

# Ratio

Foundation and Higher tiers

Total marks: 102

## Marks

- M** Method mark, for a correct method. It can be implied by a correct answer.
- A** Accuracy mark, for a correct answer. It needs the method mark before it.
- B** A mark for a correct value or statement, with or without working.
- ft** Follow through: the mark is given for using an earlier wrong answer correctly.
- oe** Or equivalent.
- [a, b]** Any value from a to b inclusive.

## Questions

| Q  | Skill                                  | Spec   | Tier       | Grade | Calculator | Marks |
|----|----------------------------------------|--------|------------|-------|------------|-------|
| 1  | Ratio and fraction from a diagram      | R4 R8  | Foundation | 2     | No         | 3     |
| 2  | Simplest form and equivalent ratios    | R4     | Foundation | 2     | No         | 4     |
| 3  | Ratio and fractions                    | R8 N12 | Foundation | 2     | No         | 3     |
| 4  | Ratio from a bar chart                 | R4     | Foundation | 2     | No         | 3     |
| 5  | Ratio, fractions and sharing           | R8 R5  | Foundation | 2     | No         | 3     |
| 6  | One quantity as a fraction of another  | R3     | Foundation | 3     | No         | 3     |
| 7  | Ratio and fractions                    | R8 N11 | Foundation | 3     | No         | 2     |
| 8  | Sharing in a ratio                     | R5     | Foundation | 3     | No         | 3     |
| 9  | Sharing in a ratio with a bar model    | R5     | Foundation | 3     | No         | 4     |
| 10 | Simplifying a three-part ratio         | R4 R8  | Foundation | 3     | No         | 3     |
| 11 | Ratio: part and whole                  | R5 R8  | Foundation | 3     | No         | 2     |
| 12 | Ratio: one part given                  | R5     | Foundation | 4     | No         | 2     |
| 13 | Ratio in the form 1 : n                | R4 R5  | Foundation | 4     | No         | 2     |
| 14 | A fraction relationship as a ratio     | R6 N11 | Foundation | 4     | No         | 3     |
| 15 | Comparing ratios                       | R5 N11 | Foundation | 5     | No         | 2     |
| 16 | Ratio: difference between shares given | R5     | Foundation | 5     | No         | 3     |

| Q  | Skill                                    | Spec   | Tier       | Grade | Calculator | Marks      |
|----|------------------------------------------|--------|------------|-------|------------|------------|
| 17 | Combining two ratios                     | R5     | Foundation | 6     | No         | 3          |
| 18 | A ratio that changes                     | R5     | Foundation | 6     | No         | 3          |
| 19 | Fractions in a ratio problem             | N11 R5 | Foundation | 6     | No         | 3          |
| 20 | Ratio with algebra                       | R8 R4  | Foundation | 7     | No         | 3          |
| 21 | Currency conversion                      | R5     | Foundation | 2     | Yes        | 2          |
| 22 | Sharing a decimal amount in a ratio      | R5     | Foundation | 2     | Yes        | 3          |
| 23 | Using a ratio in the form 1 : n          | R5     | Foundation | 2     | Yes        | 2          |
| 24 | Simplifying a ratio                      | R4 R8  | Foundation | 2     | Yes        | 3          |
| 25 | A multiplicative relationship as a ratio | R6     | Foundation | 2     | Yes        | 3          |
| 26 | Sharing in a ratio: a mixture            | R5     | Foundation | 2     | Yes        | 2          |
| 27 | Scaling a recipe                         | R5     | Foundation | 2     | Yes        | 3          |
| 28 | Ratio: one part given                    | R5     | Foundation | 2     | Yes        | 2          |
| 29 | Scaling a recipe                         | R5     | Foundation | 3     | Yes        | 3          |
| 30 | Ratio: one share given                   | R5     | Foundation | 3     | Yes        | 3          |
| 31 | Sharing in a three-part ratio            | R5     | Foundation | 3     | Yes        | 3          |
| 32 | A multiplicative relationship as a ratio | R6     | Foundation | 3     | Yes        | 3          |
| 33 | Currency conversion both ways            | R5     | Foundation | 3     | Yes        | 3          |
| 34 | Sharing in the ratio of two amounts      | R5 R4  | Foundation | 3     | Yes        | 3          |
| 35 | Ratio for currency conversion            | R5     | Foundation | 4     | Yes        | 3          |
| 36 | Ratio: the ingredient that runs out      | R5     | Foundation | 6     | Yes        | 4          |
|    | <b>Total</b>                             |        |            |       |            | <b>102</b> |

