Unit 14: Problem solving

Lesson 1: Problem solving – place value

→ pages 45–47

1. a) Max's score < Jamilla's score
   b) Richard's score < Emma's score
   c) Richard's score < Emma's score < Max's score < Jamilla's score

2. Rounds down to the nearest 10,000; Rounds up to the nearest 100

3. 6,937, 6,973, 7,369, 7,639, 7,693, 7,963

4. The *y*-axis intervals should be labelled in 200s (for every marker) or 400s (for the bold markers).

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Sales in £	1,800	2,800	2,600	1,400	3,000	3,800

5. Children should refer to numbers that round up for City X and numbers that round down for City Y; For example: the smallest possible population of City X is 482,500 and the largest possible population of City Y is 484,999 so City Y could be larger than City X.
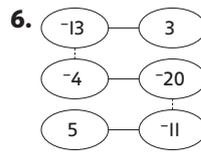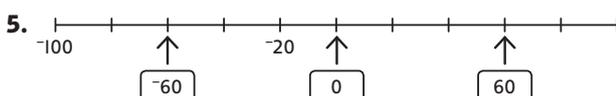
Reflect

Answers will vary.

Check that the left circle number has fewer than 5 hundreds (for example, 3,498); the middle number is greater than 50,000 and has fewer than 5 hundreds (for example, 50,368); the right circle number is greater than 50,000 and has 5 or more hundreds (for example, 50,500).

123,412 is greater than 50,000 and it rounds down to 123,000 (to the nearest 1,000).

Lesson 2: Problem solving – negative numbers

→ pages 48–50

1. Answer b) should be ticked.

2. a) ⁻23, ⁻16, ⁻9, ⁻2, 5, 12
   b) 19, 13, 7, 1, ⁻5, ⁻11
   c) ⁻35

3. a) London
   b) London and Oslo

4. winter temperature = ⁻20 °C
   summer temperature = 28 °C

5.

6.

Reflect

Answers will vary; for example:

Find the difference (24 + 40 = 64), halve the difference (32), then add 32 to ⁻40 or subtract 32 from 24 (⁻8).
or
Add the two numbers together (24 + ⁻40 = ⁻16) then halve the answer (⁻8).

Lesson 3: Problem solving – addition and subtraction

→ pages 51–53

1. There are 3,210 visitors in the park.

2. The third number is 3,037.

3. a) 1,100 more children than adults visited the park on Saturday.
   b) The difference is 1,200.

4. They sell 186 cakes in total.

5. a)
H	T	O	.	Tth	Hth
	5	3	.	1	9
+	7	8	.	8	2
1	3	2	.	0	1

   b)
Th	H	T	O
⁸9̸	¹0	⁶7̸	¹1
− 6	1	5	3
2	9	1	8

6. △ = 250 ☐ = 350 ⬠ = 750

Reflect

Answers will vary; for example:

117	
69	48

117 + 69 = 186

Lesson 4: Problem solving – four operations (1)

→ pages 54–56

1. An adult ticket costs £15. A child ticket costs £8·50.

2. 11 van trips are needed.

3. a) 42 mixed bags can be made.
   b) 3 lemons and 1 lime are needed to complete another bag.

4. Jen uses 625 ml more water for the mugs.

5. Multiplying by 6 then dividing by 3 is the same as multiplying by 2 (doubling).

6. There are 12 tins of red paint.

Reflect

Answers will vary; for example: read the question carefully, write down all the number sentences needed to solve the problem, use bar models, check that you have answered the question.

Lesson 5: Problem solving – four operations (2)

→ pages 57–59

1. One spotty bead costs 23p.

2. The tower is 420 cm high.

3. a) The capacity of a small bottle is 450 ml.
  b) 2·7 l more water fills 10 large bottles.

4. 94 × 8 + 3; 98 × 4 + 3; 48 × 9 + 3; 49 × 8 + 3

5. ◯ = 12 cm ● = 16 cm ⬤ = 20 cm

Reflect

Most efficient strategy is 10 times the difference (10 × 270) rather than 10 × 720 – 10 × 450.

