Name & Surname: _____ Class: _____ Date: _____

# Power First: Standard Form



Interpret and compare A × $10^n$

About 40 minutes Level ★★★☆☆

## Standard form in one minute

A number in **standard form** is A × $10^n$, where 1 ≤ A < 10 and n is an integer. The **power** shows the size, the front number shows the detail.

- Check A first: A must be 1 or more but less than 10. 2.5 × $10^{-2}$ is ok, 25 × $10^{-3}$ is not.
- Positive power means big: digits move left. 3.2 × $10^3$ = 3200, 4.1 × $10^5$ = 410000.
- Negative power means tiny: digits move right. 2.5 × $10^{-2}$ = 0.025, $10^{-3}$ = 0.001.
- Zero power leaves A unchanged: any value to the power 0 = 1, so 9 × $10^0$ = 9.
- To compare, look at the **power** first. Larger power means larger number. Only compare A when powers match.

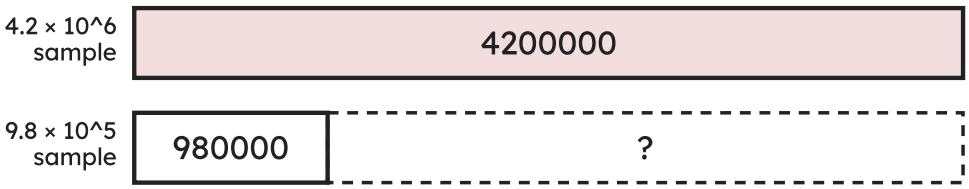


## Task A

/4

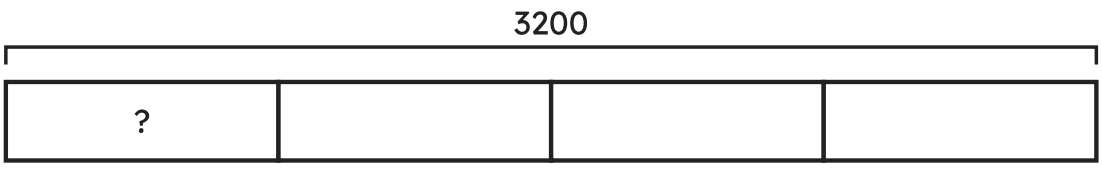
**Use each bar to link standard form to its ordinary number.**

**1** One sample has 4200000 particles (4.2 × 10^6). Another has 980000 particles (9.8 × 10^5). How many more particles in the **larger** sample?




**Answer:** _____ **particles**

**2** A count of 3200 cells (3.2 × 10^3) is shared equally between 4 dishes. How many cells in each dish?




**Answer:** _____ **cells**



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# Read and Compare

Practise reading values and comparing by power first.

## Key words

**standard form:** A × 10ⁿ with 1 ≤ A < 10

**power:** the small number telling how many times to multiply or divide by 10

**ordinary number:** a number written out in full digits

**compare:** decide which number is bigger or smaller

**order:** put numbers from smallest to largest

## Task B

/12

**Read standard form and compare by power first.**

### WARM UP

1. Write 3.2 × 10^3 as an **ordinary number**.

   Answer: _____

2. Write 2.5 × 10^-2 as an **ordinary number**.

   Answer: _____

3. Write 5.6 × 10^0 as an **ordinary number**.

   Answer: _____

4. Write 4.1 × 10^5 as an **ordinary number**.

   Answer: _____

### PRACTISE

5. Which is larger: 4.2 × 10^6 or 9.8 × 10^5? Write the larger **standard form** number.

   Answer: _____

6. Put in order smallest to largest: 5 × 10^2, 1.5 × 10^3, 4.1 × 10^5. Use **power** first.

   Answer: _____

7. Is 25 × 10^3 in **standard form**? Explain how you know.

   Answer: _____

8. Compare 6.1 × 10^3 and 2.3 × 10^3. Which is larger? Explain how you know.

   Answer: _____

### PROBLEM SOLVING

9. A hair width is 8 × 10^-5 m. Write this as an **ordinary number** in m.

   Answer: _____

10. Which is bigger: 3 × 10^8 or 8 × 10^-5? Explain how you know.

    Answer: _____

11. Put in order smallest to largest: 7 × 10^-2, 9 × 10^0, 5 × 10^2. Explain the **power** order.

    Answer: _____

12. A student says 7 × 10^-2 is a negative number. Is she correct? Explain how you know.

    Answer: _____



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# Compare with Confidence

More practice with big, tiny and zero powers.

## Task C

/12

**Keep looking at the power before the front number.**

### WARM UP

**1** Write 1.8 × 10^4 as an **ordinary number**.

Answer: _____

**2** Write 6 × 10^-2 as an **ordinary number**.

Answer: _____

**3** Write 3.05 × 10^5 as an **ordinary number**.

Answer: _____

**4** Write 7.601 × 10^-3 as an **ordinary number**.

Answer: _____

### PRACTISE

**5** Which is larger: 4.3 × 10^4 or 7.6 × 10^-3? Write the larger **standard form** number.

Answer: _____

**6** Is 0.4 × 10^5 in **standard form**? Explain how you know.

Answer: _____

**7** Compare 7.6 × 10^3 and 7.06 × 10^3. Which is larger? Explain how you know.

Answer: _____

**8** Is 2.5 × 10^-2 greater than 2.5 × 10^2? Explain how you know.

Answer: _____

### PROBLEM SOLVING

**9** Light speed is 3 × 10^8 m/s. Write this as an **ordinary number** in m/s.

Answer: _____

**10** Put in order smallest to largest: 2.5 × 10^-2, 2.5 × 10^2, 4.3 × 10^4. Use **power** first.

Answer: _____

**11** A student says 9.8 × 10^5 beats 4.2 × 10^6 because 9.8 > 4.2. Explain the **mistake**.

Answer: _____

**12** Rewrite 46 × 10^-20 in **standard form**.

Answer: _____



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# Order by Power

Complete the table then use the number lines.

