



THIRD SPACE
LEARNING

Diagnostic Questions

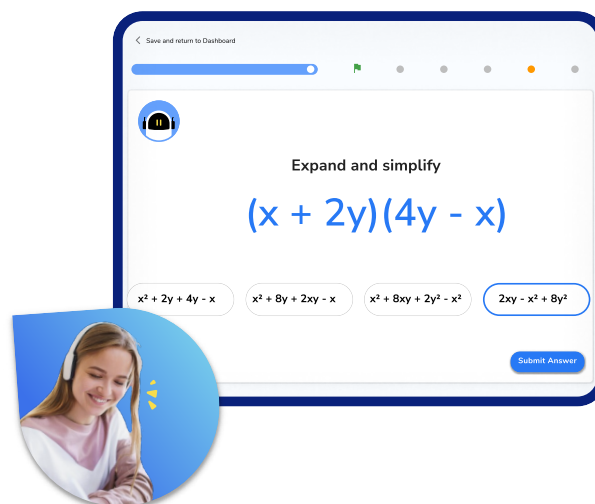
Standard Form | Number

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 **Standard Form** 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 **standard form**. Each question has **one correct answer** and **three carefully chosen incorrect answers** that are designed to identify and highlight fundamental misconceptions, including: **Order of operations**, **Place value**, **Laws of indices**, and **Correcting a number to be written in standard form**.