**Question 1** R4 R8 · Foundation · Grade 2 · 3 marks

| Q    | Answer        | Mark | Comments                           |
|------|---------------|------|------------------------------------|
| 1(a) | 3 : 5         | B2   | B1 for 9 : 15 or 5 : 3 in any form |
| 1(b) | $\frac{3}{8}$ | B1   |                                    |

**Question 2** R4 · Foundation · Grade 2 · 4 marks

| Q    | Answer  | Mark | Comments                                                           |
|------|---------|------|--------------------------------------------------------------------|
| 2(a) | 2 : 3   | B2   | B1 for 6 : 9 or 10 : 15 or another correct partly simplified ratio |
| 2(b) | 12 : 15 | B1   |                                                                    |
| 2(c) | 35      | B1   |                                                                    |

**Question 3** R8 N12 · Foundation · Grade 2 · 3 marks

| Q    | Answer            | Mark | Comments |
|------|-------------------|------|----------|
| 3(a) | 3 : 5             | B1   | oe       |
| 3(b) | $96 \div 8$ or 12 | M1   | oe       |
|      | 36                | A1   |          |

**Question 4** R4 · Foundation · Grade 2 · 3 marks

| Q    | Answer | Mark | Comments                         |
|------|--------|------|----------------------------------|
| 4(a) | 2 : 3  | B2   | B1 for 12 : 18 or 6 : 9 or 4 : 6 |
| 4(b) | Bus    | B1   |                                  |

**Question 5** R8 R5 · Foundation · Grade 2 · 3 marks

| Q    | Answer                | Mark | Comments |
|------|-----------------------|------|----------|
| 5(a) | $\frac{5}{12}$        | B1   | oe       |
| 5(b) | $1260 \div 12$ or 105 | M1   | oe       |
|      | 735                   | A1   |          |

**Question 6** R3 · Foundation · Grade 3 · 3 marks

| Q    | Answer          | Mark | Comments              |
|------|-----------------|------|-----------------------|
| 6(a) | $\frac{40}{75}$ | M1   | oe, or 40 and 75 seen |
|      | $\frac{8}{15}$  | A1   |                       |
| 6(b) | $\frac{7}{4}$   | B1   | accept $1\frac{3}{4}$ |

### Question 7 R8 N11 · Foundation · Grade 3 · 2 marks

| Q    | Answer                | Mark | Comments                                                                                                       |
|------|-----------------------|------|----------------------------------------------------------------------------------------------------------------|
| 7(a) | $\frac{3}{10}$        | B1   |                                                                                                                |
| 7(b) | a correct explanation | B1   | e.g. there could be 14 string and 6 brass players, a difference of 8.<br>Or: only true if there are 10 players |

### Question 8 R5 · Foundation · Grade 3 · 3 marks

| Q | Answer                                     | Mark | Comments                         |
|---|--------------------------------------------|------|----------------------------------|
| 8 | $126 \div (2 + 5)$ or 18                   | M1   | oe                               |
|   | $2 \times 18$ or 36 or $5 \times 18$ or 90 | M1   | oe, or $(5 - 2) \times$ their 18 |
|   | £54                                        | A1   |                                  |

### Question 9 R5 · Foundation · Grade 3 · 4 marks

| Q    | Answer                                | Mark | Comments                   |
|------|---------------------------------------|------|----------------------------|
| 9(a) | $64 \div 8$ or 8                      | M1   | oe, the value of one box   |
|      | 40                                    | A1   |                            |
| 9(b) | $64 \div 2$ or 32, or $40 - 24$ or 16 | M1   | oe, ft their answer to (a) |
|      | 8                                     | A1   |                            |

### Question 10 R4 R8 · Foundation · Grade 3 · 3 marks

| Q     | Answer                            | Mark | Comments                           |
|-------|-----------------------------------|------|------------------------------------|
| 10(a) | a correct partly simplified ratio | M1   | e.g. 84 : 126 : 49 or 24 : 36 : 14 |
|       | 12 : 18 : 7                       | A1   |                                    |
| 10(b) | $\frac{7}{37}$                    | B1   |                                    |

### Question 11 R5 R8 · Foundation · Grade 3 · 2 marks

| Q  | Answer               | Mark | Comments                 |
|----|----------------------|------|--------------------------|
| 11 | $1352 \div 8$ or 169 | M1   | oe, or child tickets 507 |
|    | 845                  | A1   |                          |

