



THIRD SPACE  
LEARNING

# Diagnostic Questions

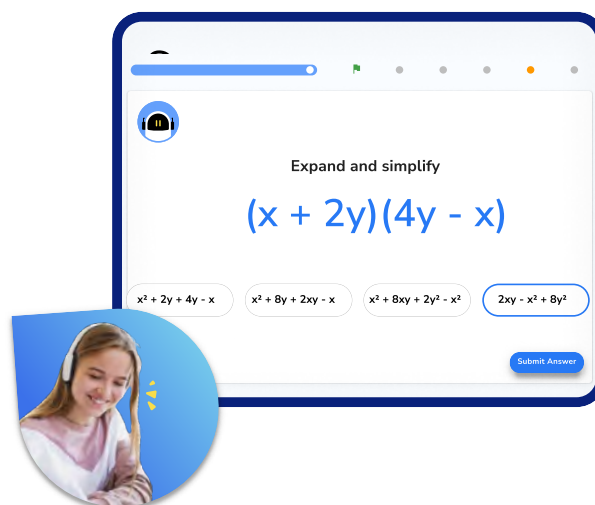
Decimals | Number

## 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 **Decimals** 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 22 multiple choice questions, each designed to assess each of the key skills required to master **decimals**. Each question has **one correct answer** and **three carefully chosen incorrect answers** that are designed to identify and highlight fundamental misconceptions, including: **Place value**, **Calculating with decimals**, **Order of operations**, **Ordering decimals (zero place holders)**, and **Substitution**.

