Number

Page 2 Standard Form

1. 1.34×10^{11}
2. 5.21×10^{-8}
3. 2.08×10^4
4. 4.0×10^9
5. 9.98×10^{-5}
6. 50.6
7. 0.2022
8. 0.000 000 08
9. 40 900
10. 0.000 030 04
11. 9.8×10^{-3}
12. 6.0×10^{10}
13. 510 100 000 km^2

Problem Solving

0.099 mm (2 sf)

or 0.0099 cm (2 sf)

Page 3 Rounding Numbers

1. 45.63 m (2 dp)
2. 46 m (2 sf)
3. $245.76
4. 68.353 (3 dp)
5. 0.003 (3 dp)
6. 100 (1 sf)
7. 2.0 (2 sf)
8. 65.00 (2 dp)
9. 1.00 (2 dp)
10. 13 000 (2 sf)
11. 55 m^2
12. Original 4 sf so answer should be 9.954 m^2
13. $14.67 each

Problem Solving

62, 64, 64, 64, 64, 64, 64, 64, 65

Page 4 Applications of Rounding

1. $726.06
2. $15.61
3. $92.87
4. $9.73
5. $36
6. 290 m
7. $2.31

Fun Spot

Roman numeral for 9

Page 5 Powers and Square Roots

1. $2^3 = 8 = \sqrt{64}$
2. $7^4 = 2401 = \sqrt{5\,764\,801}$
3. $5^1 = 5 = \sqrt{25}$
4. $6^0 = 1 = 12^0$
5. $8^6 = 262\,144 = 2^{18}$
6. $3.4^2 = 11.56 = \sqrt{133.6}$
7. $(^-2)^3 = {^-8} = (2^3) - 4^2$
8. $(0.2)^4 = 0.0016$ $= 4^2 \div 10000$
9. $\sqrt{121} = 11 = 3^2 + 2$
10. $\sqrt{1849} = 43 = 2^6 - 21$
11. $\sqrt{42.25} = 6.5 = 3^2 - 2.5$
12. $\sqrt{26} = 5.1 = 1^2 + 2^2 + 0.1$
13. $\sqrt{132} = 11.5 = 2.257^3$
14. $\sqrt{94.09} = 9.7 = 2^3 + 1.7$

Problem Solving

Basket 3 kg
Each apple 176 g

Page 6 Estimation

1. 40
2. 10
3. 4
4. 1
5. 10
6. 1
7. 100
8. 20
9. $15 000
10. $30 each
11. $600
12. $2000

Problem Solving

720 numbers possible

Page 7 Decimals

1. 14.78
2. 0.215
3. 15.87
4. 7.54
5. 72.41
6. 18.72
7. 4.51
8. 81.76
9. 3.57
10. 34.398
11. $8.20
12. a) $190.58
    b) 30.3 m
13. 8
14. $214.16

Problem Solving

72 and 79

Page 8 Practical Problems Using Decimals

1. a) 1.912 L $26.10
   b) 1.099 L $15.00
2. a) $13.88
   b) 0.743 kg or 743 g
3. $12.80
4. a) $56.93
   b) $94.85
5. Diesel $14.86
   Maintenance $107.30
   Total $122.16
6. One 5 kg bag and two 2 kg bags.
   Total $98.60

Page 9 Addition and Subtraction of Integers 1

1. ⁻384
2. ⁻291
3. 55
4. ⁻682

5. 274
6. ⁻396
7. ⁻155
8. ⁻440

9. ⁻528
10. 183
11. 78
12. ⁻24° C

13. $84 570 (OD)

Problem Solving

26 successful
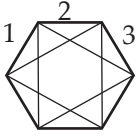
Page 10 Addition and Subtraction of Integers 2

1. ⁻89
2. ⁻1532
3. ⁻2399
4. 2388

5. ⁻2679
6. ⁻4001
7. ⁻1358
8. 5682

9. 5691
10. 2977
11. 2750 years
12. ⁻514 m

12. ⁻443 m
13. 145 m

Problem Solving

50, 20, 10, 10, 10, 10, 10 and 20, 20, 20, 20, 20, 10, 10

Page 11 Multiplication of Integers

1. ⁻715
2. ⁻6858
3. 39 264
4. ⁻71 577

5. ⁻495 018
6. 58 824
7. ⁻182 988
8. ⁻133 584

9. 178 186
10. 23 797 800
11. ⁻$2430 or $2430 OD
12. ⁻37 380

13. ⁻$475 000 000 000

Problem Solving

15 cubes and 26.7% (1 dp)

Page 12 Division of Integers

1. ⁻21
2. 7
3. ⁻90
4. 47

5. 46
6. ⁻17
7. ⁻19
8. 6

9. ⁻3
10. ⁻2
11. $465 000
12. 183 weeks

13. 25 weeks
14. $180

Problem Solving

Page 13 Number Review 1

1. 2.04×10^{11}
2. 6.07×10^{-12}
3. 3.02401×10^3
4. 1.325×10^{10}
5. 0.000 47
6. 3 510 000 000
7. 100 m² (2 sf)
8. 10 m³ (2 sf)
9. 6.5 (2 sf)

10. 1.6 cm² (2 sf)
11. 5060
12. 8100
13. 5.6
14. 30 m (2 sf)
15. 1024
16. 9.7 (1 dp)
17. 30 m
18. 200 m

19. 60
20. ⁻2
21. a) $1121.88
    b) $1283.56
22. ⁻66
23. ⁻384
24. 162
25. ⁻980
26. ⁻2

27. 18
28. ⁻30
29. a) $109.45
    b) $9.95

Page 14 Fractions (Adding and Subtracting)

1. $1\frac{3}{35}$
2. $\frac{10}{33}$
3. $\frac{50}{63}$
4. $\frac{13}{48}$

5. $1\frac{41}{60}$
6. $1\frac{14}{39}$
7. $\frac{29}{60}$
8. $\frac{127}{200}$

9. $1\frac{1}{9}$
10. $\frac{11}{24}$
11. $\frac{1}{8}$
12. $\frac{4}{7}$

13. 1200 km
14. $\frac{1}{8}$

Problem Solving

19 kg

Page 15 Fractions (Multiplication and Division)

1. $\dfrac{6}{35}$

2. $2\dfrac{2}{15}$

3. $\dfrac{8}{33}$

4. $\dfrac{4}{15}$

5. $\dfrac{10}{77}$

6. $2\dfrac{1}{16}$

7. $\dfrac{7}{55}$

8. $2\dfrac{10}{21}$

9. $\dfrac{52}{75}$

10. Yes, $\dfrac{1}{20}$ ha left over

11. $\dfrac{3}{20}$ each

12. $\dfrac{12}{35}$ in orchard

13. $\dfrac{3}{6}$ or $\dfrac{1}{2}$

Problem Solving

$\dfrac{1}{4}+\dfrac{1}{3}$ and $\dfrac{1}{2}+\dfrac{1}{12}$

Page 16 Fractions to Decimals

1. 0.04

2. 0.625

3. 0.167 (3 dp)

4. 0.444 (3 dp)

5. 0.15625

6. $\dfrac{17}{100}$

7. $\dfrac{6}{125}$

8. $1\dfrac{1}{4}$

9. $\dfrac{33}{40}$

10. $\dfrac{1}{250}$

11. 0.571 (3 dp)

12. $\dfrac{3}{8}$, bigger by 0.025

13. $\dfrac{17}{40}$

Problem Solving

Assuming she ate 5 chocolates on Friday there are 129 chocolates in the box.

