

Answers

1A OPERATIONS WITH NEGATIVE NUMBERS

- 1 a 3 b 3 c 13 d -3 e -2 f -2
g 24 h 2
- 2 a -5 b 10
- 3 a 16 b -16 c 16 d -72 e 24 f -27
- 4 a 7 b -7 c -7 d -9 e -4 f 5
- 5 a $\square = -6$ b $\square = -3$ c $\square = -3$
d $\square = -24$ e $\square = -8$ f $\square = -3$

1B INDEX NOTATION

- 1 a 32 b 75 c 72 d 63
- 2 a $2 \times 3 \times 5^2$ b $2^2 \times 3^3$ c $3^3 \times 5 \times 7^2$
- 3 a -36 b 36 c -1 d 1 e -27 f -64
- 4 a -144 b 6125 5 a 3^3 b 3^4 c 3^6

1C FACTORS

- 1 a yes b no c no
- 2 a 1, 2, 7, 14 b 1, 2, 3, 5, 6, 10, 15, 30
c 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96
- 3 a 1 and 56, 2 and 28, 4 and 14, 7 and 8
b 1 and 144, 2 and 72, 3 and 48, 4 and 36, 6 and 24, 8 and 18, 9 and 16, 12 and 12
- 4 2×20 , 4×10 , 5×8 , $2 \times 2 \times 10$, $2 \times 4 \times 5$, $2 \times 2 \times 2 \times 5$

1D PRIME AND COMPOSITE NUMBERS

- 1 41 and 43 2 36 3 a 3^2 b 2^5 c 2^7
- 4 a $88 = 2^3 \times 11$ b $175 = 5^2 \times 7$ c $688 = 2^4 \times 43$
d $918 = 2 \times 3^3 \times 17$

1E HIGHEST COMMON FACTOR

- 1 a 6 b 8 c 21 2 6 cm \times 6 cm
- 3 a 7 b 18 4 a 24 b 90
- 5 a 28 boxes
b 5 chocolate chip biscuits, 6 ginger snap biscuits, and 8 Anzac biscuits

1F MULTIPLES

- 1 a 6, 12, 18, 24, 30, 36 b 13, 26, 39, 52, 65, 78
- 2 a 301 b 496 3 42 and 63
- 4 a 18 b 30 c 36
- 5 a 30 b 210 c 360 6 60 days 7 5040 cm

1G ORDER OF OPERATIONS

- 1 a 11 b 10 c 12 d 31 e 8 f -1
g 16 h -1 i 2 j 21 k -27 l -2

- 2 a $5 \times 8 - 7 = 33$ b $4 - 8 + 6 = 2$
c $6 - 10 + 5 \div 5 = -3$
- 3 a 2 b -2 c -12 d 1 e -4 f 72
g -2 h 5 i -48
- 4 a 231 b -27 c 4 d 85
- 5 a $20 \div (2 + 3) = 4$ b $3 \times 8 \div (4 - 2) = 12$
c $8 - (6 \div 2 + 1) = 4$

1H PROBLEM SOLVING

- 1 a $42 - 90 \div 6$ b 27 km
- 2 a $(0.6 + 0.65 + 0.75) \times 4$ b \$8
- 3 a $(600 + 500 + 750 + 550) \div 12$ b 200 mL
- 4 a 3×2^3 b 24 m^2

REVIEW OF CHAPTER 1

- 1 a 14 b -5 c -8 d 40
- 2 a 36 b 600 c -112
- 3 a 1, 3, 9, 27 b 1, 2, 3, 4, 6, 8, 12, 16, 24, 48
- 4 a composite b prime c composite
- 5 a $84 = 2^2 \times 3 \times 7$ b $270 = 2 \times 3^3 \times 5$
- 6 a 2 b 80 7 a 3 b 3 c -3
- 8 $2 \times 7 - 4 \times 2 = 6$
- 9 a $(2 + 3) \times (4 - 1) = 15$ b $36 \div (2 + 4 \times 4) = 2$
- 10 10:24 am

2A SETS

- 1 a {2, 4, 6, 8, 10, 12} b {B, A, L, O, N} c {2, 3, 5}
d {b, c, d, f, g, h, j, k, l, m, n, p, q, r, s, t, v, w, x, y, z}
- 2 a i $n(P) = 6$ ii $n(Q) = 5$
b i true ii false iii true iv false
- 3 a i $A = \{1, 3, 5, 7, 9, 11, 13, 15, 17, 19\}$
ii $B = \{2, 3, 5, 7, 11, 13, 17, 19\}$
iii $C = \{1, 2, 4, 5, 10, 20\}$
b i $n(A) = 10$ ii $n(B) = 8$ iii $n(C) = 6$
c i false ii false
- 4 a $S = \{1, 13\}$, $n(S) = 2$ b $S = \{1, 8, 27, 64\}$, $n(S) = 4$
- 5 { }, {apple}, {banana}, {cherry}, {apple, banana},
{apple, cherry}, {banana, cherry}, {apple, banana, cherry}
- 6 $x = 9$

2B COMPLEMENT OF A SET

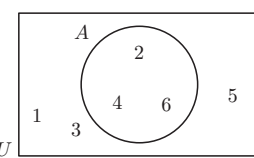
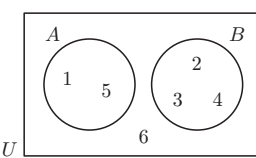
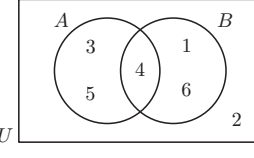
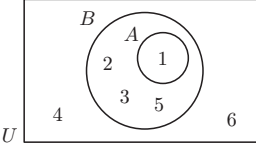
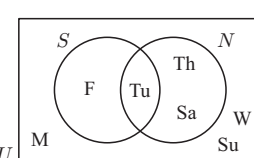
- 1 a $A' = \{1, 2, 4, 5, 7, 8\}$ b $B' = \{2, 4, 5, 7, 8\}$ c $C' = \{5\}$
- 2 a $B = \{2, 4, 6, 8, 10, 12, 14\}$ b $C = \{1, 3, 5, 15\}$
c $B' = \{1, 3, 5, 7, 9, 11, 13, 15\}$
d $C' = \{2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14\}$
- 3 a $X = \{S, E, C, O, N, D, A, R, Y\}$
b $X' = \{B, F, G, H, I, J, K, L, M, P, Q, T, U, V, W, X, Z\}$
- 4 a i $B = \{\text{volleyball, softball, cricket, rugby, soccer}\}$
ii $B' = \{\text{swimming, athletics, archery}\}$
b B' represents the sports which are not played with a ball.

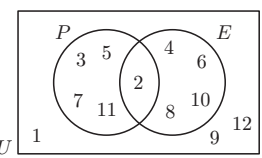
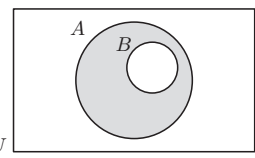
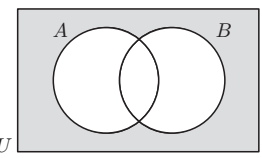
5 No, as 0 is in U but not in either P or N .

2C INTERSECTION AND UNION

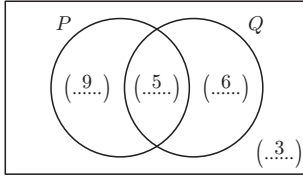
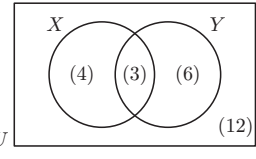
- 1 a $S \cup T = \{6, 7, 8, 9, 10, 12\}$ b $S \cap T = \{6, 8\}$
 2 a $A \cap B = \{\text{Kings, Taipans}\}$
 $A \cup B = \{\text{Tigers, Blaze, Kings, Wildcats, Taipans, Sixers, Breakers}\}$
 b $A \cap B = \{3, 5, 7\}$
 $A \cup B = \{1, 2, 3, 5, 7, 9, 11\}$
 c $A \cap B = \{j, p, w\}$
 $A \cup B = \{c, e, j, k, l, n, p, t, w\}$
 3 Yes, P and Q are disjoint as they have no elements in common.
 4 a $C = \{4, 6, 8, 9, 10, 12, 14, 15, 16, 18\}$
 $S = \{1, 4, 9, 16\}$
 b i $C \cap S = \{4, 9, 16\}$
 ii $C \cup S = \{1, 4, 6, 8, 9, 10, 12, 14, 15, 16, 18\}$
 iii $n(C \cap S) = 3$ iv $n(C \cup S) = 11$
 5 a $A = \{\text{English, Geography, History, Mathematics, Science}\}$
 $C = \{\text{Art, English, History, Mathematics, Music}\}$
 b $A \cap C = \{\text{English, History, Mathematics}\}$
 This set represents the subjects which Amanda and Casey are both studying.
 c $A \cup C = \{\text{Art, English, Geography, History, Mathematics, Music, Science}\}$
 This set represents the subjects which either Amanda or Casey (or both) are studying.
 d 7 different subjects

2D VENN DIAGRAMS

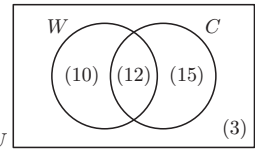
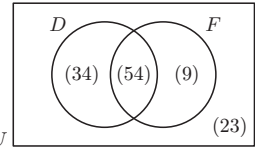
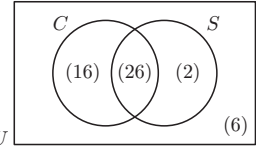
- 1 a $A = \{4, 5, 6, 7, 8\}$ b $B = \{5\}$
 c $A \cup B = \{4, 5, 6, 7, 8\}$ d $A \cap B = \{5\}$
 e $A' = \{3, 9\}$ f $B' = \{3, 4, 6, 7, 8, 9\}$
 g $U = \{3, 4, 5, 6, 7, 8, 9\}$
 2 a  b 
 c  d 
 3 a $S = \{\text{Tuesday, Friday}\}$
 $N = \{\text{Tuesday, Thursday, Saturday}\}$
 b 
 c $S \cup N = \{\text{Tuesday, Thursday, Friday, Saturday}\}$
 This set represents the days on which Nhi has singing lessons, netball training, or both.
 d Sunday, Monday, Wednesday, and Friday

- 4 a $P = \{2, 3, 5, 7, 11\}$
 $E = \{2, 4, 6, 8, 10\}$
 b 
 c i $P \cap E = \{2\}$
 ii $(P \cap E)' = \{1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$
 5 a  b 
 6 a not in Y b in X or Y but not in both

2E NUMBERS IN REGIONS

- 1 a 8 elements b 5 elements c 11 elements
 d 2 elements e 3 elements f 15 elements
 2 
 3 a  b i 18 elements
 ii 13 elements

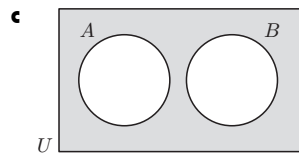
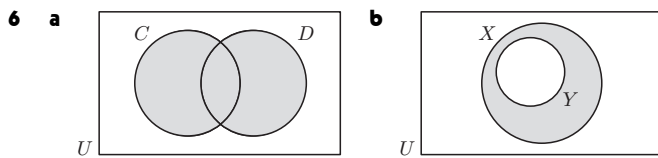
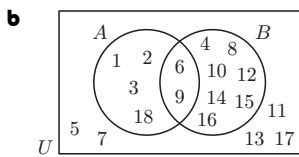
2F PROBLEM SOLVING WITH VENN DIAGRAMS

- 1 a  b i 10 customers
 ii 15 customers
 iii 25 customers
 iv 3 customers
 2 a 
 b i 23 trees
 ii 9 trees
 iii 34 trees
 iv 97 trees
 3 a  b i 6 cars
 ii 16 cars
 iii 2 cars

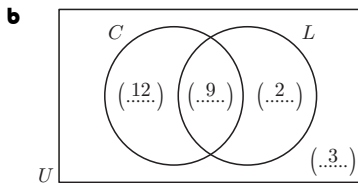
REVIEW OF CHAPTER 2

- 1 a $A = \{1, 2, 3, 4, 6, 8, 12, 16, 24, 48\}$
 $B = \{5, 10, 15, 20, 25, 30, 35, 40, 45\}$
 b i $n(A) = 10$ ii $n(B) = 9$
 c i false ii true iii false iv true
 2 a A' represents the days of the week which do not contain the letter S.
 b $A' = \{\text{Monday, Friday}\}$ c $n(A') = 2$
 3 a yes b no

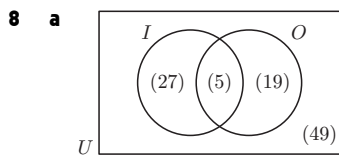
- 4 { }, {1}, {4}, {9}, {1, 4}, {1, 9}, {4, 9}, {1, 4, 9}
- 5 a i $A = \{1, 2, 3, 6, 9, 18\}$
 ii $B = \{4, 6, 8, 9, 10, 12, 14, 15, 16\}$
 iii $A \cup B = \{1, 2, 3, 4, 6, 8, 9, 10, 12, 14, 15, 16, 18\}$
 iv $A \cap B = \{6, 9\}$



- 7 a i $C = \{B, C, D, F, G, H, J, K, L, M, N, P, Q, R, S, T, V, W, X, Y, Z\}$
 ii $L = \{B, C, D, G, J, O, P, Q, R, S, U\}$
 iii $C \cap L = \{B, C, D, G, J, P, Q, R, S\}$



- c i 3 letters
 ii $(C \cup L)'$ represents the uppercase letters in the English alphabet which are neither consonants nor have any curved edges.