25 × 270 = 6,750 ml = 6·75 l

Lesson 6: Problem solving – fractions

→ pages 60–62

1. $\frac{2}{6} < \frac{1}{2} < \frac{3}{4}$

2. a) They sold 84 cookies altogether.
  b) $\frac{2}{9}$ of the cookies were left.

3. $\frac{7}{18}$

4. $3\frac{7}{20}$ km

5. There are 96 marbles in the bag.

6. $\frac{4}{8} \times \frac{2}{3} = \frac{1}{3}$ $\frac{3}{5} + \frac{4}{4} = 1\frac{3}{5}$ $\frac{3}{10} + 4 = 4\frac{3}{10}$

Reflect

$\frac{7}{12}$ is larger than $\frac{1}{2}$. 7 is more than half of 12; the other numerators are less than half of their denominator.

Lesson 7: Problem solving – decimals

→ pages 63–65

1. The mass of 1 bag of popcorn is 0·18 kg.

2. a) A carton of juice costs 65p.
  b) 8 bags of popcorn cost £9·20 more than 8 cartons of juice.

3.

4. The mass of 1 tin of nuts is 0·27 kg (to two decimal places).

5.

4·6	7·1	4·8
5·7	5·5	5·3
6·2	3·0	6·4

Reflect

0·87 is closest to 0·9 as it is only 0·03 away from 9.

Lesson 8: Problem solving – percentages

→ pages 66–68

1. The washing machine is £238 in the sale.

2. 54 children walk to school.

3.

Destination	Number of flights	Percentage of total flights
Other French cities	72	30%
European cities	132	55%
Cities outside Europe	36	15%

4. There were 4,500 visitors altogether.

5. 35% of 180 = 30% of 210

Reflect

$\frac{3}{5} = \frac{12}{20} = 60\%$

Lesson 9: Problem solving – ratio and proportion

→ pages 69–71

1. a) $\frac{3}{8}$ of the box is pens.
  b) He will have 18 fewer pens than pencils.

2. a) 30 cakes can be made.
  b) 625 g of flour is needed.

3. 9 : 3 or 3 : 1

4. On the map the two cities are 13 cm apart.

5. There are 3 boys for every 5 girls.

6. A large tin has a mass of 560 g.

Reflect

24 ÷ 3 × 5 = 40

Lesson 10: Problem solving – time (1)

➜ pages 72–74

1. a) Max must wait 2 hours and 25 minutes.
   b) Jen watches TV for 50 minutes.
   c) Viewers must wait 10 full weeks.

2. a) The teacher makes 21 appointments.
   b) The last appointment on Wednesday ends at 19:55.

3. Olivia raises £40.

4. 12 intervals of 45 minutes = 9 hours, which is longer than one third of a day (8 hours).

5. a) 2,904 hours = 121 days
   b) The puppy was born on 17 June.

Reflect

10 minutes past 10; 22:10; 10:10 pm

Lesson 11: Problem solving – time (2)

➜ pages 75–77

1. a) The journey on the 16:12 bus is 3 minutes shorter.
   b) It is quicker for Max to walk.

2. Children spend 4 hours 15 minutes longer in lessons.

3. a) He travelled 125 km.
   b) The break was 1 hour 15 minutes long.
   c) He stopped for lunch at 1:05 pm (13:05).