### Question 12 R5 · Foundation · Grade 4 · 2 marks

| Q  | Answer              | Mark | Comments            |
|----|---------------------|------|---------------------|
| 12 | $1.4 \div 2$ or 0.7 | M1   | oe, or yellow = 4.9 |
|    | 6.3                 | A1   |                     |

**Question 13** R4 R5 · Foundation · Grade 4 · 2 marks

| Q         | Answer        | Mark      | Comments                   |
|-----------|---------------|-----------|----------------------------|
| <b>13</b> | 40 : 2600     | <b>M1</b> | oe, both in the same units |
|           | <b>1 : 65</b> | <b>A1</b> |                            |

**Question 14** R6 N11 · Foundation · Grade 4 · 3 marks

| Q            | Answer                 | Mark      | Comments           |
|--------------|------------------------|-----------|--------------------|
| <b>14(a)</b> | <b>3 : 5</b>           | <b>B1</b> | oe                 |
| <b>14(b)</b> | $32 \div (3 + 5)$ or 4 | <b>M1</b> | oe, ft their ratio |
|              | <b>20</b>              | <b>A1</b> |                    |

**Question 15** R5 N11 · Foundation · Grade 5 · 2 marks

| Q         | Answer                            | Mark      | Comments                                                                       |
|-----------|-----------------------------------|-----------|--------------------------------------------------------------------------------|
| <b>15</b> | $\frac{3}{8}$ and $\frac{2}{5}$   | <b>M1</b> | oe, e.g. $\frac{15}{40}$ and $\frac{16}{40}$ or 0.375 and 0.4 or 37.5% and 40% |
|           | <b>Tropic with correct values</b> | <b>A1</b> |                                                                                |

**Question 16** R5 · Foundation · Grade 5 · 3 marks

| Q         | Answer                | Mark      | Comments                     |
|-----------|-----------------------|-----------|------------------------------|
| <b>16</b> | $750 \div 3$ or 250   | <b>M1</b> | oe, $5 - 2 = 3$ parts        |
|           | their $250 \times 10$ | <b>M1</b> | oe, $250 \times (5 + 2 + 3)$ |
|           | <b>2500</b>           | <b>A1</b> | accept 2.5 kg                |

**Question 17** R5 · Foundation · Grade 6 · 3 marks

| Q         | Answer                      | Mark      | Comments                                        |
|-----------|-----------------------------|-----------|-------------------------------------------------|
| <b>17</b> | 27 : 6 or 6 : 8             | <b>M1</b> | oe, the two ratios with the same number of vans |
|           | $82 \div (27 + 6 + 8)$ or 2 | <b>M1</b> | oe, ft their combined ratio                     |
|           | <b>54</b>                   | <b>A1</b> |                                                 |

**Question 18** R5 · Foundation · Grade 6 · 3 marks

| Q         | Answer                                           | Mark      | Comments                        |
|-----------|--------------------------------------------------|-----------|---------------------------------|
| <b>18</b> | seniors stay the same, so $6 - 4 = 2$ parts = 12 | <b>M1</b> | oe, or $(4x + 12) : 5x = 6 : 5$ |
|           | one part = 6, or $x = 6$                         | <b>M1</b> | oe                              |
|           | <b>54</b>                                        | <b>A1</b> |                                 |

**Question 19** N11 R5 · Foundation · Grade 6 · 3 marks

| Q         | Answer                                             | Mark      | Comments                                                                  |
|-----------|----------------------------------------------------|-----------|---------------------------------------------------------------------------|
| <b>19</b> | $\frac{2}{5} \times \frac{3}{4}$ or $\frac{3}{10}$ | <b>M1</b> | oe, or a correct amount for food from a chosen wage, e.g. £600 from £2000 |
|           | $1 - \frac{1}{4} - \frac{3}{10}$ or $\frac{9}{20}$ | <b>M1</b> | oe, or a correct amount saved                                             |
|           | <b>5 : 6 : 9</b>                                   | <b>A1</b> |                                                                           |