- b i 68 personnel ii 27 personnel iii 49 personnel

3A FRACTIONS

- 1 a mixed number b improper fraction c proper fraction
- 2 a $\frac{9}{2}$ b $\frac{9}{7}$ c $-\frac{17}{6}$
- 3 a $9 \div 3 = 3$ b $24 \div 6 = 4$ c $52 \div 4 = 13$
 d $-35 \div 7 = -5$ e $-12 \div -2 = 6$ f $24 \div -8 = -3$
- 4 a $3\frac{4}{5}$ b $4\frac{6}{7}$ c $-9\frac{1}{9}$
- 5
-
- 6 a
-
- b $1\frac{3}{5}, \frac{2}{5}, -\frac{1}{5}, -\frac{6}{5}, -2\frac{1}{5}$
- 7 a 4 b 3 c -1 8 a -2 b 4 c 33

3B EQUAL FRACTIONS

- 1 a $\frac{10}{12}$ b $\frac{9}{12}$ c $\frac{8}{12}$
- 2 a $\frac{6}{18}, \frac{10}{18}, \frac{9}{18}$ b $\frac{1}{3}, \frac{1}{2}, \frac{5}{9}$
- 3 a $\frac{1}{4}$ b $-\frac{7}{10}$ c $\frac{2}{3}$ d $-\frac{3}{7}$ e $\frac{7}{9}$ f $-\frac{1}{7}$
- 4 a $-\frac{1}{2}$ b $-\frac{3}{10}$ c $-\frac{7}{6}$
- 5 a 4 students b i $\frac{1}{6}$ ii $\frac{5}{6}$

3C ADDING AND SUBTRACTING FRACTIONS

- 1 a $\frac{3}{10}$ b $\frac{7}{8}$ c $-\frac{1}{18}$ d $\frac{13}{45}$
- 2 a $\frac{1}{18}$ b $-\frac{5}{12}$
- 3 a $\frac{13}{3}$ or $4\frac{1}{3}$ b $\frac{13}{6}$ or $2\frac{1}{6}$ c $\frac{41}{14}$ or $2\frac{13}{14}$ d $\frac{47}{12}$ or $3\frac{11}{12}$
- 4 a $\frac{7}{8}$ b $\frac{1}{8}$ 5 a $-\frac{51}{182}$ b $\frac{358}{119}$ or $3\frac{1}{119}$

3D MULTIPLYING FRACTIONS

- 1 a 8 b $\frac{12}{7}$ or $1\frac{5}{7}$ c $\frac{20}{3}$ or $6\frac{2}{3}$
- 2 a 8 b \$16 c 24 kg 3 \$32
- 4 a $\frac{6}{55}$ b $\frac{15}{32}$ c $\frac{81}{100}$ d $\frac{85}{8}$ or $10\frac{5}{8}$ e $\frac{5}{18}$ f $\frac{2}{9}$
- 5 a $-\frac{2}{9}$ b $-\frac{21}{20}$ or $-1\frac{1}{20}$ c $-\frac{216}{343}$
- 6 a $\frac{10}{33}$ b $\frac{14}{33}$ 7 a $\frac{81}{625}$ b $\frac{75}{481}$

3E DIVIDING FRACTIONS

- 1 a $\frac{15}{28}$ b $\frac{2}{21}$ c $\frac{39}{8}$ or $4\frac{7}{8}$ d $\frac{9}{13}$ e $-\frac{18}{25}$ f $-\frac{2}{9}$
- 2 80 packets 3 a $\frac{93}{2}$ or $46\frac{1}{2}$ b $\frac{17}{112}$

3F DECIMAL NUMBERS

- 1 a $\frac{2}{10} + \frac{1}{100}$ b $1 + \frac{3}{10} + \frac{5}{1000}$ c $2 + \frac{2}{1000} + \frac{4}{10000}$
- 2 a 0.733 b 1.205 c 3.0609
- 3 a $\frac{5}{10}$ b $\frac{5}{10000}$
- 4 a $\frac{3}{5}$ b $\frac{18}{25}$ c $-\frac{3}{20}$ d $\frac{121}{200}$
- 5 a
-
- b
-

3G ROUNDING DECIMAL NUMBERS

- 1 a 7 b 4 c 49
- 2 a 9.8 b 12.1 c 0.6
- 3 a 1.94 b 2.50 c 17.18
- 4 a 4.08 b 36.7 c 0.0274
- 5 a 0.0570 b 0.057 c 0.057040

3H ADDING AND SUBTRACTING DECIMAL NUMBERS

- 1 a 3.65 b 2.613 c 7.818 d 10.51
- 2 a 1.31 b 4.66 c 6.26 d 7.649
- 3 5.25 m

3I MULTIPLYING AND DIVIDING BY POWERS OF 10

- 1 a 750.96 b 7509.6 c 750 960
 2 a 80.72 b 0.8072 c 0.080 72
 3 a 408 b 0.0809 c 8680 d 0.000 043 14

3J MULTIPLYING DECIMAL NUMBERS

- 1 a 0.72 b 0.006 c -0.0099 d 0.000 42
 e -0.045 f 0.000 96
 2 a 9.87 b -34.96 c 1.752 d -12.505
 3 \$3 4 148.2 g

3K DIVIDING DECIMAL NUMBERS

- 1 a 8 b 7 c 50 d 0.1 e -13 f 0.6
 2 a 4.9 b 9.7 3 95 tiles

3L SQUARE ROOTS

- 1 a 18 b 26 c 31 d 45
 2 a 4 and 5 b 7 and 8 c 8 and 9 d 11 and 12
 3 a ≈ 2.8284 b ≈ 5.3852 c ≈ 9.8489 d ≈ 21.5174

3M CUBE ROOTS

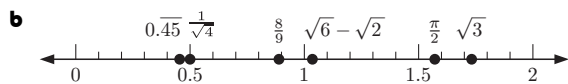
- 1 a 4 b -4
 2 a 12 b ≈ 2.154 c ≈ 3.826 d ≈ 9.868

3N RATIONAL NUMBERS

- 1 a $\frac{21}{4}$ b $-\frac{8}{1}$ c $\frac{3}{4}$ d $\frac{9}{1}$
 2 a terminating b recurring c terminating d recurring
 3 a 0.6 b 0.55 c 0.48
 4 a $0.\overline{4}$ b $0.\overline{27}$ c $1.\overline{3}$ d $0.\overline{285714}$
 5 a $0.\overline{21}$ b $0.28\overline{3}$ c $0.208\overline{3}$

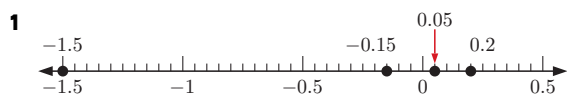
3O IRRATIONAL NUMBERS

- 1 a i rational ii irrational iii rational
 iv irrational v rational vi irrational



- 2 a false b true c true

REVIEW OF CHAPTER 3



- 2 a $48 \div 6 = 8$ b $-96 \div 12 = -8$
 3 a $\frac{1}{2}$ b $\frac{6}{7}$ c $-\frac{5}{3}$
 4 a $\frac{1}{36}$ b $\frac{49}{8}$ or $6\frac{1}{8}$ c $\frac{4}{15}$ d $\frac{3}{16}$
 5 $\frac{1}{18}$ 6 a 200 b $\frac{2}{1000}$
 7 a 18.10 b 0.0432 8 a 5.215 b 2.592 c 0.372

- 9 a 47 510 b 0.050 32 c -228.78 d 0.098
 10 0.355 kg 11 11 and 12 12 a 0.42 b 0.925
 13 a i terminating ii recurring iii terminating iv recurring
 b i 0.5625 ii $0.7\overline{3}$ iii 0.4325 iv $0.58\overline{3}$
 14 a irrational b rational, $\frac{19}{1}$ c rational, $\frac{333}{1000}$ d irrational

4A PRODUCT NOTATION

- 1 a $2b$ b $3k$ c $c + 2d$ d $3s + 4t$
 e $3w - 6$ f $5 - 2q$
 2 a $5p$ b $4cd$ c $3xy$ d $6ef$
 3 a $5j - k$ b $w - vx$ c $rs + ps$ d $18 - 2ab$
 4 a $4(c + d)$ b $l(3 + k)$ c $df(2 - g)$

4B INDEX NOTATION

- 1 a y^4 b $2a^2$ c w^2z^3 d $5d^3e$ e $7m^2n^2$ f pq^3r^2
 2 a $h \times h$ b $3 \times a \times a$ c $3 \times a \times 3 \times a$
 d $8 \times g \times g \times g \times h$ e $x \times x + 2 \times x \times y$
 f $4 \times z \times z \times z - 7 \times w \times w$
 3 a $c^2 + c^3$ b $7r + r^2$ c $4k^2 - j^2k$
 d $7rs - dg$ e $2a^2b - 5b^2$ f $6mn - m^3 + mn^2$

4C WRITING EXPRESSIONS

- 1 a x plus 4
 b y minus the product of 2 and z
 c the product of 5, a squared, and b
 d c divided by the square root of e
 e 2 divided by y less than 7
 f 3 minus x , all squared
 g 6 divided by the product of 5 and x squared
 h the square root of the sum of 2 times p and 3 times q
 2 a $8t$ b $4l + m$ c $\left(\frac{e}{f}\right)^2$ d $2 + x^2$
 e $\sqrt{y} + 3z$ f $2\sqrt{r} - p$
 3 a $9 - 4x$ b $\frac{\sqrt{x}}{2}$

4D GENERALISING ARITHMETIC

- 1 a 8 kg b $2p$ kg c pw kg
 2 a 4 years old b $(21 - y)$ years old
 3 a 150 chairs b acf chairs 4 $(27 - p)$ people
 5 a $6r$ roses b br roses c $\frac{br}{3}$ roses
 6 $\$(mn + cp)$

4E ALGEBRAIC SUBSTITUTION

- 1 a 3 b 3 c 13 d 98
 2 a -20 b 8 c -7 d -9 e 27 f 5
 3 a 0 b 6 c -2 d 6 e $-\frac{1}{9}$ f 4
 4 a 6 b 17 5 24 cm² 6 \$250

4F THE LANGUAGE OF ALGEBRA

- 1 a equation b expression c equation d expression
 2 a 2 terms b 3 terms c 5 terms
 3 a 6 b -3 c -1 d -5
 4 a -9 b 7 c 3 d -1
 5 a 5 b -3 c -2 d 7
 6 a 3 and 1 b x and $-9x$ c $-7x^2$ and $2x^2$, $10x$ and $-14x$

4G COLLECTING LIKE TERMS

- 1 a $1+z$ b $2b+7$ c $3h+3$ d $5c$ e $7xy$
 f cannot be simplified g $3f^2$ h cannot be simplified
 2 a 0 b $2st$ c $6p-2q$ d $8e$
 e $8f-3f^2$ f cannot be simplified
 3 a a b $-6b$ c $-6c-7$ d $7d$
 e $-9d$ f $8f$
 4 a $5x-5$ b $x^2+9x+20$ c $11d-10cd$
 d $4x^3-36x$ e $-e+3f$ f $-x^2$

4H ALGEBRAIC PRODUCTS

- 1 a $6a$ b $-36a^2$ c x^3 d $12y^3$ e $49d^2$ f $10e^4$
 2 a $3s^2t$ b $-24w^2$ c $18d^3$ d $-4e^2$ e $36f^2$
 f $-2pq^2$ g z^5 h $-12k^3$ i $-j^3$