Page 17 Mixed Numerals

1. $\dfrac{17}{7}$

2. $\dfrac{27}{5}$

3. $\dfrac{32}{9}$

4. $\dfrac{83}{10}$

5. $\dfrac{63}{8}$

6. $3\dfrac{9}{10}$

7. $8\dfrac{4}{11}$

8. $7\dfrac{11}{13}$

9. $4\dfrac{11}{19}$

10. $13\dfrac{7}{9}$

11. $4\dfrac{7}{24}$

12. $2\dfrac{5}{36}$

13. $\dfrac{29}{30}$

14. $1\dfrac{1}{4}$

15. 10

16. $1\dfrac{2}{7}$

17. $\dfrac{93}{175}$

18. 22 sweets

19. $7\dfrac{1}{2}$ poles

20. $4\dfrac{4}{5}$ m

Page 18 Ratios

1. $3:5$

2. $4:1$

3. $20:17$

4. $29:65$

5. $27:8$

6. $\$40:\$60$

7. $70\,cm:50\,cm$

8. $2.1\,kg:3.5\,kg$

9. $320:704$

10. $\$60:\$96$

11. 2.25 kg of meat

12. $\$10.50:\$24.50$

13. $5:6:4$

14. 12 km : 15 km : 9 km

Problem Solving

A
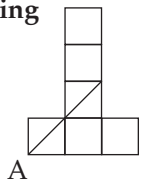
Page 19 Applications of Fractions

1. $\dfrac{1}{15}$

2. $\dfrac{5}{6}$

3. 12

4. 50

5. $\dfrac{12}{17}$

6. $\dfrac{3}{20}$

7. 9

8. $3\dfrac{3}{8}$ times as long

9. $\$450\,000$

10. 185 males

Page 20 Quantities as a Percentage

1. 35%
2. 46.6%
3. 82.1%
4. 54.7%
5. 3%
6. 82.5%
7. 6.1%
8. 8.2%
9. 38.4%
10. a) 21.9%
    b) 22.4%
    c) 23.5%
11. a) 65%
    b) 43.8 % (1 dp)
    c) 42.2% (1 dp)
12. 10.4% (1 dp)
13. 18%
14. 7.7% (1 dp)
15. 15%

Page 21 Percentage of an Amount

1. $7.50
2. $18
3. $66.50
4. $4.95
5. $13.20
6. 1524
7. 1683
8. 7800
9. 85 750
10. 91.64
11. $570
12. $1275
13. 252 ha
14. 0.84 secs
15. 11.4 strokes
16. $5400

Page 22 Percentage Change

1. 15.4%
2. 12.3%
3. 40%
4. 21.1%
5. 22.1%
6. 76.9%
7. 13.7%
8. 12.4%
9. 130.8%
10. 31.4%

Page 23 Percentage Increase and Decrease

1. $20
2. $199.42
3. $677.10
4. $355.71
5. $14 687.50
6. $72.09
7. $540.55
8. $103 490
9. $23.38
10. $1735.50
11. $20 250
12. $58 860
13. 2655 m
14. 55.49 kg
15. 240 boys

Page 24 Selling Price, Cost price and Mark-up

1. $31.98
2. $57.51
3. $119.93
4. $2993.90
5. $4350
6. $104.35
7. $27.18
8. $381.36
9. $224.14
10. $231.76
11. 39 pupils
12. $82 034.45

Communication Problem

The mark-up should increase to allow more profit. 25% of $9850 is $2462.50, yet expenses are $2500 so there is a loss of $37.50.

Page 25 Percentages (GST)

1. $9782.61
2. $121.77
3. $1061.22
4. $511.04
5. $3760.87
6. $1304.35
7. $847.83
8. $1782.61
9. $869.57
10. $462.61
11. $183 952.17
12. $3195.65
13. $126 956.52
14. $51.52

Problem Solving

$$\frac{10}{52}, \frac{1}{5}, \frac{6}{26}, \frac{8}{32}$$

Page 26 Number Crossnumber
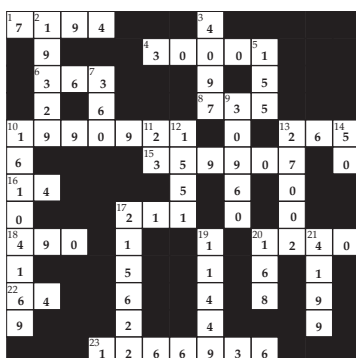
Page 27 Number Review 2

1. 36.4%

2. 270%

3. 0.49%

4. 20%

5. 11%

6. 76%

7. 0.32

8. 1.35

9. $\dfrac{1}{25}$

10. $\dfrac{3}{8}$

11. $1\dfrac{3}{20}$

12. $\dfrac{123}{500}$

13. $1\dfrac{29}{42}$

14. $1\dfrac{5}{11}$

15. $8\dfrac{3}{4}$

16. $4\dfrac{1}{60}$

17. $87.50

18. 2 : 5

19. 5 : 4

20. 6 : 11

21. $9 : $15

22. $4 : $6 : $14

23. $4 : $20

24. 12.9%

25. ⁻10.1

26. ⁻52.576

27. 4

28. $713.90

29. $71.61

30. 40.0% (1 dp)

31. 30

32. $21 304.35

33. $440.87

34. $86.65

35. $271.40

36. $215 050

37. $396.67

38. $362.37

Measurement

Page 29 Perimeter

1. 135.5 cm
2. 28.4 m
3. 8.05 m
4. 191 cm
5. a) 1700 m
   b) 10 200 m
   c) 6 laps
6. a) 214
   b) $1741.10

Page 30 Circumference

1. 48.1 cm (1 dp)
2. 24.5 m (1 dp)
3. 51.8 m (1 dp)
4. 295.6 cm (1 dp)
5. 85.9 cm (1 dp)
6. a) 400 m (0 dp)
   b) 406 m (0 dp)
   c) 23 laps

Problem Solving

888 + 88 + 8 + 8 + 8

Page 31 Area

1. 116.1 m² (1 dp)
2. 52 cm²
3. 1312 cm²
4. 25.7 m² (1 dp)
5. 1360 cm²
6. 360 m²

Application Problem

826.5 m² (1 dp)

Page 32 Area of a Circle

1. 301.7 m² (1 dp)
2. 191.1 cm² (1 dp)
3. 8824.7 mm² (1 dp)
4. 152.4 cm² (1 dp)
5. 32.3 m² (1 dp)
6. 296.4 cm² (1 dp)

Application Problem

5 by 10 = 50

Page 33 Volume

1. 28.6 m³ (1 dp)
2. 441.4 cm³ (1 dp)
3. 89.9 cm³ (1 dp)
4. 11.1 m³ (1 dp)
5. 265 268.8 mm³ (1 dp)
6. 29.7 m³ (1 dp)

Application Problem

18 hours

Page 34 Surface Area

1. 122 m²
2. 213 cm²
3. 102 m²
4. 60.4 m² (1 dp)
5. 1680 cm²
6. 7446.4 cm²

Problem Solving
196, when turned upside down you get 961.

Page 35 Metric Units

1. 35.4
2. 789
3. 24.514
4. 5240
5. 18 900
6. 13.453
7. 37 230
8. 0.872
9. 35 200
10. 3.435
11. 44 500
12. 34
13. 1.45
14. 4 700 000
15. 125
16. 1.386
17. 13.5
18. 21

Application Problem

26.8 L/h

Page 36 Practical Problems

1. $4875
2. a) 94.5 m³ (1 dp)
   b) 94 500 L
2. c) 45 hours
3. 27.8 m² (1 dp)
4. $27.43
5. a) 281.3 m² (1 dp)
   b) 44 L
   c) $690.80

Problem Solving
Andrew is 24
Daniel is 20
Samuel is 16
Matt is 12

Page 37 Timetables

1. 10.50 am, 25 min. long
2. 4 hours 20 minutes
3. 9.15 am
4. 4.05 pm
5. 25 hours
6. 70 min. (1 h, 10 min.)
7. $80
8. $255
9. $520
10. $470

Problem Solving
Nicola $5
Matthew $7

Page 38 Graphs

1. 11.00 am
2. 1 pm
3. 5 pm
4. 7 pm
5. 4 hours
6. 40 km
7. 6 to 7 pm and 8 to 9 pm.
8. 7.15 pm ± 5 min
9. 220 km
10. 1 to 6 pm. (line not as steep)
11. 70 km
12. 65 km/h
13. 11 am to 1 pm. Speed 10 km/h
14. 26 km/h
15. Katie. Katie's average speed is 27.5 km/h.

Problem Solving

11 pieces.
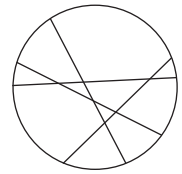
Page 39 Time

1. 0545
2. 1815
3. 0345
4. 2252
5. 2.25 am
6. 5.42 pm
7. 11.56 am
8. 4.5 h
9. 5.2 h
10. 2.67 h (2 dp)
11. 30 km/h
12. 24.86 km/h
13. 14 hours 57 mins
14. 22 hours 40 mins
15. 8 hours 55 mins
16. 1805 hours
17. a) 2.6 h
   b) 466.2 km/h

Problem Solving

52 rectangles.