## Task D

/10

**Fill each gap. Decide if each is big, tiny or near A.**

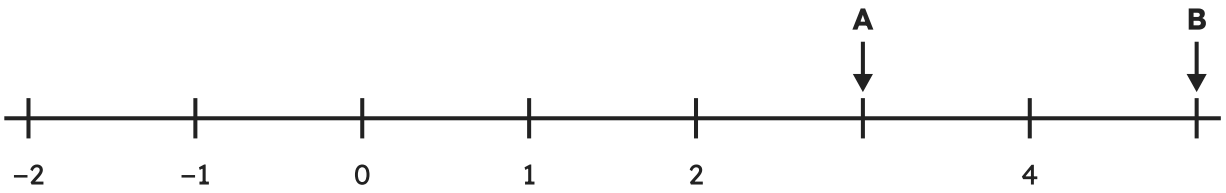
| Standard form | Ordinary number | Size |
|---|---|---|
| 3.2 × 10^3 | | |
| 2.5 × 10^-2 | | |
| 9 × 10^0 | | |
| 3.05 × 10^5 | | |
| 7 × 10^-2 | | |

## Task E

/8

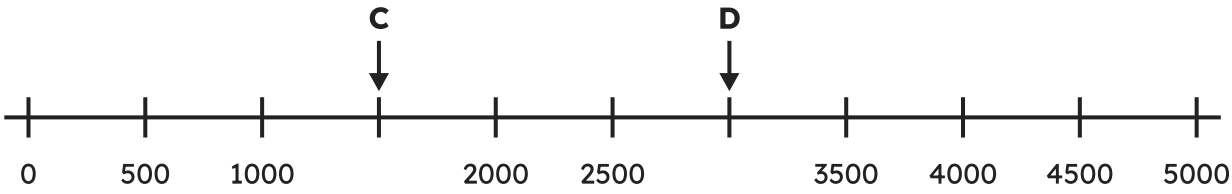
**Mark the powers, then read the ordinary numbers.**

1




**A =** ☐ **B =** ☐ Draw an arrow to show: -2, 0, 2

2




**C =** ☐ **D =** ☐ Draw an arrow to show: 500



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# Compare Step by Step

Follow the worked steps then try it yourself.

## Task F

/2

**Circle the power first, then compare A only for ties.**

**WORKED EXAMPLE**

Compare 4.2 × 10^6 and 9.8 × 10^5. Which is larger?

1. Circle the powers: 6 and 5
2. Larger power means larger number, so 6 beats 5
3. Check with ordinary numbers: 4200000 > 980000

**Answer:** 4.2 × 10^6

**YOUR TURN**

Compare 4.3 × 10^4 and 7.6 × 10^-3. Which is larger?

**Answer:** _____

**WORKED EXAMPLE**

Write 3200 in standard form.

1. First digit is 3, so A = 3.2
2. Count moves left: 3 places, so n = 3
3. So 3200 = 3.2 × 10^3

**Answer:** 3.2 × 10^3

**YOUR TURN**

Write 43000 in standard form.

**Answer:** _____

## Task G

/3

**Write each number in the chart. Watch the place value moves.**

| Number | Th | H | T | O | t | h | th |
|---|---|---|---|---|---|---|---|
| **3200** | | | | | | | |
| **1500** | | | | | | | |
| **0.025** | | | | | | | |

Th = thousands · H = hundreds · T = tens · O = ones · t = tenths · h = hundredths · th = thousandths

## How did I do?

Circle a face for each line.

I can read A × $10^n$ and say if it is big, tiny or near A ☹ 😐 ☺

I can spot numbers correctly written in standard form ☹ 😐 ☺

I can order standard-form numbers by power first, then by A ☹ 😐 ☺



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# Answer sheet: Power First: Standard Form

**Task A**

1. 3220000 particles
2. 800 cells

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**Task B**

1. 3200
2. 0.025
3. 5.6
4. 410000
5. 4.2 × 10^6
6. 5 × 10^2 < 1.5 × 10^3 < 4.1 × 10^5
7. No, 25 is not between 1 and 10
8. 6.1 × 10^3, powers equal so larger A wins
9. 0.00008
10. 3 × 10^8, power 8 is much larger than -5
11. 7 × 10^-2 < 9 × 10^0 < 5 × 10^2
12. No, negative power means tiny and close to 0, 0.07

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**Task C**

1. 18000
2. 0.06
3. 305000
4. 0.007601
5. 4.3 × 10^4
6. No, 0.4 is less than 1
7. 7.6 × 10^3, powers equal and 7.6 > 7.06
8. No, -2 gives tiny 0.025 and 2 gives 250
9. 300000000
10. 2.5 × 10^-2 < 2.5 × 10^2 < 4.3 × 10^4
11. Power first: 6 beats 5, so 4.2 × 10^6 is larger
12. 4.6 × 10^-19

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**Task D**

3.2 × 10^3 | 3200 | big
2.5 × 10^-2 | 0.025 | tiny
9 × 10^0 | 9 | near A
3.05 × 10^5 | 305000 | big
7 × 10^-2 | 0.07 | tiny

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**Task E**

1. A = 3; B = 5; arrows at -2, 0, 2
2. C = 1500; D = 3000; arrows at 500

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## Task F

1. 4.3 × 10^4
2. 4.3 × 10^4

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## Task G

1. 3200: 3 | 2 | 0 | 0 | – | – | –
2. 1500: 1 | 5 | 0 | 0 | – | – | –
3. 0.025: – | – | – | 0 | 0 | 2 | 5

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