Answers - The four operations, order of operations and long division

Year: Year 6

Answer to Question 1

a. Estimate 350 × 30 = 10 500. 346 × 7 = 2 422 and 346 × 20 = 6 920. Add: 2 422 + 6 920 = **9 342**.
b. Estimate 1 300 × 30 = 39 000. 1 258 × 4 = 5 032 and 1 258 × 30 = 37 740. Add: **42 772**.
c. Estimate 4 000 × 60 = 240 000. 4 023 × 6 = 24 138 and 4 023 × 50 = 201 150. Add: **225 288**.
d. 346 × 270 is ten times 346 × 27, so it is **93 420**.

Answer to Question 2

a. 12 into 75 goes 6 (72), remainder 3. Bring down 6 to make 36. 12 into 36 goes 3. Answer **63**.
b. 14 into 19 goes 1, remainder 5. Bring down 0 to make 50: 14 into 50 goes 3 (42), remainder 8. Bring down 4 to make 84: 14 into 84 goes 6. Answer **136**.
c. 15 into 23 goes 1, remainder 8. Bring down 4: 84 ÷ 15 = 5 (75), remainder 9. Bring down 5: 95 ÷ 15 = 6 (90), remainder 5. Answer **156 remainder 5**.
d. 16 into 30 goes 1 (16), remainder 14. Bring down 0: 140 ÷ 16 = 8 (128), remainder 12. Bring down 0: 120 ÷ 16 = 7 (112), remainder 8. Add a decimal point: 80 ÷ 16 = 5. Answer **187.5**.

Answer to Question 3

a. 12 × 40 = 480 and 487 − 480 = 7. Answer **40 remainder 7**.
b. The remainder 7 becomes the fraction 7/12. Answer **40 and 7/12**.
c. 8 × 60 = 480 and the remainder is 7. 7 ÷ 8 = 0.875. Answer **60.875**.
d. Dividing by a smaller number gives a bigger answer, so **487 ÷ 8 is bigger**.

Answer to Question 4

a. Multiplication first: 4 × 3 = 12, then 8 + 12 = **20**.
b. Brackets first: 12, then 12 × 3 = **36**.
c. Division first: 12 ÷ 4 = 3. Then 20 − 3 + 1 = 17 + 1 = **18**.
d. Brackets: 5. Then 5 × 5 = 25 and 10 ÷ 2 = 5. Add: **30**.
e. Index first: $3^2 = 9$. Then 9 × 4 = 36. Then 2 + 36 = **38**.

Answer to Question 5

a. 1, 2, 3, 4, 6, 9, 12, 18, 36. (Nine factors, found in pairs: 1 × 36, 2 × 18, 3 × 12, 4 × 9, 6 × 6.)
b. Factors of 24: 1, 2, 3, 4, 6, 8, 12, 24. Common to both: **1, 2, 3, 4, 6, 12**. The HCF is **12**.
c. Multiples of 4: 4, 8, **12**, ... Multiples of 6: 6, **12**, ... The LCM is **12**.
d. **9, 18, 27, 36**.
e. 7 × 8 = **56**.

Answer to Question 6

a. 27 = 3 × 9, 39 = 3 × 13 and 51 = 3 × 17 are not prime. The primes are **23, 31 and 53**.
b. **41, 43, 47, 53, 59**. (Even numbers and multiples of 5 are never prime here. 49 = 7 × 7, 51 = 3 × 17 and 57 = 3 × 19.)
c. $12^2 = 12 \times 12 =$ **144**. $4^3 = 4 \times 4 \times 4 =$ **64**.
d. 9 × 9 = 81, so the square root is **9**.
e. Squares: **1, 4, 9, 16, 25**. Cubes: **1, 8, 27, 64**.

Answer to Question 7

a. 342 + 18 = **360** people.
b. 360 ÷ 52 = 6 remainder 48. Six coaches carry only 312 people, so 48 would be left behind. We need **7 coaches**.
c. 7 × 385 = **£2 695**.
d. 342 × 6 = **£2 052**.
e. Total = 2 695 + 2 052 = **£4 747**. Each pupil pays 4 747 ÷ 342 = 13.88... so **£13.88** to the nearest penny.

Answer to Question 8

a. 24 × 36 = 720 + 144 = **864** pencils.
b. 864 ÷ 18 = **48** pencils for each class.
c. 864 ÷ 20 = 43 remainder 4. Each class receives **43 pencils** and **4 pencils** are left over.
d. (24 × 36) ÷ 18 = **48**. The brackets make sure that we multiply before we divide.

Answer to Question 9

a. 23 × 15 = 230 + 115 = **345** rolls.

b. 345 ÷ 6 = 57 remainder 3. She fills **57 bags** and has **3 rolls** left over.
c. 57 × 180p = 10 260p, which is **£102.60**.
d. 28 × 15 = 420 rolls and 420 ÷ 6 = **70 bags**, exactly.

