



THIRD SPACE  
LEARNING

# Diagnostic Questions

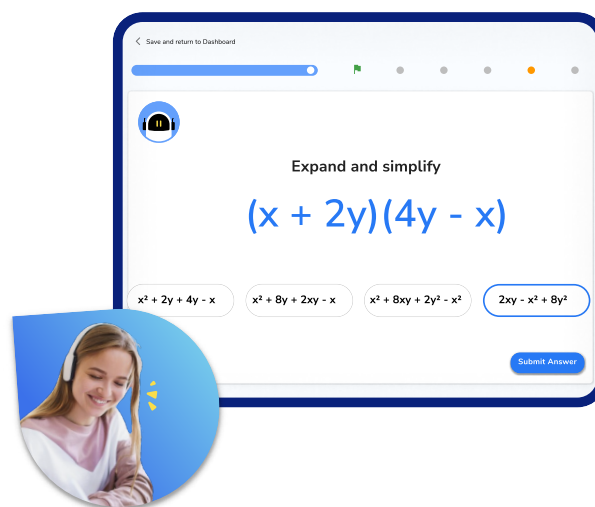
Ratio | Ratio & Proportion

## This resource in a nutshell

Diagnostic questions are a quick and easy way of assessing your students' knowledge and understanding of a particular topic.

Students may be struggling with **ratio** for a number of different reasons. Diagnostic questions can help to identify the particular misconception that the student has and help to determine the specific support they will need in order to improve.

They are low stakes and support students developing metacognition around how their learning is progressing and what they need to do to improve further.



At Third Space Learning, we use diagnostic questions before and after online tutoring sessions to identify gaps and track progress, an example of this is shown above.

## How to use the questions in this resource

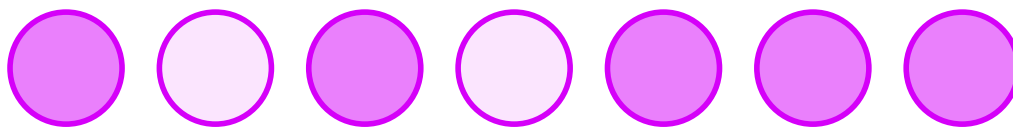
There are 20 multiple choice questions, each designed to assess each of the key skills required to master the given topic. Each question has **one correct answer** and **three carefully chosen incorrect answers** that are designed to identify and highlight fundamental misconceptions, including: **Writing ratios in the correct order**, **Simplifying ratios fully**, **Converting ratios to fractions**, and **Combining ratios**.

When answering these questions, students should be **encouraged to explain why they have chosen a particular answer**, and why the other three answers are incorrect. This can be done verbally in small groups, or written down on the worksheet or in their books.

This resource has been designed to be as **flexible** as possible with questions that can be easily chopped up and reordered, and come with a separate answer sheet that details all of the misconceptions highlighted in the answers.

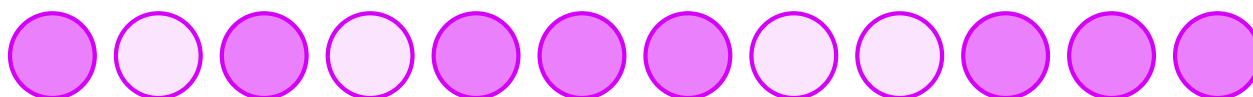
## Diagnostic Questions: Ratio

1. Write the ratio of purple to white:



A) 2 : 5	B) 5 : 2
C) 5 : 7	D) 2 : 7

2. Write the ratio of white to purple in its simplest form:



A) 2 : 4	B) 2 : 1
C) 4 : 8	D) 1 : 2

3. There are 20 sweets in a bag; 6 sweets are orange and the rest are purple. Write the ratio of purple sweets to orange sweets in its simplest form.