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: Decimals

1. Calculate:

$$0.7 + 0.3$$

A) 0.10	B) 0.73
C) 1	D) 0.01

2. Calculate:

$$0.68 + 0.75$$

A) 2.33	B) 0.33
C) 0.143	D) 1.43

3. Calculate:

$$2.156 + 3.09$$

A) 5.246	B) 5.165
C) 6.056	D) 2.465

## Diagnostic Questions: Decimals

4. Calculate:

$$0.34 - 0.2$$

A) 0.32	B) 0.14
C) 0.12	D) 1.4

5. Calculate:

$$0.47 - 0.318$$

A) 0.162	B) 0.168
C) -0.271	D) 0.152

6. Calculate:

$$5 - 3.204$$

A) 4.6796	B) 2.806
C) 1.796	D) 2.796

## Diagnostic Questions: Decimals

7. Calculate:

$$0.6 \times 0.3$$

A) 1.8	B) 0.18
C) 0.9	D) 1.08

8. Calculate:

$$0.2 \times 0.3 \times 0.7$$

A) 0.42	B) 1.2
C) 4.2	D) 0.042

9. Calculate:

$$(1.3)^2$$

A) 0.169	B) 2.6
C) 1.69	D) 1.069

## Diagnostic Questions: Decimals

10. Calculate:

$$2.7 \times 1.05$$

A) 2.835	B) 2.35
C) 4.05	D) 2.035

11. Calculate:

$$5.6 \div 8$$

A) 0.07	B) 0.9
C) 0.48	D) 0.7

12. Calculate:

$$9 \div 0.15$$

A) 6	B) 60
C) 1.35	D) 600

## Diagnostic Questions: Decimals

13. Calculate:

$$4.9 \div 0.08$$

A) 60	B) 612.5
C) 61.25	D) 6.125

14. Calculate:

$$0.029 \div 0.4$$

A) 7.25	B) 0.725
C) 0.00725	D) 0.0725

15. Select the number with greatest value:

$$0.0084, 0.72, 0.074, 0.711$$

A) 0.0084	B) 0.72
C) 0.074	D) 0.711

## Diagnostic Questions: Decimals

16. Select the number with least value:

**0.03, 0.011, 0.04, 0.0101**

A) 0.03	B) 0.011
C) 0.04	D) 0.0101

17. Calculate:

**$3.7 - 1.2 \times 2.6$**

A) 0.58	B) 6.5
C) 1.58	D) 0.5

18. Determine  $E$  when  $m = 0.7$  and  $v = 4.1$ , if:

$$E = \frac{1}{2}mv^2$$

A) 1.435	B) 11.767
C) 5.8835	D) 2.059225



## Diagnostic Questions: Decimals

19. Three people went to a cafe. Work out the total for their bill:



A) £7.79	B) £16.02
C) £14.79	D) £14.92

20. Gul buys a book that costs £13.72. How much change does Gul receive after paying with a £20 note?

A) £33.72	B) £7.72
C) £6.28	D) £7.28

## Diagnostic Questions: Decimals

21. Write these decimals in ascending order:

**0.32, 0.3, 0.315, 0.38, 0.369**

A) 0.3, 0.315, 0.32, 0.369, 0.38	B) 0.3, 0.32, 0.38, 0.315, 0.369
C) 0.38, 0.369, 0.32, 0.315, 0.3	D) 0.369, 0.315, 0.38, 0.32, 0.3

22. Write these decimals in descending order:

**0.407, 0.74, 0.4, 0.074**

A) 0.074, 0.4, 0.407, 0.74	B) 0.407, 0.074, 0.74, 0.4
C) 0.4, 0.74, 0.074, 0.407	D) 0.74, 0.407, 0.4, 0.074

## Diagnostic Questions: Decimals Answers

1. Calculate:

$$0.7 + 0.3$$

- A) 0.10 Student doesn't understand place value
- B) 0.73 Student concatenated rather than added
- C) 1 Correct answer
- D) 0.01 Student carried the one into the wrong place value column

2. Calculate:

$$0.68 + 0.75$$

- A) 2.33 Student carried twice into the units column
- B) 0.33 Student forgot to carry
- C) 0.143 Student doesn't understand place value
- D) 1.43 Correct answer

3. Calculate:

$$2.156 + 3.09$$

- A) 5.246 Correct answer
- B) 5.165 Student didn't line up digits according to place value (used 3.009)
- C) 6.056 Student didn't line up digits according to place value (used 3.9)
- D) 2.465 Student didn't line up digits according to place value (used 0.309)

## Diagnostic Questions: Decimals Answers

4. Calculate:

$$0.34 - 0.2$$

- A) 0.32 Student misaligned the digit 2 into the hundredths column
- B) 0.14 Correct answer
- C) 0.12 Student used the digit 2 twice to subtract
- D) 1.4 Student changed the place value of all digits

5. Calculate:

$$0.47 - 0.318$$

- A) 0.162 Student forgot to reduce the digit 7 to 6 when regrouping
- B) 0.168 Student forgot to use a placeholder and regroup
- C) -0.271 Student treated the decimal parts as integers (47 - 318)
- D) 0.152 Correct answer

6. Calculate:

$$5 - 3.204$$

- A) 4.6796 Student subtracted 0.3204
- B) 2.806 Student found positive difference of aligned digits
- C) 1.796 Correct answer
- D) 2.796 Student forgot to adjust the digit 5 when regrouping

## Diagnostic Questions: Decimals Answers

7. Calculate:

$$0.6 \times 0.3$$

- A) 1.8 Student did not adjust answer by considering  $10^2$
- B) 0.18 Correct answer
- C) 0.9 Student added rather than multiplied
- D) 1.08 Student does not understand how place value is used in decimal multiplication

8. Calculate:

$$0.2 \times 0.3 \times 0.7$$

- A) 0.42 Student forgot to make an adjustment to the place value of the answer
- B) 1.2 Student found the sum rather than the product
- C) 4.2 Student forgot to make an adjustment to the place value of the answer
- D) 0.042 Correct answer

9. Calculate:

$$(1.3)^2$$

- A) 0.169 Student adjusted the place value incorrectly after multiplying
- B) 2.6 Student doubled rather than squared 1.3
- C) 1.69 Correct answer
- D) 1.069 Student made mistakes with the place value of digits in the answer