4I ALGEBRAIC QUOTIENTS

- 1 a $\frac{c}{2}$ b $\frac{3}{2x}$ c $\frac{c}{6}$ d $\frac{2}{3m}$
 2 a a^3 b $2b$ c $\frac{c^3}{6}$ d $\frac{3x}{y}$ e 1
 f $\frac{6e}{f}$ g a^2 h $\frac{2}{3t}$

4J ALGEBRAIC COMMON FACTORS

- 1 a $2x$ b $3c$ c $-2b^2$ d $5ab$
 2 a 6 b $7b$ c 3 d $16p$
 3 a $2x$ b 6 c $2y$ d $5ab$ e mn f $5qr$

REVIEW OF CHAPTER 4

- 1 a $4c^3$ b $6a^2b$ c $z+z^2+3z^3$
 2 a $6 \times x \times x \times x$ b $4 \times y \times 4 \times y$
 c $9 \times w \times w \times w \times w + 2 \times w \times w$
 3 a the sum of 2 times x and 7 b 4 minus x , all divided by 3
 4 a lmn b $\sqrt{z+5}$
 5 a \$8 b $\$(20-3c)$ c $\$(20-cp)$
 6 a 3 b -3 c 4 d 6
 7 a 50 km b 2000 km
 8 a expression b equation c equation
 9 a $-2x+4$ b $12x-7y$ c $4x^3-7x$
 10 a 5 terms b x^2 and $2x^2$, $-5x$ and $-3x$ c 6
 d $6+3x^2-8x$
 11 a $18a^5$ b $-15p^3q$ c $\frac{1}{2c}$ d $\frac{11d}{b}$

- 12 a 15 b $4uv$

5A CONVERTING PERCENTAGES INTO DECIMALS AND FRACTIONS

- 1 a 0.34 b 3.2 c 0.08 d 0.045 e 9 f 0.489
 2 a $\frac{1}{20}$ b $\frac{7}{10}$ c $\frac{27}{5}$ d $\frac{1}{5000}$ e $\frac{9}{2000}$ f $\frac{33}{400}$

5B CONVERTING DECIMALS AND FRACTIONS INTO PERCENTAGES

- 1 a 3% b 180% c 56% d 37.5%
 e 0.47% f 206.03%
 2 a 90% b 26% c 40% d 52.5%
 e 158.5% f 120%
 3 a $44\frac{4}{9}\%$ b 4.8% 4 a $\approx 45.5\%$ b $\approx 115.8\%$

5C EXPRESSING ONE QUANTITY AS A PERCENTAGE OF ANOTHER

- 1 a 76% b 50% c 8% d 55%
 e 12.5% f $\approx 43.3\%$
 2 72%
 3 Russell, as he scored 80%, whereas Stephen scored $\approx 77.8\%$.

4

Blood type	Desired level	Actual level	% level	% still needed
A+	465	200	$\approx 43.0\%$	$\approx 57.0\%$
A-	105	36	$\approx 34.3\%$	$\approx 65.7\%$
B+	120	72	60%	40%
B-	30	22	$\approx 73.3\%$	$\approx 26.7\%$
AB+	30	17	$\approx 56.7\%$	$\approx 43.3\%$
AB-	15	12	80%	20%
O+	600	216	36%	64%
O-	135	42	$\approx 31.1\%$	$\approx 68.9\%$

5D FINDING A PERCENTAGE OF A QUANTITY

- 1 a 175 b 20 t c 6.4 kg d 21 mL
 e 340 cm f 30 km
 2 315 students 3 \$212.50 4 a 27 g b 67.5 g

5E PERCENTAGE INCREASE OR DECREASE

- 1 a \$276 b 99 kg
 2 a 324 views b 1188 views
 3 a 1.03 b 0.52 c 0.81
 4 a \$18 000 b 144 pages c 882 g d 8448 people
 5 333 first home buyers 6 a \$69 b \$86.25

5F FINDING A PERCENTAGE CHANGE

- 1 a a 4 cm increase b a 150 mL decrease
 2 a 25% increase b 2% decrease c 20% decrease
 d 300% increase
 3 36% decrease 4 $\approx 46.7\%$ increase

5G PROFIT AND LOSS

	Cost price	Selling price	Profit or loss
1 a	\$65	\$49	\$16 loss
b	\$760	\$798	\$38 profit
c	\$10.50	\$7.55	\$2.95 loss
d	\$550	\$660	\$110 profit
e	\$208	\$156	\$52 loss

- 2 a i \$7 profit ii $\approx 58.3\%$ profit
 b i \$181 loss ii $\approx 36.3\%$ loss
- 3 40% profit 4 a \$2400 loss b 20% loss
- 5 \$340 6 \$325 000

5H DISCOUNT

- 1 \$77 2 \$136.50 3 a \$325 b 26%

	Marked price	Discount	Selling price	Discount as a % of marked price
4 a	\$60	\$18	\$42	30%
b	\$2	\$0.45	\$1.55	22.5%
c	\$550	\$44	\$506	8%
d	\$1400	\$84	\$1316	6%

5I GOODS AND SERVICES TAX

- 1 a \$0.46 b \$5.06 2 \$99

REVIEW OF CHAPTER 5

- 1 a i $\frac{3}{10}$ ii 0.3 b i $\frac{13}{2}$ ii 6.5
- 2 a 61% b 80% c $\approx 53.85\%$
- 3 a 0.4% b 98.75%
- 4 80 mL 5 \$179.80 6 273 m²
- 7 a an increase of 4500 members b 12.5% increase
- 8 35% loss 9 \$5400 10 \$30.60
- 11 a \$75 b \$825

6A INDEX LAWS

- 1 a $2^7 = 128$ b $3^6 = 729$ c b^6 d x^8
- 2 a $4^2 = 16$ b $5^3 = 125$ c c^4 d f^7
- 3 a $3^8 = 6561$ b $2^{10} = 1024$ c x^4 d h^{18}
- 4 a k^{15} b d^{12} c p^5 d x^{12}
- 5 a $x^5 \div x^3 = x^2$ b $(2^2)^7 = 2^{14}$ c $z^4 \times z^6 = z^{10}$
- d $y^6 \div y^3 \times y^7 = y^{10}$
- 6 a $\frac{uv^3}{2}$ b $12x^3y^4$ c p^9 d $2m^{10}$
- 7 a 2^9 b 2^{12} 8 a x^{20} b $x^1 = x$

6B EXPANSION LAWS

- 1 a c^3d^3 b e^5f^5 c $x^2y^2z^2$ d $16d^4$
- 2 a $\frac{j^2}{k^2}$ b $\frac{s^3}{t^3}$ c $\frac{h^4}{81}$ d $\frac{64}{x^6}$
- 3 a $\frac{4}{9}$ b $\frac{27}{125}$

- 4 a $125x^6$ b $16b^8c^4$ c $27a^3b^6$ d $64r^4t^2$ e $36e^6f^4$
- f $\frac{h^3j^3}{27}$ g $\frac{16b^4}{c^4}$ h $\frac{p^4}{36}$ i $\frac{343d^3}{e^6}$

6C THE ZERO INDEX LAW

- 1 a 1 b 1 c 3 d 10 e 2
- f x^{11} $\{x \neq 0\}$ g 1 $\{x \neq 0\}$ h 1
- 2 a s^2 b g^2 c ab

6D THE NEGATIVE INDEX LAW

- 1 a $\frac{1}{13}$ b $\frac{1}{16}$ c $\frac{1}{36}$ d $\frac{1}{32}$
- 2 a $4\frac{1}{2}$ b $-\frac{3}{4}$
- 3 a $\frac{1}{y}$ b $\frac{1}{s^4}$
- 4 a 2^{-4} b 3^{-2} c 11^{-1}
- 5 a $\frac{1}{3t}$ b $\frac{4}{x^2}$ c $\frac{7x}{y^3}$ d $\frac{7}{x^3y^3}$

6E THE DISTRIBUTIVE LAW

- 1 a $3x + 24$ b $9x - 18$ c $55 + 5b$
- d $3a + 3b$ e $70 - 7k$ f $4s - 20$
- 2 a $8x + 12$ b $15z - 20$ c $2s + 6t$
- d $12 - 18a$ e $21x + 18y$ f $5m - 15n$
- g $3 - 12p^2$ h $x^2 + 12x$ i $g^2 - 2g$
- j $2xy + xz$ k $2z^2 - 14z$ l $16k - 40k^2$
- m $6q^2 + 5qr$ n $10mn - 12m^2$ o $4x^2 + 3x^3$
- 3 a $7g + 7h - 49$ b $4x^2 - 24x + 8xy$ c $9p^2 + 6pq + 12p$
- 4 a $-5a - 5$ b $-2b + 6$ c $-c - 2$
- d $-18 + 6x$ e $-24 - 30y$ f $-t^2 - 5t$
- g $-2p^2 + 3p$ h $-6x + 15x^2$ i $-6q^2 - 8q$
- 5 a $6x + 11$ b $-10x - 23$ c $3x + 8$
- d -2 e $4x - 3x^2$ f $2n^2 - 5n$
- g $5x^2 - 13x$ h $9x + 2$ i $a^2 + 5a + 6$
- j $x^2 - 6x + 12$ k $3z^2 - 28z$ l $20x - 36$

6F FACTORISATION

- 1 a $2(x + 4)$ b $3(3 + 5x)$ c $x(3 + y)$ d $b(d + f)$
- 2 a $8(n - 1)$ b $10(2a - 3)$ c $x(1 - 6y)$ d $n(m - p)$
- 3 a $4(a + b)$ b $3(2 - 7y)$ c $x(y - 6)$ d $q(p + 4r)$
- 4 a $p(p + 5)$ b $4y(2 - y)$ c $x(2x + 13y)$
- d $3st(2t - 3)$ e $4t^2(t + 3 - 5t^2)$ f $xy(x + y - xy)$

REVIEW OF CHAPTER 6

- 1 a b^{10} b f c $6k^4$ d $2x^2y^2$
- 2 a 3^8 b 3^4
- 3 a a^4b^4 b $49n^2$ c $\frac{8}{z^3}$ d $\frac{x^4y^4}{81}$
- 4 a $36x^4y^2$ b $\frac{64z^3}{w^3}$
- 5 a 1 b 2 6 a $\frac{1}{64}$ b $\frac{6x}{y^3}$
- 7 a $-27 + 18z$ b $a^2 + 6a$ c $6a^2 - 10ab - 12a$
- d $9a - 25$ e $m^2 + 3m$ f $3m - 6$

- 8 a $6(3x - 1)$ b $2(x + 5)$ c $d(c - 2d)$
 d $qr(5 + p)$ e $2x(2x - 3)$ f $e(9 - 4e + 6e^2)$

7A SOLUTIONS OF AN EQUATION

- 1 a $l = 1$ b $s = 7$ c $b = 4$ d $d = 10$
 e $z = 3$ f $a = -6$ g $r = 16$ h $n = -7$
 2 a $x = 4$ b $x = 2$
 3 a $a = 5$ b none c all values of a d $x = 24$
 4 a C b D c B d D e A f B
 5 a not an identity, $x = 0$ b identity c not an identity, $p = 0$

7B MAINTAINING BALANCE

- 1 a $x = 6$ b $5x + 15 = x$ c $3x = -3$ d $2x = x + 2$
 e $x = 27$ f $x + 5 = 63$ g $x = -4$ h $2x - 1 = 9$
 2 a $3(1 + 9) = 3 \times 10 = 30$ ✓ b $x + 9 = 10$ c $x = 1$
 d no

7C INVERSE OPERATIONS

- 1 a $\div 5$ b $- 6$ c $\times 10$ d $+ 7$
 2 a $a = 12$ b $b = 4$ c $c = 6$ d $d = 16$
 3 a $x = -35$ b $x = -9$ c $x = 6$ d $x = -1$
 e $x = -10$ f $x = 18$ g $x = 28$ h $x = -6$

