



THIRD SPACE
LEARNING

Diagnostic Questions

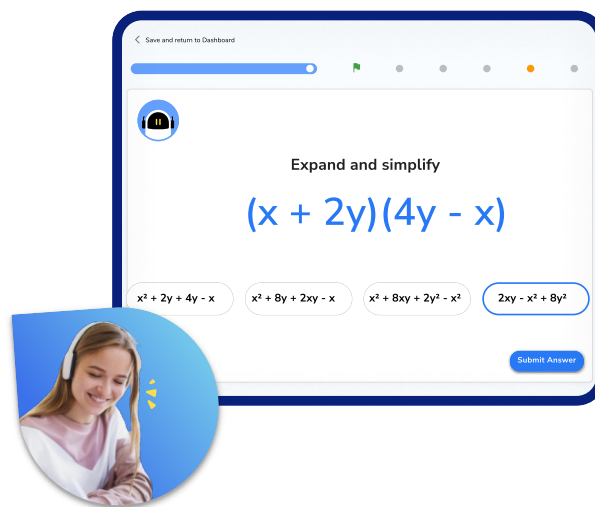
Proportion | Ratio & Proportion

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 **proportion** 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: **Multiplying and dividing by opposing values**, **Incorrect decimal-time conversions**, **Confusing fractions and ratios**, and **Inverse operations**.

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: Proportion

1. The total mass of 6 bags of sand is 90kg .
What is the total mass of 18 bags of sand?

A) 15kg	B) 270kg
C) 180kg	D) 30kg

2. The price of 4 pencils is $\pounds 2.80$.
What is the cost of 6 pencils?

A) $\pounds 3.50$	B) $\pounds 16.80$
C) $\pounds 0.70$	D) $\pounds 4.20$

3. The capacity of 12 buckets is 15 Litres.
Find the capacity of 3 buckets.

A) 3.75 L	B) 4 L
C) 5 L	D) 60 L

Diagnostic Questions: Proportion

4. The cost of seven marshmallows is £3.15
What is the cost of five marshmallows?

A) £0.45	B) £4.41
C) £2.25	D) £1.75

5. The mass of three jars of cocoa is 465g
What is the mass of eight jars of cocoa?

A) 174.4g	B) 1240g
C) 1160g	D) 155g

6. A cyclist travels 13 km in 24 minutes.
How far does the cyclist travel in one hour?

A) 32.5 km	B) 26 km
C) 312 km	D) 54.2 km

Diagnostic Questions: Proportion

7. A car travels at a constant speed of 48 km/h .
How far does the car travel in 1 hour and 45 minutes?

A) 69.6 km	B) 96 km
C) 84 km	D) 36 km

8. What proportion of the shapes are blue?



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

9. In a jar of sweets, the ratio of orange sweets to purple sweets is $2 : 3$
What proportion of the sweets are orange?

A) $\frac{2}{3}$	B) $\frac{2}{5}$
C) $\frac{3}{5}$	D) 2

Diagnostic Questions: Proportion

10. y is directly proportional to x .

When $x = 3$, $y = 7.5$.

Find the value of y when $x = 7$.

A) $y = 17.5$	B) $y = 52.5$
C) $y = 14.5$	D) $y = 22.5$

11. y is directly proportional to x .

When $x = 6$, $y = 39$.

Find the value of x when $y = 58.5$.

A) $x = 380.25$	B) $x = 6.5$
C) $x = 19.5$	D) $x = 9$

12. y is proportional to the square of x .

When $x = 4$, $y = 12$.

Find the value of y when $x = 6$.

A) $y = 27$	B) $y = 18$
C) $y = 36$	D) $y = 8$

Diagnostic Questions: Proportion

13. The value of y is directly proportional to the value of x .

Determine the value A :

x	4	7	12
y	14	A	42

A) 28	B) 21
C) 24.5	D) 27

14. y is inversely proportional to x .

When $x = 8$, $y = 6$.

Find the value of y when $x = 24$.

A) $y = 18$	B) $y = 32$
C) $y = 3$	D) $y = 2$

15. y is inversely proportional to x .

When $x = 12$, $y = 6$.

Find the value of x when $y = 4$.

A) $x = 8$	B) $x = 18$
C) $x = 15$	D) $x = 72$

Diagnostic Questions: Proportion

16. y is inversely proportional to the square of x .