Page 40 Rates of Change

1. 10 km/h
2. 30 km/h
3. 7 - 8 pm and 9 - 11 pm.
4. She is stationary.
5. $1300
6. $1500
7. Increase. Steeper gradient.
8. $8800

Problem Solving

Members = 96

Page 41 Scales

1.
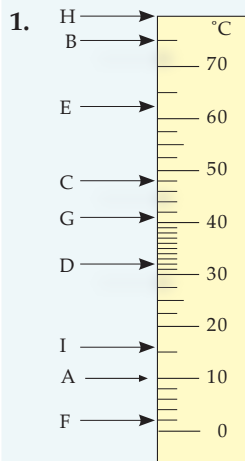
2. A = 60 km/h
   B = 135 km/h
   C = 160 km/h
   D = 10 km/h
   E = 107 - 108 km/h
   F = 31 - 32 km/h

3. A = 70 mL
   B = 18 mL
   C = 118 mL
   D = 38 mL

Problem Solving

Page 42 Measurement Crossnumber
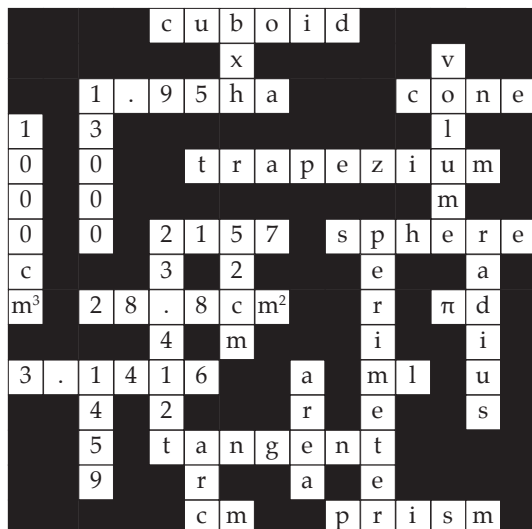
Page 43 Measurement Review

1. 55.2 cm
2. 27.0 m (1 dp)
3. 132.2 m^2 (1 dp)
4. 2.7
5. 2.53
6. 0.451
7. 777
8. A = 7.5
   B = 16.25
     or 16   (0 dp)
9. a) Vol. = 4.6 m^3 (1 dp)
   b) Cap. = 4600 L (2 sf)
10. a) $18.00
    b) $33.50
11. 5 hours 13 mins
    Depart 1012
    Arrive 1525
12. a) 25 units/h
    b) 24.6 units/h

Algebra

Page 45 Sequences

1. a)

and

b)

Pattern	1	2	3	4	5	6
No. of Matches	3	5	7	9	11	13

1. c) 21 matches
2. a) 13, 15, 17
   b) 2, ⁻2, ⁻6
   c) 21, 27, 34
   d) ⁻3, ⁻23, ⁻46
   e) 31, 63, 127

2. f) 27, 13.5, 40.5
   h) 1, ⁻0.5, 0.25
3. a) 3, 4, 5
   b) 1, 3, 5
   c) 4, 7, 12

3. d) $\frac{1}{3}, \frac{2}{3}, 1$
   e) 7, 4, 3

Problem Solving

$655 355.00

Page 46 Sequence Formulae

1. a)

Seats	1	2	3	4
Rods	3	5	7	9

1. b) Increase = 2 rods
   Previous = 1 rod
   Therefore formula is $T_n = 2n + 1$

2. a)

Shape	1	2	3	4
Counters	5	9	13	17

2. b) Increase = 4
   Previous = 1
   Therefore formula is $T_n = 4n + 1$

Problem Solving 55

Page 47 Interpreting Graphs

1. 20 litres
2. The tank has been filled.
3. 35 litres
4. The truck is stationary.
5. 8 pm to 10 pm
6. 5 pm to 8 pm
7. 8.75 litres/hour

Problem Solving

$364

Page 48 Graphs of Everyday Situations

1. $2
2. $6
3. 10 kg
4. $46
5. $35.20
6. 24 kg

Fun Spot
8 Planets in the Solar System.

Page 49 Adding and Subtracting Algebraic Terms

1. 9a
2. 8x − 4
3. 4m
4. 13 + x
5. 5
6. 2y − 4
7. ⁻4z
8. $6k^2 + k$
9. ⁻5mn + 3
10. $3q^3 + 15p$
11. xy + 3x − 2y
12. 8ab − 3
13. $⁻x^2 + 4x + 3$
14. 15k − 5s
15. ⁻8pq − 5q + 4p
16. $12x^2 + 5x − 4$
17. 6y − 15
18. $3r^2 − 4k$
19. $⁻3v^3 + 3v^2 − 7v$
20. xy − 7x + 15y

Problem Solving

8

Page 50 Multiplying Algebraic Terms

1. $6a^2b$
2. $12k^3$
3. $2m^3n^2$
4. $24a^4b^2$
5. $10p^2q^5$
6. $40j^{20}$
7. $3u^7$
8. $144x^3y^7$
9. $24r^6$
10. $8a^3$
11. $9m^4$
12. $16a^{12}b^{16}$
13. m^9n^{12}
14. $64x^6y^{15}$
15. p^3q^3
16. $8m^3n^6$
17. $48ab^4$
18. $144a^4$

Fun Spot

90 = Degrees in a rt. Angle

Page 51 Dividing Algebraic Terms

1. a^5
2. m^3
3. $\frac{1}{k^2}$
4. $\frac{2}{3b}$
5. $\frac{4}{3m}$
6. $\frac{1}{4xy}$
7. $\frac{5b^3}{9a^2}$
8. 2q
9. $\frac{3}{m}$
10. $\frac{2y}{a}$
11. xy
12. $\frac{2}{3b^2}$

Problem Solving

0 and 10 years

3 and 6 years

6 and 2 years

Page 52 Algebraic Substitution

1. 1
2. 20
3. 25
4. ⁻3

5. 79
6. 17
7. 9.52 m²

8. 904 .8 cm³ (1dp)
9. 378
10. 14.9 (1dp)
11. 7.5 (1dp)

Application Problem

54 287 cm³ (0 dp)

Page 53 Expanding

1. 4x + 24
2. x² – 5x
3. 3x² + 12x
4. 2x² – 12x

5. 14x² – 35x
6. ⁻12y – 8
7. ⁻6a + 8b
8. 8x – 14

9. 5x – 19
10. x² + 8x + 15
11. m² – 8m + 15
12. 6a² – 11a – 35

13. 12x² + 8xy – 12xz
14. ⁻2x² + 26x

Problem Solving

12 cubes
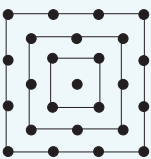
Page 54 Factorising – Common Factors

1. 3(x + 2)
2. 5(x – 4)
3. a(b + c)
4. 3(3x – 4y)
5. x(x + 4)

6. 4y(2k + 3y)
7. m(n + 1)
8. a(c + f + 2b)
9. 3(x + 4)
10. 2y(6x – 7)

11. 6(3 + 5b)
12. x(x + 2y + 3)
13. 6xy(2x – y)
14. 4x(x² + 4x – 2)
15. 15y(y – 1)

16. q²(14q – 1)
17. 9(a – 4 + 3a²)

Application Problem

a) x – 4

b) 4x – 8

Page 55 Factorising – Quadratics

1. (x + 3)(x + 2)
2. (k + 5)(k + 4)
3. (n + 1)(n + 1) = (n + 1)²
4. (q + 3)(q + 5)
5. (t – 4)(t – 2)

6. (p – 3)(p – 8)
7. (x – 2)(x – 2) = (x – 2)²
8. (v – 1)(v – 6)
9. (k + 8)(k – 2)
10. (g + 12)(g – 2)

11. (x – 9)(x + 4)
12. (n – 13)(n + 2)
13. d(d – 8)
14. u(u + 12)
15. (x + 2)(x – 2)

16. (x + 6)(x – 6)
17. (k + 7)(k + 8)

Problem Solving

420 days

Page 56 Algebra Review 1

1. 24, 27, 30
2. ⁻7, 0, 7
3. 51, 73, 99
4. ⁻2, 1, 4
5. a)

b) 25

6. a) 3 km

b) 40 minutes

c) After 20 minutes, for 10 minutes.

d) 18 km/h

7. ⁻5x + 12y
8. ⁻6x² + 6x – 1
9. 15k² – 2k

10. a²b³
11. 12m³n²
12. 12k²t³
13. 9x⁴y²
14. $\dfrac{x}{3z}$
15. a) 2
    b) 37
    c) 1

16. a) 3x – 15
    b) ⁻x + 31
    c) p² – 3p – 54
17. a) 2(3a + 4)
    b) 4(k – 3)
    c) (x + 4)(x + 8)
    d) (m – 16)(m + 2)
    e) (a + 9)(a – 9)

Page 57 Solve Linear Equations x + a = k , cx = k

1. x = 26
2. x = 30
3. x = ⁻73

4. x = ⁻74
5. x = 20
6. x = ⁻5

7. x = ⁻6
8. x = 72
9. x = 104

Application Problem

6x + x = 42

x = 6

Marama has $6 and Rawiri $36.