7D ALGEBRAIC FLOWCHARTS

1 a Build up: $x \xrightarrow{\times 5} 5x \xrightarrow{-9} 5x - 9$
 Undo: $5x - 9 \xrightarrow{+9} 5x \xrightarrow{\div 5} x$
 b Build up: $x \xrightarrow{+2} x + 2 \xrightarrow{\div 6} \frac{x + 2}{6}$
 Undo: $\frac{x + 2}{6} \xrightarrow{\times 6} x + 2 \xrightarrow{-2} x$
 c Build up: $x \xrightarrow{+8} x + 8 \xrightarrow{\times 3} 3(x + 8)$
 Undo: $3(x + 8) \xrightarrow{\div 3} x + 8 \xrightarrow{-8} x$
 d Build up: $x \xrightarrow{\div 4} \frac{x}{4} \xrightarrow{-3} \frac{x}{4} - 3$
 Undo: $\frac{x}{4} - 3 \xrightarrow{+3} \frac{x}{4} \xrightarrow{\times 4} x$
 2 a Build up: $x \xrightarrow{\times 6} 6x \xrightarrow{-5} 6x - 5 \xrightarrow{\div 8} \frac{6x - 5}{8}$
 Undo: $\frac{6x - 5}{8} \xrightarrow{\times 8} 6x - 5 \xrightarrow{+5} 6x \xrightarrow{\div 6} x$
 b Build up: $x \xrightarrow{+9} x + 9 \xrightarrow{\times 3} 3(x + 9) \xrightarrow{\div 7} \frac{3(x + 9)}{7}$
 Undo: $\frac{3(x + 9)}{7} \xrightarrow{\times 7} 3(x + 9) \xrightarrow{\div 3} x + 9 \xrightarrow{-9} x$

c Build up: $x \xrightarrow{\times 3} 3x \xrightarrow{-1} 3x - 1 \xrightarrow{\times 4} 4(3x - 1)$

Undo: $4(3x - 1) \xrightarrow{\div 4} 3x - 1 \xrightarrow{+1} 3x \xrightarrow{\div 3} x$

d Build up: $x \xrightarrow{\times -4} -4x \xrightarrow{+3} 3 - 4x \xrightarrow{\div 6} \frac{3 - 4x}{6}$

Undo: $\frac{3 - 4x}{6} \xrightarrow{\times 6} 3 - 4x \xrightarrow{-3} -4x \xrightarrow{\div -4} x$

7E SOLVING EQUATIONS

- 1 a $x = 3$ b $x = 3$ c $x = 2$ d $x = -2$
 e $x = 4\frac{1}{5}$ f $x = 2$ g $x = 9$ h $x = \frac{1}{2}$
 i $x = -5$ j $x = -1\frac{1}{5}$
 2 a $x = 4$ b $x = 44$ c $x = -56$ d $x = 12$
 e $x = -57$ f $x = -48$
 3 a $x = 13$ b $x = -1\frac{1}{7}$ c $x = -3$ d $x = -10$
 e $x = 3$ f $x = 5\frac{1}{2}$
 4 a $x = 5$ b $x = 10$ c $x = -7$ d $x = 8$

7F EQUATIONS WITH A REPEATED UNKNOWN

- 1 a $x = 2$ b $x = -4$ c $x = -8$ d $x = 3$
 2 a $x = 1$ b $x = -9$ c $x = 1$ d $x = -2$
 e $d = 13$ f $z = -4$
 3 a $x = -15$ b $x = 8$ c $x = -\frac{2}{3}$ d $x = \frac{7}{10}$

REVIEW OF CHAPTER 7

- 1 a $c = 9$ b $p = -18$ 2 $x = -3$
 3 a $\div -3$ b $+ 4$ c $\times 7$ d $-\frac{1}{2}$
 4 a $x = -10$ b $6x = 40$ c $5x = x + 12$ d $2 - x = 4$
 5 a $x = 48$ b $x = 27$ c $x = 6$ d $x = -4$

6 a Build up: $x \xrightarrow{\times 2} 2x \xrightarrow{-7} 2x - 7 \xrightarrow{\times 3} 3(2x - 7)$
 Undo: $3(2x - 7) \xrightarrow{\div 3} 2x - 7 \xrightarrow{+7} 2x \xrightarrow{\div 2} x$

b Build up: $x \xrightarrow{+9} x + 9 \xrightarrow{\times 7} 7(x + 9) \xrightarrow{\div 4} \frac{7(x + 9)}{4}$
 Undo: $\frac{7(x + 9)}{4} \xrightarrow{\times 4} 7(x + 9) \xrightarrow{\div 7} x + 9 \xrightarrow{-9} x$

- 7 a $x = -1$ b $x = 8$ c $x = -9$ d $x = 3$
 8 a $x = 3$ b $x = -1$ c $x = \frac{1}{2}$ d $x = -4$
 e $x = -2$ f $x = 4$

8A ANGLES

- 1 a true b true c true
 2 a \widehat{ABC} , acute b reflex \widehat{PQR} , reflex

3 a 59° b 6° 4 a 167° b 67°

8B PARALLEL AND PERPENDICULAR LINES

1 a (PR) \parallel (TS) b (PQ) \perp (QS) c (PT) \parallel (RS)
d (TS) \perp (SQ)

8C ANGLE PROPERTIES

1 a $x = 36$ {angles in a right angle}
b $a = 50$ {vertically opposite angles}
c $x = 40$ {angles on a straight line}
d $b = 135$ {angles at a point}
e $x = 12$ {angles in a right angle}
f $q = 38$ {angles at a point}

8D LINES CUT BY A TRANSVERSAL

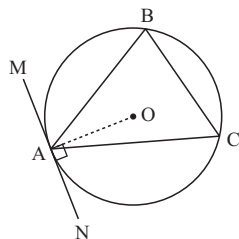
1 a $x = 71$ {equal alternate angles}
b $x = 59$ {supplementary co-interior angles}
c $x = 30$ {equal corresponding angles}
d $z = 20$ {vertically opposite angles, supplementary co-interior angles}
2 a yes {co-interior angles are supplementary}
b no {alternate angles are not equal}

REVIEW OF CHAPTER 8

1 a 79° b 172°
2 a (LM) \perp (LN) b (KL) \parallel (NM)
3 a $x = 129$ {angles at a point}
b $x = 35$ {vertically opposite angles}
4 a $x = 27$ {equal corresponding angles}
 $y = 162$ {vertically opposite angles}
b $p = 65$ {equal alternate angles}
 $q = 25$ {angles on a straight line}
5 no {co-interior angles are not supplementary}

9A CIRCLES

1 a 4 m b 7 cm
2 a 7 m b 14 m c 3 m d 10 m
3 a, b



c $\widehat{ABC} = \widehat{CAN}$ d $\widehat{ACB} = \widehat{BAM}$

9B TRIANGLES

1 a scalene b isosceles c equilateral
2 a acute angled b right angled c obtuse angled
3 a [BC] b [AC] 4 a \widehat{PQR} b \widehat{QPR}

9C TRIANGLE THEOREMS

1 a $x = 76$ {angle sum of a triangle}
b $a = 129$ {exterior angle of a triangle}
c $m = 134$ {exterior angle of a triangle}
d $x = 57$ {angle sum of a triangle}
2 a false b true 3 a [AB] b [PQ]
4 a $a = 15$ b $a = 77, b = 72$ c $c = 14$

9D ISOSCELES TRIANGLES

1 a $x = 116$ b $x = 62$ c $x = 61$
2 a $x = 8$ b $x = 90$ c $x = 42$ 3 62°
4 a $x = 40$
b $\triangle TUV$ is isosceles with $\widehat{TUV} = \widehat{T\hat{V}U}$, and $TU = TV$.
5 a i $\widehat{ADE} = 22.5^\circ$ ii $\widehat{ABE} = 22.5^\circ$
b $\widehat{BDE} = \widehat{DBE} = 45^\circ$
c $\triangle BDE$ is isosceles and is right angled at E.
d $CE = 8$ cm

9E QUADRILATERALS

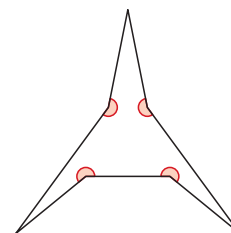
1 a $x = 8, y = 90$ b $b = 44$ c $p = 28, q = 28$
2 a false b true
3 a $x = 107, y = 98$ b $a = 76, b = 67, c = 5$
4 a rectangle

9F ANGLE SUM OF A QUADRILATERAL

1 a $x = 55$ b $x = 95$
2 a $a = 87, b = 93$ b $a = 72$

9G ANGLE SUM OF AN n -SIDED POLYGON

1 a 1080° b 2160°
2 a $x = 72$ b $x = 130$ 3 19 sides
4 a 4 reflex angles b



REVIEW OF CHAPTER 9

1 40 cm
2 a isosceles, acute angled b equilateral, acute angled
3 a $x = 86$ {angle sum of a triangle}
b $x = 113$ {base angles of isosceles triangle, angles on a straight line}
4 a $a = 69$ {angle sum of a triangle, base angles of isosceles triangle}
 $b = 69$ {equal corresponding angles}
b $x = 3$ and $y = 90$ {converse of isosceles triangle theorem}
5 a a rhombus b a trapezium

- 6 a $x = 95$ b $x = 92$ 7 $x = 55, y = 260, z = 240$

10A NUMBER CRUNCHING MACHINES

1 a

Input	Calculation	Output
1	1×7	7
2	2×7	14
3	3×7	21
4	4×7	28

b

Input	Calculation	Output
2	$2 - 2$	0
4	$4 - 2$	2
6	$6 - 2$	4
8	$8 - 2$	6

c

Input	Calculation	Output
1	$(1 + 4) \times 3$	15
3	$(3 + 4) \times 3$	21
5	$(5 + 4) \times 3$	27
6	$(6 + 4) \times 3$	30

d

Input	Calculation	Output
12	$12 \div 2 - 4$	2
14	$14 \div 2 - 4$	3
20	$20 \div 2 - 4$	6
28	$28 \div 2 - 4$	10

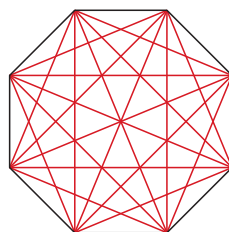
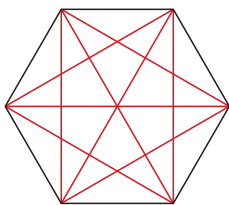
- 2 a $M = \frac{3+n}{5}$ b $M = n^2 - 1$

10B FINDING THE FORMULA

- 1 a $M = 2n + 5$ b $M = 9n - 1$ c $M = 18 - 4n$
 2 a $M = 4n$ b $y = 6x - 5$ c $Q = 5 - 2p$

10C SUBSTITUTING INTO FORMULAE

- 1 a $R = 27$ b $s = 3$
 2 a \$170 b \$395 c \$770
 3 a i \$95 ii \$77
 b $2\frac{1}{3}$ hours or 2 hours 20 minutes
 4 a i 9 diagonals ii 20 diagonals



b 230 diagonals

10D GEOMETRIC PATTERNS



b

Figure number (n)	1	2	3	4	5
Number of matchsticks (M)	3	6	9	12	15

- c $M = 3n$ d 120 matchsticks



b

Figure number (n)	1	2	3	4	5
Number of matchsticks (M)	4	9	14	19	24

- c $M = 5n - 1$
 d i 79 matchsticks ii 174 matchsticks



b

Number of sections (n)	1	2	3	4	5
Number of wood lengths (W)	7	13	19	25	31

- c $W = 6n + 1$ d 61 lengths of wood e 12-section fence

10E PRACTICAL PROBLEMS

- 1 a \$12m b $C = 12m + 9$
 c i \$69 ii \$129
 2 a Each of the d hot dogs is sold for \$4 and there is \$50 in the till initially.
 \therefore the total amount of money is $T = 4d + 50$ dollars.
 b \$350 c 128 hot dogs
 3 a $F = 1000 - 4t$
 b i 940 flyers ii 760 flyers
 c 2 hours 5 minutes

REVIEW OF CHAPTER 10

1

Input	Output
2	55
3	60
4	65
5	70

- 2 a $M = 8n$ b $y = 5x - 2$
 3 a $P = 28$ b $x = 6$



b

Figure number (n)	1	2	3	4	5
Number of matchsticks (M)	4	10	16	22	28

- c $M = 6n - 2$
 d i 46 matchsticks ii 76 matchsticks
 e figure 17
 5 a i \$260 ii \$620
 b 8 days
 6 a There is a 55 cent connection fee, and each minute costs \$1.40, so a call that is t minutes long costs $C = 1.4t + 0.55$ dollars.
 b i \$11.75 ii \$28.55
 c 14 minutes

11A LENGTH

- 1 a 2.67 cm b 0.047 m c 24970 mm
 2 a 1252.6 cm b 2272.28 m
 3 12 cm taller 4 50 lengths 5 77 m

11B PERIMETER

- 1 a 32 cm b 65 mm c 18 m
 2 a 4.2 m or 420 cm b 32.7 cm or 327 mm
 3 a 1600 m b 8 km
 4 a $P = 5x$ m b $P = (2a + 2b)$ cm
 5 a $P = (4x + 10)$ mm b $P = (7x + 6)$ km
 c $P = 12x$ cm
 6 a $P = (6x - 2)$ m b 10 m c $x = 7$