When $x = 4$, $y = 10$.

Find the value of y when $x = 8$.

A) $y = 2.5$	B) $y = 5$
C) $y = 20$	D) $y = 25$

17. y is inversely proportional to the square root of x .

When $x = 25$, $y = 4$.

Find the value of y when $x = 100$.

A) $y = 16$	B) $y = 0.2$
C) $y = 1$	D) $y = 2$

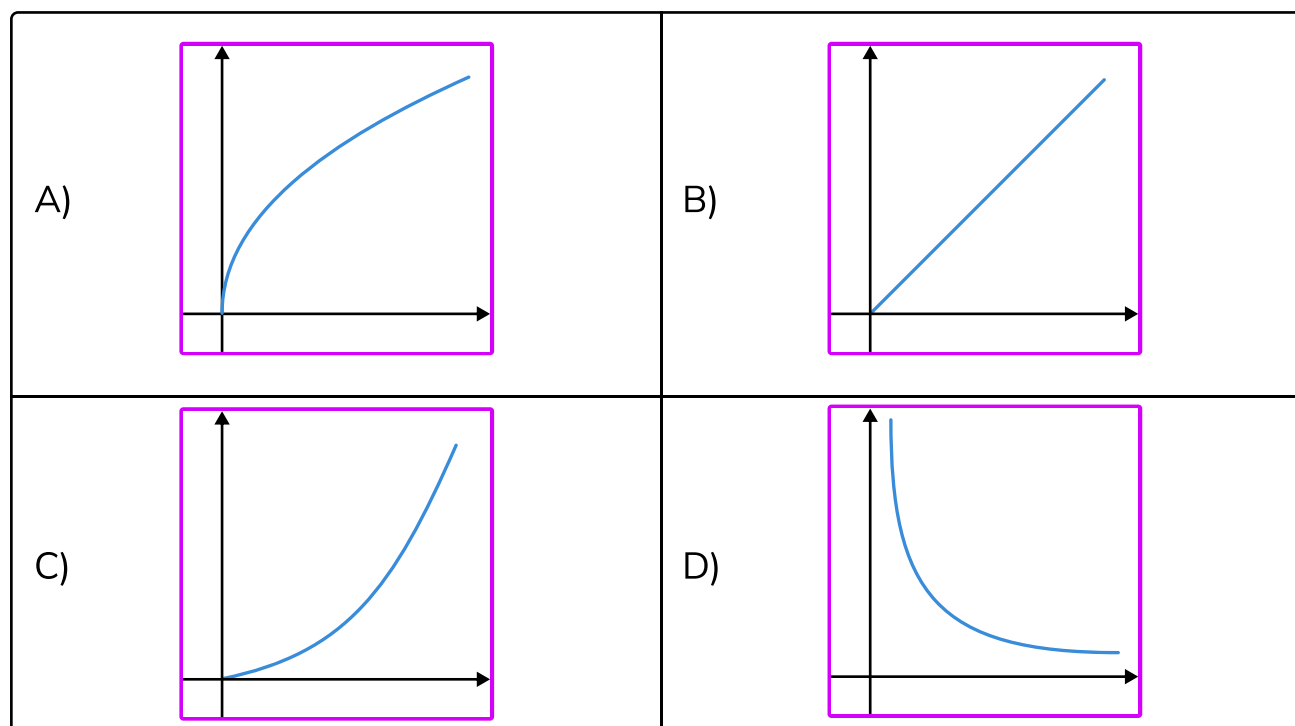
18. Determine the value of x that satisfies:

