



b 11.2 cm  
c  $57.95^\circ$

7 a 141 m b  $45^\circ$  c  $\div 51.3^\circ$  d  $\div 314$  m

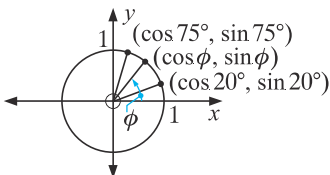
## EXERCISE 11A

1 a 0 b 0.26 c 0.42 d 0.5 e 0.71 f 0.87  
g 0.97 h 1

3 a 1 b 0.97 c 0.91 d 0.87 e 0.71 f 0.5  
g 0.26 h 0

5 (0.57, 0.82) 6

7 a  $\sin \theta = 0.6$   
b  $\cos \theta \div 0.714$



## EXERCISE 11B

1 a 0.98 b 0.98 c 0.87 d 0.87 e 0.5 f 0.5  
g 0 h 0

3 a  $\sin(180 - \theta)^\circ = \sin \theta^\circ$

4 a -0.34 b 0.34 c -0.64 d 0.64 e -0.77  
f 0.77 g -1 h 1

6  $\cos(180 - \theta)^\circ = -\cos \theta^\circ$

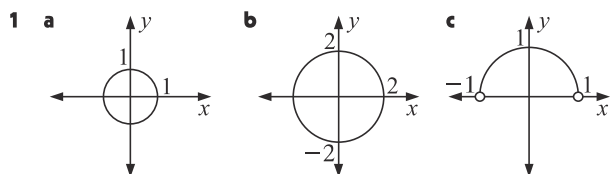
7 a  $135^\circ$  b  $129^\circ$  c  $106^\circ$  d  $98^\circ$

8 a  $50^\circ$  b  $34^\circ$  c  $18^\circ$  d  $9^\circ$

9 a 0.6820 b 0.8572 c -0.7986 d 0.9135  
e 0.9063 f -0.6691

10 a  $(180 - \theta)^\circ$   
b OQ is a reflection of OP in the  $y$ -axis and so Q has coordinates  $(-\cos \theta, \sin \theta)$   
c  $\cos(180 - \theta) = -\cos \theta$  and  $\sin(180 - \theta) = \sin \theta$

## EXERCISE 11C



2 a i A( $\cos 26^\circ, \sin 26^\circ$ ) B( $\cos 146^\circ, \sin 146^\circ$ )  
C( $\cos 199^\circ, \sin 199^\circ$ )

ii A(0.899, 0.438) B(-0.829, 0.559)  
C(-0.946, -0.326)

b i A( $\cos 123^\circ, \sin 123^\circ$ ) B( $\cos 251^\circ, \sin 251^\circ$ )  
C( $\cos(-35^\circ), \sin(-35^\circ)$ )

ii A(-0.545, 0.839) B(-0.326, -0.946)  
C(0.819, -0.574)

3 a  $\cos 0^\circ = 1, \sin 0^\circ = 0$  b  $\cos 90^\circ = 0, \sin 90^\circ = 1$   
c  $\cos 180^\circ = -1, \sin 180^\circ = 0$   
d  $\cos 270^\circ = 0, \sin 270^\circ = -1$   
e  $\cos(-90^\circ) = 0, \sin(-90^\circ) = -1$   
f  $\cos 450^\circ = 0, \sin 450^\circ = 1$

## REVIEW SET 11

1 a  $\sin 70^\circ \div 0.94$  b  $\cos 35^\circ \div 0.82$

2 M( $\cos 73^\circ, \sin 73^\circ$ )  $\div (0.292, 0.956)$   
N( $\cos 190^\circ, \sin 190^\circ$ )  $\div (-0.985, -0.174)$   
P( $\cos 307^\circ, \sin 307^\circ$ )  $\div (0.602, -0.799)$

3  $\theta \div 102.8^\circ$  4 a  $60^\circ$  b  $15^\circ$  c  $85^\circ$

5 a  $133^\circ$  b  $172^\circ$  c  $94^\circ$

6 a 0.358 b -0.035 c 0.259 d -0.731 e 0.766

7 a -0.5, -0.866 b -0.5, 0.866 c -0.5, -0.866

8 a 1, 0 b -1, 0 c 0, -1

9 a  $79^\circ$  b  $53^\circ$  c  $12^\circ$  10 a  $84^\circ$  c  $62^\circ$  c  $3^\circ$

11 a 0.961 b -0.961 c -0.961 d -0.961

12 a -0.743 b -0.743 c 0.743 d -0.743

## EXERCISE 12A

1 a  $28.9 \text{ cm}^2$  b  $384 \text{ km}^2$  c  $26.7 \text{ cm}^2$  2  $x = 19.0$