11C CIRCUMFERENCE

- 1 a ≈ 15.7 m b ≈ 50.9 cm
 2 ≈ 19.5 mm 3 a ≈ 47.1 cm b ≈ 11.3 km
 4 ≈ 4.71 m 5 a ≈ 188.50 cm b ≈ 170 km
 6 ≈ 135 m 7 ≈ 205.7 cm
 8 a $P = (4x + 2\pi x)$ m b ≈ 51.4 m

11D AREA

- 1 B
 2 a 0.08 km² b 50 cm² c 0.039 ha d 73 cm²
 e 0.19 km² f 9600 mm²
 3 a Danni: 380 ha, Lynn: 375 ha, Martha: 376 ha
 b i Danni ii Lynn

11E AREA FORMULAE

- 1 a 840 mm² b 135 mm² c 54 m² d 225 mm²
 e 100 km² f 40 m²
 2 a 42.745 cm² or 4274.5 mm² b 0.812 m² or 8120 cm²
 3 a 104 ha b \$12 480
 4 a 3.12 m² b 6.5% 5 12 sides
 6 a $A = (x^2 + 4x)$ cm² b $A = (\frac{3}{2}x^2 - x)$ m²
 7 9 cm

11F THE AREA OF A CIRCLE

- 1 a ≈ 28.27 cm² b ≈ 9.62 m² c ≈ 530.14 mm²
 2 a ≈ 17.59 m b ≈ 24.63 m² 3 ≈ 1430 m²
 4 a ≈ 113 cm² b ≈ 487 cm² c $\approx 81.2\%$

11G AREAS OF COMPOSITE FIGURES

- 1 a 42 cm² b 36 m² c 407 mm²
 2 a ≈ 58.9 cm² b ≈ 23.5 m² c ≈ 34.1 km²
 3 174 tiles
 4 a $A = (2x^2 + 6x)$ cm² b $A = (16x^2 - 4\pi x^2)$ m²
 5 a $A = (160 - 4x)$ cm² b $x = 10$

REVIEW OF CHAPTER 11

- 1 a 310 cm b 29.6 m
 2 a 45 mm b ≈ 10.3 m 3 ≈ 141 cm
 4 a 0.29 ha b 83 000 cm²

- 5 a 115 mm² b ≈ 79.2 m² c 0.855 km²
 6 450 mm² 7 a 5696 mm² b 300 playing cards
 8 a 54 km² b ≈ 247 cm²
 9 a $A = (36 - 2x)$ cm² b $x = 3$

12A SURFACE AREA

- 1 a 43.74 cm² b 1528 mm² c 96 m² d 2430 cm²
 2 ≈ 13.0 L

12B THE SURFACE AREA OF A CYLINDER

- 1 a ≈ 553 mm² b ≈ 39.8 m² c ≈ 0.271 m²
 2 ≈ 187 cm² 3 ≈ 12.0 m²

12C VOLUME

- 1 a m³ b mm³ c cm³
 2 a 25 000 mm³ b 350 000 cm³ c 0.027 cm³ d 0.48 m³
 3 0.968 m³ 4 150 buckets

12D THE VOLUME OF A SOLID OF UNIFORM CROSS-SECTION

- 1 a 36 cm³ b 160 mm³ c ≈ 2710 cm³
 d ≈ 7700 mm³ e 96 cm³ f 270 m³
 g 24 m³ h 800 cm³
 2 0.24 m³ or 240 000 cm³ 3 12 705 mm³
 4 a ≈ 2593 cm³ b ≈ 2530 cm³ 5 250 cm

REVIEW OF CHAPTER 12

- 1 a 20.8 m² b 1804 cm² 2 500 cm²
 3 a ≈ 283 mm² b ≈ 81.9 m²
 4 a 17 200 000 cm³ b 0.000 365 cm³
 5 a ≈ 2.65 cm³ or ≈ 2650 mm³ b 1680 cm³
 6 a 25.5 m² b 229.5 m³ 7 $\approx 29 688$ cm³

13A UNITS OF TIME

- 1 a 6 min b 1440 min c 177 min
 2 a 49 days b 6 days c 9 days
 3 a 12 h 24 min b 6 min 22 s c 2 days 9 h
 4 2 h 55 min 5 ≈ 10 hours 6 5 min 35 s
 7 a 50 years b 1700 years c 6500 years d 420 years
 8 6 millennia 9 3400 millennia

13B TIME CALCULATIONS

- 1 a 4:32 pm b 5:11 pm c 7:59 pm
 d 11:25 pm the previous day
 2 3:10 pm 3 7:10 pm
 4 a 3 h 45 min b 9 h 41 min c 12 h 55 min
 5 2 h 9 min 6 a 8 h 5 min b 55 min

13C 24-HOUR TIME

- 1 a 04:30 b 17:15 c 13:47 d 00:16
 2 a 6:22 am b 11:58 am c 6:11 pm d 4:47 pm
 3 a 3 h 25 min b 3 h 17 min c 7 h 10 min d 1 h 54 min
 4 5 h 56 min
 5 a i 5 flights ii 3 flights
 b 2 h 21 min c 53 min d 14:57

13D TIME ZONES

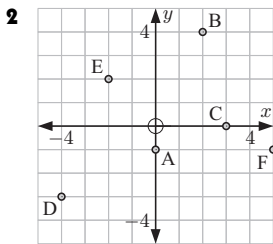
- 1 a 9 am Monday b 3 am Tuesday
 2 a 7 pm Friday b 3 pm Friday
 3 12:16 pm the next day
 4 a 4 hours b i 7 h 50 min ii 10 h 40 min
 c 22 h 30 min

REVIEW OF CHAPTER 13

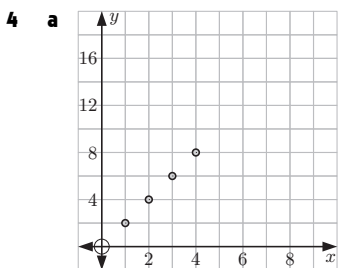
- 1 a 3 min 16 s b 7 weeks 5 days 2 7 min 20 s
 3 a 510 years b 3800 years
 4 a 1:45 pm b 10:50 pm the previous day
 5 a 9 h 15 min b 10 h 43 min
 6 a 4 h 10 min b 5:40 pm
 7 a 5:32 am b 3:48 pm c 12:14 am
 8 11 pm Monday

14A THE CARTESIAN PLANE

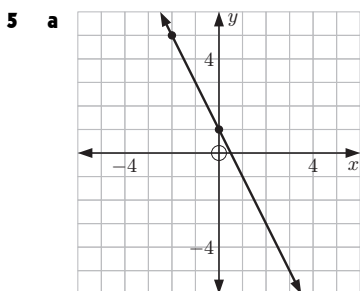
- 1 a A(1, 2), B(-1, -3), C(0, 1), D(-4, 0), E(3, -2)
 b i D ii C c 4th quadrant d B



- 3 a D(1, -2) b D(-3, -2)



- b yes
 c i 10 kitchens
 ii 18 kitchens



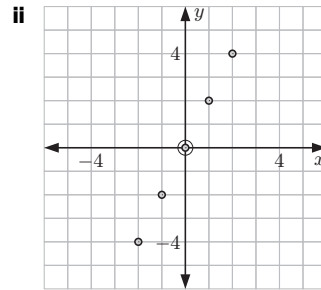
b

x	-2	-1	0	1	2
y	5	3	1	-1	-3

- c i (0, 1) ii (1/2, 0)

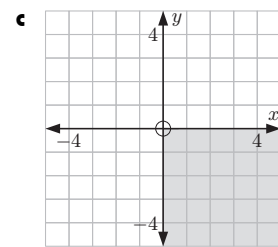
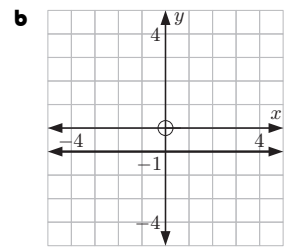
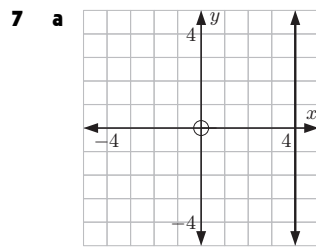
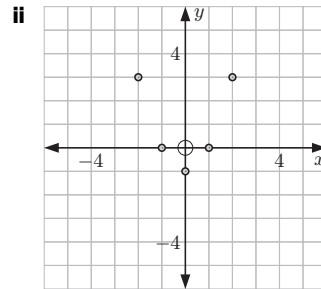
6 a i

x	-2	-1	0	1	2
y	-4	-2	0	2	4



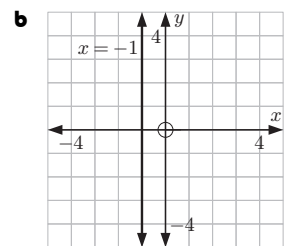
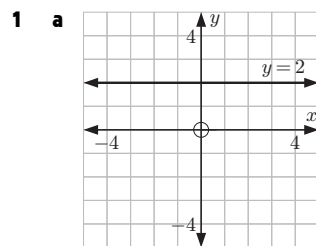
b i

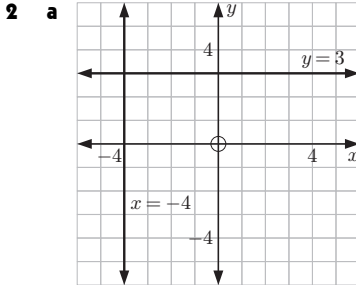
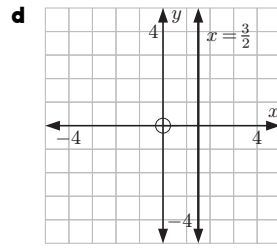
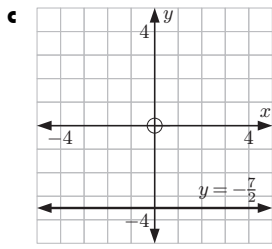
x	-2	-1	0	1	2
y	3	0	-1	0	3



The points on the axes are not included.

14B STRAIGHT LINES

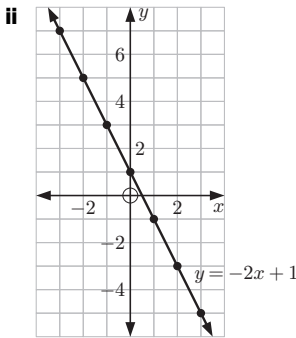




b $(-4, 3)$

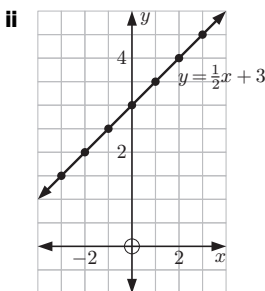
3 a i

x	-3	-2	-1	0	1	2	3
y	7	5	3	1	-1	-3	-5



b i

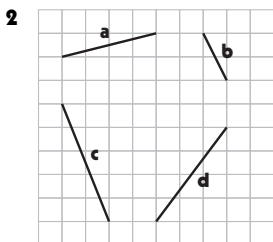
x	-3	-2	-1	0	1	2	3
y	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$



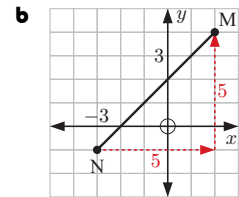
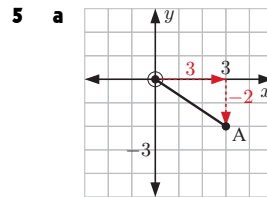
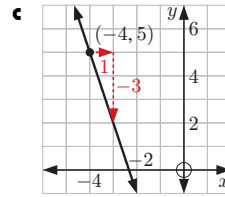
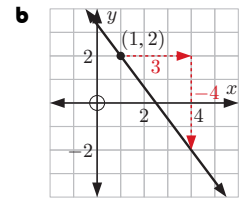
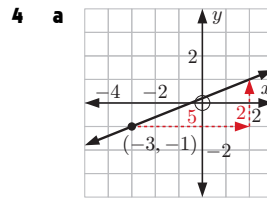
- 4 a** $y = x + 3$ **b** $y = \frac{1}{2}x$ **c** $x + y = 4$ **d** $y = 3x - 1$
5 a yes **b** no **6 a** -8 **b** -4

