

Fix it 1 The numbers and the powers of 10

Standard form · ANSWERS

Put the two numbers together and the two powers of 10 together, with the same sign between them.
Dividing: the first number $\div$ the second, and the first power $\div$ the second.

EXAMPLE

Split $(3 \times 10^4) \times (1.5 \times 10^6)$ into the numbers and the powers of 10.

1. The numbers: 3×1.5
2. The powers of 10: $10^4 \times 10^6$
3. Multiplying, so the order does not matter.

YOUR TURN

- 1 Split $(2.5 \times 10^3) \times (4 \times 10^2)$ into the numbers and the powers of 10.

$$2.5 \times 4 \text{ and } 10^3 \times 10^2$$

- 2 Split $(8.4 \times 10^9) \div (2 \times 10^5)$ into the numbers and the powers of 10.

$$8.4 \div 2 \text{ and } 10^9 \div 10^5$$

- 3 Split $(3 \times 10^{-2}) \div (6 \times 10^{-7})$ into the numbers and the powers of 10.

$$3 \div 6 \text{ and } 10^{-2} \div 10^{-7}$$

Check: Each number and each power from the question is used once, and for $\div$ the first ones stay first.

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Fix it 2 Work out the numbers

Standard form · ANSWERS

Multiply or divide the numbers in front, with no powers of 10. The answer can be 10 or more, or less than 1: card 5 puts that right.

EXAMPLE

Work out the numbers in $(2.5 \times 10^4) \times (6 \times 10^3)$

1. The numbers: 2.5×6
2. $2 \times 6 = 12$ and $0.5 \times 6 = 3$
3. $12 + 3 = 15$
4. 15 is not between 1 and 10.
That is fine for now.

YOUR TURN

- 1 Work out the numbers: 1.2×3

$$3.6$$

- 2 Work out the numbers: 7.5×4

$$30$$

- 3 Work out the numbers: $2 \div 5$

$$0.4$$

Check: Multiplying: divide your answer by one number to get the other. Dividing: multiply your answer by the second number to get the first.

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Fix it 3 Work out the powers of 10

Standard form · ANSWERS

Multiplying: add the powers. **Dividing:** take the second power away from the first. Take care with negative powers:
 $10^4 \div 10^{-2} = 10^6$, because $4 - (-2) = 6$.

EXAMPLE

Work out $10^6 \times 10^{-2}$

1. Multiplying, so add the powers.
2. $6 + (-2) = 4$
3. $10^6 \times 10^{-2} = 10^4$

YOUR TURN

- 1 Work out $10^{-4} \times 10^9$

10^5

- 2 Work out $10^3 \div 10^7$

10^{-4}

- 3 Work out $10^{-2} \div 10^{-6}$

10^4

Check: Multiplying: take one power from your answer to get the other. Dividing: add the second power to your answer to get the first. *The Maths Habit*

Fix it 4 Is it standard form?

Standard form · ANSWERS

Put the number and the power of 10 back together. It is standard form only when the number is at least 1 and less than 10.

EXAMPLE

The numbers give 14 and the powers give 10^8 . Is it standard form?

1. Put them back together: 14×10^8
2. 14 is not less than 10.
3. No: it is not standard form yet.

YOUR TURN

- 1 Put them back together: 8.5×10^{-3} . Is it standard form?

Yes

- 2 Put them back together: 0.6×10^5 . Is it standard form?

No: 0.6 is less than 1

- 3 Put them back together: 10×10^4 . Is it standard form?

No: 10 is not less than 10

Check: Look before the point: one digit, and it is not 0.

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10 or more: $15 \times 10^7 = 1.5 \times 10 \times 10^7 = 1.5 \times 10^8$. Less than 1: $0.5 \times 10^3 = 5 \times 10^{-1} \times 10^3 = 5 \times 10^2$.

EXAMPLE

Write 36×10^5 in standard form.

1. $36 = 3.6 \times 10$

2. $36 \times 10^5 = 3.6 \times 10 \times 10^5$

3. The 10 joins the power: 3.6×10^6

YOUR TURN

1 Write 45×10^{-7} in standard form.

4.5×10^{-6}

2 Write 0.8×10^6 in standard form.

8×10^5

3 Write 0.25×10^{-3} in standard form.

2.5×10^{-4}

Check: The number got smaller, so the power went up (or the other way round), and the value is the same.

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