GCSE Maths: Standard form: large and small numbers (Higher): answers

GCSE Maths - Standard Form, Indices and Surds - Higher - Lesson 6.4

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at **websink.site/gcse/maths/ch06-standard-form-indices-surds/higher/standard-form-large-and-small-numbers/**

Exercise 6I Writing numbers in standard form Non-calculator

1 Is each number in standard form? Give a reason.

(a) 3.4×10^5

Answer: Yes

(b) 34×10^4

Answer: No (A is 10 or more)

(c) 0.5×10^3

Answer: No (A is less than 1)

(d) 9.99×10^{-2}

Answer: Yes

(e) 10×10^2

Answer: No (A is 10 or more)

(f) 6×10^0

Answer: Yes

2 Write each number in standard form.

(a) 6000

Answer: 6×10^3

(b) 45,000

Answer: 4.5×10^4

(c) 380,000

Answer: 3.8×10^5

(d) 5,600,000

Answer: 5.6×10^6

(e) 91,000,000

Answer: 9.1×10^7

(f) 720

Answer: 7.2×10^{2}

3 Write each number in standard form.

(a) 0.7

Answer: 7×10^{-1}

(b) 0.06

Answer: 6×10^{-2}

(c) 0.0035

Answer: 3.5×10^{-3}

(d) 0.00072

Answer: 7.2×10^{-4}

(e) 0.000081

Answer: 8.1×10^{-5}

(f) 0.0000046

Answer: 4.6×10^{-6}

4 Write each as an ordinary number.

(a) 5×10^{3}

Answer: 5000

(b) 2.4×10^{4}

Answer: 24,000

(c) 7.08×10^{5}

Answer: 708,000

(d) 1.5×10^{6}

Answer: 1,500,000

(e) 9.2×10^{7}

Answer: 92,000,000

5 Write each as an ordinary number.

(a) 4×10^{-1}

Answer: 0.4

(b) 6.2×10^{-3}

Answer: 0.0062

(c) 3.07×10^{-4}

Answer: 0.000307

(d) 8.5×10^{-5}

Answer: 0.000085

(e) 1.1×10^{-6}

Answer: 0.0000011

6 These numbers are **not** in standard form. Write each in standard form.

(a) 45×10^{3}

Answer: 4.5×10^{4}

(b) 0.6×10^{5}

Answer: 6×10^{4}

(c) 120×10^{-4}

Answer: 1.2×10^{-2}

(d) 0.08×10^{7}

Answer: 8×10^{5}

(e) 250×10^{2}

Answer: 2.5×10^{4}

7 A calculator display shows each of these. Write the value in standard form and as an ordinary number.

(a) 3.6E8

Answer: 3.6×10^{8} = 360,000,000

(b) 2.4E-3

Answer: 2.4×10^{-3} = 0.0024

(c) 7.1E5

Answer: 7.1×10^{5} = 710,000

(d) 5E-2

Answer: 5×10^{-2} = 0.05

8 Write each number in standard form, correct to the number of significant figures shown.

(a) 4,523,000 (2 s.f.)

Answer: 4.5×10^{6}

(b) 0.0003846 (2 s.f.)

Answer: 3.8×10^{-4}

(c) 299,792,458 (3 s.f.)

Answer: 3.00×10^8

(d) 6,371,000 (3 s.f.)

Answer: 6.37×10^6

9 **Write each of these facts in standard form.**

(a) The world population is about 8,100,000,000.

Answer: 8.1×10^9

(b) The Moon is about 384,400 km from the Earth.

Answer: 3.844×10^5

(c) A sheet of paper is about 0.0001 m thick.

Answer: 1×10^{-4}

(d) A hydrogen atom has a mass of 0.000000000000000000000000000167 kg.

Answer: 1.67×10^{-27}

10 **Write each number in standard form.**

(a) 25 million

Answer: 2.5×10^7

(b) half a billion (a billion is 1,000,000,000)

Answer: 5×10^8

(c) three thousandths

Answer: 3×10^{-3}

(d) 1 hundred-thousandth

Answer: 1×10^{-5}

11 **Explain why 10 is written as 1×10^1 in standard form and why 0.1 is written as 1×10^{-1}.**

Answer: A = 1 is allowed (at least 1). $10 = 1 \times 10$ and $0.1 = 1 \div 10 = 1 \times 10^{-1}$.

12 **Ali writes $0.0072 = 7.2 \times 10^3$. Explain his mistake and write the correct standard form.**

Answer: 7.2×10^{-3}

13 **$N = 4.5 \times 10^6$. Write $10N$ and $N \div 100$ in standard form.**

(a) $10N$

Answer: 4.5×10^7

(b) $N \div 100$

Answer: 4.5×10^4

14 Which of these is **not** equal to 3.5×10^4? A: 35,000 B: 350×10^2 C: 0.35×10^5 D: 3.5×10^{-4}

Answer: D

15 The number 7.2×10^n is greater than 500 and less than 50,000. List all the possible whole-number values of n.

Answer: $n = 2$ or $n = 3$

Exercise 6J Standard form in context Non-calculator

1 Write each measurement in standard form.

(a) The diameter of the Sun is 1,392,000 km.

Answer: 1.392×10^6

(b) The wavelength of red light is 0.0000007 m.

Answer: 7×10^{-7}

(c) The population of the UK is about 67,000,000.

Answer: 6.7×10^7

(d) A human hair is about 0.00007 m wide.

Answer: 7×10^{-5}

(e) The nearest star is about 40,000,000,000,000 km away.

Answer: 4×10^{13}

2 Write each of these as an ordinary number.

(a) The Earth is 1.5×10^8 km from the Sun.

Answer: 150,000,000

(b) A virus is 1.2×10^{-7} m long.

Answer: 0.00000012

(c) A computer can do 3×10^9 operations per second.

Answer: 3,000,000,000

(d) A grain of pollen has a mass of 2.5×10^{-9} kg.

Answer: 0.0000000025

3 Write each of these numbers in standard form.

(a) 85,000

Answer: 8.5×10^4

(b) 0.0092

Answer: 9.2×10^{-3}

(c) 630,000,000

Answer: 6.3×10^8

(d) 0.00000058

Answer: 5.8×10^{-7}

(e) 1,200,000,000

Answer: 1.2×10^9

4 Write each number as an ordinary number.

(a) 6.3×10^4

Answer: 63,000

(b) 9×10^{-3}

Answer: 0.009

(c) 1.07×10^6

Answer: 1,070,000

(d) 4.4×10^{-2}

Answer: 0.044

5 Write each number in standard form.

(a) 32×10^6

Answer: 3.2×10^7

(b) 0.45×10^3

Answer: 4.5×10^2

(c) 560×10^{-5}

Answer: 5.6×10^{-3}

(d) 0.09×10^4

Answer: 9×10^2

6 Zoe says: "50×10^4 is bigger than 5×10^4, so it must be in standard form." Is she right? Explain.

Answer: No. A = 50 is not less than 10. In standard form it is 5×10^5.

7 A scientist measures a bacterium as 0.0000025 m long. She writes 25×10^{-7} m. Write this correctly in standard form.

Answer: 2.5×10^{-6} m

8 Show that 3×10^5 is 100 times bigger than 3×10^3.

Answer: $3 \times 10^5 \div (3 \times 10^3) = 10^2 = 100$

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