

Try each question first. Show each step. Use only if assigned the Support route.

Department / teacher instructions:

Editable toolkit / reminders:

Name: _____ Class: _____ Date: _____

A. Conversions

1.	Write 4,000 as 4×10 __.
	Prompt: Count the places the decimal moves.
2.	Write 6,000,000 in standard form.
	Prompt: The power counts the zeros.
3.	Write 0.05 as 5×10 __.
	Prompt: A small number has a negative power.
4.	Write 0.0007 in standard form.
	Prompt: Move the decimal after the 7.
5.	Write 3×10^3 as an ordinary number.
	Prompt: Positive power means move right.
6.	Write 8×10^{-2} as an ordinary number.
	Prompt: Negative power means move left.

B. Converting and comparing

1.	Write 7,000 in standard form.
	Prompt: Coefficient between 1 and 10.
2.	Write 0.004 in standard form.
	Prompt: Count left moves.
3.	Which is larger: 3×10^4 or 8×10^3 ?
	Prompt: Compare the powers first.
4.	Write 2.5×10^5 as an ordinary number.
	Prompt: Move the decimal 5 places right.
5.	Write 6×10^{-3} as an ordinary number.
	Prompt: Move the decimal 3 places left.
6.	Put 4×10^2 and 3×10^3 in order.
	Prompt: Rewrite as ordinary numbers.

Support route continued

Complete the remaining work if time allows. Show enough working for another person to follow your method.

C. Explain and check

1.	Is 0.4×10^6 in standard form?
	Prompt: Check the coefficient.
2.	Correct 45×10^3 so it is standard form.
	Prompt: Move one place and increase the power.
3.	Which is larger: 2×10^{-3} or 5×10^{-4} ?
	Prompt: Write both as decimals.
4.	Explain what the power tells you.
	Prompt: Think about decimal movement.
5.	A pupil says 10^{-2} is larger than 10^2 . Explain.
	Prompt: Compare 0.01 and 100.
6.	How can you check a standard-form answer?
	Prompt: Estimate its size.

D. Mixed practice

1.	Write 3,600,000 in standard form.
	Prompt: Six places to the left.
2.	Write 0.0008 in standard form.
	Prompt: Four places to the right.
3.	Calculate $(2 \times 10^3)(3 \times 10^2)$.
	Prompt: Multiply numbers, then powers.
4.	Calculate $(8 \times 10^4) \div (2 \times 10^2)$.
	Prompt: Divide numbers, subtract powers.
5.	Which is closer to 10^6 : 9×10^5 or 2×10^6 ?
	Prompt: Compare the distance from 1,000,000.
6.	Write one sentence explaining a negative power.
	Prompt: It represents a small number.

Support route answers

Answers are grouped by section. Accept equivalent correct methods and explanations.

A: 3 ; 6×10^6 ; -2 ; 7×10^{-4} ; 3×10^3 ; 8×10^{-2} .

B: 7×10^3 ; 4×10^{-3} ; 3×10^4 ; 250,000; 0.006; 4×10^2 then 3×10^3 .

C: no; 4.5×10^4 ; 2×10^{-3} ; decimal places/power; $10^{-2} = 0.01$; estimate size.

D: 3.6×10^6 ; 8×10^{-4} ; 6×10^5 ; 4×10^2 ; 9×10^5 ; answers vary.

Standard form - Core route

Work independently. Use this worksheet only if your teacher assigned the Core route.

Department / teacher instructions:

Editable toolkit / reminders:

Name: _____ Class: _____ Date: _____

A. Conversions

1.	Write 58,000 in standard form.
2.	Write 0.00042 in standard form.
3.	Write 7.2×10^5 as an ordinary number.
4.	Write 3.06×10^{-4} as an ordinary number.
5.	Write 0.00000091 in standard form.
6.	Write 4,500,000 in standard form.

B. Calculate

1.	Calculate $(3 \times 10^4)(2 \times 10^3)$.
2.	Calculate $(8 \times 10^6) \div (2 \times 10^2)$.
3.	Calculate $(5 \times 10^{-3})(4 \times 10^5)$.
4.	Calculate $(9 \times 10^7) \div (3 \times 10^3)$.
5.	Calculate $(2.4 \times 10^5)(3)$.
6.	Calculate $(6 \times 10^{-4}) \div (2)$.
7.	A file is 3.2×10^6 bytes. How many bytes is this?
8.	A bacterium is 4×10^{-6} m long. Write this as a decimal.

Complete the remaining work if time allows. Show enough working for another person to follow your method.