Page 58 Solve Linear Equations ax + b = k , $\dfrac{x}{d} + b = k$

1. $x = 5$
2. $x = {}^-2$
3. $x = 39$
4. $x = 15$
5. $x = {}^-84$
6. $x = 36$

Application Problem

$4x + 5 = 33$
$\qquad x = 7$
Pania is 7

Page 59 Solve Linear Equations a(x + b)= k , ax + b = cx + d

1. $x = 5$
2. $x = 23$
3. $x = 9$
4. $x = 1$
5. $x = 10$
6. $x = 8$
7. $x = {}^-7$
8. $x = {}^-6$

Page 60 Linear Equations Involving Fractions

1. $x = 3\dfrac{3}{4}$ $(\dfrac{15}{4})$
2. $x = 8\dfrac{3}{4}$ $(\dfrac{35}{4})$
3. $x = 1\dfrac{1}{2}$ $(\dfrac{3}{2})$
4. $x = 1\dfrac{7}{8}$ $(\dfrac{15}{8})$
5. $x = 1\dfrac{1}{8}$ $(\dfrac{9}{8})$
6. $x = \dfrac{7}{8}$ $(\dfrac{35}{40})$

Page 61 Writing Equations

1. $2x + 32 = 180$
   $\qquad x = 74°$
2. $12x + 8 = 140$
   $\qquad x = 11$ litres
3. $5x + 2 = 17$
   $\qquad x = 3$ kg
4. a) 145 litres
   b) $145x = 1305$
   $\qquad x = 9$ km

Problem Solving

36 000 cans

Page 62 Forming Formulae

1. a) \$95
   b) $C = 75N + 20P$
   c) \$360
1. d) 2 nights
   e) 7 nights
2. a) $C = 115s + 48d + 620$
   b) \$1291
   c) 6 sensors

Problem Solving

Lorraine	40 runs
Nicola	30 runs
Carl	15 runs
Diane	10 runs

Page 63 Solving Problems Using Linear Equations

1. $n = 17$
2. Musa has \$67.
3. 16, 17, 18
4. Daughter is 18, Mother is 36.

Application Problem

$4x + 1 = 10.6$
x(width) = 2.4 m
Dims. = 2.4 m x 2.9 m

Page 64 Change of Subject

1. $k = \dfrac{3m + 4}{2}$
2. $v = \dfrac{20 - 2t}{3}$
3. $S = \dfrac{4P}{T}$
4. $R = \dfrac{5 - 6Q + 3S}{2}$
5. $k = (m - 4)^2$
   $\quad = m^2 - 8m + 16$
6. a) \$90.20
   b) $K = \dfrac{5C - 4}{3}$
   c) 382 km

Problem Solving

Matt, Fraser, Sam, Latham, Rachel

Page 65 Linear Graphs – Plotting Points

1.

x	y = x − 2
0	⁻2
1	⁻1
2	0
3	1

2.

x	y = 2x + 3
0	3
1	5
2	7
3	9

5.

x	y = x
0	0
1	1
2	2
3	3

6.

x	y = 5
0	5
1	5
2	5
3	5
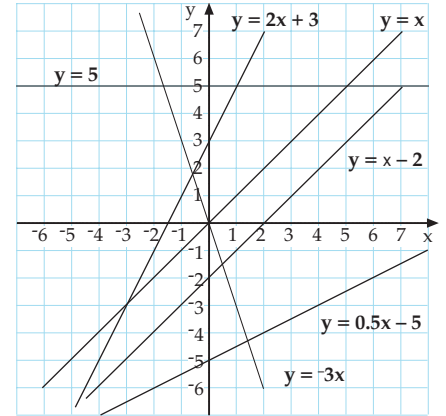
3.

x	y = ⁻3x
0	0
1	⁻3
2	⁻6
3	⁻9

4.

x	y = $\frac{1}{2}$x − 5
0	⁻5
2	⁻4
4	⁻3
6	⁻2

Problem Solving

5	4		
	6	2	
		3	1

Page 66 Linear Graphs – Gradient/Intercept

1. Grad. = 3   Y int = 2

2. Grad. = 1   Y int = 1

3. Grad. = ⁻2   Y int = ⁻1

4. Grad. = ⁻1   Y int = 0

5. Grad. = $\frac{1}{4}$ Y int = ⁻2

6. Grad. = $\frac{1}{2}$ Y int = 3

7. Grad. = 1   Y int = 4

8. Grad. = 0   Y int = ⁻5
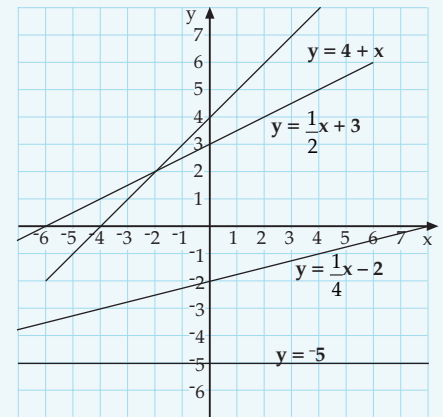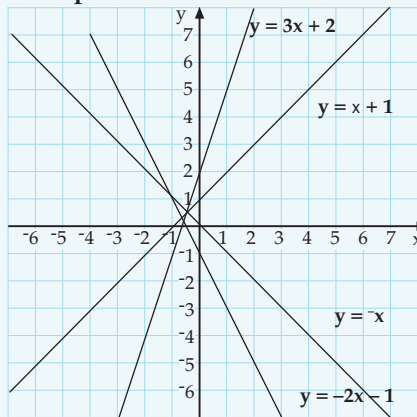
Problem Solving 14, 7, 22, 11, 34, 17, 52, 26, 13, 40, 20, 10, 5, 16, 8, 4, 2, 1.
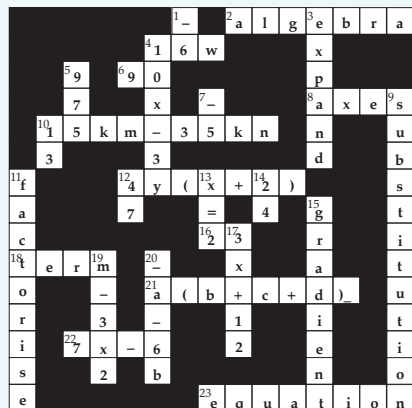
Page 67 Identifying Graphs

1. Grad. = 2 Y int = 1   y = 2x + 1

2. Grad. = 1 Y int = 7   y = x + 7

3. Grad. = $\frac{1}{2}$ Y int = ⁻4 y = $\frac{1}{2}$x − 4

4. Grad. = 1 Y int = ⁻3   y = x − 3

5. Grad. = 3 Y int = ⁻4   y = 3x − 4

6. Grad. = $\frac{⁻1}{4}$ Y int = 3 y = $\frac{⁻1}{4}$x + 3

7. Grad. = ⁻1 Y int = ⁻2 y = ⁻x − 2

8. Grad. = 0   Y int = 4   y = 4

Problem Solving

156 chimes

Page 68 Algebra Crossmaths

Page 69 Algebra Review 2

1. x = ⁻12

2. x = ⁻9

3. x = 10

4. x = $\frac{21}{20}$ = 1$\frac{1}{20}$

5. x = 11 cm (shorter)
longer = 15 cm

6. x + 4x + 5x = 8000
x = 800 m

7. a) $1.45
b) $7.45
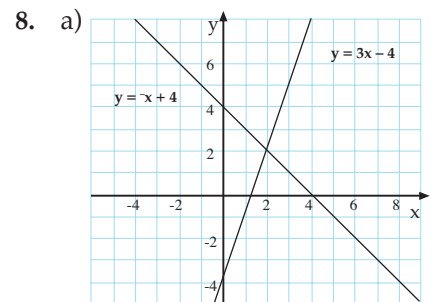
8. a)

8. b) (2, 2)

9. M = $\frac{5 - N}{2}$ or M = (5 − N) ÷ 2

Statistics

Page 71 Mean, Median, Mode, Quartiles, Interquartile Range (Discrete Data)

1. mean = 15.2
   median = 10
   mode = 9
   LQ = 8 UQ = 23
   IQ range = 15

2. mean = 28.5 (1 dp)
   median = 28
   mode = 29
   LQ = 21 UQ = 36.5
   IQ range = 15.5

3. mean = 4.14 (2 dp)
   median = 4.12
   no mode
   LQ = 3.56 UQ = 4.75

3. IQ range = 1.19

4. mean = 26.4
   median = 24
   mode = 21
   LQ = 19 UQ = 34
   IQ range = 15

Communication Problem

To travel 100 km at 40 km/h would take 2.5 hours. It is therefore impossible for you to average 80 km/h over 200 km as you will have to complete the last 100 km in 0 time.