3  $18.9 \text{ cm}^2$  4  $137 \text{ cm}^2$  5  $374 \text{ cm}^2$  6  $7.49 \text{ cm}$

7  $11.9 \text{ m}$  8 a  $48.6^\circ$  or  $131.4^\circ$  b  $42.1^\circ$  or  $137.9^\circ$

9  $\frac{1}{4}$  is not covered

10 a i and ii  $6 \text{ cm}^2$  b i  $\div 21.3 \text{ cm}^2$  ii  $30.7 \text{ cm}^2$

## EXERCISE 12B

1 a i  $6.535 \text{ cm}$  ii  $29.4 \text{ cm}^2$  b i  $10.5 \text{ cm}$  ii  $25.9 \text{ cm}^2$

2 a  $3.14 \text{ cm}$  b  $9.305 \text{ cm}^2$

3 a  $5.91 \text{ cm}$  b  $18.9 \text{ cm}$  4 a  $39.3^\circ$  b  $34.4^\circ$

5 a  $11.7 \text{ cm}$  b  $11.7$  c  $37.7 \text{ cm}$  d  $185^\circ$  6 b  $2 \text{ h } 24 \text{ min}$

7 a  $67.7 \text{ cm}^2$  b  $138 \text{ cm}^2$  c  $70.6 \text{ cm}^2$

8 a  $\alpha = 18.43$  b  $\theta = 143.1$  c  $387.3 \text{ m}^2$  9  $227 \text{ m}^2$

10 a  $\alpha = 5.739$  b  $\theta = 168.5$  c  $\phi = 191.5$  d  $71.62 \text{ cm}$

## EXERCISE 12C

1 a  $28.8 \text{ cm}$  b  $3.38 \text{ km}$  c  $14.2 \text{ m}$

2  $\angle A = 52.0^\circ, \angle B = 59.3^\circ, \angle C = 68.7^\circ$  3  $112^\circ$

4 a  $40.3^\circ$  b  $107^\circ$  5 a  $\cos \theta = 0.65$  b  $x = 3.81$

## EXERCISE 12D.1

1 a  $x = 28.4$  b  $x = 13.4$  c  $x = 3.79$

2 a  $a = 21.25$  b  $b = 76.9$  c  $c = 5.095$

## EXERCISE 12D.2

1  $\angle C = 62.1^\circ$  or  $\angle C = 117.9^\circ$

2 a  $\angle A = 49.5^\circ$  b  $\angle B = 72.05^\circ$  or  $107.95^\circ$  c  $\angle C = 44.3^\circ$

3 No,  $\frac{\sin 85^\circ}{11.4} \neq \frac{\sin 27^\circ}{9.8}$

4  $\angle ABC = 66^\circ$  BD = 4.55 cm 5  $x = 17.7$   $y = 33.1$

## EXERCISE 12E

1  $17.7 \text{ m}$  2  $207 \text{ m}$  3  $23.9^\circ$  4  $77.5 \text{ m}$

5  $13.2^\circ$  6  $69.1 \text{ m}$  7 a  $38.0 \text{ m}$  b  $94.0$

8  $55.1^\circ$  9 AC = 11.7 km BC = 8.49 km

10 a  $74.9 \text{ km}^2$  b 7490 hectares 11  $9.12 \text{ km}$

12  $\div 85 \text{ mm}$  13  $10.1 \text{ km}$  14  $29.2 \text{ m}$

## REVIEW SET 12A

1  $21.1 \text{ km}^2$  2 a  $118 \text{ cm}^2$  b  $44.9 \text{ cm}^2$

3 perimeter = 34.1 cm, area =  $66.5 \text{ cm}^2$

4 radius = 8.79 cm, area =  $81.0 \text{ cm}^2$

5  $x = 67.4$  or  $112.6$

6  $x = 47.5, AC = 14.3 \text{ cm}$  or  $x = 132.5, AC = 28.1 \text{ cm}$

7  $36.8 \text{ cm}^2$  8 a  $10600 \text{ m}^2$  b  $1.06 \text{ ha}$  9  $26.6 \text{ m}^2$

## REVIEW SET 12B

1 a  $x = 34.1$  b  $x = 18.9$  2 a  $x = 41.5$  b  $x = 15.4$

3 AC = 12.55 cm,  $\angle A = 48.6^\circ, \angle C = 57.4^\circ$

4  $113 \text{ cm}^2$  5  $7.32 \text{ m}$  6  $204 \text{ m}$