5 **a**

							b sum
				1	1		2
			1	2	1		4
		1	3	3	1		8
	1	4	6	4	1		16
1	5	10	10	5	1		32

c It seems that the sum of the numbers in row n of Pascal's triangle is 2^n.

d After the first part let $x = 1$.

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

7 **b** $84x^3$ **c** $n = 6$ and $k = -2$

REVIEW SET 9

1 $(a+b)^6 = a^6+6a^5b+15a^4b^2+20a^3b^3+15a^2b^4+6ab^5+b^6$

a $x^6 - 18x^5 + 135x^4 - 540x^3 + 1215x^2 - 1458x + 729$

b $1 + \frac{6}{x} + \frac{15}{x^2} + \frac{20}{x^3} + \frac{15}{x^4} + \frac{6}{x^5} + \frac{1}{x^6}$

2 $\binom{6}{3}5^3 2^3 = 20\,000$ **3** $362 + 209\sqrt{3}$

4 64.964 808 **5** It does not have one.

6 $243a^{10} - \frac{810a^8}{b} + \frac{1080a^6}{b^2} - \frac{720a^4}{b^3} + \frac{240a^2}{b^4} - \frac{32}{b^5}$

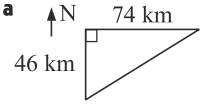
7 $\binom{12}{6}2^6(-3)^6$ **8** $\binom{15}{5}5^5$ **9** $8\binom{6}{2} - 6\binom{6}{1} = 84$

EXERCISE 10A

1 **a** $x = 0.663$ **b** $x = 4.34$ **c** $x = 2.23$

2 **a** 4.54 m **b** 4.17 m **3** 237 m

4 **a**



b 87.1 km

EXERCISE 10B

1 50.3 m **2** 17.3 cm **3** 8.60 m **4** 53.4 m

5 **a** both are 90^o **b** $a^2 + b^2$

EXERCISE 10C

1 **a** 3, $\sin\theta = \frac{3}{5}$, $\cos\theta = \frac{4}{5}$, $\tan\theta = \frac{3}{4}$

b 12, $\sin\theta = \frac{5}{13}$, $\cos\theta = \frac{12}{13}$, $\tan\theta = \frac{5}{12}$

c $\sqrt{11}$, $\sin\theta = \frac{5}{6}$, $\cos\theta = \frac{\sqrt{11}}{6}$, $\tan\theta = \frac{5}{\sqrt{11}}$

d $\sqrt{5}$, $\sin\theta = \frac{2}{\sqrt{5}}$, $\cos\theta = \frac{1}{\sqrt{5}}$, $\tan\theta = 2$

e $\sqrt{52}$, $\sin\theta = \frac{4}{\sqrt{52}}$, $\cos\theta = \frac{6}{\sqrt{52}}$, $\tan\theta = \frac{2}{3}$

f $\sqrt{15}$, $\sin\theta = \frac{7}{8}$, $\cos\theta = \frac{\sqrt{15}}{8}$, $\tan\theta = \frac{7}{\sqrt{15}}$

2 **a** $\sin\theta = \frac{\sqrt{3}}{2}$, $\tan\theta = \sqrt{3}$ **b** $\cos\alpha = \frac{\sqrt{5}}{3}$, $\tan\alpha = \frac{2}{\sqrt{5}}$

c $\sin\beta = \frac{4}{5}$, $\cos\beta = \frac{3}{5}$

3 **a** $\sin\theta = \frac{b}{c}$, $\cos\theta = \frac{a}{c}$, $\tan\theta = \frac{b}{a}$

4 **a** **i** $\frac{a}{b}$ **ii** $\frac{c}{b}$ **iii** $\frac{c}{b}$ **iv** $\frac{a}{b}$ **b** **i** complement **ii** complement

5 **a** $\sqrt{2}$ **b** $\sin 45^o = \frac{1}{\sqrt{2}}$, $\cos 45^o = \frac{1}{\sqrt{2}}$, $\tan 45^o = 1$

6 **a** $\angle ABN = 60^o$, $\angle BAN = 30^o$ **b** BN = 1, AN = $\sqrt{3}$

c **i** $\sin 60^o = \frac{\sqrt{3}}{2}$, $\cos 60^o = \frac{1}{2}$, $\tan 60^o = \sqrt{3}$

ii $\sin 30^o = \frac{1}{2}$, $\cos 30^o = \frac{\sqrt{3}}{2}$, $\tan 30^o = \frac{1}{\sqrt{3}}$