A) 7 : 3	B) 14 : 20
C) 14 : 6	D) 3 : 7

## Diagnostic Questions: Ratio

4. Fully simplify the ratio:

$$150 : 210 : 240$$

A) 15 : 21 : 24	B) 50 : 70 : 80
C) 5 : 7 : 8	D) 10 : 14 : 16

5. Write in the form  $1 : n$  where  $n$  need not be an integer:

$$8 : 30$$

A) 1 : 30	B) 1 : 4
C) 1 : 3.5	D) 1 : 3.75

6. Write the ratio in its simplest form, using integer values:

$$\frac{1}{2} : 3$$

A) 2 : 3	B) 1 : 6
C) 1 : 3	D) 3 : 18

## Diagnostic Questions: Ratio

7. Write the ratio in its simplest form, using integer values:

$$\frac{3}{4} : \frac{5}{8}$$

A) 6 : 5	B) 3 : 5
C) 24 : 20	D) 12 : 40

8. Write the ratio in its simplest form, using integer values:

$$2.8 : 1.6$$

A) 28 : 16	B) 1 : 0.571
C) 14 : 8	D) 7 : 4

9. Write the ratio in its simplest form, using integer values:

$$1.25 : \frac{1}{6}$$

A) 3 : 2	B) 30 : 4
C) 15 : 2	D) 7.5 : 1

## Diagnostic Questions: Ratio

10. In a bag, there are yellow counters and blue counters in the ratio 2 : 3  
What percentage of the counters are blue?

A) 40%	B) 30%
C) 60%	D) 5%

11. The ratio of green counters to red counters is 3 : 5  
What fraction of the counters are green?

A) $\frac{3}{5}$	B) $\frac{3}{8}$
C) 3	D) $\frac{5}{8}$

12. A fruit drink is mixed in the ratio 1 part concentrate to 4 parts water.  
How much fruit drink can be made using 300ml of concentrate?

A) 1500ml	B) 1200ml
C) 75ml	D) 375ml

## Diagnostic Questions: Ratio

13. A map has the scale  $1\text{cm} : 5\text{km}$

Work out the real life distance if the measurement on the map is  $6.5\text{cm}$ .

A) $32.5\text{cm}$	B) $1.3\text{km}$
C) $32.5\text{km}$	D) $28\text{km}$

14. The fraction of apples in a fruit bowl is  $\frac{5}{12}$

Determine the ratio of apples to other pieces of fruit in the bowl.

A) $5 : 12$	B) $5 : 17$
C) $7 : 12$	D) $5 : 7$

15. £45 is shared in the ratio  $5 : 4$

Hal receives the larger amount.

How much does Hal receive?

A) £5	B) £20
C) £25	D) £9

## Diagnostic Questions: Ratio

16. Sev, Kim and Jas share 96 marbles in the ratio  $2 : 3 : 7$   
 Jas received the most marbles. Sev received the fewest marbles.  
 How many more marbles than Sev did Jas receive?

A) 16	B) 40
C) 56	D) 72

17. You are given that the ratio  $a : b = 2 : 3$  and the ratio  $b : c = 7 : 4$   
 Find, in its simplest terms, the ratio

**$a : c$**

A) $14 : 12$	B) $1 : 2$
C) $23 : 74$	D) $7 : 6$

18. Given the ratio  $a : b = 3 : 5$ , write  $a$  in terms of  $b$ .

A) $a = \frac{3}{8}b$	B) $a = \frac{5}{3}b$
C) $a = \frac{3}{5}b$	D) $a = 5b$

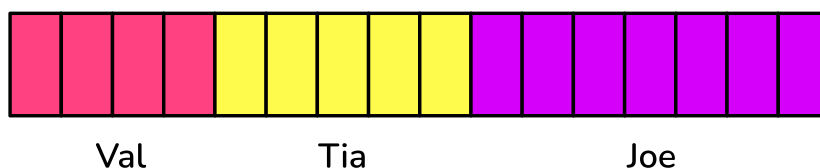


## Diagnostic Questions: Ratio

19. An orchestra has 56 musicians. 25% of the musicians play a brass instrument. The ratio of trumpet players to other brass instruments is 2 : 5  
How many trumpet players does the orchestra have?

A) 10	B) 4
C) 14	D) 16

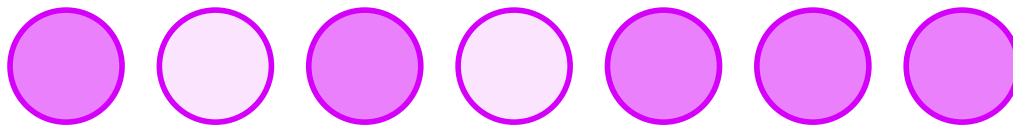
20. Val, Tia and Joe use a bar model to show their ages.  
Tia is 8 years younger than Joe. How old is Val?