Page 72 Mean, Median, Mode, Quartiles, Interquartile Range (Grouped Data)
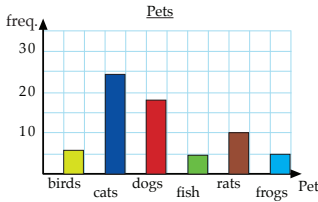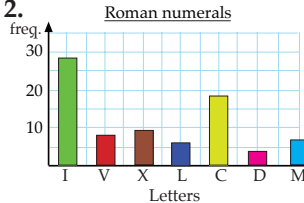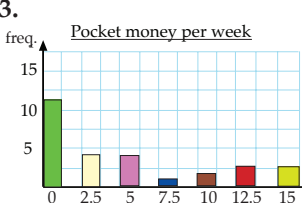
1. mean = 22.7
   median = 23
   mode = 23
   LQ = 21.5 UQ = 23.5
   IQ range = 2

2. mean = 2.6 (1 dp)
   median = 3
   mode = 2 and 3
   LQ = 2 UQ = 4
   IQ range = 2

2.

Freq.	fx
4	0
8	8
12	24
12	36
7	28
7	35
Totals 50	131

Problem Solving

Either 4 more matches and 400 more runs or 12 more matches and 729 more runs.

Page 73 Bar Graphs

1.

Pets

2.

Roman numerals

3.

Pocket money per week

4. 11

5. 8
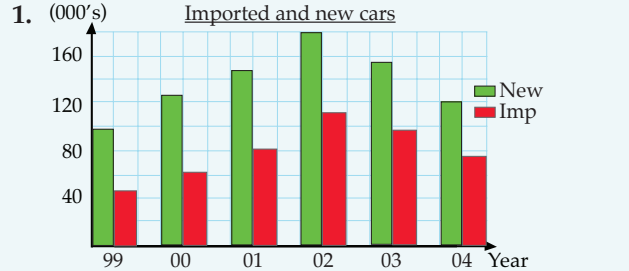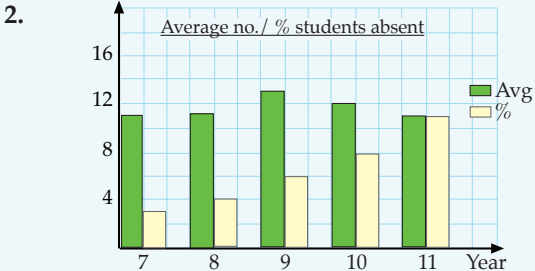
6. $140

7. $5

8. $2.50

9. Median as half the students get more or less than this figure.

Problem Solving

6 of each, 30 coins in total.
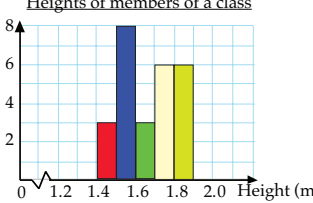
Page 74 Double Column Bar Graphs

1.

Imported and new cars
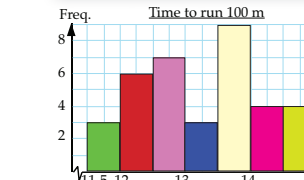
The number of cars (both new and imported) rose quickly from 1999 until 2002 and then declined. The number of imported cars did not decline as quickly as new cars and changed from under 50% in 1999 to over 60% in 2004.

2.

Average no./ % students absent

The average number of students away at each level is fairly constant but the percentage away goes up steadily from 3% to 11% as there is a different total number of students at each year level.

Page 75 Histograms

1.

Heights of members of a class

2.

Time (secs)	11.5 –	12.0 –	12.5 –	13.0 –	13.5 –	14.0 –	14.5 – 15.0
Frequency	3	6	7	3	9	4	4

Time to run 100 m

3. 37 people

4. 0.08 – 0.10 seconds

5. 0.02 to 0.04 seconds

6. 3 people

Page 76 Stem and Leaf Plots

1. a)

Males		Females
9 6	15	4 8 9 9
9 9 9 8 7 7	16	5 5 7 7 7 8 8 8
8 7 5 4 4 3 2 2	17	0 0 1 1 1 3 4
4 3 1 0	18	1

b)

Males		Females	
Median	172.5	Median	168
LQ	168.5	LQ	165
UQ	177.5	UQ	171

c) All males parameters are higher than those of the females.

2. a)

Test A		Test B
8 4 4 4 2	3	
9 7 7 6 5 5	4	5 6 7 7
8 7 7 6 6 4	5	6 7 7 7 8
7 5 3	6	2 7 7 7 8 8 8
6 2 2	7	2 2 6 7 8
	8	1 3 3 3

b)

Test A		Test B	
Median	56	Median	67
LQ	45	LQ	57
UQ	66	UQ	76.5

c) Test A ≥ 71   Test B ≥ 78

d) The class sitting Test B got higher results. On average their results were better by about 11 marks.

Page 77 Pie Graphs

1. Pie graph of Jeff's day

Other, TV, Sport, Bike, Homework, Bed, School

2. a) 900 or $900 000

b) School expenditure

Publicity, H and S, Grounds, Stud. sup, Sport, Building, Library, Admin Dept

2. c) Admin + = $460 000

d) % admin = 23.3%

e) % education = 40%

f) % property = 27.8%

Communication Problem

Possibly as 40% is spent on students' education, but over 50% is spent on administration or property.

Page 78 Box and Whisker Plots

1. Test results (%)

Males, Females

Conclusions. Female students (upper quartile and top) out-performed the males, but average and below average female students (median and lower quartile) was less than their male counterparts.

2. Stem and leaf plot of Test A and Test B (%)

Test A		Test B
8 4 4 4 2	3	
9 7 7 6 5 5	4	5 6 7 7
8 7 7 6 6 4	5	6 7 7 7 8
7 5 3	6	2 7 7 7 8 8 8
6 2 2	7	2 2 6 7 8
	8	1 3 3 3

Test A and Test B results (%)

Test A, Test B

3. Most of the class has improved by about 11%.

Page 79 Time Series

1. Assume the rate to climb is slower than descend.
- It took 2 hr 45 mins to reach the top.
- It took 1 hr to descend.
- 3 rests of 15 mins, 1 of 30 mins.
- Distance walked up was 2.5 km.
- Distance walked down was 4.5 km.
- Average walking speed 2.5 km/h (1 dp)

2. a) Weight of student's bag

b) 38 kg

c) 24 kg

Problem Solving 1 006 632 960

Page 80 Scatter Graphs

1. a), b) and c)
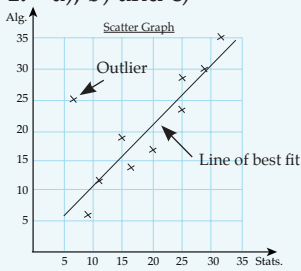
d) Outlier – Colin. Possible cause was that he was unwell on the day of the test or was away during some of the Statistics lessons.

e) There appears to be a close linear relationship between the results scored in Stats. and Algebra. You would expect that a student who is good at Stats. would also be good at Algebra.

f) It appears that the Stats. test was more difficult than the Algebra as 7 of the students' marks were better in Algebra. It could also mean that the students found the Stats. topic harder.

Page 81 Sampling Methods

1. Leo, because it included a representative from each class.

2. Ling

3. The amount of work that was required. It was like conducting two elections.

4. Difficult to administer. How do you get to the first student on the roll in 40 classes? If class registers are alphabetical then the survey may contain students from the same family.

5. Mainly senior students who are interested in sport.

6. It could be one form level that was entering the school gate all at the same time. They are likely to know each other and make similar statements.

7. The prefects are all likely to be voting similarly to each other, as will the drama group and the Year 9 class. Instead of getting a sample Daniel would get 3 different groups.

Communication Problem
Teacher will need to answer as there are lots of possible answers.

Page 82 Interpreting Statistical Graphs

1. mean = 7.6 (1 dp)
median = 8
mode = 8
LQ = 6   UQ = 9
range = 6
total sold = 79

2. Mean (7.6) is the sum of shoe sizes divided by the number sold – of little use in this situation.

2. Median (8) is the middle shoe size sold after they are ranked in order.
Mode (8) most common shoe size sold – useful in this situation.

2. LQ (6) 25% of people wear size 6 shoe or smaller.
UQ (9) 75% of people wear size 9 shoe or smaller.
Range (6) of shoe sizes sold i.e. 10 – 4.

3. Most popular size is size 8, no size 11s are sold, mostly sizes 8, 9 and 10 are sold (48 out of 79).

Communication Problem

Probably a reasonable statement as no size 11 was sold and 79 pairs were sold altogether.

Page 83 Misleading Graphs

1. Not consistent scale 10, 20, 40.

2. Differences exaggerated because vertical scale does not start at 0.

3. Wider and taller. Area increased not just the height.

4. Should be a bar graph. Implies points in between.

Page 84 Statistics Review

1.
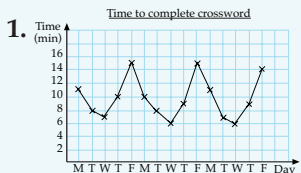
The teacher solves the crossword faster on Wednesdays and takes longer on Fridays. Time she takes depends on the day of the week.
Predictions: M 11, T 8, W 6, T 9, F 15 (mins).