EXERCISE 10D

1 **a** $x = 17.2$ **b** $x = 257$ **c** $x = 15.1$

d $x = 7.10$ **e** $x = 554$ **f** $x = 457$

2 **a** $\theta = 69.5$ **b** $\theta = 76.2$ **c** $\theta = 60.0$ **d** $\theta = 73.4$

e $\theta = 19.5$ **f** $\theta = 77.9$ **g** $\theta = 9.06$ **h** $\theta = 34.7$

3 **a** $\theta = 56.4$ **b** $\alpha = 4.8$ **c** $\beta = 48.2$

4 **a** AC = 6.40 m, $\angle A = 38.7^o$, $\angle C = 51.3^o$

b $\angle R = 39^o$, PQ = 8.10 m, PR = 12.9 m

5 **a** $x = 2.65$, $\theta = 37.1$

b $x = 6.16$, $\theta = 50.3$, $y = 13.0$

6 **a** $x = 4.13$ **b** $\alpha = 75.5$ **c** $\beta = 41.0$

7 **a** $\theta = 36.9$ **b** $r = 11.3$ **c** $\alpha = 61.9$

8 7.99 cm **9** 89.2^o **10** 47.2^o **11** 22.4^o

12 11.8 cm **13** 119.5^o **14** 36.5 cm

15 **a** $x = 3.44$ **b** $\alpha = 51.5$ **16** 129.5^o

EXERCISE 10E

1 18.3 m **2** **a** 371 m **b** 1.62 km

3 159 m **4** 1.575^o

5 angle of elevn. = 26.4^o, angle of depn. = 26.4^o

6 418.5 m **7** 111 m **8** 72.0 m **9** 9.91 m

10 **a** 16.2 m/s **b** 11.5^o **11** $\theta = 12.6$ **12** 9.56 m

13 77.7 litres **14** 2.22 m **15** 10.95 m **16** 786 m

17 962 m **18** 2.10 km **19** 3.17 km **20** 33.8 m

EXERCISE 10F

1 **a** $\div 18.4^o$ **b** $\div 26.6^o$ **c** $\div 116.6^o$ **d** 135^o

2 **a** $\tan 60^o = \sqrt{3}$ **b** $\tan 165^o \div -0.268$

3 **a** $y = \sqrt{3}x + 2$ **b** $y = -\sqrt{3}x$ **c** $y = \frac{1}{\sqrt{3}}x - 2$

REVIEW SET 10A

1 $\frac{7}{11}$ **2** $\sin\theta = \frac{7}{\sqrt{74}}$ $\cos\theta = \frac{5}{\sqrt{74}}$ **3** $\frac{3}{\sqrt{55}}$

4 unknown side = $\sqrt{45} \div 6.71$, $\sin\theta = \frac{\sqrt{45}}{9}$, $\cos\theta = \frac{2}{3}$, $\tan\theta = \frac{\sqrt{45}}{6}$

5 unknown side = $\sqrt{48} \div 6.93$ cm, $\sin\theta = \frac{\sqrt{48}}{13}$, $\cos\theta = \frac{11}{13}$, $\tan\theta = \frac{\sqrt{48}}{11}$

6 **a** 36.7 cm **b** 60.6^o **7** **a** 6.025 m **b** 6.13^o

8 $\angle K = 66^o$, KL = 6.91 cm, LM = 15.5 cm

9 $\angle R = 52^o$, PQ = 8.96 cm, PR = 11.4 cm **10** 7.28 m

REVIEW SET 10B

1 15.75 km on a bearing of 147^o **2** 22.3^o

3 369 kmph **4** **a** $\theta = 54.6$ **b** $\theta = 84.7$ **c** $\theta = 79.2$

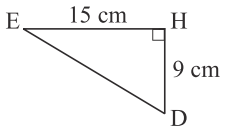
5 **a** $\theta = 41.55$ **b** $\theta = 44.4$ **c** $\theta = 36.7$ **6** 6.2 cm

7 25.2^o **8** **a** 5 cm **b** 36.9^o **9** 9.78 cm **10** 70.9 m

REVIEW SET 10C

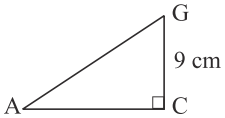
1 **a** 3.61 m **b** 33.7^o **2** $\div 121^o$ **3** $y = \frac{1}{\sqrt{3}}x - 3$

