3 **a** $T_{r+1} = \binom{7}{r} x^{7-r} a^r$ **b** $a = -2$

4 **a** $\binom{10}{5} 3^5 2^5$ **b** $\binom{6}{3} 2^3 (-3)^3$ **c** $\binom{6}{3} 2^3 (-3)^3$
d $\binom{12}{4} 2^8 (-1)^4$

5 **a** $\binom{15}{5} 2^5$ **b** $\binom{9}{3} (-3)^3$

6 **a**
$$\begin{array}{ccccccccccc} & & & & 1 & & 1 & & & & \\ & & & 1 & & 2 & & 1 & & & \\ & & 1 & & 3 & & 3 & & 1 & & \\ & 1 & & 4 & & 6 & & 4 & & 1 & \\ 1 & & 5 & & 10 & & 10 & & 5 & & 1 \\ 1 & & 6 & & 15 & & 20 & & 15 & & 6 & & 1 \end{array}$$
b **i** 2 **ii** 4 **iii** 8 **iv** 16 **v** 32

c The sum of the numbers in row n of Pascal's triangle is 2^n.
d Let $x = 1$, in the expansion of $(1 + x)^n$.

7 **a** $\binom{8}{6} = 28$ **b** $2\binom{9}{3} 3^6 x^6 - \binom{9}{4} 3^5 x^6 = 91\,854x^6$

8 $T_3 = \binom{6}{2} (-2)^2 x^8 y^8$

9 **a** $84x^3$ **b** $n = 6$ and $k = -2$ **10** $a = 2$

REVIEW SET 7A

1 15

2 **a** $x^3 - 6x^2y + 12xy^2 - 8y^3$
b $81x^4 + 216x^3 + 216x^2 + 96x + 16$

3 60

4 $(a+b)^6 = a^6 + 6a^5b + 15a^4b^2 + 20a^3b^3 + 15a^2b^4 + 6ab^5 + b^6$
a $x^6 - 18x^5 + 135x^4 - 540x^3 + 1215x^2 - 1458x + 729$
b $1 + \frac{6}{x} + \frac{15}{x^2} + \frac{20}{x^3} + \frac{15}{x^4} + \frac{6}{x^5} + \frac{1}{x^6}$

5 $362 + 209\sqrt{3}$ **6** **a** 7 **b** $\binom{6}{4} \times 3^2 = 135$

7 **a** $a = e^x$ and $b = -e^{-x}$
b $(a+b)^4 = e^{4x} - 4e^{2x} + 6 - 4e^{-2x} + e^{-4x}$

REVIEW SET 7B

1 2500 **2** 64.964 808 **3** $\binom{12}{6} \times 2^6 \times (-3)^6$

4 $8\binom{6}{2} x^5 - 6\binom{6}{1} x^5 = 84x^5$ **5** $k = 180$ **6** $c = 3$

7 **a** $2^n + \binom{n}{1} 2^{n-1}x^1 + \binom{n}{2} 2^{n-2}x^2 + \binom{n}{3} 2^{n-3}x^3 + \ldots$
$\ldots + \binom{n}{n-1} 2^1 x^{n-1} + x^n$
b 3^n **Hint:** Let $x = 1$ in **a**.

EXERCISE 8A

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

2 **a** 0.641^c **b** 2.39^c **c** 5.55^c **d** 3.83^c **e** 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** 114.59° **b** 87.66° **c** 49.68° **d** 182.14°
e 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** **i** 49.5 cm **ii** 223 cm^2 **b** **i** 23.0 cm **ii** 56.8 cm^2

2 **a** 3.14 m **b** 9.30 m^2 **3** **a** 5.91 cm **b** 18.9 cm

4 **a** 0.686^c **b** 0.6^c

5 **a** 0.75^c, 24 cm^2 **b** 1.68^c, 21 cm^2 **c** 2.32^c, 126.8 cm^2

6 10 cm, 25 cm^2

8 **a** 11.7 cm **b** 11.7 **c** 37.7 cm **d** 3.23^c

9 **a** $\alpha \approx 18.43$ **b** $\theta \approx 143.1$ **c** 387 m^2

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

EXERCISE 8C

1 **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$(0.819, -0.574)$

2

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

3 **a** **i** $\frac{1}{\sqrt{2}} \approx 0.707$ **ii** $\frac{\sqrt{3}}{2} \approx 0.866$

b

θ (degrees)	30°	45°	60°	135°	150°	240°	315°
θ (radians)	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	$\frac{4\pi}{3}$	$\frac{7\pi}{4}$
sine	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{\sqrt{2}}$
cosine	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	$-\frac{1}{\sqrt{2}}$	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	$\frac{1}{\sqrt{2}}$
tangent	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	-1	$-\frac{1}{\sqrt{3}}$	$\sqrt{3}$	-1

4 **a** **i** 0.985 **ii** 0.985 **iii** 0.866 **iv** 0.866
v 0.5 **vi** 0.5 **vii** 0.707 **viii** 0.707
b $\sin(180° - \theta) = \sin\theta$ as the points have the same y-coordinate
d **i** 135° **ii** 129° **iii** $\frac{2\pi}{3}$ **iv** $\frac{5\pi}{6}$

5 **a** **i** 0.342 **ii** -0.342 **iii** 0.5 **iv** -0.5
v 0.906 **vi** -0.906 **vii** 0.174 **viii** -0.174
b $\cos(180° - \theta) = -\cos\theta$
d **i** 140° **ii** 161° **iii** $\frac{4\pi}{5}$ **iv** $\frac{3\pi}{5}$

6 **a** ≈ 0.6820 **b** ≈ 0.8572 **c** ≈ -0.7986
d ≈ 0.9135 **e** ≈ 0.9063 **f** ≈ -0.6691

7 **a**

Quadrant	*Degree measure*	*Radian measure*	$\cos\theta$	$\sin\theta$	$\tan\theta$
1	$0° < \theta < 90°$	$0 < \theta < \frac{\pi}{2}$	+ve	+ve	+ve
2	$90° < \theta < 180°$	$\frac{\pi}{2} < \theta < \pi$	−ve	+ve	−ve
3	$180° < \theta < 270°$	$\pi < \theta < \frac{3\pi}{2}$	−ve	−ve	+ve
4	$270° < \theta < 360°$	$\frac{3\pi}{2} < \theta < 2\pi$	+ve	−ve	−ve