14C GRADIENT

- 1 a** $\frac{3}{2}$ **b** $-\frac{4}{5}$ **c** 0 **d** undefined



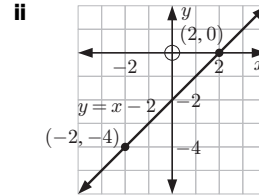
- 3 a** -12 **b** $\frac{5}{8}$



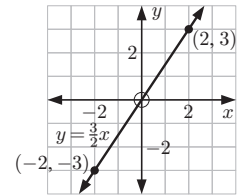
gradient is $-\frac{2}{3}$

gradient is 1

- 6 a i** $(-2, -4)$ and $(2, 0)$



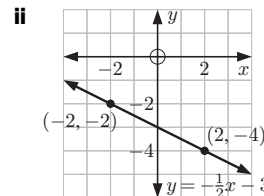
- b i** $(-2, -3)$ and $(2, 3)$



iii 1

iii $\frac{3}{2}$

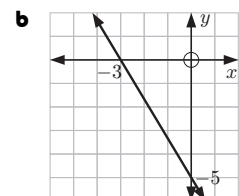
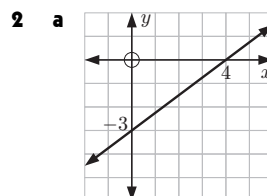
- c i** $(-2, -2)$ and $(2, -4)$



iii $-\frac{1}{2}$

14D AXES INTERCEPTS

- 1 a** x -intercept is -4, y -intercept is 3
b x -intercept is 4, y -intercept is 6
c x -intercept is 0, y -intercept is 0



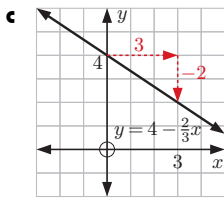
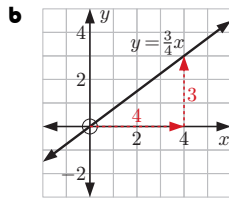
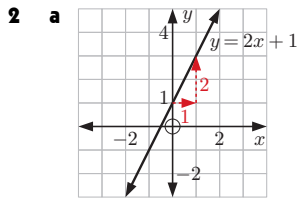
gradient is $\frac{3}{4}$

gradient is $\frac{5}{3}$

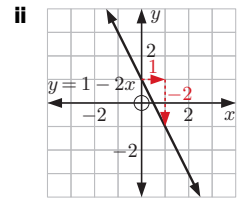
- 3 a** 4 **b** 2 **c** x -intercept is 2, y -intercept is 4

14E GRAPHING A LINE OF THE FORM $y = mx + c$

- 1 a** gradient is 2, y -intercept is -3
b gradient is $-\frac{3}{4}$, y -intercept is 1

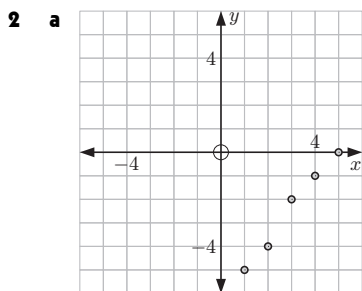


b i gradient is -2 ,
 y -intercept is 1



REVIEW OF CHAPTER 14

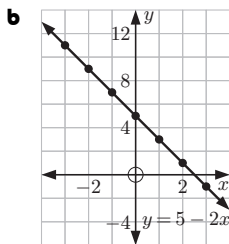
1 a $P(-3, -1)$, $Q(0, -4)$, $R(3, 4)$, $S(4, -3)$ **b** S



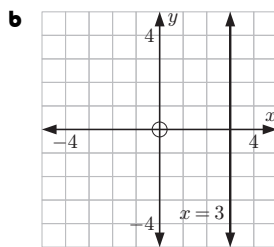
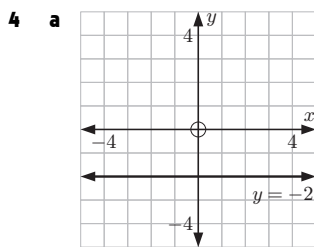
b no

3 a

x	-3	-2	-1	0	1	2	3
y	11	9	7	5	3	1	-1

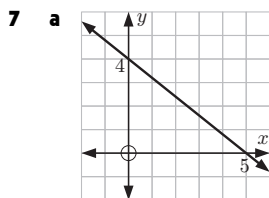


c gradient is -2 , y -intercept is 5



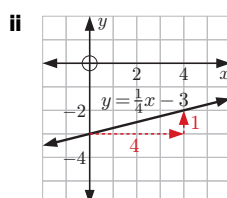
5 a no **b** yes

6 a 2 **b** 12



b $-\frac{4}{5}$

8 a i gradient is $\frac{1}{4}$,
 y -intercept is -3



15A RATIO

- 1 a** $8 : 17$ **b** $3 : 2$ **c** $1 : 5 : 9$ **d** $8 : 12 : 3$
2 a $4 : 1$ **b** $7 : 3 : 10$
3 a $900 : 1000$ **b** $24 : 5$ **c** $4000 : 700$
4 a $450 : 4500 : 1570$ **b** $180 : 128 : 335$
5 a $3 : 100$ **b** $7 : 6 : 4$

15B EQUAL RATIOS

- 1 a** $36 : 24$ **b** $3 : 2$
2 a $30 : 12 : 24$ **b** $1 : 0.4 : 0.8$
3 a equal **b** not equal **c** not equal **d** equal
4 a Betty: $200 : 150 : 300$, Paul: $4 : 3 : 5$
b No, as the two mixtures contain different ratios of ingredients. We cannot multiply each part of $4 : 3 : 5$ by the same non-zero number to obtain $200 : 150 : 300$.

15C LOWEST TERMS

- 1 a** $1 : 12$ **b** $5 : 8$ **c** $3 : 10$ **d** $7 : 8$
e $5 : 6$ **f** $3 : 9 : 7$
2 a $2 : 1$ **b** $1 : 1$
3 a $5 : 7$ **b** $9 : 1$ **c** $4 : 25$ **d** $4 : 11$ **e** $3 : 4$ **f** $3 : 1$
4 a $8 : 3$ **b** $9 : 8$ **c** $11 : 7$ **d** $1 : 3$ **e** $3 : 7$ **f** $9 : 1$
5 a $2 : 5$ **b** $1 : 7$ **c** $1 : 5$ **d** $3 : 1$
e $5 : 1$ **f** $100 : 9$
6 a not equal **b** equal

15D PROPORTIONS

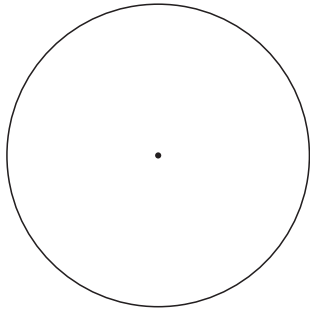
- 1 a** $44 : 20 = 11 : 5$ **b** $13 : 12 = 65 : 60$
c $21 : 45 = 7 : 15$ **d** $3 : 7 = \frac{3}{8} : \frac{7}{8}$
e $8 : 5 = 2 : 1\frac{1}{4}$ **f** $13 : 8 : 15 = 65 : 40 : 75$
2 22 black alpacas
3 a 30 strawberry plants **b** 72 tomato plants
4 66 sausage rolls **5** $\frac{2}{3}$ cup of sugar
6 15 mL of vinegar, 30 mL of lemon juice

15E USING RATIOS TO DIVIDE QUANTITIES

- 1 a i** $\frac{3}{10}$ **ii** $\frac{7}{10}$
b i 15 books **ii** 35 books
2 150 g **3 a** 400 g **b** 375 g
4 a John pays \$700, Jerry pays \$560
b \$280 **c** \$540
5 a 1.85 t **b** 8 t

15F SCALE DIAGRAMS

- 1 a 1 : 2500, scale factor is 2500 b 1 : 100, scale factor is 100
 c 1 : 5 000 000, scale factor is 5 000 000
- 2 a 1 cm represents 7.5 m b 1 cm represents 500 m
 c 1 cm represents 2 km
- 3 1 : 20 000 4 a 150 m b 875 m
- 5 a 10 cm b 2.4 cm or 24 mm



Scale: 1 : 250

- 7 a 1 : 200 b 2.4 m c 3.2 m

REVIEW OF CHAPTER 15

- 1 3 : 7 2 a 5 : 6 b 100 : 120
- 3 a 9 : 4 b 12 : 5 4 a equal b equal
- 5 Adam pays \$80, Brian pays \$60, Corey pays \$120
- 6 260 mL, 40 mL
- 7 a 35 debating club members b 66 chess players



Scale: 1 : 500

- 10 a 3.2 mm b 1.12 mm

16A RATES

- 1 a km/h b L/hour 2 3 mm/day
- 3 a an increase of \$1400/month b month 3
- 4 a 12 assignments/hour b 60 assignments
- 5 a 5320 L b \approx 84 minutes
- 6 a 1050 L/100 km b 178 500 L

16B SPEED

- 1 a 40 km/h b 15 km/h
- 2 Alex's average speed is 90 km/h which is over the speed limit.
 \therefore Alex has broken the law.
- 3 a 825 km b 18 h 56 min
- 4 a \approx 2.77 m b \approx 2.3 m/s 5 82 km/h

16C DENSITY

- 1 a i 1.6 g per cm^3 ii 8.5 g per cm^3 iii 0.2 g per cm^3
 b The balsa wood in a iii would float on water as its density is less than 1 g per cm^3 .

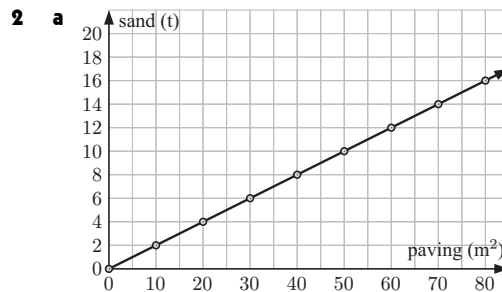
- 2 Ingot B (\approx 8.89 g/ cm^3 compared with \approx 7.83 g/ cm^3)
- 3 a \approx 1.13 times b \approx 2.45 times 4 503.68 g

16D CONVERTING RATES

- 1 360 L/hour
- 2 a 8 cm/week b \approx 1.14 cm/day c \approx 0.0476 cm/hour
- 3 a 10.5 L/week b \approx 548 L/year c \approx 0.548 kL/year
- 4 a \approx 0.917 t/ m^3
 b The density of the iceberg is \approx 917 kg/ m^3 which is less than the density of seawater, so the iceberg floats on seawater.
- 5 a 144 km/h b 7.2 km/h c 30 m/s d \approx 174 m/s
- 6 a \approx 12.68 m/s b \approx 45.65 km/h
- 7 a \approx 53.7 km/h b \approx 34.3 km/h

16E LINE GRAPHS

- 1 a \$75 b 4 hours c \$25/hour

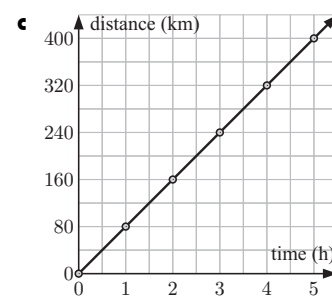


- b 8 t c 75 m^2 d 200 kg/m^2
- 3 a 150 km b 75 km/h c 100 km d 50 km/h
 e 62.5 km/h

4 a

Time (h)	0	1	2	3	4	5
Distance (km)	0	80	160	240	320	400

b Time is the independent variable and distance is the dependent variable.



- d 280 km
 e 2.5 hours

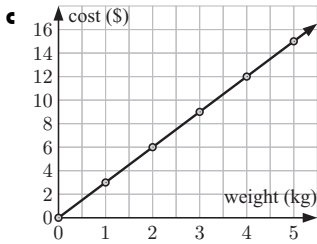
f The gradient of the line is 80. This corresponds to the speed of the train.