4. Taxi company A will be the cheapest. A is 60p a minute, so £18; B is 15 minutes for £9·75 so £19·50 for 30 mins; C is 64p per minute (or £3·20 for 5 minutes) so £19·20 for 30 minutes.
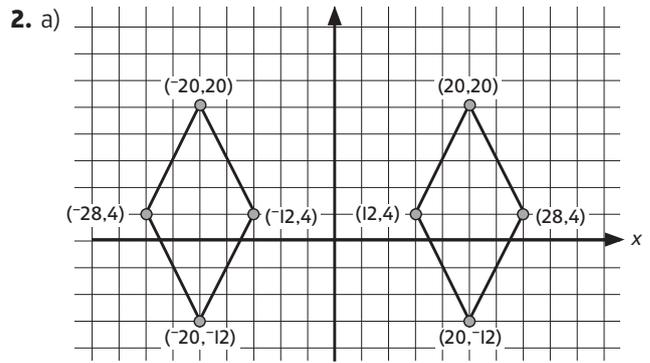
Reflect

She has used column addition forgetting that there are 60 mins in an hour, not 100. The correct time is 1:40 (13:40).

Lesson 12: Problem solving – position and direction

➜ pages 78–80

1. B($^-$1,5)
   D(3,1)

2. a)

   b) (12,4), (20,20), (20, $^-$12) and (28,4)

3. a) A(12,14)
      B(12,2)
      C(19,2)
   b) (12,8)
   c) Circled: (16,12)

4. ($^-$1,4); (2,$^-$5); ($^-$1,5); ($^-$4,$^-$4)

Reflect

Add each part of the coordinate then divide by 2.
7 + 7 = 14; 14 ÷ 2 = 7; 2 + 10 = 12, 12 ÷ 2 = 6.
The half-way point is (7,6).

Some children will notice that the x-coordinate will be 7 as well, as the line is horizontal, parallel to x-axis.

Lesson 13: Problem solving – properties of shapes (1)

➜ pages 81–83

1. a = 30°, b = 42°, c = 68°, d = 68°

2. a) a = 55°, b = 35°
   b) Answers will vary; for example: c = 180° – 35° (angle b) = 145°, d = c (opposite angles).

3. angle x = 28°, angle y = 100°, angle z = 52°

4. angle x = 100°, angle y = 60°, angle z = 200°

5. angle a = 40°, angle b = 140°, angle c = 40°

Reflect

Answers will vary.

Angles b + c = 92° (180 – 88). For example: 46° and 46°; 80° and 12°.

Lesson 14: Problem solving – properties of shapes (2)

1. External angle is 360° ÷ number of sides; 360 ÷ 8 = 45
   or internal angle sum: 6 × 180 = 1,080; 1,080 ÷ 8 = 135;
   180 – 135 = 45
   m = 45°

2. Shapes in the wrong place: trapezium, rhombus, regular pentagon and regular hexagon.

	Interior angles add up to 360°	Interior angles do not add up to 360°
Have at least one pair of parallel sides	rectangle ←	⟨rhombus⟩
	parallelogram	⟨regular pentagon⟩
Have no pairs of parallel sides	kite	triangle
	⟨trapezium⟩	⟨regular hexagon⟩

3. Internal angle of hexagon = 120°, 3 × 120° = 360°

4. angle a = 120° (adjacent angles in parallelogram = 180°
   or opposite angles are equal), angle b = 47°
   (internal angles in a pentagon = 108°; angles round
   a point = 360°)

5. angle e = 80°, angle f = 40°

Reflect

A regular pentagon has 5 angles each of 108°.
330 ÷ 3 = 110°, not 108. Alternatively: all angles must be
equal in regular shapes: 330 ÷ 3 = 110°, leaving only 210°
for the other two angles, not enough for both to be 110°
(angle sum of pentagon = 3 × 180 = 540).

End of unit check

My journal

He will save £7,776.

Children need to find 25% and $\frac{3}{10}$ of 1,200 to find how
much is left (540) then split into the ratio 3 : 2 to find out
how much he saves each month (540 ÷ 5 = 108;
2 × 108 = 216 saved) then multiply by the number of
months: 216 × 36 months = 7,776

Power play

	Money spent	Arrival time	Departure time
Jamie	£7·50	13:00	14:15
Max	£2·50	10:30	13:30
Zac	£10	11:15	13:15

Children should fill in any information given in the
speech bubble first: Max's times and Zac's spend, using
that to work out the rest.