Answers: Problem solving & Reasoning

1 QUESTION TYPE 1: CHOOSING OPTIONS AND FILLING-IN BLANKS Page 6: Choosing options 1. 0.75 2. 3. ✓ A quarter of the children had a salad. More children had sandwiches or baked potato than had salad. ✓ Two children had sandwiches. 50% of the children had baked potatoes.

Page 7: Fill in the blanks – write numbers in the spaces

- 1. Although other numbers are possible, the question asks for the same digit.
 - **2** + 6 × **2** = 14
- 207. The rule is to double the previous number and add 1.

	¹ ⁄2	¹ 4	⁶ 7	¹ 3
_	1	7	3	5
		7	3	8

2 QUESTION TYPE 2: THINKING THINGS THROUGH AND GIVING EXPLANATIONS Page 8: Thinking things through

rage o. Thinking things th

1. 8431

3.

- 2. Either 2582 1707 = 875 or 2582 875 = 1707
- There are many possible answers. The easiest is to choose four of each fruit, add the four fruit prices together, then multiply by 4: £6.80, plus a £1 melon and a 15p banana to make £7.95. This leaves 5p in change.

Page 9: Giving explanations

- 1. Because a rhombus also has four identical sides.
- 2. Because $\frac{2}{5}$ as a decimal is 0.4. (Or $\frac{2}{5} = \frac{40}{100}$, and 0.45 = $\frac{45}{100}$)
- Multiply 21 by 3 (63), and then multiply this by 100: 63 × 100 = 6300. (Or, 300 × 20 = 6000, and 300 × 1 = 300, then 6000 + 300 = 6300.)

3 QUESTION TYPE 3: WORD PROBLEMS

Page 10: Single-step problems.

- 1. 30 cars
- **2.** $200 \times 10 = 2000$, and $200 \times 0.5 = 100$. 2000 100 =£1900
- 3. 700 minutes

Page 11: Multi-step problems (show your method)

- 1. $8 \times \pounds 5.50 = \pounds 44$ $\pounds 50 - \pounds 44 = \pounds 6$ $2 \times \pounds 8 = \pounds 16$ $\pounds 6 + \pounds 16 = \pounds 22$
- 2. $\frac{1}{3}$ of 24,000 = 8000, and 8000 × 2 = 16,000

 $\frac{1}{4}$ of 16,000 = 4000 children

- 3. There is more than one way to solve this problem. Large = L, Small = S S = 550 - L S = 1350 - 3L Try L = 300 S = 550 - 300 = 250 S = 1350 - 900 = 450 This isn't correct, because each gives a different answer. Try L = 400 S = 550 - 400 = 150 S = 1350 - 1200 = 150 Both give S = 150g so the large bricks must weight 400g each. Or L + S = 550q
 - 3L + S = 1350g
 - So 2L = 1350g 550g
 - 2L = 800gL = 400g

4 PLACE VALUE AND ROUNDING (PAGE 13)

1. 8565

- 2. To the nearest Hundred To the nearest Ten Thousand Ten Thousand 245,100 245,000 250,000
- 3. 1,029,482 (second number to be circled)
- 4. Complete the missing numbers in this table.

•	-	
100 less	Number	1000 more
7730	7830	8830
2010	2110	3110
725	825	1825
45	145	1145

- Jim must have rounded both numbers down, but he should have rounded 6512 up, because it is greater than 6499, which would give an estimate of 19,000.
- 6. 12,537,000 people

5 ADDITION AND SUBTRACTION (PAGE 15)

- Subtract 100 and then add 3.
 - Subtract 3, then subtract 90
 - Add 7 then subtract 90
 - Subtract 90 then subtract 7

		7	6	9	7
_	ł	5	7	3	5
-	1	3	4	3	2

- **3.** 8642 7531 = 1111
- 4. She rounded to the nearest ten thousand for each number, giving: 240,000 + 120,000 + 440,000 = 800,000
- 5. £401.22

2.

6. 12,847 + 8571 = 21,418 then, 22483 - 21418 = 1065 <u>1065 people</u>

6 MULTIPLICATION AND DIVISION (PAGE 17)

1. 3050

2.

	8	12	20	100	800
× 5	40	60	100	500	4000
÷ 4	2	3	5	25	200

3. Kavi knows that if $12 \times 12 = 144$, then 144 divided by 12 equals 12.

24 is double12, so it will only go into 144 six times.