$$\frac{6}{18} = \frac{19}{x}$$

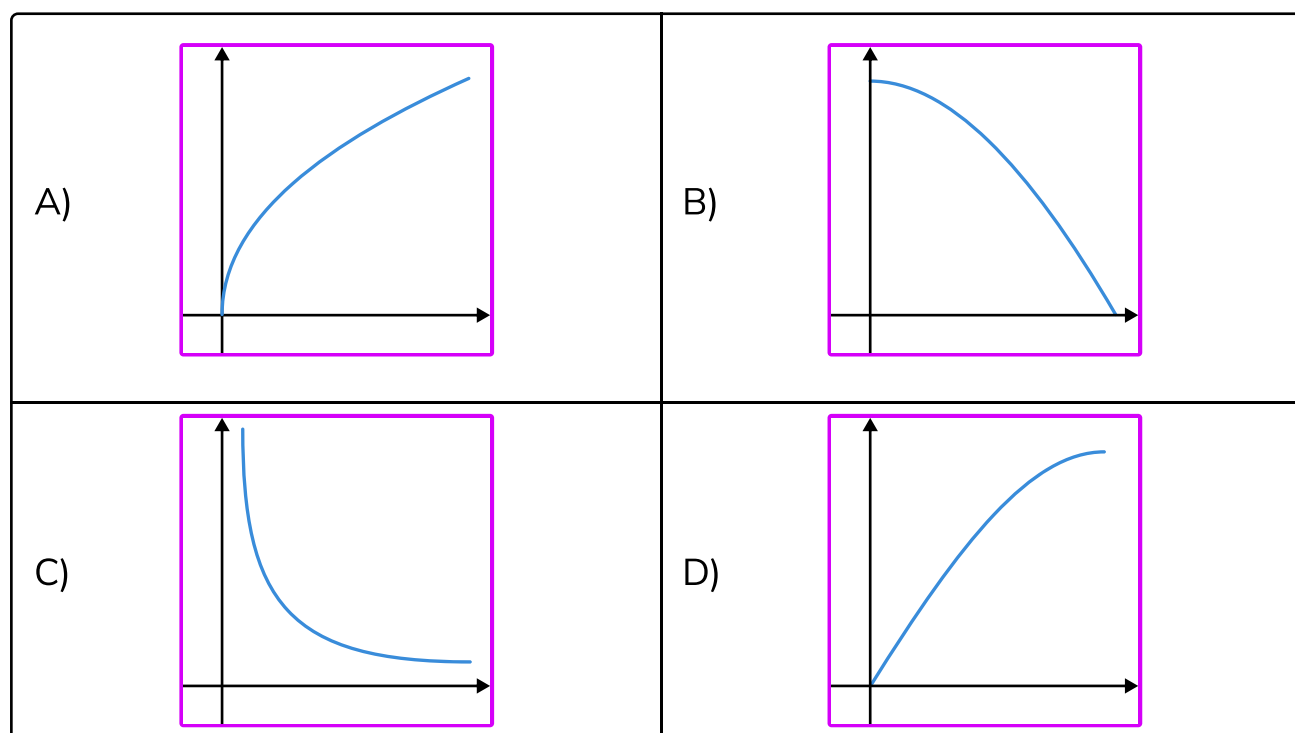
A) $x = 38$	B) $x = 76$
C) $x = 57$	D) $x = 6.3$

Diagnostic Questions: Proportion

19. Choose the graph that represents direct proportion:



20. Choose the graph that represents inverse proportion:



Diagnostic Questions: Proportion

1. The total mass of 6 bags of sand is 90kg .
What is the total mass of 18 bags of sand?

A) 15kg Student found the mass of one bag of sand
B) 270kg Correct answer
C) 180kg Student found the mass of twelve bags of sand
D) 30kg Student divided by 18 then multiplied by 6

2. The price of 4 pencils is $\pounds 2.80$.
What is the cost of 6 pencils?

A) $\pounds 3.50$ Student added the cost of one extra pencil
B) $\pounds 16.80$ Student multiplied the cost of four pencils by six
C) $\pounds 0.70$ Student found the cost of one pencil
D) $\pounds 4.20$ Correct answer

3. The capacity of 12 buckets is 15 Litres.
Find the capacity of 3 buckets.

A) 3.75 L Correct answer
B) 4 L Student divided 12 (buckets) by 3 (buckets)
C) 5 L Student divided 15 (litres) by 3 (buckets)
D) 60 L Student multiplied by 4 instead of dividing by 4

Diagnostic Questions: Proportion

4. The cost of seven marshmallows is £3.15

What is the cost of five marshmallows?

- A) £0.45 Student found the cost of one marshmallow
- B) £4.41 Student multiplied by 7 and divided by 5 (incorrect order)
- C) £2.25 Correct answer
- D) £1.75 Student found the incorrect price for one marshmallow (£0.35)

5. The mass of three jars of cocoa is 465g

What is the mass of eight jars of cocoa?

