

GCSE STANDARD FORM

- ✓ a) What is standard form ?
- ✓ b) How to express in standard form ?
- ✓ c) How to express standard form in normal numbers
- ✓ d) Ordering Standard Forms
- ✓ e) Standard form addition, subtraction, multiplication and division ?
- ✓ f) Mixed problems



WHAT IS STANDARD FORM ?

$$a \times 10^n$$

n = whole number

$$a = 1 \leq a < 10$$

Standard forms are used to express the very big numbers or the small numbers in the form of power of 10.

$352 \times 10^2 =$ Not in standard form X

$35.2 \times 10^3 =$ Not in standard form

$3.52 \times 10^4 =$ Not in standard form

CONVERTING NUMBERS TO STANDARD FORM

Rule 1

If the decimal is moved towards left then the power of 10 is raised to positive power to the number of places moved

$$\underline{35} = 3.5 \times 10^1$$

$$\underline{2956} = 2.956 \times 10^3$$

$$\underline{3569} = 3.569 \times 10^3$$

$$\underline{0.00056} = 5.6 \times 10^{-4}$$

Rule 2

If the decimal is moved towards right then the power of 10 is raised to the negative power to the number of places moved.

$$\underline{700000000.0} = 7 \times 10^8$$

$$\underline{0.0000695} = 6.95 \times 10^{-5}$$

CONVERTING STANDARD FORM TO NORMAL NUMBERS

If the power of 10 is positive, then move the decimal to the right to the number of places as the power of 10.

If the power of 10 is negative, then move the decimal to the left to the number of places as the power of 10.

$$3.5 \times 10^1 = 35 \quad \left(\begin{array}{l} \text{decimal moved} \\ \text{one place} \\ \text{to the right} \end{array} \right)$$

$$2.9 \times 10^6 = 2900000 \quad \left(\begin{array}{l} \text{decimal moved 6 places} \\ \text{to the right} \end{array} \right)$$

$$5.6 \times 10^{-4} = 0.00056 \quad \left(\begin{array}{l} \text{decimal moved 4 places} \\ \text{to the left} \end{array} \right)$$



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ORDERING STANDARD FORMS

Rule

Write the standard forms as normal numbers and then compare

49×10^0 4.9×10^2 0.049×10^5 490×10^{-2}
 ↓ ↓ ↓ ↓
 49 490 4900 4.9
 ✓ $4900 > 490 > 49 > 4.9$
 $0.049 \times 10^5 > 4.9 \times 10^2 > 49 \times 10^0 > 490 \times 10^{-2}$

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PAPER 1

Answer all questions in this section.

1 Round off 65 768 correct to three significant figures.

A 657

C 65 700

B 658

D 65 800

2 Express 758 000 in the standard form.

A 7.58×10^{-6}

B 7.58×10^{-5}

C 7.58×10^5

D 3.06×10^6

Handwritten purple ink solution for question 1: 758000 with arrows pointing to the 5, 8, and the first 0, indicating rounding to three significant figures.



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ADDING AND SUBTRACTING STANDARD FORM

Make the power of 10 the same

Add or subtract the numbers

Express in standard forms

eg $(4.76 \times 10^4) + (3.2 \times 10^3)$

$47.6 \times 10^3 + 3.2 \times 10^3$

50.8×10^3

5.08×10^4

eg $(5.27 \times 10^{-3}) - (8.2 \times 10^{-4})$

$= (5.27 \times 10^{-3}) - (0.82 \times 10^{-3})$

$= (5.27 - 0.82) \times 10^{-3}$

$= 4.45 \times 10^{-3}$

MULTIPLYING AND DIVIDING STANDARD FORM

Rule

Multiply or divide the numbers

Use the Indices Law for the power of 10

$$4 \times 10^6 \times 2 \times 10^3 = 8 \times 10^9$$

$$\begin{aligned} & (2 \times 10^6) \div (4 \times 10^3) \\ & (2 \div 4) \times 10^{6-3} \\ & 0.5 \times 10^3 \\ & 5 \times 10^2 \end{aligned}$$

$$\frac{2 \times 10^6}{4 \times 10^3} = 0.5 \times 10^3 = 5 \times 10^2$$

The weight of one box 5×10^5
Calculate the weight of 120 such boxes
and write the answer in the standard form

$$\begin{aligned} &= 5 \times 10^5 \times 120 \\ &= 600 \times 10^5 \\ &= 6 \times 10^7 \end{aligned}$$

The area of Sphere A is 4.8×10^6
The area of Sphere B is 1.2×10^3
How many times larger is A than B

$$\frac{4.8 \times 10^6}{1.2 \times 10^3} = 4 \times 10^3$$



NEXT STEP

★ CHECK SPECIFICATION

★ EXAM QUESTIONS ON THE TOPIC

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