4 **a**



b 59.0^o

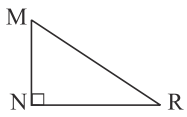
c



d 68.35^o

5 **a** 50.2^o **b** 22.6^o

6 **a**



b 11.2 cm
c 57.95°

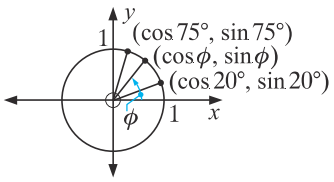
7 **a** 141 m **b** 45° **8** ≒ 51.3° **10** ≒ 314 m

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** $\sin(180 - \theta)^o = \sin\theta^o$

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

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

7 **a** 135° **b** 129° **c** 106° **d** 98°

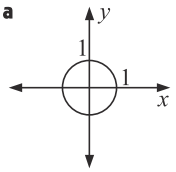
8 **a** 50° **b** 34° **c** 18° **d** 9°

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

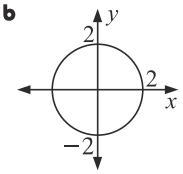
10 **a** $(180 - \theta)^o$
b OQ is a reflection of OP in the y-axis and so Q has coordinates $(-\cos\theta, \sin\theta)$
c $\cos(180 - \theta) = -\cos\theta$ and $\sin(180 - \theta) = \sin\theta$

EXERCISE 11C

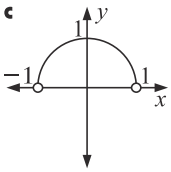
1 **a**



b



c



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)

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

REVIEW SET 11

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

2 M(cos 73°, sin 73°) ≒ (0.292, 0.956)
N(cos 190°, sin 190°) ≒ (−0.985, −0.174)
P(cos 307°, sin 307°) ≒ (0.602, −0.799)

3 $\theta \div 102.8^o$ **4** **a** 60° **b** 15° **c** 85°

5 **a** 133° **b** 172° **c** 94°

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° **b** 53° **c** 12° **10** **a** 84° **c** 62° **c** 3°

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 cm² **b** 384 km² **c** 26.7 cm² **2** $x = 19.0$

3 18.9 cm² **4** 137 cm² **5** 374 cm² **6** 7.49 cm

7 11.9 m **8** **a** 48.6° or 131.4° **b** 42.1° or 137.9°

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

10 **a** **i** and **ii** 6 cm² **b** **i** ≒ 21.3 cm² **ii** 30.7 cm²

EXERCISE 12B

1 **a** **i** 6.535 cm **ii** 29.4 cm² **b** **i** 10.5 cm **ii** 25.9 cm²

2 **a** 3.14 cm **b** 9.305 cm²

3 **a** 5.91 cm **b** 18.9 cm **4** **a** 39.3° **b** 34.4°

5 **a** 11.7 cm **b** 11.7 **c** 37.7 cm **d** 185° **6** **b** 2 h 24 min

7 **a** 67.7 cm² **b** 138 cm² **c** 70.6 cm²

8 **a** $\alpha = 18.43$ **b** $\theta = 143.1$ **c** 387.3 m² **9** 227 m²

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

EXERCISE 12C

1 **a** 28.8 cm **b** 3.38 km **c** 14.2 m

2 $\angle A = 52.0^o$, $\angle B = 59.3^o$, $\angle C = 68.7^o$ **3** 112°

4 **a** 40.3° **b** 107° **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 $\angle C = 62.1^o$ or $\angle C = 117.9^o$

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

3 No, $\dfrac{\sin 85^o}{11.4} \neq \dfrac{\sin 27^o}{9.8}$

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

EXERCISE 12E

1 17.7 m **2** 207 m **3** 23.9° **4** 77.5 m

5 13.2° **6** 69.1 m **7** **a** 38.0 m **b** 94.0

8 55.1° **9** AC = 11.7 km BC = 8.49 km

10 **a** 74.9 km² **b** 7490 hectares **11** 9.12 km

12 ≒ 85 mm **13** 10.1 km **14** 29.2 m

REVIEW SET 12A

1 21.1 km² **2** **a** 118 cm² **b** 44.9 cm²

3 perimeter = 34.1 cm, area = 66.5 cm²

4 radius = 8.79 cm, area = 81.0 cm²

5 $x = 67.4$ or 112.6

6 $x = 47.5$, AC = 14.3 cm **or** $x = 132.5$, AC = 28.1 cm

7 36.8 cm² **8** **a** 10 600 m² **b** 1.06 ha **9** 26.6 m²

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, $\angle A = 48.6^o$, $\angle C = 57.4^o$

4 113 cm² **5** 7.32 m **6** 204 m