2. Vertical axis has different scale and horizontal axis has different steps for years. It looks like the company has made more dramatic sales increases than it has.

3.

4. Sales increased by 500 000 rolls between 2011 and 2012 and the same amount between 2012 to 2015. From 2015 to 2019 the increase was 1 000 000 rolls.

Predictions:

2020 5 250 000 rolls.

2021 5 550 000 rolls.
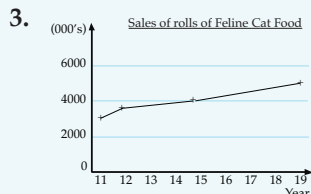
5. 10FB   10GM
median 26   median 26
LQ = 13   LQ = 14.5
UQ = 33   UQ = 38

The median mark for both classes is the same. The interquartile range of 10GM is greater than that of 10FB (23.5% compared to 20%).
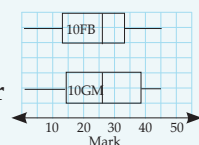
Probability

Page 86 Experimental Probability

1. a) throws $= 500$

    b) P(up) $= 0.75$ $\left(\frac{3}{4}\right)$

    c) P(down) $= 0.25$ $\left(\frac{1}{4}\right)$

2. a) P(fail) $= 0.0667$ (3 sf) $\left(\frac{1}{15}\right)$

    b) number $= 400$

3. a) P(pole) $= 0.109$ (3 sf) $\left(\frac{7}{64}\right)$

    b) P($\neq$ false) $= 0.641$ (3 sf) $\left(\frac{41}{64}\right)$

    c) False $= 1196$

4. a) 40

    b) P(W) $= 0.275$ $\left(\frac{11}{40}\right)$

    c) P(R) $= 0.1$ $\left(\frac{1}{10}\right)$

4. d) White $= 165$

    e) Number $= 1000$

    f) P(W $\cap$ R) $= 0.375$ $\left(\frac{15}{40}\right)$

    g) P(W') $= 0.725$ $\left(\frac{29}{40}\right)$

    h) P(any) $= 1$

Problem Solving
24 ways.

Page 87 Theoretical Probability

1. a) P(odd) $= 0.5$ $\left(\frac{1}{2}\right)$

    b) P($\neq$4) $= 0.833$ (3 sf) $\left(\frac{5}{6}\right)$

    c) P(<7) $= 1$

2. a) P(J) $= 0.0769$ (3 sf) $\left(\frac{1}{13}\right)$

    b) P(J $\cap$ 10) $= 0.154$ (3 sf) $\left(\frac{2}{13}\right)$

    c) P($\neq$2) $= 0.923$ (3 sf) $\left(\frac{12}{13}\right)$

    d) P(b7,r3) $= 0.0769$ (3 sf) $\left(\frac{1}{13}\right)$

3. a) P(win) $= 0.004$ $\left(\frac{1}{250}\right)$

    b) P(W) $= 0.02$ $\left(\frac{1}{50}\right)$

4. a) P(2ndG) $= 0.222$ (3 sf) $\left(\frac{2}{9}\right)$

    b) P(2ndR) $= 0.222$ (3 sf) $\left(\frac{2}{9}\right)$

5. a) P(first) $= 0.15$ $\left(\frac{3}{20}\right)$

    b) Number $= 0.128$ (3 sf) $\left(\frac{5}{39}\right)$

6. P(win) $= 0.16$ $\left(\frac{4}{25}\right)$

Communication Problem

As half go each side of a peg you should get
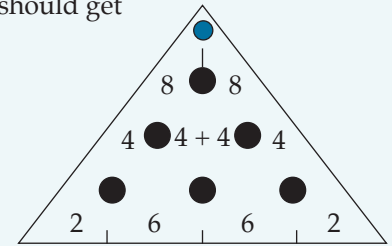
Or looking at the outside only, you should always have half the number hitting the peg above which will give 2 on each outside.

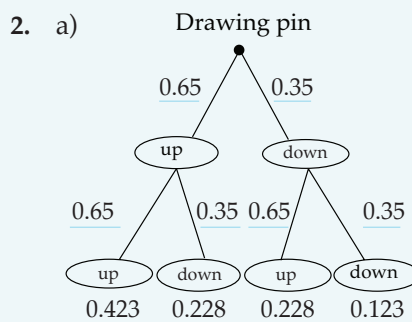### Page 88 Predicting Probability Results

1. a) P(red) $= 0.125$ $\left(\frac{1}{8}\right)$
    b) Number $= 25$
    c) Number $= 87.5$ (87 or 88)

2. a) P(2 x 6s) $= 0.0278$ (3 sf) $\left(\frac{1}{36}\right)$
    b) Number $= 36$

    c) P(double) $= 0.167$ (3 sf) $\left(\frac{1}{6}\right)$
    d) Number $= 6$

2. e) P($=10$) $= 0.0833$ (3 sf) $\left(\frac{1}{12}\right)$

3. a) P(diff) $= 0.8$ $\left(\frac{4}{5}\right)$
    b) Expect $= 1.25$ trips

    c) P(diff) $= 0.6$ $\left(\frac{3}{5}\right)$
    d) Expect $= 1.67$ trips (3 sf)

    e) P(diff) $= 0.4$ $\left(\frac{2}{5}\right)$

3. f) Expect $= 2.5$ trips

    g) P(diff) $= 0.2$ $\left(\frac{2}{5}\right)$
    h) Expect $= 5$ trips
    i) Total $= 1+1.25+1.67+2.5+5$
    $\qquad = 11.42$ trips

Problem Solving

Result $= 0$

Page 89 Tree Diagrams

1. a)
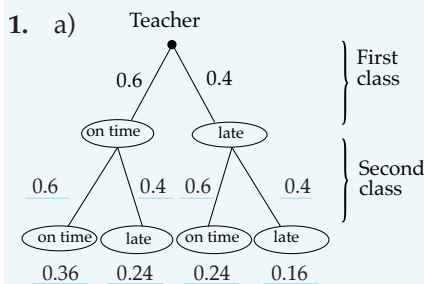
    b) P(late twice) $= 0.16$
    c) P(twice on time) $= 0.36$
    d) P(late only once) $= 0.48$

2. a)

    b) P(2 x up) $= 0.423$ (3 sf)
    c) P(2 x down) $= 0.123$ (3 sf)

2. d) P(1 x up) $= 0.455$ (3 sf)

    e) P(5 x up) $= 0.116$ (3 sf)

Problem Solving

Any pair which sum to 3.54 m.

Page 90 Probability Review

1. a) 90 mice.

    b) P(W) = 0.411 (3 sf) $\left(\dfrac{37}{90}\right)$

    c) P(≠W) = 0.589 (3 sf) $\left(\dfrac{53}{90}\right)$

2. a) P(R) = 0.25 $\left(\dfrac{1}{4}\right)$

    b) P(YorW) = 0.417 $\left(\dfrac{5}{12}\right)$

    c) P(≠B) = 0.833 $\left(\dfrac{5}{6}\right)$

3. a)

Goal kicks

0.77   0.23   First shot

goal   miss

0.77   0.23   0.77   0.23   Second shot

goal   miss   goal   miss

0.593   0.177   0.177   0.0529
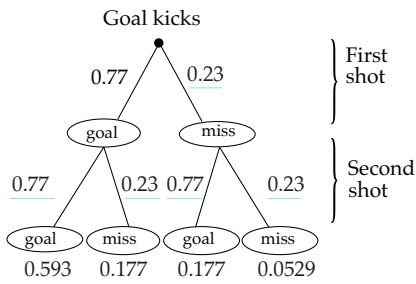
3. b) P(2 x over) = 0.593 (3 sf)

    c) P(1 x over) = 0.354 (3 sf)

    d) P(3 x miss) = 0.0122 (3 sf)

    e) Yes he should as the probability of being on his usual form and missing 3 in a row is 0.0122 or 1.2%.

4. a) P(1st) = 0.0075 $\left(\dfrac{3}{400}\right)$

    b) P(≠1st) = 0.993 $\left(\dfrac{397}{400}\right)$

5. a) P(wing) = 0.486 (3 sf)

    b) P(shoot) = 0.326 (3 sf)

    c) Place the best defender to mark the wing attack. Your centre can be ready to intercept passes to the wing attack.

6.