- 4. 6 and 12
- $2500 \div 80 = 31$ remainder 20, so there are 20 books left over. 5. $20 \times f4.50 = f90$

 $9 - 2 \times 3 + 5 = 8$

112 seeds 6.

7 ORDER OF OPERATIONS (PAGE 19)

 $12 \div 4 - 3 = 0$ 1.

- $6 \times (2 + 5 4) = 18$ 2
- 3. Note: the 4 and 3 can be the other way around. $2 + 4 \times 3 - 5 = 9$
- She subtracted the 4 and then divided by 2. 4. She should have divided the 4 by the 2 first.
- £3.30 5.
- 6 $3 \times 15 + 2 \times 25 - 17 =$ 45 + 50 - 17 = 78 balloons

8 FRACTIONS: IDENTIFYING, SIMPLIFYING, **AND COMPARING (PAGE 21)**



9 FRACTIONS: ADDING, SUBTRACTING MULTIPLYING AND **DIVIDING (PAGE 23)**

- 1. $+\frac{2}{6}$ $\frac{1}{2}$ $1 - \frac{1}{6}$ 2. 24 pencils $\frac{1}{3} \times \frac{3}{8} = \frac{1}{8}$ $\frac{5}{7} \times \frac{3}{4} = \frac{1}{2}$ $12 \times \frac{3}{4} = 9$ 3 $\frac{3}{8}$ 4.
- Because when we divide by a fraction we flip it, so the calculation 5. is $\frac{1}{2} \times \frac{4}{1} = \frac{4}{2}$ and 4 divided by 2 equals 2.
- 6. $\frac{1}{3} \times \frac{141}{1} = 47$

 $2 \times 47 = 94$ girls

10 FRACTIONS, DECIMALS AND PERCENTAGES (PAGE 25)



2.	Fraction	$\frac{1}{4}$	<u>2</u> 5	$\frac{3}{4}$	<u>9</u> 10
	Decimal	0.25	0.4	0.75	0.9
	Percentage	25%	40%	75%	90%

3. $\frac{3}{8} < 40\%$ $0.65 > \frac{3}{5}$

4.

- 5. Ahmed worked out that 10% of 800 is 80, so 40% must be $4 \times 80 = 320$ children
 - Or, he calculated $\frac{40}{100} \times 800$, which is $40 \times 8 = 320$ children
- 25 7 = 18 did not have cheese. 6.

 $\frac{18}{25} = 72\%$

11 DECIMALS AND MONEY (PAGE 27)

1.							
	0		0.31		0.76	0.91	1
2.	0.76	0.706	0.7	0.076			
3.	0.54						
4.	£34						

- 5.
 - 0.12kg
- $\pounds1.45 + \pounds0.75 = \pounds2.20$ 6. $\pounds 2.20 \times 30$ is the same as $\pounds 2.20 \times 10 \times 3$ $22 \times 3 = 266$ She needs £16 more.

12 RATIO AND PROPORTION (PAGE 29)

- 1. 2 in every 5 counters are blue.
 - One in three sheep have black wool.
 - The ratio of white to black sheep is 3:2
 - ✓ 40% of the sheep have black wool.
- 3. 10m

2.

- He has added the 3 and the 2. Instead he should have multiplied 4. them. For one onion there are 3 carrots, and for 3 carrots there must be 6 potatoes.
- 5. 6cm
- For every 5 people 2 are children and 3 adults, 6. 5 goes into 200 40 times. So there are $2 \times 40 = 80$ children, and $3 \times 40 = 120$ adults.

13 PATTERNS, SEQUENCES, AND ALGEBRA (PAGE 31)

- $3 \times (2) = 6$ 1. 2. 2 1
 - 5 14 41 122
- The rule is to add $1\frac{1}{4}$ each time. The next number will be $7\frac{3}{4}$. 3.

4.	x	1	3	5	7
	У	-3	1	5	9

Triangle = 2, Hexagon = 7 5.

£15 6.