- A) 174.4g Student divided by 8 and multiplied by 3 (incorrect order)
- B) 1240g Correct answer
- C) 1160g Student found the mass of one jar to be 145g
- D) 155g Student gave the mass of one jar

6. A cyclist travels 13 km in 24 minutes.

How far does the cyclist travel in one hour?

- A) 32.5 km Correct answer
- B) 26 km Student did not use proportional reasoning
- C) 312 km Student found product of 13 and 24
- D) 54.2 km Student attempted to scale using 0.24 of an hour

Diagnostic Questions: Proportion

7. A car travels at a constant speed of 48 km/h .

How far does the car travel in 1 hour and 45 minutes?

- A) 69.6 km Student multiplied by 1.45 rather than 1.75
- B) 96 km Student worked out the distance travelled in two hours
- C) 84 km Correct answer
- D) 36 km Student worked out the distance travelled in 45 minutes

8. What proportion of the shapes are blue?



- A) $3 : 8$ Student confused the concepts of fractions and ratios
- B) $3 : 5$ Student gave the ratio of blue to non-blue shapes
- C) $\frac{3}{5}$ Student used the number of non-blue shapes as the denominator
- D) $\frac{3}{8}$ Correct answer

9. In a jar of sweets, the ratio of orange sweets to purple sweets is $2 : 3$.

What proportion of the sweets are orange?

- A) $\frac{2}{3}$ Student does not understand the relationship between ratio and fractions
- B) $\frac{2}{5}$ Correct answer
- C) $\frac{3}{5}$ Student used the order of the ratio incorrectly
- D) 2 Student stated the number of parts from the ratio, not a proportion

Diagnostic Questions: Proportion

10. y is directly proportional to x .

When $x = 3$, $y = 7.5$.

Find the value of y when $x = 7$.

A) $y = 17.5$ Correct answer

B) $y = 52.5$ Student multiplied 7.5 by 7

C) $y = 14.5$ Student added 7 to 7.5

D) $y = 22.5$ Student multiplied 7.5 by 3

11. y is directly proportional to x .

When $x = 6$, $y = 39$.

Find the value of x when $y = 58.5$.

A) $x = 380.25$ Student found the value of y when $x = 58.5$

B) $x = 6.5$ Student performed an incomplete calculation

C) $x = 19.5$ Student subtracted 39 from 58.5

D) $x = 9$ Correct answer

12. y is proportional to the square of x .

When $x = 4$, $y = 12$.

Find the value of y when $x = 6$.

A) $y = 27$ Correct answer

B) $y = 18$ Student used a scale factor of 1.5

C) $y = 36$ Student found 6^2

D) $y = 8$ Student divided 12 by 6 and multiplied by 4

Diagnostic Questions: Proportion

13. The value of y is directly proportional to the value of x .

Determine the value A :

x	4	7	12
y	14	A	42

A) 28 Student found the average of the given y -values

B) 21 Student found the scale factor from x to y as being 3

C) 24.5 Correct answer

D) 27 Student used $4 + 10 = 14$, and $12 + 30 = 42$ to imply $7 + 20 = 27$ was correct

14. y is inversely proportional to x .

When $x = 8$, $y = 6$.

Find the value of y when $x = 24$.

A) $y = 18$ Student confused inverse and direct proportion

B) $y = 32$ Student used an incorrect sequence of operations ($\div 6$, $\times 8$)

C) $y = 3$ Student did not use all the information correctly

D) $y = 2$ Correct answer

15. y is inversely proportional to x .

When $x = 12$, $y = 6$.

Find the value of x when $y = 4$.

A) $x = 8$ Student used incorrect operations ($\div 6$, $\times 4$)

B) $x = 18$ Correct answer

C) $x = 15$ Student made arithmetic errors

D) $x = 72$ Student found the product of 12 and 6

Diagnostic Questions: Proportion

16. y is inversely proportional to the square of x .

When $x = 4$, $y = 10$.

Find the value of y when $x = 8$.

A) $y = 2.5$ Correct answer

B) $y = 5$ Student used incorrect method ($4 \times 10 \div 8$)

C) $y = 20$ Student used a correct method, but forgot to square 8

D) $y = 25$ Student made arithmetic errors

17. y is inversely proportional to the square root of x .

When $x = 25$, $y = 4$.

Find the value of y when $x = 100$.