Wt \ Bk	1	2	3	4	5	6
1	(1, 1)	(1, 2)	(1, 3)	(1, 4)	(1, 5)	(1, 6)
2	(2, 1)	(2, 2)	(2, 3)	(2, 4)	(2, 5)	(2, 6)
3	(3, 1)	(3, 2)	(3, 3)	(3, 4)	(3, 5)	(3, 6)
4	(4, 1)	(4, 2)	(4, 3)	(4, 4)	(4, 5)	(4, 6)
5	(5, 1)	(5, 2)	(5, 3)	(5, 4)	(5, 5)	(5, 6)
6	(6, 1)	(6, 2)	(6, 3)	(6, 4)	(6, 5)	(6, 6)

$$\text{Probability} = \frac{15}{36} = 0.417 \text{ (3 sf)}$$

Geometry

Page 92 Angle Properties

1. a = 49° Adjacent angles on a straight line add to 180°.

    b = 131° Adjacent angles on a straight line add to 180°.

2. c = 64° Angle sum of a Δ = 180° (base angles of an isos. Δ are =)

    d = 116° Adjacent angles on a straight line add to 180°.

3. e = 60° Angles in an equilateral Δ are equal.
    f = 60° Vertically opposite angles are equal.

4. g = 41° Angle sum of a Δ = 180°.

    h = 90° Angle in a rectangle.

5. i = 38° Base angles of an isos Δ are =.

    j = 104° Angle sum of a Δ = 180° .

    k = 76° Adjacent angles on a straight line add to 180°.

6. p = 51° Angle sum of a Δ = 180° .

    q = 69° Angle sum of a Δ = 180°.

7. 12x = 360° Angle sum at a point is 360°.
    x = 30°

8. y = 38° Adjacent angles on a straight line add to 180°.

    z = 71° Base angles of an isosceles triangle are equal and angle sum of a triangle equals 180°.

Communication Problem

Angle of elevation + 90° + 63° = 180°

Angle of elevation = 27°

Page 93 Angle Properties of Parallel Lines

1. a = 26° Co-interior angles between parallel lines add to 180°.

    b = 154° Corresponding angles between parallel lines are equal.

2. c = 131° Alternate angles between parallel lines are equal.

    d = 49° Co-interior angles between parallel lines add to 180°.

3. e = 54° Angle sum of a Δ = 180° .

    f = 54° Alternate angles between parallel lines are equal.
    g = 65° Corresponding angles between parallel lines are equal.

4. h = 34° Co-interior angles between parallel lines add to 180°.

    j = 34° Alternate angles between parallel lines are equal or Angle sum of a Δ = 180°.

    k = 47° Co-interior angles between parallel lines add to 180°.

5. m = 128° Vertically opposite angles are equal.

    n = 52° Co-interior angles between parallel lines add to 180°.

    p = 128° Corresponding angles between parallel lines are equal.

6. r = 126° Angle sum of a Δ = 180° and vertically opposite angles are equal.

    s = 21° Alternate angles between parallel lines are equal.

    t = 33° Angle sum of a Δ = 180° .
    u = 99° Angle sum of a Δ = 180°.

7. w = 83° Corresponding angles between parallel lines are equal.

    v = 129° Co-interior angles between parallel lines add to 180°.

Application Problem

a = 60°

b = 70°

c = 130°

Page 94 Angle Properties of Polygons

1. a = 60°
    b = 120°
    c = 60°

2. d = 45°
    e = 135°
    f = 90°

3. g = 60°
    h = 120°
    i = 120°
    j = 240°

4. k = 51.4° (1 dp)
    n = 64.3° (1 dp)
    14m = 360°
    m = 25.7° (1 dp)

5. Sides = 12

6. Sides = 8
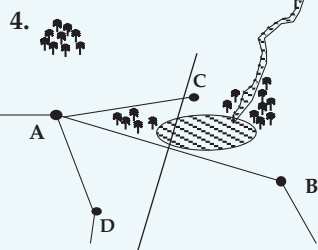
7. d = 40°

Communication Problem

Interior angle of a hexagon is 120° and so three of them equal 360°. The interior angle of a pentagon is 108° and no multiple of 108° equals 360°.

Page 95 Symmetry and Angle Properties of Polygons

1. a = 200°
    b = 90°
    c = 35°
    d = 325°
    e = 115 mm
    f = 83 mm

2. g = 40°
    h = 140°
    j = 105°
    k = 75°
    n = 1.9 m
    p = 1.7 m
    q = 5.5 m

3. Hexagon = 4 triangles
    Hexagon = 4 x 180°
    Hexagon = 720°

4.

Name	Sides	No Δs	Angles	Total
Tri.	3	1	1 x 180	180
Quad.	4	2	2 x 180	360
Pent.	5	3	3 x 180	540
Hex.	6	4	4 x 180	720
Oct.	8	6	6 x 180	1080
Deca.	10	8	8 x 180	1440

5. 60° = b
    90° = a
    120° = d
    150° = c

Page 96 Constructions

1. Passes through 28 ± 1
2. Passes through 23 ± 1

3. Angle bisector passes through the letter C of angle ACB.

4.

5. Triangle drawn to scale.
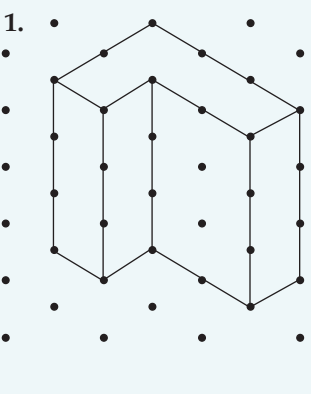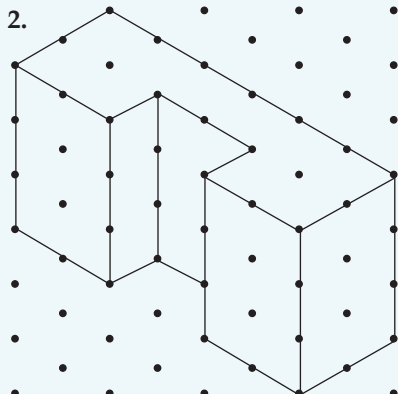
Page 97 Circle Geometry

1. A = 38°
    B = 104°
    C = 43°
    D = 43°

2. E = 96°
    F = 42°
    G = 42°
    H = 90°

3. I = 35°
    J = 55°
    K = 55°
    L = 55°

4. M = 32° Angles from the same arc are equal ⊗.
    N = 39° Angles from the same arc are equal ⊗.
    P = 109° Angle sum of a Δ is 180°.

5. Q = 90° An angle in a semi circle ◯ is 90°.
    R = 28° The angle at the centre is twice the angle at the circumference Ⓐ.
    T = 28° Base angles of an isos. Δ are equal.

Fun Spot
WEONO1
We owe no one.
4U2ENV
For you to envy.
IDA14U
I am the one for you.

Page 98 Isometric Drawing 1

1.

2.

Page 99 Isometric Drawing 2

1.
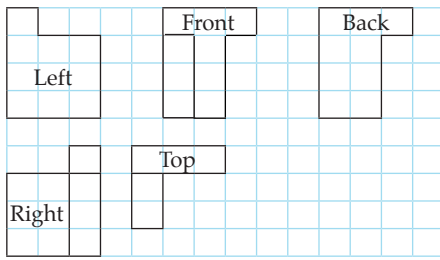
2.
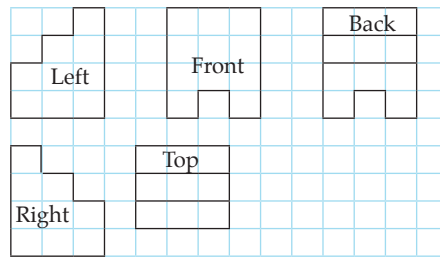
3.
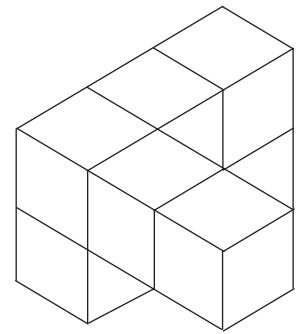
Page 100 Polyhedra and Nets

1.

Cone

2.
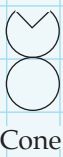
Cube
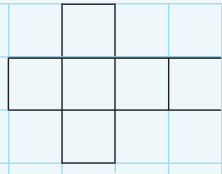
Application Problem

3.
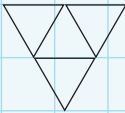
Tetrahedron

4.
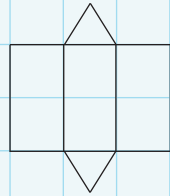
Triangular prism

5.
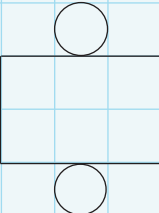
Cylinder

6.
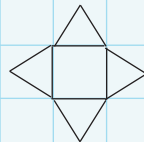
Square pyramid
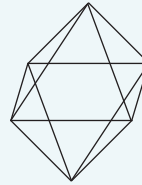
Page 101 Enlargement

1. sf = 2
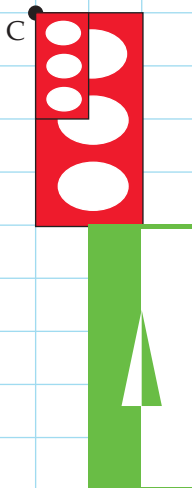
2. sf = 2
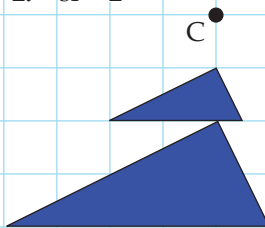
3. sf = $\frac{1}{2}$

4. x = 32 mm

y = 21 mm

z = 35°

5. a = 3.75 m

b = 1.6 m

c = 1.875 m

Application Problem

Detail	Plan	House
Width of lounge	45 mm	4.5 m
Length of the kitchen	36 mm	3.6 m
Height of the door	19.5 mm	1.95 m
Area of the house	18 000 mm²	180 m²

Page 102 Rotation

1.