REVIEW OF CHAPTER 16

- 1 a \$9.50/kg b \$42.75
- 2 cyclist (25.5 km/h compared with 22.5 km/h)
- 3 \approx 1 h 5 min 53 s 4 \approx 0.648 g/ cm^3
- 5 a 2 beats/s b 1980 oysters/h c \approx 22.2 m/s
- 6 a \approx 13.3 m/s b 48 km/h
- 7 a 40 cm b 75 s
 c i \approx 0.333 cm/s ii 200 mm/minute

8 a	<i>Weight of potatoes (kg)</i>	0	1	2	3	4	5
	<i>Cost (\$)</i>	0	3	6	9	12	15

b *Weight of potatoes* is the independent variable and *cost* is the dependent variable.



d **i** \$4.50
ii 3.5 kg

17A PROBABILITY

- 1 a** 50-50 chance **b** unlikely
- 2 a** Wales **b** South Africa **c** 15% **d** true
- 3 a** 50-50 chance **b** highly likely **c** impossible
d certain
- 4 a** B' is the event that Katherine does not have breakfast at work tomorrow.
b $P(B') = 0.12$

17B SAMPLE SPACE

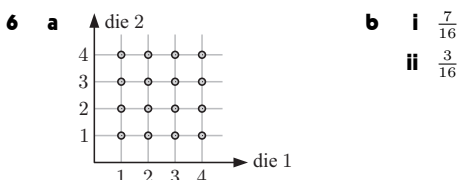
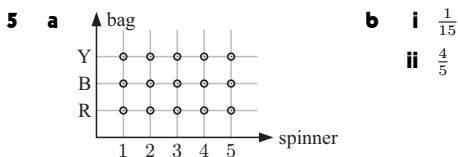
- 1 a** {red, green, white, black}, 4 outcomes
- b** {Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday}, 7 outcomes
- c** {2, 3, 5, 7, 11, 13, 17, 19, 23, 29}, 10 outcomes

2 a, c, d **b** 12 outcomes

3 a **b** 16 outcomes

17C THEORETICAL PROBABILITY

- 1 a** $\frac{1}{6}$ **b** $\frac{2}{6} = \frac{1}{3}$ **c** $\frac{3}{6} = \frac{1}{2}$ **d** $\frac{5}{6}$ **e** $\frac{3}{6} = \frac{1}{2}$ **f** $\frac{3}{6} = \frac{1}{2}$
- 2 a** $\frac{1}{5}$ **b** $\frac{1}{2}$ **c** 0 **d** $\frac{4}{5}$
- 3 a** **i** $\frac{3}{8}$ **ii** blue is more likely
b **i** $\frac{1}{5}$ **ii** green is more likely
- 4 a** $\frac{5}{16}$ **b** $\frac{3}{16}$ **c** $\frac{13}{16}$



17D INDEPENDENT EVENTS

- 1 a** $\frac{1}{18}$ **b** $\frac{1}{6}$ **2 a** $\frac{3}{20}$ **b** $\frac{3}{8}$
- 3 a** **i** $\frac{2}{21}$ **ii** $\frac{4}{9}$ **iii** $\frac{1}{3}$ **iv** $\frac{8}{63}$
b The outcome in **a ii** of both not bowling a strike is most likely.
c $\frac{2}{21} + \frac{4}{9} + \frac{1}{3} + \frac{8}{63} = 1$ which means exactly one of the events in **a** will occur.

17E EXPERIMENTAL PROBABILITY

- 1 a** ≈ 0.6 **b** ≈ 0.4
- 2 a** **i** ≈ 0.177 **ii** ≈ 0.515 **b** ≈ 0.235
- 3 a** **i** ≈ 0.22 **ii** ≈ 0.142 **iii** ≈ 0.165
b We expect the estimate in **a iii** to be the most accurate because it uses the largest sample size.

17F PROBABILITIES FROM TABLED DATA

1 a

City	Frequency	Relative frequency
Adelaide	27	0.675
Murray Bridge	8	0.2
Naracoorte	2	0.05
Millicent	3	0.075
<i>Total</i>	40	1

- b** 40 passengers
- c** **i** 0.675 **ii** 0.125

2 a

Discipline	Frequency	Relative frequency
Lead	68	0.34
Speed	40	0.2
Bouldering	92	0.46
<i>Total</i>	200	1

- b** **i** 0.2 **ii** 0.66

17G PROBABILITIES FROM TWO-WAY TABLES

1 a

		Gender		<i>Total</i>
		Male	Female	
Sport	Yes	17	25	42
	No	9	12	21
<i>Total</i>		26	37	63

- b** 63 students
- c** 17 male students surveyed played sport outside of school.
- d** **i** ≈ 0.397 **ii** ≈ 0.346

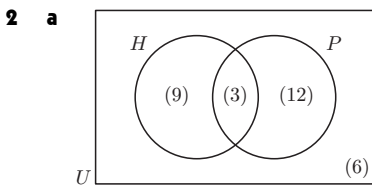
2 a

		Preference			<i>Total</i>
		Like	Dislike	Undecided	
Age	Under 30	51	80	39	170
	30 or over	63	78	89	230
<i>Total</i>		114	158	128	400

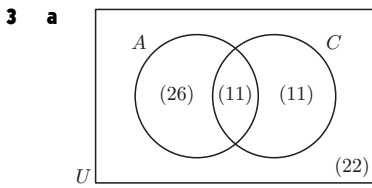
- b** ≈ 0.395 **c** ≈ 0.3 **d** ≈ 0.387
- e** The estimate in **d** is more likely to be accurate since it involves a larger sample size.

17H PROBABILITIES FROM VENN DIAGRAMS

- 1 a** 40 members **b** **i** $\frac{7}{20}$ **ii** $\frac{7}{40}$



b $\frac{7}{10}$

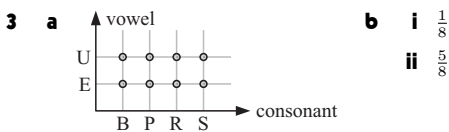


b i $\frac{24}{35}$
ii $\frac{1}{3}$

REVIEW OF CHAPTER 17

1 a E' is the event that Gary will not win. b $P(E') = 0.45$

2 a $\frac{5}{17}$ b $\frac{12}{17}$ c $\frac{9}{17}$



4 a ≈ 0.0183 b ≈ 0.982 5 a 0.52 b 0.28

6 a

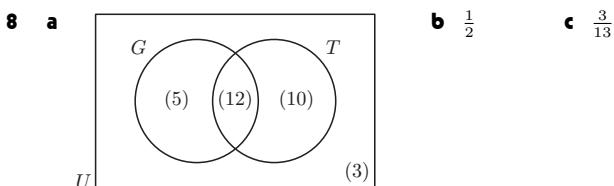
Reason	Frequency	Relative frequency
Exams	76	0.76
Relationships	13	0.13
Parents	11	0.11
Total	100	1

b ≈ 0.76

7 a

		Preference			Total
		Track	Field	Undecided	
Gender	Female	35	14	12	61
	Male	51	7	21	79
Total		86	21	33	140

b i ≈ 0.364 ii ≈ 0.426



18A DATA COLLECTION

- 1 a sample b census
- 2 a Only boys are surveyed; teenage girls' opinions are not represented.
b Only those people who are at home during working hours and have a landline phone are being considered. Those who are not part of either of these groups are not represented.
- 3 a 80% preferred knitting
b Yes, as Lianne chose members randomly and the sample size is sufficiently large.

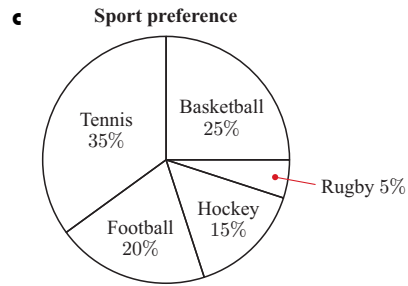
18B CATEGORICAL DATA

- 1 a Could be: apple, banana, orange, peach, pear, plum, mandarin, watermelon, and so on.

- b Could be: tennis, cricket, football, soccer, rugby, netball, basketball, volleyball, and so on.

2 a 24 students b $\frac{1}{4}$ c 12.5% d brown

3 a tennis b 5%

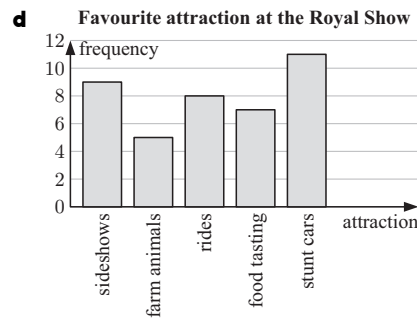


4 a

Attraction	Tally	Frequency
Sideshows		9
Farm animals		5
Rides		8
Food tasting		7
Stunt cars		11
Total		40

b The mode is stunt cars. More children chose stunt cars as their favourite attraction than any other attraction.

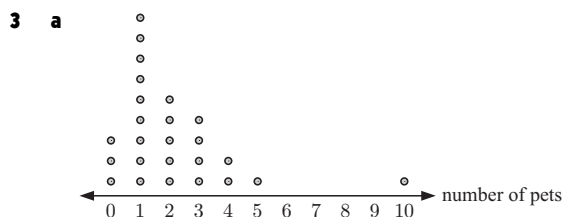
c 20%



18C NUMERICAL DATA

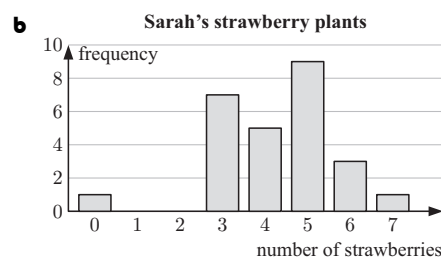
1 a numerical b numerical c categorical d numerical

2 a 20 teenagers b $\frac{1}{5}$ c 65%



b 12% c Yes, "10" is an outlier. d 16%

4 a 26 strawberry plants



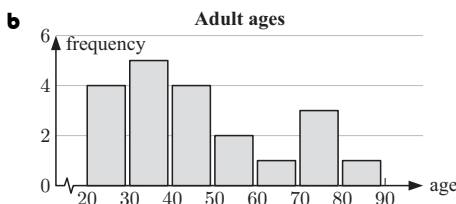
c Yes, "0" is an outlier. d $\approx 34.6\%$

18D GROUPED DATA

- 1 a 24 people b 70 to 74 wpm c 87.5%
 d i no ii 80 to 84 wpm

2 a

Age	Tally	Frequency
20 to 29		4
30 to 39		5
40 to 49		4
50 to 59		2
60 to 69		1
70 to 79		3
80 to 89		1
<i>Total</i>		20



- c 30 to 39 years d 55%

18E STEM-AND-LEAF PLOTS

- 1 a 59 g b 78 g c 107 g d 5 data values
 2 a 13 games b 2 points c $\approx 30.8\%$
 d Yes, "67" is an outlier.
 3 a i 3 | 9 8 9 ii 3 | 8 9 9
 4 | 2 5 8 2 7 0 4 | 0 2 2 5 7 8
 5 | 2 0 6 1 5 | 0 1 2 6
 6 | 3 4 6 | 3 4
 7 | 2 1 1 7 | 1 1 2
 Scale: 3 | 9 means 39 cm Scale: 3 | 9 means 39 cm

- b 40 to 49 cm

18F MEASURES OF CENTRE AND SPREAD

- 1 mean ≈ 6.45 , median = 7, mode = 8, range = 7
 2 a 33.25 minutes b 33 minutes
 c There are 3 data values which occur twice each. The mode is therefore undefined and is not used.
 d 51 minutes
 3 a median = 2, mean ≈ 2.39 b median = 223, mean = 225.56
 4 276 g 5 15 games

18G MEASURES OF CENTRE AND SPREAD FROM A FREQUENCY TABLE

1 a

Number of babies	Frequency	Product	Cumulative frequency
2	6	12	6
3	4	12	10
4	8	32	18
5	4	20	22
6	3	18	25
<i>Total</i>	25	94	

b i 4 babies ii 4 babies iii 3.76 babies iv 4 babies

2 a

Pieces of fruit	Frequency	Product	Cumulative frequency
1	3	3	3
2	2	4	5
3	4	12	9
4	2	8	11
5	4	20	15
6	6	36	21
7	1	7	22
8	2	16	24
9	0	0	24
10	1	10	25
<i>Total</i>	25	116	

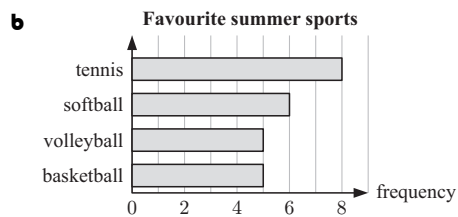
- b 25 people
 c i 6 pieces of fruit ii 5 pieces of fruit
 iii 4.64 pieces of fruit iv 9 pieces of fruit

REVIEW OF CHAPTER 18

- 1 a census b sample 2 a categorical b numerical

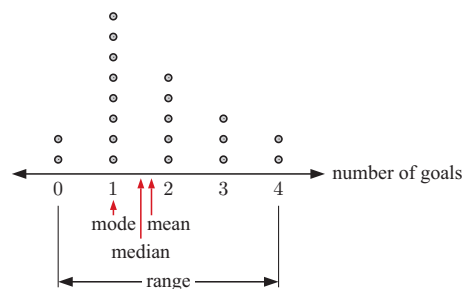
3 a

Sport	Tally	Frequency
Tennis		8
Softball		6
Volleyball		5
Basketball		5
<i>Total</i>		24



