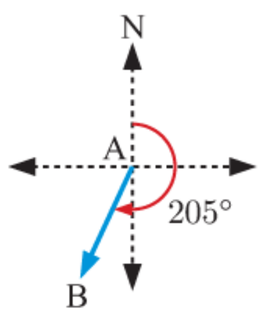
b ≈ 0.285 arc seconds

EXERCISE 7E

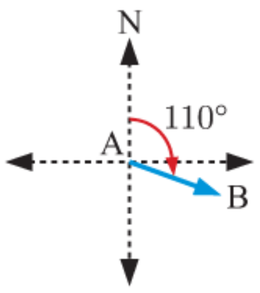
1 **a**



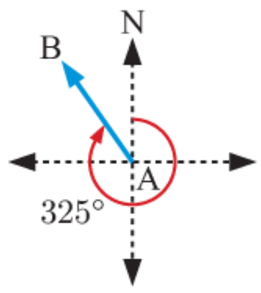
b



c



d

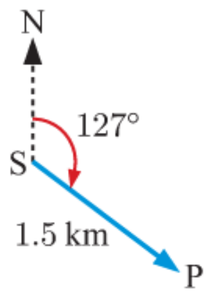


2 **a** 126° **b** 245° **c** 152° **d** 308°

3 **a** 072° **b** 252° **c** 162° **d** 342°
e 113° **f** 293°

4 $\approx 125°$ **5** **a** ≈ 224 m **b** $\approx 333°$ **c** $\approx 153°$

6 **a**



b ≈ 1.20 km **c** ≈ 0.903 km

7 ≈ 2.41 km **8** ≈ 12.6 km

9 **a** ≈ 854 m **b** $\approx 203°$

10 ≈ 73.3 km on the bearing $\approx 191°$

11 ≈ 17.8 km on the bearing $\approx 162°$

12 **a** $\approx 046.6°$ **b** ≈ 4.22 km

EXERCISE 7F

1 **a** **i** [EH] **ii** [EF] **iii** [EG] **iv** [FH]
b **i** [MR] **ii** [MN]

2 **a** **i** $A\widehat{F}E$ **ii** $B\widehat{M}F$ **iii** $A\widehat{D}E$ **iv** $B\widehat{N}F$
b **i** $B\widehat{A}M$ **ii** $B\widehat{N}M$ **iii** $E\widehat{A}N$

3 **a** **i** $\approx 36.9°$ **ii** $\approx 25.1°$ **iii** $\approx 56.3°$ **iv** $\approx 29.1°$
b **i** $\approx 33.7°$ **ii** $\approx 33.7°$ **iii** $\approx 25.2°$ **iv** $\approx 30.8°$
c **i** $\approx 59.0°$ **ii** $\approx 22.0°$ **iii** $\approx 22.6°$
d **i** $\approx 64.9°$ **ii** $\approx 71.7°$

4 $\approx 31.7°$

REVIEW SET 7A

1 **a** 10 cm **b** $\frac{6}{10} = \frac{3}{5}$ **c** $\frac{8}{10} = \frac{4}{5}$ **d** $\frac{6}{8} = \frac{3}{4}$

2 **a** $x \approx 3.51$ **b** $x \approx 51.1$ **c** $x \approx 5.62$

3 ≈ 43.4 cm^2 **4** $\theta = 33°$, $x \approx 3.90$, $y \approx 7.15$

5 $\theta \approx 8.19°$ **6** $\approx 124°$

7 **a** $x \approx 2.8$ **b** $x \approx 4.2$ **c** $x \approx 5.2$

8 ≈ 13.5 m **9** **a** 118° **b** 231° **c** 329°

10 13 km on the bearing $\approx 203°$ from the helipad.

11 $\approx 8.74°$ **12** ≈ 0.607 L **13** **a** $\approx 53.1°$ **b** $\approx 62.1°$

REVIEW SET 7B

1 **a** AB ≈ 4.5 cm, AC ≈ 2.2 cm, BC ≈ 5.0 cm
b **i** ≈ 0.44 **ii** ≈ 0.90 **iii** ≈ 0.49

2 **a** $\theta \approx 34.8°$ **b** $\theta \approx 39.7°$ **c** $\theta \approx 36.0°$

3 AB ≈ 120 mm, AC ≈ 111 mm

4 $x \approx 25.7$, $\theta \approx 53.6°$, $\alpha \approx 36.4°$

5 **a** ≈ 200 cm **b** ≈ 1500 cm^2 **6** ≈ 2.54 cm

7 ≈ 204 m **8** **a** 90° **b** $\approx 33.9°$

9 ≈ 3.91 km on the bearing $\approx 253°$ from his starting point.