A) 16	B) 4
C) 32	D) 8

## Diagnostic Questions: Ratio

1. Write the ratio of purple to white:



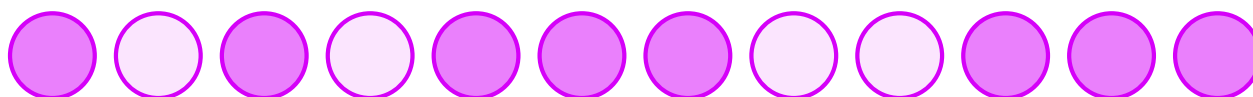
A) 2 : 5 Student wrote ratio in wrong order

B) 5 : 2 Correct answer

C) 5 : 7 Student confused the concepts of ratio and fraction

D) 2 : 7 Student attempted to write the fraction that is white (as a ratio)

2. Write the ratio of white to purple in its simplest form:



A) 2 : 4 Student simplified but not fully

B) 2 : 1 Student wrote simplified ratio in wrong order

C) 4 : 8 Student forgot to simplify

D) 1 : 2 Correct answer

3. There are 20 sweets in a bag; 6 sweets are orange and the rest are purple. Write the ratio of purple sweets to orange sweets in its simplest form.

A) 7 : 3 Correct answer

B) 14 : 20 Student confused the concepts of fraction and ratio

C) 14 : 6 Student wrote correct ratio but forgot to simplify

D) 3 : 7 Student wrote the ratio in the wrong order

## Diagnostic Questions: Ratio

4. Fully simplify the ratio:

$$150 : 210 : 240$$

- A) 15 : 21 : 24 Student divided through by 10
- B) 50 : 70 : 80 Student divided through by 3
- C) 5 : 7 : 8 Correct answer
- D) 10 : 14 : 16 Student divided through by 15

5. Write in the form  $1 : n$  where  $n$  need not be an integer:

$$8 : 30$$

- A) 1 : 30 Student forgot to divide the right-hand side of the ratio by 8
- B) 1 : 4 Student rounded the right-hand side to the nearest integer
- C) 1 : 3.5 Student made arithmetic errors dividing 30 by 8
- D) 1 : 3.75 Correct answer

6. Write the ratio in its simplest form, using integer values:

$$\frac{1}{2} : 3$$

- A) 2 : 3 Student simply inverted the fraction
- B) 1 : 6 Correct answer
- C) 1 : 3 Student ignored the denominator
- D) 3 : 18 Student found a correct ratio, but did not simplify

## Diagnostic Questions: Ratio

7. Write the ratio in its simplest form, using integer values:

$$\frac{3}{4} : \frac{5}{8}$$

A) 6 : 5 Correct answer

B) 3 : 5 Student wrote down a ratio involving the numerators only

C) 24 : 20 Student found a correct ratio but did not simplify

D) 12 : 40 Student multiplied numerator by denominator on each side of the ratio

8. Write the ratio in its simplest form, using integer values:

$$2.8 : 1.6$$

A) 28 : 16 Student found a correct ratio but did not simplify

B) 1 : 0.571 Student attempted to give answer in form  $1 : n$

C) 14 : 8 Student did not fully simplify

D) 7 : 4 Correct answer

9. Write the ratio in its simplest form, using integer values:

$$1.25 : \frac{1}{6}$$

A) 3 : 2 Student used 0.25 instead of 1.25 for the left-hand side

B) 30 : 4 Student found a correct ratio but did not simplify

C) 15 : 2 Correct answer

D) 7.5 : 1 Student did not use integer values

## Diagnostic Questions: Ratio

10. In a bag, there are yellow counters and blue counters in the ratio 2 : 3  
What percentage of the counters are blue?
- A) 40% Student gave the percentage of yellow counters  
B) 30% Student multiplied the right hand side of the ratio by 10  
C) 60% Correct answer  
D) 5% Student found the sum of parts in the ratio
- 
11. The ratio of green counters to red counters is 3 : 5  
What fraction of the counters are green?
- A)  $\frac{3}{5}$  Student forgot to use total of parts for the denominator  
B)  $\frac{3}{8}$  Correct answer  
C) 3 Student gave the number of parts that are green  
D)  $\frac{5}{8}$  Student gave the fraction of counters that are red
- 
12. A fruit drink is mixed in the ratio 1 part concentrate to 4 parts water.  
How much fruit drink can be made using 300ml of concentrate?
- A) 1500ml Correct answer  
B) 1200ml Student gave the amount of water needed  
C) 75ml Student divided the amount of concentrate by the number of parts of water  
D) 375ml Student divided by the number of parts of water then multiplied by the total number of parts

## Diagnostic Questions: Ratio

13. A map has the scale  $1\text{cm} : 5\text{km}$

Work out the real life distance if the measurement on the map is  $6.5\text{cm}$ .