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: Standard Form

1. Write as an ordinary number:

$$2 \times 10^4$$

A) 160 000	B) 80
C) 2000	D) 20 000

2. Write as an ordinary number:

$$9.4 \times 10^0$$

A) 940	B) 0
C) 1	D) 9.4

3. Write this number in standard form:

4700

A) 47×10^2	B) 4.7×10^3
C) 4.7×10^2	D) $4.7^3 \times 10$

Diagnostic Questions: Standard Form

4. Write as an ordinary number:

$$6.25 \times 10^7$$

A) 62 500 000	B) 6 250 000
C) 625 000 000	D) 437.5

5. Write this number in standard form:

$$0.00007$$

A) 7×10^{-5}	B) $7^{-5} \times 10$
C) $(7 \times 10)^{-5}$	D) 7×10^5

6. Write as an ordinary number:

$$5.14 \times 10^{-3}$$

A) 5140	B) 0.514
C) 0.00514	D) 0.000514

Diagnostic Questions: Standard Form

7. Write this number in standard form:

384 000 000 000

A) 3.84×10^9	B) 3.84×10^{11}
C) 384×10^9	D) 3×10^{11}

8. Write this number in standard form:

0. 000 000 047

A) 4.7×10^{-8}	B) 47×10^{-9}
C) 4.7×10^8	D) 4.7×10^{-9}

9. Rewrite in correct standard form:

358×10^2

A) 35800	B) 3.58×10^4
C) 3.58×10^5	D) 358×10^0

Diagnostic Questions: Standard Form

10. Rewrite in correct standard form:

$$9500 \times 10^5$$

A) 9.5×10^8	B) 9.5×10^7
C) 9.5×10^2	D) 9.5×10^9

11. Rewrite in correct standard form:

$$0.0002 \times 10^{-3}$$

A) 2×10^1	B) 2×10^{-6}
C) 2×10^{-7}	D) 2×10^7

12. Giving your answer in standard form, calculate:

$$(2 \times 10^4) \times (3 \times 10^7)$$

A) 6×10^7	B) 6×10^{11}
C) 6×10^{-3}	D) 6×10^{12}

Diagnostic Questions: Standard Form

13. Giving your answer in standard form, calculate:

$$(8 \times 10^3) \times (5 \times 10^4)$$

A) 40×10^7	B) 4×10^7
C) 4×10^8	D) 4×10^6

14. Giving your answer in standard form, calculate:

$$(4.6 \times 10^3) \div (2 \times 10^8)$$

A) 2.3×10^{-5}	B) 2.3×10^{11}
C) 2.3×10^{-11}	D) 2.3×10^5

15. Giving your answer in standard form, calculate:

$$(1.5 \times 10^2) \div (5 \times 10^{-3})$$

A) 0.3×10^5	B) 30000
C) 3×10^4	D) 3×10^6

Diagnostic Questions: Standard Form

16. Giving your answer as an ordinary number, calculate:

$$(2.75 \times 10^7) + (6.83 \times 10^5)$$

A) 28 183 000	B) 95 800 000
C) 2.8183×10^7	D) 3 433 000

17. Giving your answer as an ordinary number, calculate:

$$(5.821 \times 10^6) - (4.14 \times 10^5)$$

A) 5.407×10^6	B) 1 681 000
C) 540 700	D) 5 407 000

18. Giving your answer in standard form, calculate:

$$(7.3 \times 10^{-2}) + (8.94 \times 10^{-3})$$

A) 9.67×10^3	B) 0.08194
C) 8.194×10^{-2}	D) 8.194×10^{-3}

Diagnostic Questions: Standard Form

19. Giving your answer in standard form, calculate:

$$(3.2 \times 10^{-4}) - (8.5 \times 10^{-5})$$

A) -5.3×10^{-9}	B) 2.35×10^{-4}
C) 0.000235	D) 2.35×10^{-5}

20. The average distance from the Earth to the Sun is 149.6 million kilometres.
Write this distance using standard form:

A) $1.496 \times 10^8 \text{ km}$	B) $149.6 \times 10^6 \text{ km}$
C) $1.496 \times 10^9 \text{ km}$	D) $1.496 \times 10^{11} \text{ km}$

Diagnostic Questions: Standard Form Answers

1. Write as an ordinary number:

$$2 \times 10^4$$

- A) 160 000 Student multiplied 2 by 10, then raised the result to the power 4
- B) 80 Student found the product of 2, 10 and 4
- C) 2000 Student placed the digit 2 in the fourth place value column
- D) 20 000 Correct answer

2. Write as an ordinary number:

$$9.4 \times 10^0$$

- A) 940 Student forgot the rule for the 0th power
- B) 0 Student multiplied by zero
- C) 1 Student multiplied then raised the result to the power zero
- D) 9.4 Correct answer

3. Write this number in standard form:

$$4700$$

- A) 47×10^2 Student has not used correct standard form since $47 > 10$
- B) 4.7×10^3 Correct answer
- C) 4.7×10^2 Student used the wrong index number
- D) $4.7^3 \times 10$ Student attributed the index number to the wrong base

Diagnostic Questions: Standard Form Answers

4. Write as an ordinary number:

$$6.25 \times 10^7$$

A) 62 500 000 Correct answer

B) 6 250 000 Student wrote down a number with 7 digits

C) 625 000 000 Student introduced an extra place holder

D) 437.5 Student found the product of 6.25, 10 and 7

5. Write this number in standard form:

$$0.00007$$

A) 7×10^{-5} Correct answer

B) $7^{-5} \times 10$ Student wrote the index on the wrong base number

C) $(7 \times 10)^{-5}$ Student does not understand how to write a number in standard form

D) 7×10^5 Student forgot to include the sign of the index number

6. Write as an ordinary number:

$$5.14 \times 10^{-3}$$

A) 5140 Student did not use the negative sign of the index number

B) 0.514 Student placed the digit 4 in the thousandths, then placed the 5 and 1

C) 0.00514 Correct answer

D) 0.000514 Student placed three zeros after the decimal point

Diagnostic Questions: Standard Form Answers

7. Write this number in standard form:

384 000 000 000

A) 3.84×10^9 Student used the number of placeholders as the index number

B) 3.84×10^{11} Correct answer

C) 384×10^9 Student did not use correct standard form

D) 3×10^{11} Student did not include all necessary digits

8. Write this number in standard form:

0.000 000 047

A) 4.7×10^{-8} Correct answer

B) 47×10^{-9} Student did not use correct standard form

C) 4.7×10^8 Student forgot the negative sign of the index number

D) 4.7×10^{-9} Student used the total number of decimal places as the index number