14 MEASUREMENT: PERIMETER, AREA AND VOLUME (PAGE 33)

1.	2m, 6m	3m, 5m	4m, 3m	12m, 1m
	✓		✓	✓

- 2. 4 laps
- 3. 86 metres of fence

- 4. 3cm long and 2cm wide.
- 5. 22.7cm²
- Each side = 6cm

15 MEASUREMENT: LENGTH, MASS AND CAPACITY (PAGE 35)

- 1. Hamster = 0.032kg Cat = 3.6kg Horse = 360kg Elephant = 3200kg
- 2. 10.2cm
- **3.** 0.43l or 430ml
- 4. For every 5 miles there is 8km. 30 miles is 5×6 , so we also multiply the 8×6 : $8 \times 6 = 48$ km
- For 225 × 11 multiply by 10 then add 225 225 × 10 = 2250 2250 + 225 = 2475g or 2.475kg 5000 - 2475 = 2525g or 2.525kg
- 250ml every second in one hour is 250 × 60 = 15,000ml for every minute and then 15,000 × 60 = 900,000ml for every second. 900,000ml is 900 litres of paint.

16 GEOMETRY: ANGLES AND SHAPES (PAGE 37)

1. All the angels should be 60°.



- 5 faces, 8 edges, 5 vertices.
- 3. Any three of rectangle, parallelogram, kite and arrowhead kite.
- 4. $a = 180^{\circ} b$. The two horizontal lines are parallel so the angles are the same on each of the lines. Therefore, on both lines *a* and *b* are next to each other on a straight line. Angles on a straight line add up to 180° .
- **5.** 450°
- 6. The angle at the centre of a shape is 360°.

72° × 5 = 360° So she can put five triangles together, which will make a 5-sided shape, a regular pentagon.

17 GEOMETRY: POSITION AND DIRECTION (PAGE 39)

- 1. (6, 6)
- 2. (8, 9)

S

- 3. He has added the y translation, rather than subtracted. The correct coordinates for B when translated would be (6, 0).
- 4. 5.



6. (-3, -4) and (-3, 2) (Answers given in the opposite order is fine.)

18 TIME, DISTANCE AND SPEED (PAGE 41)

- 1. 07:35 or 7.35am
- 2. 3 years = 36 months, eight weeks = 56 days, five days = 120 hours
- 3. July, August, September by 2 more days
- 4. Because the flat part on the graph shows time increasing when distance stays the same. This is for 90 minutes.
- 5. 75kph
- 6. Holly takes 20 ÷ 4 = 5 hours. She left at 9am, so she arrives at 2pm.

Isabelle takes 20 \div 8 = 2.5 hours. She left at 11am, so she arrives at 1.30pm.

Isabelle will arrive first, by 0 hours and 30 minutes.

19 DATA HANDLING: SIMPLE CHARTS (PAGE 43)

Black	Blond	Brown	Red
JHT I		₩1₩ ₩1	
6	3	18	3

2. Brown

1.

- 3. Because there are 20 sheep in total, and one-third of twenty is just less than 7.
- 4. Field A.
- 5. 11 rides
- 6. 3 out of 20

20 DATA HANDLING: GRAPHS, PIE CHARTS AND STATISTICS (PAGE 45)

- **1**. 4
- 2. 6 °C
- The mean temperature is 1 + 3 + 4 + 4 = 12, then divide by 4.
 12 ÷ 4 = 3 °C. Joel has given the mode temperature.
- 4. The mean of 4, 5 and 9 is 6.
- 5. Wrens: 80° Robins: 100°
- 6. 9 people like crows best

PRACTICE TEST (PAGE 46)

- 1. 73,000
- 2. $\frac{3}{4}$ and $\frac{14}{20}$
- 3. If the two sides that meet at the right angle are the same length, then the triangle will be both right-angled and isosceles.
 - 45° 45° 90°



5. $\frac{1}{3} \div \frac{2}{5} = \frac{5}{6}$ or $\frac{1}{2} \div \frac{3}{5} = \frac{5}{6}$

- 6. 16 more children, and 28%
- **7.** q = 2p 3

when p = 15, q = 27

- 8. £8.50
- 9. 20.9kg
- 2kph After 30 minutes she stopped for 15 minutes.
 60 minutes.
- 11. 2 red : 1 blue
- 12. Perimeter = 20cm, so each side is 5cm. Area of 1 square is $5 \times 5 = 25$ cm², so total surface area = $25 \times 6 = 150$ cm² Volume = 5^3 , or $5 \times 5 \times 5$, which is $5 \times 25 = 125$ cm³