- A)  $32.5\text{cm}$  Student used incorrect units
- B)  $1.3\text{km}$  Student used incorrect operation (division)
- C)  $32.5\text{km}$  Correct answer
- D)  $28\text{km}$  Student made errors performing multiplication

14. The fraction of apples in a fruit bowl is  $\frac{5}{12}$

Determine the ratio of apples to other pieces of fruit in the bowl.

- A) 5 : 12 Student used the total number of pieces of fruit as the parts of non-apples in the ratio
- B) 5 : 17 Student combined numerator and denominator to determine non-apple parts
- C) 7 : 12 Student incorrectly used the information to form the ratio
- D) 5 : 7 Correct answer

15. £45 is shared in the ratio 5 : 4

Hal receives the larger amount.

How much does Hal receive?

- A) £5 Student worked out how much one unit in the ratio represents
- B) £20 Student worked out the value of the smaller portion
- C) £25 Correct answer
- D) £9 Student divided the total amount by the number of parts in the LHS of the ratio

## Diagnostic Questions: Ratio

16. Sev, Kim and Jas share 96 marbles in the ratio 2 : 3 : 7

Jas received the most marbles. Sev received the fewest marbles.  
How many more marbles than Sev did Jas receive?

- A) 16 Student wrote down the number of marbles Sev received  
B) 40 Correct answer  
C) 56 Student wrote down the number of marbles Jas received  
D) 72 Student found the amount Sev and Jas received altogether

17. You are given that the ratio  $a : b = 2 : 3$  and the ratio  $b : c = 7 : 4$

Find, in its simplest terms, the ratio

**$a : c$**

- A) 14 : 12 Student found a correct ratio but did not simplify  
B) 1 : 2 Student compared  $a$  with  $c$ , without considering  $b$   
C) 23 : 74 Student combined digits from the ratios without understanding the concepts  
D) 7 : 6 Correct answer

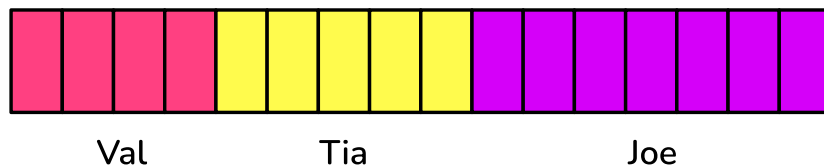
18. Given the ratio  $a : b = 3 : 5$ , write  $a$  in terms of  $b$ .

- A)  $a = \frac{3}{8}b$  Student related  $a$  to the total number of parts  
B)  $a = \frac{5}{3}b$  Student lacks confidence rearranging equations  
C)  $a = \frac{3}{5}b$  Correct answer  
D)  $a = 5b$  Student lacks understanding of the relation of parts in a ratio

## Diagnostic Questions: Ratio

19. An orchestra has 56 musicians. 25% of the musicians play a brass instrument. The ratio of trumpet players to other brass instruments is 2 : 5  
How many trumpet players does the orchestra have?
- A) 10 Student found the number of brass musicians that do not play trumpet  
B) 4 Correct answer  
C) 14 Student found the number of musicians in the brass section  
D) 16 Student divided the total number of musicians in the ratio 2 : 5, without first finding 25%

20. Val, Tia and Joe use a bar model to show their ages.  
Tia is 8 years younger than Joe. How old is Val?



- A) 16 Correct answer  
B) 4 Student counted the number of bars in the model  
C) 32 Student calculated one bar to be equivalent to 8 years  
D) 8 Student calculated one bar to be equivalent to 2 years



# Where to go next?

For more diagnostic questions, and GCSE maths revision resources and worksheets to support students in fixing any misconceptions take a look at the free Third Space Learning [GCSE maths revision](#) pages.

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