**Question 20** R8 R4 · Foundation · Grade 7 · 3 marks

| Q            | Answer                                         | Mark      | Comments                                                                     |
|--------------|------------------------------------------------|-----------|------------------------------------------------------------------------------|
| <b>20(a)</b> | $y = \frac{7x}{2}$                             | <b>B1</b> | oe, e.g. $y = 3.5x$                                                          |
| <b>20(b)</b> | $3 \times 2 + 7 : 2 + 2 \times 7$ or $13 : 16$ | <b>M1</b> | oe, e.g. $6k + 7k : 2k + 14k$ , or substitutes any pair in the ratio $2 : 7$ |
|              | <b>13 : 16</b>                                 | <b>A1</b> |                                                                              |

**Question 21** R5 · Foundation · Grade 2 · 2 marks

| Q         | Answer                      | Mark      | Comments    |
|-----------|-----------------------------|-----------|-------------|
| <b>21</b> | $240 \times 1.16$ or 278.40 | <b>M1</b> | oe          |
|           | <b>€64.90</b>               | <b>A1</b> | accept 64.9 |

**Question 22** R5 · Foundation · Grade 2 · 3 marks

| Q         | Answer                                                | Mark      | Comments                 |
|-----------|-------------------------------------------------------|-----------|--------------------------|
| <b>22</b> | $52.38 \div (2 + 3 + 4)$ or $52.38 \div 9$ or 5.82    | <b>M1</b> | oe                       |
|           | $2 \times 5.82$ or $3 \times 5.82$ or $4 \times 5.82$ | <b>M1</b> | oe, one share worked out |
|           | <b>Ola £11.64, Bea £17.46, Tariq £23.28</b>           | <b>A1</b> |                          |

**Question 23** R5 · Foundation · Grade 2 · 2 marks

| Q         | Answer           | Mark      | Comments |
|-----------|------------------|-----------|----------|
| <b>23</b> | $2.6 \times 3.5$ | <b>M1</b> | oe       |
|           | <b>9.1</b>       | <b>A1</b> |          |

**Question 24** R4 R8 · Foundation · Grade 2 · 3 marks

| Q            | Answer                                                   | Mark      | Comments           |
|--------------|----------------------------------------------------------|-----------|--------------------|
| <b>24(a)</b> | $23\,712 \div 2964$ or a correct partly simplified ratio | <b>M1</b> | e.g. 5928 : 741    |
|              | <b>8 : 1</b>                                             | <b>A1</b> |                    |
| <b>24(b)</b> | $\frac{1}{9}$                                            | <b>B1</b> | oe, ft their ratio |

**Question 25** R6 · Foundation · Grade 2 · 3 marks

| Q            | Answer                                  | Mark      | Comments                    |
|--------------|-----------------------------------------|-----------|-----------------------------|
| <b>25(a)</b> | $27.65 \times 0.4$ or $27.65 \times 40$ | <b>M1</b> | oe, the second giving pence |
|              | <b>£11.06</b>                           | <b>A1</b> | accept 1106p                |
| <b>25(b)</b> | <b>5 : 2</b>                            | <b>B1</b> |                             |

**Question 26** R5 · Foundation · Grade 2 · 2 marks

| Q         | Answer        | Mark      | Comments                      |
|-----------|---------------|-----------|-------------------------------|
| <b>26</b> | $750 \div 41$ | <b>M1</b> | oe                            |
|           | <b>18.3</b>   | <b>A1</b> | accept 18.3 or [18.29, 18.30] |

**Question 27** R5 · Foundation · Grade 2 · 3 marks

| Q         | Answer                                          | Mark      | Comments                                                 |
|-----------|-------------------------------------------------|-----------|----------------------------------------------------------|
| <b>27</b> | $15 \div 6$ or 2.5                              | <b>M1</b> | oe, or butter used: $75 \div 30$ , or one correct amount |
|           | two of plain flour 337.5 g, eggs 5, milk 850 ml | <b>A1</b> |                                                          |
|           | <b>plain flour 337.5 g, eggs 5, milk 850 ml</b> | <b>A1</b> |                                                          |

**Question 28** R5 · Foundation · Grade 2 · 2 marks

| Q         | Answer                 | Mark      | Comments                          |
|-----------|------------------------|-----------|-----------------------------------|
| <b>28</b> | $0.85 \times 6$ or 5.1 | <b>M1</b> | oe, the water, or $0.85 \times 7$ |
|           | <b>5.95</b>            | <b>A1</b> |                                   |

