Mathematics

Standard Form Converting to & from Standard Form $a \times 10^{n}$



What is standard form and why is it used?

- Standard form is a way of writing very large and very small numbers using powers of 10
- · This allows us to:
 - Write them more concisely
 - Compare them more easily
 - o Perform calculations with them more easily



How do I write a number in standard form?

Numbers written in standard form are always written as:

$$a \times 10^{n}$$

- · Where:
 - o $1 \le a < 10$ (a is between 1 and 10)
 - \circ n > 0 (n is **positive**) for large numbers
 - n < 0 (n is negative) for small numbers



How do I write a large number in standard form?

- To write a large number such as 3 240 000 in standard form
 - Identify the value of a
 - **3.24**
 - Find how many times you must multiply 3.24 by 10, to make 3 240 000
 - Count how many places you need to move the decimal point
 - We need to multiply by 10 six times
 - \circ 3240000 = 3.24 × 10 × 10 × 10 × 10 × 10 × 10 = 3.24 × 10⁶



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 - o 3240000 = 3.24 × 10 × 10 × 10 × 10 × 10 × 10 = 3.24 × 106



How do I write a small number in standard form?

- To write a small number such as 0.000567 in standard form
 - Identify the value of a
 - **5.67**
 - Find how many times you must divide 5.67 by 10, to make 0.000567
 - Count how many places you need to move the decimal point
 - We need to divide by 10 four times
 - We are dividing rather than multiplying so the power will be negative
 - \circ 0.000567 = 5.67 ÷ 10 ÷ 10 ÷ 10 ÷ 10 = 5.67 × 10⁻⁴



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$$\circ$$
 0.000567 = 5.67 ÷ 10 ÷ 10 ÷ 10 ÷ 10 = 5.67 × 10⁻⁴



Worked Example 🔠

(a) Without a calculator, write 0.007052 in standard form.

Standard form will be written as $a \times 10^n$ where a is between 1 and 10 Find the value for a

$$a = 7.052$$

The original number is smaller than 1 so n will be negative

Count how many times you need to divide a by 10 to get the original number

$$0.007052 = 7.052 \div 10 \div 10 \div 10$$
 (3 times)

Therefore n = -3.





(a) Without a calculator, write 0.007052 in standard form.

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 (3 times)

Therefore n = -3.

 $0.007052 = 7.052 \times 10^{-3}$

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Worked Example 🔠

(b) Without a calculator, write 324 500 000 in standard form.

Standard form will be written as $a \times 10^n$ where a is between 1 and 10 Find the value for a

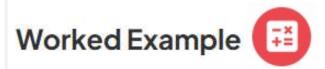
a = 3.245

The original number is larger than 1 so n will be positive

Count how many times you need to multiply a by 10 to get the original number

Therefore n = 8





(b) Without a calculator, write 324 500 000 in standard form.

Standard form will be written as $a \times 10^n$ where a is between 1 and 10 Find the value for a

a = 3.245

The original number is larger than 1 so n will be positive

Count how many times you need to multiply a by 10 to get the original number

Therefore n = 8

 $324\,500\,000 = 3.245 \times 10^8$

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Thank you!



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