9. Rewrite in correct standard form:

358×10^2

A) 35800 Student wrote the ordinary number representation

B) 3.58×10^4 Correct answer

C) 3.58×10^5 Student increased the index of 10 by the number of digits in 358

D) 358×10^0 Student did not write using correct standard form

Diagnostic Questions: Standard Form Answers

10. Rewrite in correct standard form:

$$9500 \times 10^5$$

A) 9.5×10^8 Correct answer

B) 9.5×10^7 Student only used the two place holders to adjust the index

C) 9.5×10^2 Student adjusted the index in the wrong direction

D) 9.5×10^9 Student increased the index by the number of digits in 9500

11. Rewrite in correct standard form:

$$0.0002 \times 10^{-3}$$

A) 2×10^1 Student adjusted the index in the wrong direction

B) 2×10^{-6} Student adjusted the index by the number of placeholders

C) 2×10^{-7} Correct answer

D) 2×10^7 Student forgot to include the negative sign of the index

12. Giving your answer in standard form, calculate:

$$(2 \times 10^4) \times (3 \times 10^7)$$

A) 6×10^7 Student used the greater power of ten instead of combining

B) 6×10^{11} Correct answer

C) 6×10^{-3} Student confused rules for multiplying and dividing

D) 6×10^{12} Student combined powers of ten incorrectly

Diagnostic Questions: Standard Form Answers

13. Giving your answer in standard form, calculate:

$$(8 \times 10^3) \times (5 \times 10^4)$$

- A) 40×10^7 Student forgot to write in correct standard form
- B) 4×10^7 Student adjusted power of ten incorrectly
- C) 4×10^8 Correct answer
- D) 4×10^6 Student adjusted power of ten in wrong direction

14. Giving your answer in standard form, calculate:

$$(4.6 \times 10^3) \div (2 \times 10^8)$$

- A) 2.3×10^{-5} Correct answer
- B) 2.3×10^{11} Student added powers of ten rather than subtracting
- C) 2.3×10^{-11} Student found difference of powers incorrectly
- D) 2.3×10^5 Student forgot to include the sign on the index number

15. Giving your answer in standard form, calculate:

$$(1.5 \times 10^2) \div (5 \times 10^{-3})$$

- A) 0.3×10^5 Student did not write in correct standard form
- B) 30000 Student wrote answer as an ordinary number
- C) 3×10^4 Correct answer
- D) 3×10^6 Student adjusted power of ten in wrong direction

Diagnostic Questions: Standard Form Answers

16. Giving your answer as an ordinary number, calculate:

$$(2.75 \times 10^7) + (6.83 \times 10^5)$$

A) 28 183 000 Correct answer

B) 95 800 000 Student aligned digits beginning with highest place value

C) 2.8183×10^7 Student wrote answer in standard form

D) 3 433 000 Student wrote the decimal expansion of the first term incorrectly

17. Giving your answer as an ordinary number, calculate:

$$(5.821 \times 10^6) - (4.14 \times 10^5)$$

A) 5.407×10^6 Student gave answer in standard form

B) 1 681 000 Student aligned numbers incorrectly before subtracting

C) 540 700 Student wrote first term as a 6-digit number and second term as a 5- digit number

D) 5 407 000 Correct answer

18. Giving your answer in standard form, calculate:

$$(7.3 \times 10^{-2}) + (8.94 \times 10^{-3})$$

A) 9.67×10^3 Student converted to ordinary numbers using positive indices, added, then converted to standard form

B) 0.08194 Student forgot to convert to standard form

C) 8.194×10^{-2} Correct answer

D) 8.194×10^{-3} Student added second terms with outside terms

Diagnostic Questions: Standard Form Answers

19. Giving your answer in standard form, calculate:

$$(3.2 \times 10^{-4}) - (8.5 \times 10^{-5})$$

A) -5.3×10^{-9} Student made several conceptual errors

B) 2.35×10^{-4} Correct answer

C) 0.000235 Student did not write answer in standard form

D) 2.35×10^{-5} Student converted to standard form incorrectly

20. The average distance from the Earth to the Sun is 149.6 million kilometres.
Write this distance using standard form:

A) 1.496×10^8 km Correct answer

B) 149.6×10^6 km Student did not use correct standard form

C) 1.496×10^9 km Student determined the index incorrectly

D) 1.496×10^{11} km Student's answer was 1000 times the actual 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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