10 ≈ 5.46 km **11** ≈ 485 m^3

12 **a** $\approx 14.4°$ **b** $\approx 18.9°$ **c** $\approx 21.8°$

13 **a** **i** ≈ 27.6 cm **ii** ≈ 23.3 cm **b** ≈ 6010 cm^3

EXERCISE 8A

1 **a** $\frac{\pi}{2}$ **b** $\frac{\pi}{3}$ **c** $\frac{\pi}{6}$ **d** $\frac{\pi}{10}$ **e** $\frac{\pi}{20}$
f $\frac{3\pi}{4}$ **g** $\frac{5\pi}{4}$ **h** $\frac{3\pi}{2}$ **i** 2π **j** 4π
k $\frac{7\pi}{4}$ **l** 3π **m** $\frac{\pi}{5}$ **n** $\frac{4\pi}{9}$ **o** $\frac{23\pi}{18}$

2 **a** $\approx 0.641^c$ **b** $\approx 2.39^c$ **c** $\approx 5.55^c$ **d** $\approx 3.83^c$
e $\approx 6.92^c$

3 **a** 36° **b** 108° **c** 135° **d** 10° **e** 20°
f 140° **g** 18° **h** 27° **i** 210° **j** 22.5°

4 **a** $\approx 114.59°$ **b** $\approx 87.66°$ **c** $\approx 49.68°$
d $\approx 182.14°$ **e** $\approx 301.78°$

5 **a**

Degrees	0	45	90	135	180	225	270	315	360
Radians	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	$\frac{5\pi}{4}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	2π

b

Deg.	0	30	60	90	120	150	180	210	240	270	300	330	360
Rad.	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	2π

EXERCISE 8B

1 **a** 7 cm **b** 12 cm **c** ≈ 13.0 m

2 **a** 6 cm^2 **b** 48 cm^2 **c** ≈ 8.21 cm^2

3 **a** arc length ≈ 49.5 cm, area ≈ 223 cm^2
b arc length ≈ 23.0 cm, area ≈ 56.8 cm^2

4 **a** $\approx 0.686^c$ **b** 0.6^c

5 **a** $\theta = 0.75^c$, area $= 24$ cm^2
b $\theta = 1.68^c$, area $= 21$ cm^2
c $\theta \approx 2.32^c$, area $= 126.8$ cm^2

6 **a** ≈ 3.15 m **b** ≈ 9.32 m^2

7 **a** ≈ 5.91 cm **b** ≈ 18.9 cm

8 **a** $\alpha \approx 0.3218^c$ **b** $\theta \approx 2.498^c$ **c** ≈ 387 m^2

9 **a** ≈ 11.7 cm **b** $r \approx 11.7$ **c** ≈ 37.7 cm **d** $\theta \approx 3.23^c$

10 ≈ 25.9 cm **11** **b** ≈ 2 h 24 min **12** ≈ 227 m^2

13 **a** $\alpha \approx 5.739$ **b** $\theta \approx 168.5$ **c** $\phi \approx 191.5$
d ≈ 71.62 cm

14 **a** 4 cm **b** **i** ≈ 2.16 cm^2 **ii** ≈ 29.3 cm^2

15 **a** **Hint:** Let the largest circle have radius r_1, and use a right angled triangle to show that $\sin\frac{\pi}{6} = \frac{r_1}{10 - r_1}$.
b $\frac{25\pi}{2}$ units^2 **c** $\frac{3}{4}$

EXERCISE 8C

1

θ (degrees)	0°	90°	180°	270°	360°	450°
θ (radians)	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π	$\frac{5\pi}{2}$
sine	0	1	0	-1	0	1
cosine	1	0	-1	0	1	0
tangent	0	undef.	0	undef.	0	undef.

2 **a** **i** A$(\cos 26°, \sin 26°)$, B$(\cos 146°, \sin 146°)$, C$(\cos 199°, \sin 199°)$
ii A$(0.899, 0.438)$, B$(-0.829, 0.559)$, C$(-0.946, -0.326)$
b **i** A$(\cos 123°, \sin 123°)$, B$(\cos 251°, \sin 251°)$, C$(\cos(-35°), \sin(-35°))$
ii A$(-0.545, 0.839)$, B$(-0.326, -0.946)$, C$(0.819, -0.574)$