**Question 29** R5 · Foundation · Grade 3 · 3 marks

| Q         | Answer                                      | Mark      | Comments                                      |
|-----------|---------------------------------------------|-----------|-----------------------------------------------|
| <b>29</b> | $30 \div 8$ or 3.75 or $75 \div 8$ or 9.375 | <b>M1</b> | oe, or $250 \div 75$ or 3.33...               |
|           | $75 \times 3.75$ or 281.25                  | <b>M1</b> | oe, or $3.33... \times 8 = 26.6...$ flapjacks |
|           | <b>No with 281.25 g</b>                     | <b>A1</b> | oe, or No with 26.6... flapjacks              |

**Question 30** R5 · Foundation · Grade 3 · 3 marks

| Q         | Answer                  | Mark      | Comments                          |
|-----------|-------------------------|-----------|-----------------------------------|
| <b>30</b> | $79.98 \div 3$ or 26.66 | <b>M1</b> | oe                                |
|           | their $26.66 \times 4$  | <b>M1</b> | oe, or $79.98 \times \frac{4}{3}$ |
|           | <b>£106.64</b>          | <b>A1</b> |                                   |

**Question 31** R5 · Foundation · Grade 3 · 3 marks

| Q         | Answer                                                  | Mark      | Comments                                                   |
|-----------|---------------------------------------------------------|-----------|------------------------------------------------------------|
| <b>31</b> | $5000 \div (15 + 12 + 8)$ or $5000 \div 35$ or 142.8... | <b>M1</b> | oe                                                         |
|           | their 142.8... $\times 15$                              | <b>M1</b> | oe, or $2000 \div 15 = 133.3...$<br>compared with 142.8... |
|           | <b>Yes with £2142.86</b>                                | <b>A1</b> | accept [2142.8, 2142.9], or Yes with correct comparison    |

**Question 32** R6 · Foundation · Grade 3 · 3 marks

| Q            | Answer                                 | Mark      | Comments |
|--------------|----------------------------------------|-----------|----------|
| <b>32(a)</b> | <b>6.3</b>                             | <b>B1</b> |          |
| <b>32(b)</b> | $3.6 : 6.3$ or $1 : 1.75$ or $36 : 63$ | <b>M1</b> | oe       |
|              | <b>4 : 7</b>                           | <b>A1</b> |          |

**Question 33** R5 · Foundation · Grade 3 · 3 marks

| Q         | Answer                                         | Mark      | Comments                 |
|-----------|------------------------------------------------|-----------|--------------------------|
| <b>33</b> | $400 \times 172.4$ or 68 960                   | <b>M1</b> |                          |
|           | $(\text{their } 68\,960 - 48\,960) \div 168.5$ | <b>M1</b> | oe, $20\,000 \div 168.5$ |
|           | <b>£118.69</b>                                 | <b>A1</b> |                          |

**Question 34** R5 R4 · Foundation · Grade 3 · 3 marks

| Q         | Answer                                                 | Mark      | Comments                         |
|-----------|--------------------------------------------------------|-----------|----------------------------------|
| <b>34</b> | $18 : 27$ or $2 : 3$ or 45                             | <b>M1</b> | oe, the ratio or the total hours |
|           | $281.25 \div 5 \times 3$ or $281.25 \div 45 \times 27$ | <b>M1</b> | oe                               |
|           | <b>£168.75</b>                                         | <b>A1</b> |                                  |

**Question 35** R5 · Foundation · Grade 4 · 3 marks

| Q         | Answer                   | Mark      | Comments                            |
|-----------|--------------------------|-----------|-------------------------------------|
| <b>35</b> | $96 \div 1.17$ or £82.05 | <b>M1</b> | oe, or $84 \times 1.17 = 98.28$     |
|           | £82.05                   | <b>A1</b> | or €98.28 and a difference of €2.28 |
|           | <b>Paris by £1.95</b>    | <b>A1</b> | accept [£1.94, £1.96]               |

**Question 36** R5 · Foundation · Grade 6 · 4 marks

| Q         | Answer                                        | Mark      | Comments                                   |
|-----------|-----------------------------------------------|-----------|--------------------------------------------|
| <b>36</b> | $64.5 \div 2$ or $158 \div 5$ or $250 \div 8$ | <b>M1</b> | oe, any one of 32.25, 31.6 or 31.25        |
|           | all three of 32.25, 31.6 and 31.25            | <b>M1</b> | oe, or compares what each ingredient needs |
|           | $31.25 \times 15$                             | <b>M1</b> | oe, uses the smallest                      |
|           | <b>468.75</b>                                 | <b>A1</b> |                                            |