C. Compare and reason

1.	Which is larger: 4.5×10^7 or 9×10^6 ? Explain.
2.	Put 3×10^{-2} , 7×10^{-3} and 1×10^{-1} in order.
3.	Explain why 72×10^4 is not standard form.
4.	A pupil writes $0.00056 = 5.6 \times 10^4$. Explain the error.
5.	Estimate $(6 \times 10^5)(2 \times 10^3)$ before calculating.
6.	Find a number between 2×10^5 and 3×10^5 in standard form.

D. Mixed and check

1.	Calculate $(4 \times 10^5)(3 \times 10^{-2})$.
2.	Calculate $(9 \times 10^8) \div (3 \times 10^2)$.
3.	A distance is 7.5×10^6 m. Write it in km.
4.	A microchip is 2.5×10^{-3} m wide. Write it in mm.
5.	Which is greater: 0.0008 or 7×10^{-4} ?
6.	Create a standard-form calculation with answer 6×10^4 .

Core route answers

Answers are grouped by section. Accept equivalent correct methods and explanations.

A: 5.8×10^4 ; 4.2×10^{-4} ; 720,000; 0.000306; 9.1×10^{-7} ; 4.5×10^6 .

B: 6×10^7 ; 4×10^4 ; 2×10^3 ; 3×10^4 ; 7.2×10^5 ; 3×10^{-4} ; 3,200,000; 0.000004.

C: 4.5×10^7 ; 7×10^{-3} ; 3×10^{-2} ; 1×10^{-1} ; coefficient too large; power sign error; about 10^9 ; answers vary.

D: 1.2×10^4 ; 3×10^6 ; 7,500 km; 2.5 mm; 0.0008; answers vary.

Standard form - Stretch route

Choose efficient methods. Use this worksheet only if your teacher assigned the Stretch route.

Department / teacher instructions:

Editable toolkit / reminders:

Name: _____ Class: _____ Date: _____

A. Flexible conversion

1.	Calculate $(4 \times 10^7)(3 \times 10^{-3})$. Give standard form.
2.	Calculate $(9 \times 10^8) \div (3 \times 10^{-2})$.
3.	A bacterium is 2.5×10^{-6} m long. Write this in micrometres.
4.	Explain why 0.4×10^6 is not in standard form.
5.	Which is closer to 10^6 : 9.8×10^5 or 1.2×10^6 ? Justify.
6.	Create a standard-form calculation with answer 6×10^4 .

B. Applied calculations

1.	The Earth is 1.5×10^8 km from the Sun. Write this in metres.
2.	A medicine dose is 3×10^{-4} g. Write this in milligrams.
3.	Calculate $(2.4 \times 10^6)(1.5 \times 10^{-2})$.
4.	Calculate $(7.2 \times 10^{-5}) \div (1.2 \times 10^{-2})$.
5.	A number is 6×10^7 and another is 2×10^{-3} . Find their product.
6.	Explain why multiplying by 10 changes the power by 1.

Complete the remaining work if time allows. Show enough working for another person to follow your method.

C. Reasoning

1.	Without a calculator, decide whether $(4 \times 10^6)(3 \times 10^{-4})$ is greater than 1,000.
2.	Which is larger: 5.9×10^{-7} or 6.1×10^{-8} ? Justify.
3.	A pupil gives 0.00032 as 3.2×10^{-5} . Explain the mistake.
4.	Why must a standard-form coefficient be at least 1 but less than 10?
5.	Find two different calculations with the same standard-form answer.
6.	Explain how to estimate the power of an answer before calculating.

D. Challenge

1.	A population is 4.8×10^6 and grows by 2×10^{-1} . Find the increase.
2.	A journey is 3.6×10^8 m. Express it in standard form in km.
3.	A square has side 2×10^3 m. Find its area in standard form.
4.	The mass of one grain is 6×10^{-5} kg. Find the mass of 4×10^6 grains.
5.	A pupil says $(3 \times 10^5)(2 \times 10^{-2}) = 6 \times 10^3$. Is this correct? Explain.
6.	Write a general rule for multiplying two numbers in standard form.

Stretch route answers

Answers are grouped by section. Accept equivalent correct methods and explanations.

A: 1.2×10^5 ; 3×10^{10} ; 2.5 micrometres; coefficient must be at least 1; 9.8×10^5 ; answers vary.

B: 1.5×10^{11} m; 0.3 mg; 3.6×10^4 ; 6×10^{-3} ; 1.2×10^5 ; power increases by 1.

C: greater; 5.9×10^{-7} ; decimal point moved incorrectly; it keeps the number unique; answers vary; estimate coefficient and powers.

D: 9.6×10^5 ; 3.6×10^5 km; 4×10^6 m²; 2.4×10^2 kg; yes; multiply coefficients and add powers.