Answer to Question 10

a. 1 250 − 1 025 = **225** child tickets.
b. 1 025 × 27 = 20 500 + 7 175 = **£27 675**.
c. 225 × 20 = **£4 500**.
d. 27 675 + 4 500 = **£32 175**. Check: 1 000 × 27 = 27 000 and 250 × 20 = 5 000, giving about 32 000. The answers agree.

Answer to Question 11

a. (8 × 135) + (2 × 90) = 1 080 + 180 = **1 260** seats.
b. 1 260 × 6 = **7 560** seats to fill.
c. 7 560 × 8 = **£60 480**.

Answer to Question 12

a. 15 × 24 = **360** bulbs.
b. 360 ÷ 25 = 14.4, so 14 packs are not enough. He must buy **15 packs**.
c. 15 × 25 = 375, so 375 − 360 = **15** bulbs are left over.
d. 15 × £4 = **£60**.

Answer to Question 13

a. **0, 12, 24, 36, 48** minutes.
b. **0, 15, 30, 45, 60** minutes.
c. The common multiple of 12 and 15 is the LCM: 60. They leave together again at **9:00 am**.
d. Every 60 minutes: 8:00, 9:00, 10:00, 11:00 and 12:00. That is **5 times**.

Answer to Question 14

a. Factors of 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72. Factors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48.
b. The highest common factor is **24**, so she makes 24 bags.
c. 72 ÷ 24 = **3 balloons**, 48 ÷ 24 = **2 hats**.
d. 84 and 48 have HCF 12, so she can make **12 bags** (the HCF of 84 and 48 is smaller than 24).

Answer to Question 15

a. Cakes: 126 × 2 = £252. Plants: 38 × 6 = £228. Books: 215 × 1 = £215. Car washes: 47 × 5 = £235.
b. 252 + 228 + 215 + 235 = **£930**. Check: 250 + 230 + 215 + 235 = 930. The numbers match.
c. 930 − 248 = **£682**.
d. £682 is less than £700, so they did **not** reach the target; they were **£18** short.
e. 682 ÷ 4 = **£170.50** each.

Answer to Question 16

a. 1 764 ÷ 12 = **147** passengers.
b. 15 × 147 = 1 470 + 735 = **2 205** passengers.
c. 28 × 1 764 = 35 280 + 14 112 = **49 392** passengers.
d. 49 392 × 30 = 1 481 760 and 49 392 × 5 = 246 960. Add: **£1 728 720**.
e. 28 × 1 764 is about 30 × 1 800 = 54 000. This is close to 49 392, so the answer is sensible.

Answer to Question 17

a. 7 + 3 × 4 = 7 + 12 = **19**. (15 − 3) ÷ 4 + 2 = 12 ÷ 4 + 2 = 3 + 2 = **5**. 18 − 6 ÷ 3 × 2 = 18 − 2 × 2 = 18 − 4 = **14**.
b. Only **Dev** has 19, 5 and 14.
c. Amy worked from left to right: 7 + 3 = 10, then 10 × 4 = 40. She should have multiplied before adding.
d. Cara added 4 + 2 = 6 first and then worked out 12 ÷ 6 = 2. The addition must come after the division.
e. Ben subtracted before dividing: 18 − 6 = 12, then 12 ÷ 3 = 4, then 4 × 2 = 8. Division and multiplication come before subtraction.
f. (18 − 6) ÷ 3 × 2 = 12 ÷ 3 × 2 = 4 × 2 = **8**.

Answer to Question 18

a. The primes between 70 and 90 are 71, 73, 79, 83 and 89. The digit sums are 8, 10, 16, 11 and 17, so the number is **71**.
b. The squares between 30 and 60 are 36 and 49. Only 36 is in the 6 times table (6 × 6 = 36), so the number is **36**.
c. The LCM of 6 and 8 is 24, so the common multiples are 24, 48, 72, 96, ... Between 50 and 100 we have **72 and 96**, so there are two answers.
d. A number with exactly three factors is the square of a prime: 7 × 7 = **49** (factors 1, 7 and 49).
e. **2** is the only even prime. Every other even number has 2 as a factor as well as 1

and itself, so it has more than two factors.

Answer to Question 19

a. 15 × 6 = 90 hours, and 90 × 34 = **£3 060**.
b. 15 × 28 = **£420**.
c. 3 060 + 420 = **£3 480**.
d. 3 480 ÷ 12 = **£290** each.
e. £1 400 is less than £3 480, so it is **not enough**. The committee still needs 3 480 − 1 400 = **£2 080**.

Answer to Question 20

a. (4 + 6) × 2 − 1 = 10 × 2 − 1 = 20 − 1 = **19**.
b. 4 + 6 × (2 − 1) = 4 + 6 × 1 = **10**.
c. The possible brackets give 15 (no change), 19 and 10. For example (4 + 6 × 2) − 1 = 15 and 4 + (6 × 2 − 1) = 15 and (4 + 6) × (2 − 1) = 10. So the three answers are **10, 15 and 19**. Joe is **correct**.
d. (3 + 12) ÷ 3 × 2 = 15 ÷ 3 × 2 = 5 × 2 = **10**.