- c The mode is tennis. More students chose tennis as their favourite summer sport than any other sport.
 d $\frac{1}{4}$

- 4 a a vertical column graph b train c 5 students d 18%
 5 a, c



- b i 1.75 goals ii 1.5 goals iii 1 goal iv 4 goals

6 a

Time (min)	Tally	Frequency
0 to 9		2
10 to 19		6
20 to 29		8
30 to 39		9
40 to 49		4
50 to 59		3
60 to 69		1
<i>Total</i>		33

b 30 to 39 minutes
 c $\approx 24.2\%$

7	0	4	6	7	
	1	6	6	8	
	2	1	1	5	7
	3	2	2	5	7
	4	5	8	9	

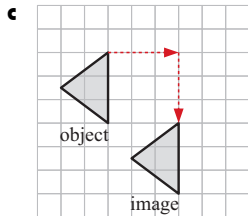
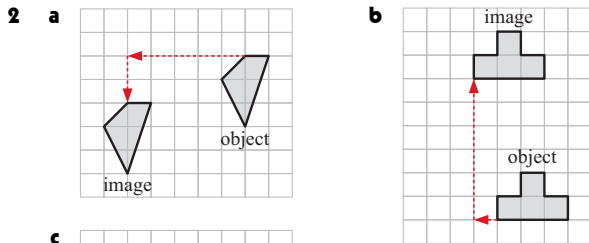
Scale: 1 | 6 means 16 marks

Number of days	Frequency	Product	Cumulative frequency
0	1	0	1
1	2	2	3
2	3	6	6
3	7	21	13
4	11	44	24
5	10	50	34
6	4	24	38
7	5	35	43
Total	43	182	

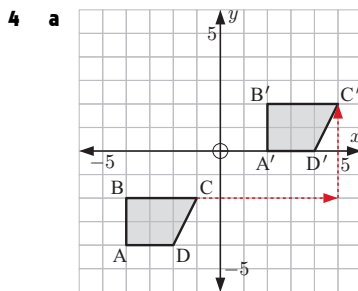
- b** i 4 days ii 4 days iii ≈ 4.23 days iv 7 days

19A TRANSLATIONS

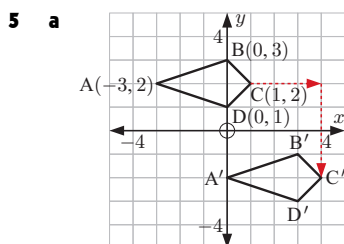
- 1 a** 4 units right, 3 units down **b** 2 units right, 4 units up
c 5 units left, 1 unit down



- 3 a** no **b** yes (5 units right, 2 units down)

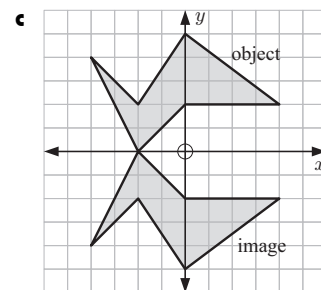
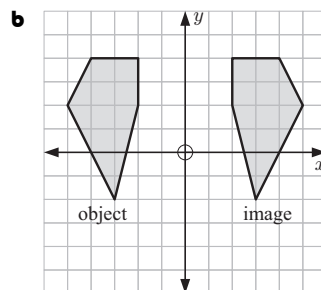
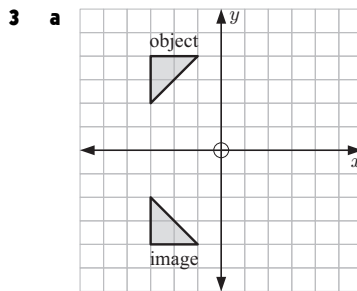
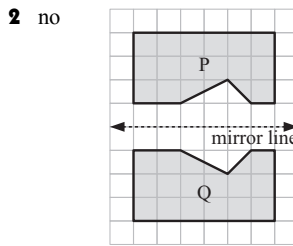
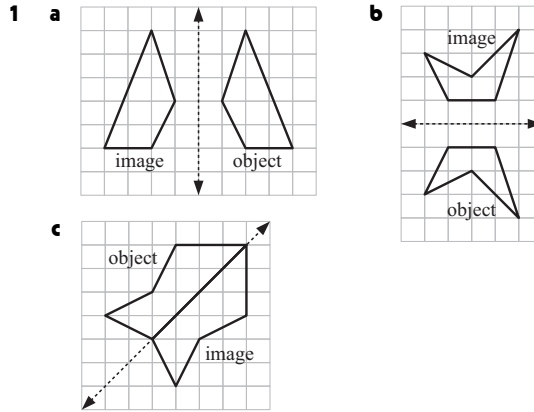


- b** $A'(2, 0)$, $B'(2, 2)$, $C'(5, 2)$, $D'(4, 0)$



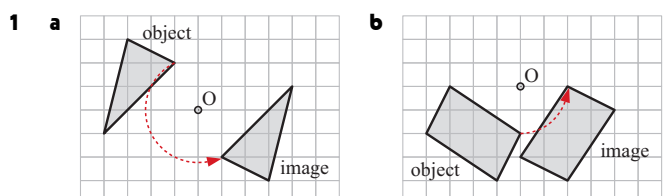
- b** $A'(0, -2)$, $B'(3, -1)$, $C'(4, -2)$, $D'(3, -3)$
c Yes, they are both kites.

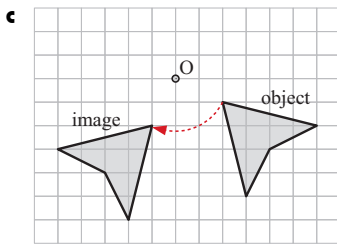
19B REFLECTIONS



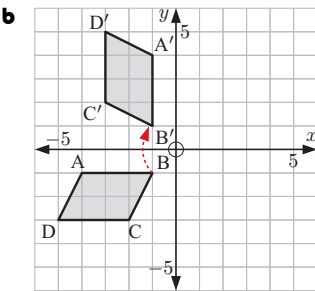
- 4 a** B and C **b** x-axis

19C ROTATIONS





- 2 Rotate 60° clockwise about O.
 3 a figure D b 90° anticlockwise
 4 a $A(-4, -1), B(-1, -1), C(-2, -3), D(-5, -3)$



- c $A'(-1, 4), B'(-1, 1), C'(-3, 2), D'(-3, 5)$

19D CONGRUENT FIGURES

- 1 a yes b no 2 B and C
 3 a 26 cm b 90° c 182 cm

19E USING TRANSFORMATIONS TO DEFINE CONGRUENCE

- 1 a Translate A 5 units right and 5 units down.
 b Rotate A 90° anticlockwise about O.
 c Reflect A in the x -axis, then translate the result 2 units left and 1 unit down.
 d Rotate A 90° anticlockwise about O, then translate the result 4 units down.
 2 a no b yes

19F CONGRUENT TRIANGLES

- 1 a yes {SAS} b yes {SSS}
 c No, insufficient information. d yes {SAS}
 e yes {AAcorS} f yes {RHS}
- 2 A
- 3 a i $\triangle ABC \cong \triangle EFD$ {SSS}
 ii $\widehat{ABC} = \widehat{EFD}, \widehat{CAB} = \widehat{DEF}, \widehat{BCA} = \widehat{FDE}$
 b i not congruent
 c i $\triangle ABC \cong \triangle RPQ$ {SAS}
 ii $\widehat{ABC} = \widehat{RPQ}, \widehat{BCA} = \widehat{PQR}, BC = PQ$

19G PROOF USING CONGRUENCE

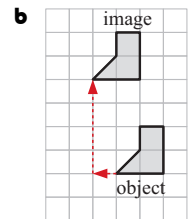
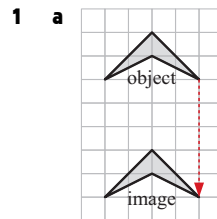
- 1 a In triangles ABM and ACM:
 • $AB = AC$ {given}
 • $\widehat{AMB} = \widehat{AMC} = 90^\circ$ {angles on a straight line}
 • [AM] is common to both triangles.

$\therefore \triangle ABM \cong \triangle ACM$ {RHS}

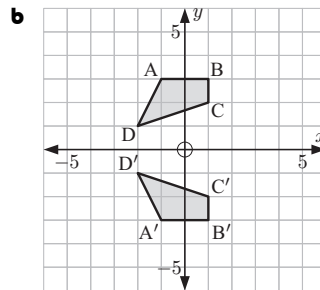
Equating corresponding angles, $\widehat{BAM} = \widehat{CAM}$.

- b In an isosceles triangle, the line joining the apex to the base at right angles bisects the vertical angle.
 2 b $PR = SQ$ {corresponding sides of congruent triangles}
 c The diagonals of a rectangle are equal in length.

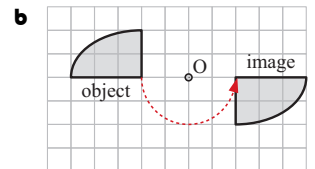
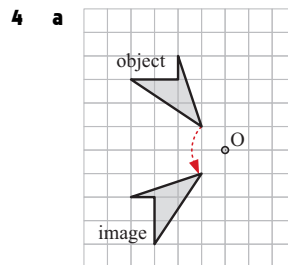
REVIEW OF CHAPTER 19



- 2 a 4 units right, 1 unit up b 3 units left, 4 units up
 3 a $A(-1, 3), B(1, 3), C(1, 2), D(-2, 1)$



- c $A'(-1, -3), B'(1, -3), C'(1, -2), D'(-2, -1)$



- 5 Reflect A in the y -axis, then translate the result 1 unit left and 6 units down.
 6 $\triangle PQR \cong \triangle YXW$ {AAcorS}
 $\widehat{PRQ} = \widehat{YWX}, PQ = YX, PR = YW$

20A WRITING PROBLEMS AS EQUATIONS

- 1 a $\frac{x-4}{7} = 3$ b $4x + 1 = x - 8$
 2 a $x + 3x = 4$ b $x + x - 2 = 44$

20B PROBLEM SOLVING WITH ALGEBRA

- 1 The number is 8. 2 The number is 3. 3 \$5
 4 The Bulls scored 118 points and the Bucks scored 112 points.
 5 15 kettles and 12 toasters 6 21 cm 7 32 cm^2

20C SOLUTION BY SEARCH

- 1 a If x is greater than 6 and $3x + 2y = 20$, then y will be negative.

b

x	1	2	3	4	5	6
y	$8\frac{1}{2}$	7	$5\frac{1}{2}$	4	$2\frac{1}{2}$	1

c $x = 2, y = 7; x = 4, y = 4; x = 6, y = 1$

2 $3\text{ m} \times 6\text{ m}$

3 a

Width (cm)	Length (cm)	Area (cm ²)
1	7	7
2	6	12
3	5	15
4	4	16
5	3	15
6	2	12
7	1	7

b $4\text{ cm} \times 4\text{ cm}$

4 18 **5** 200, when $a = 5$ and $b = 8$

20D SOLUTION BY WORKING BACKWARDS

- 1** The number is 8. **2** 352 gold
3 a 17 points **b** 9 questions **4** 90 envelopes

20E MISCELLANEOUS PROBLEMS

- 1** The numbers are 9 and 14. **2** 24 sausages **3** \$5
4 A hamburger costs \$3 and an ice cream costs \$1.50.
5 49, when $x = 4$
6 Devil's ivy costs \$20 per pot and lucky bamboo costs \$8 per pot.

20F LATERAL THINKING

- 1** 55 cars and 15 motorcycles **2** 28 matches **3** 30 squares
4 1 hour 12 minutes **5** 10
6 Yes, a possible strategy is guessing cups 2, 3, 3, then 2.

Guess 1: If 2 is initially incorrect, we know the ball started in cups 1, 3, or 4.

Guess 2: If our second guess 3 is incorrect, we know the ball started in cup 1 or cup 3. It cannot have started in cup 4 as it would have moved to cup 3 before the second guess, so our guess would be correct.

Guess 3: Since the ball started in cup 1 or cup 3, we know it started in an odd numbered cup. After 2 incorrect guesses, it must again be in cups 1 or 3.

If our guess of cup 3 is incorrect, then the ball must be in cup 1, and will now move to cup 2.

Guess 4: Our final guess of cup 2 must be correct.

REVIEW OF CHAPTER 20

- 1** The number is 6. **2** Paul spends \$50, Sue spends \$30
3 15 years old **4** 25 cm
5 722, when $x = 2$ and $y = 19$
6 4 black jelly beans, 10 yellow jelly beans, and 8 red jelly beans
7 \$1230