## Diagnostic Questions: Decimals Answers

10. Calculate:

$$2.7 \times 1.05$$

A) 2.835 Correct answer

B) 2.35 Student multiplied integer parts and decimal parts separately

C) 4.05 Student missed the zero placeholder in the second number

D) 2.035 Student lacks understanding of how place value affects products

11. Calculate:

$$5.6 \div 8$$

A) 0.07 Student lacks understanding of place value

B) 0.9 Student has gaps in their times tables knowledge

C) 0.48 Student doesn't understand how to divide a decimal by an integer

D) 0.7 Correct answer

12. Calculate:

$$9 \div 0.15$$

A) 6 Student did not adjust place values of both numbers by same order

B) 60 Correct answer

C) 1.35 Student performed wrong operation

D) 600 Student did not adjust place values of both numbers by same order

## Diagnostic Questions: Decimals Answers

13. Calculate:

$$4.9 \div 0.08$$

- A) 60 Student gave an approximate answer
- B) 612.5 Student did not adjust place values of both numbers by same order
- C) 61.25 Correct answer
- D) 6.125 Student did not adjust place values of both numbers by same order

14. Calculate:

$$0.029 \div 0.4$$

- A) 7.25 Student applied the concept of place value incorrectly
- B) 0.725 Student did not adjust place values of both numbers by same order
- C) 0.00725 Student did not adjust place values of both numbers by same order
- D) 0.0725 Correct answer

15. Select the number with greatest value:

$$0.0084, 0.72, 0.074, 0.711$$

- A) 0.0084 Student considered first significant figure rather than place value
- B) 0.72 Correct answer
- C) 0.074 Student compared 72 and 74 without looking at place value
- D) 0.711 Student compared 72 and 711 without looking at place value

## Diagnostic Questions: Decimals Answers

16. Select the number with least value:

**0.03, 0.011, 0.04, 0.0101**

- A) 0.03 Student selected 3 from the set {3, 11, 4, 101}
- B) 0.011 Student compared 11 and 101 without looking at place value
- C) 0.04 Student only considered the value of individual digits
- D) 0.0101 Correct answer

17. Calculate:

**$3.7 - 1.2 \times 2.6$**

- A) 0.58 Correct answer
- B) 6.5 Student performed calculation sequentially from left to right
- C) 1.58 Student found product incorrectly (multiplied integer and decimal parts independently)
- D) 0.5 Student found product correctly, but subtracted decimal parts incorrectly

18. Determine  $E$  when  $m = 0.7$  and  $v = 4.1$ , if:

$$E = \frac{1}{2}mv^2$$

- A) 1.435 Student forgot to square  $v$
- B) 11.767 Student forgot to multiply by a half
- C) 5.8835 Correct answer
- D) 2.059225 Student found  $\frac{1}{2}mv$  then squared



## Diagnostic Questions: Decimals Answers

19. Three people went to a cafe. Work out the total for their bill:



- A) £7.79 Student totalled cake, coffee and tea prices without considering how many of each were bought
- B) £16.02 Correct answer
- C) £14.79 Student only multiplied integer parts of cost by 3 and 2
- D) £14.92 Student forgot to carry when finding the sum

20. Gul buys a book that costs £13.72. How much change does Gul receive after paying with a £20 note?

- A) £33.72 Student found the sum rather than the difference
- B) £7.72 Student made errors with the order of subtraction of the decimal digits
- C) £6.28 Correct answer
- D) £7.28 Student made errors when regrouping

## Diagnostic Questions: Decimals Answers

21. Write these decimals in ascending order:

**0.32, 0.3, 0.315, 0.38, 0.369**

A) 0.3, 0.315, 0.32, 0.369, 0.38 Correct answer

B) 0.3, 0.32, 0.38, 0.315, 0.369 Student ordered by number of digits not place value

C) 0.38, 0.369, 0.32, 0.315, 0.3 Student put in descending order

D) 0.369, 0.315, 0.38, 0.32, 0.3 Student incorrectly put in descending order and ordered by number of digits not place value

22. Write these decimals in descending order:

**0.407, 0.74, 0.4, 0.074**

A) 0.074, 0.4, 0.407, 0.74 Student put in ascending order

B) 0.407, 0.074, 0.74, 0.4 Student ordered by number of digits not place value

C) 0.4, 0.74, 0.074, 0.407 Student incorrectly put in ascending order and ordered by number of digits not place value

D) 0.74, 0.407, 0.4, 0.074 Correct answer

# 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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