90° anticlockwise

2.

90° clockwise

3.

90° anticlockwise

4.

half turn

5.

half turn

6. A rotation of 90° anti-clockwise about O.

7.
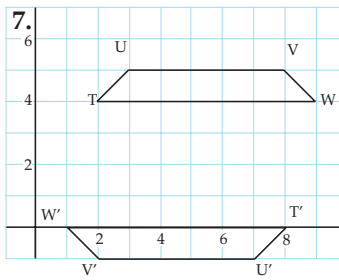
T' = (8, 0), U' = (7, ⁻1)

V' = (2, ⁻1), W' = (1, 0)

8. A rotation of 180° about O.

Page 103 Reflection and Symmetry

1.

2.

3.

4.

5.

6.

7. Axes = 4
   Order = 4
   Total = 8

8. Axes = 10
   Order = 10
   Total = 20

9. Axes = 0
   Order = 1
   Total = 1

10. Axes = 0
   Order = 4
   Total = 4

11. Axes = 0
   Order = 2
   Total = 2

12. Axes = 1
   Order = 1
   Total = 2

Problem Solving

Cylinder because there are more ways it will fit - total order of symmetry is greater.
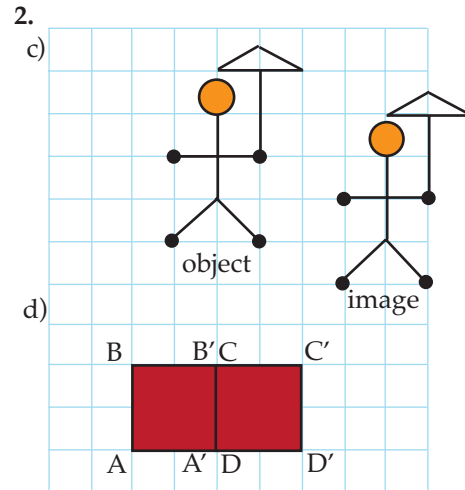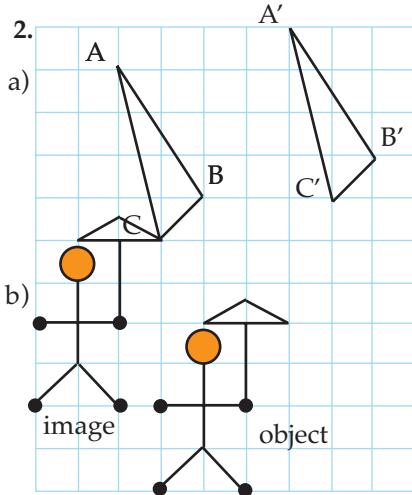
Page 104 Locus

1.

2.

3. a)

b) A rectangular area 10 m by 4 m starting from and parallel with the 10 m length of wire; plus two quarter circles radius 4 m centred at each end of the 10 m length of wire.

4.

Problem Solving

61.5%

Page 105 Translation

1. a) $\begin{pmatrix} 4 \\ 1 \end{pmatrix}$

   b) $\begin{pmatrix} 5 \\ -1 \end{pmatrix}$

   c) $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$

2. a)

b)

2. c)

object

image

d)

Communication Problem

A translation of 1 unit across and 2 units down.

i.e. $\begin{pmatrix} 1 \\ -2 \end{pmatrix}$

Problem Solving 36 km/h (2 sf)

Page 106 Properties of Transformations

1. Translation back 5 down 1.
2. Rotation of half a turn about (4, 2.5).
3. Reflection in the mirror line x = 5.
4. All the points on the line x = 3.
5. Just the point R.

	Rotation	Reflection	Translation	Enlargement
Angle size	✔	✔	✔	✔
Area	✔	✔	✔	✗
Line length	✔	✔	✔	✗
Sense – the direction you go around it.	✔	✗	✔	✔

Fun Spot

12	13	1	8
6	3	15	10
7	2	14	11
9	16	4	5

Page 107 Geometry Review

1. a = 26° Adjacent angles on a straight line add to 180°.

   b = 90° Right angle marked.

2. c = 64° Angle sum of a Δ is 180°.

   d = 154° Adjacent angles on a straight line add to 180°.

3. e = 116° Co-interior angles between parallel lines add to 180°.

   f = 64° Corresponding angles between parallel lines are equal.

4. g = 72°
   h = 108°
   i = 72°

5. j = 90°
   k = 39°
   m = 102°

6.

7. 10 sides

8. sum = 360°

9.

10.

Reflect the figure in the mirror line m.

11.

Translate the figure by $\begin{pmatrix} -2 \\ -1 \end{pmatrix}$

12.

Rotate the figure 90° clockwise about O.

13.

Enlarge the figure scale factor 2 centre C.

14.

15.

Trigonometry

Page 109 Pythagoras 1

1. a = 13 cm
2. b = 30 mm
3. c = 25 mm
4. d = 12.5 cm
5. e = 16.4 cm (1 dp)
6. f = 10.1 cm (1 dp)
7. g = 8.3 cm (1 dp)
8. diagonal = 4.2 m
9. 11.5 km (1 dp)
10. 3.7 km (1 dp)
11. 110 + 50 + 121
    = 281 m (0 dp)

Page 110 Pythagoras 2

1. a = 6 cm
2. b = 5 cm
3. c = 5.1 cm (1 dp)
4. d = 9.9 cm (1 dp)
5. e = 7.2 cm (1 dp)
6. f = 15.8 m (1 dp)
7. g = 9.7 m (1 dp)
8. 15.9 m (1 dp)
9. 2 x around = 600 m
    6 x diag. = 671 m (0 dp)
    Diagonal by 71 m
10. Sides 3.54 m (2 dp)

Page 111 Sine and Cosine

1. a = 8.62 m
2. b = 16.3 cm
3. c = 4.97 m
4. d = 12.1 m
5. e = 12.1 m
6. f = 118 mm
7. g = 4.85 m

Application Problem

Height 2.41 m (2 dp)

Page 112 Tangent

1. a = 5.00 cm
2. b = 5.65 cm
3. c = 37.2 cm
4. d = 126 mm
5. e = 9.56 m
6. f = 32.2 m
7. g = 92.2 m

Application Problem

Height = 5.60 m (2 dp)

Page 113 Mixed Problems

1. a = 36.3 m (1 dp)
2. b = 5.47 cm (1 dp)
3. c = 7.3 m (1 dp)
4. d = 162.4 mm (1 dp)
5. e = 20.5 m (1 dp)
6. f = 6.5 cm (1 dp)
7. g = 8.3 m (1 dp)

Application Problem

x = 18.7 m (1 dp)

Page 114 Angles

1. A = 28.2 ° (1 dp)
2. B = 57.8° (1 dp)
3. C = 26.0° (1 dp)
4. D = 37.3° (1 dp)
5. E = 54.8° (1 dp)
6. F = 62.3° (1 dp)
7. G = 35.0° (1 dp)

Application Problem

Angle = 66.4° (1 dp)

Page 115 Applications

1. h = 1.13 m
2. h = 3.04 m
3. d = 2.88 m
4. b = 20.7 m
    s = 14.0 m
5. dist. = 19.3 m
    angle = 62.1°
6. h = 13.8 m

Page 116 Trigonometry Review

1. p = 13.2 m (1 dp)
2. q = 80.5 cm (1 dp)
3. r = 3.19 m (3 sf)
    s = 1.81 m (3 sf)
4. t = 83.5 mm (3 sf)
5. u = 11.7 m (1 dp)
6. v = 45.4 cm (1 dp)
7. x = 1.26 m (3 sf)
8. y = 0.362 m (3 sf)
9. A = 40.3° (1 dp)
10. a) h = 55.1 m (1 dp)
    b) a = 84.6° (1 dp)
11. h = 301 m (3 sf)
12. a) h = 29.9 m (3 sf)
    b) lgth = 150 m (3 sf)