A) $y = 16$ Student used direct proportion

B) $y = 0.2$ Student forgot to square root x

C) $y = 1$ Student used an incorrect sequence of operations

D) $y = 2$ Correct answer

18. Determine the value of x that satisfies:

$$\frac{6}{18} = \frac{19}{x}$$

A) $x = 38$ Student incorrectly simplified LHS to one half

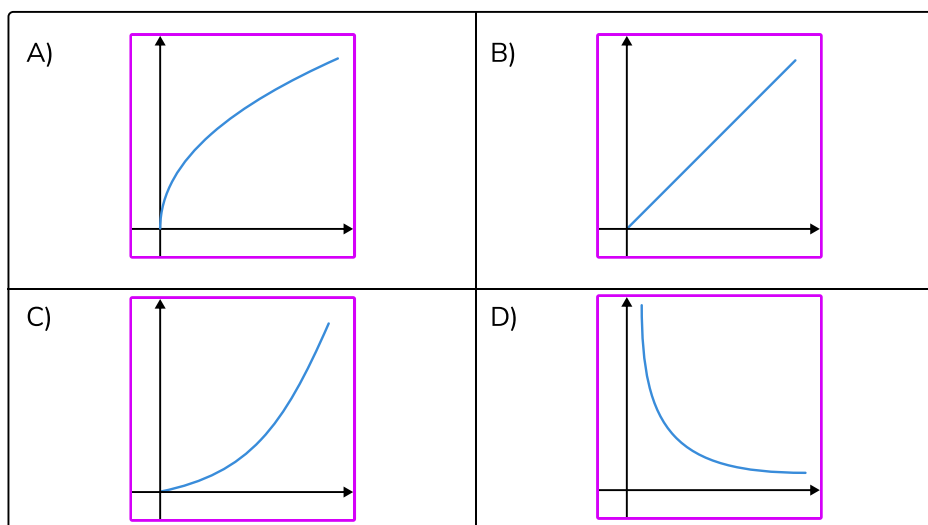
B) $x = 76$ Student incorrectly simplified LHS to one quarter

C) $x = 57$ Correct answer

D) $x = 6.3$ Student inverted operations in wrong order

Diagnostic Questions: Proportion

19. Choose the graph that represents direct proportion:



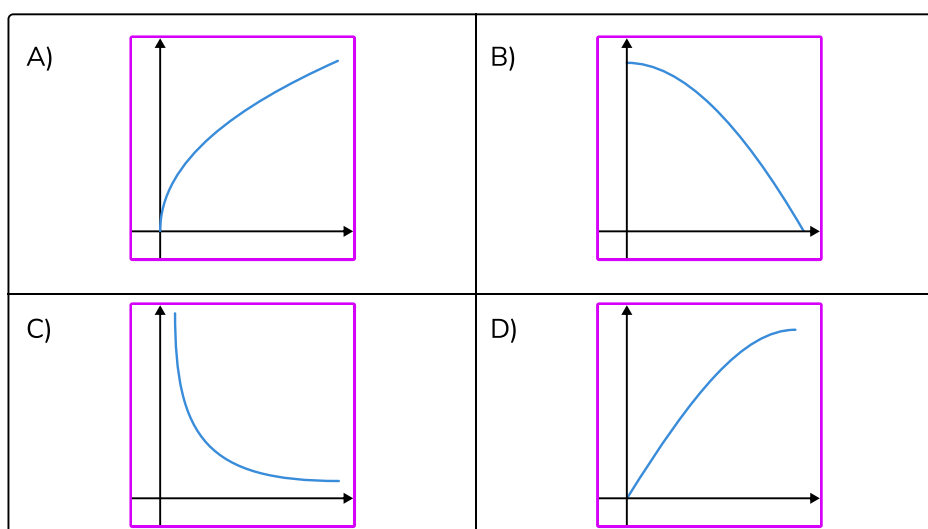
A) Student chose an upward sloping graph, but it is not linear

B) **Correct answer**

C) Student chose the graph of y proportional to x^2

D) Student chose a graph representing inverse proportion

20. Choose the graph that represents inverse proportion:



A) Student chose graph of y proportional to \sqrt{x}

B) Student chose downward sloping graph but it is not the correct shape

C) **Correct answer**

D) Student chose graph with incorrect gradient

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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