FOUNDATION & HIGHER

SAME AT BOTH TIERS

Name ..... **Class** .....

N9: Standard form

Reason and interpret with standard form

20 marks · 25 minutes · Non-calculator

1) Explain why 23×10^4 is not written in standard form.

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[Question 1: 1 marks]

2) Show that $(4 \times 10^3) \times (6 \times 10^5) = 2.4 \times 10^9$

[Question 2: 2 marks]

3) Which is larger, 3×10^{-4} or 5×10^{-5}? Explain.

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[Question 3: 2 marks]

4) Show that $(9 \times 10^{8}) \div (3 \times 10^{-2}) = 3 \times 10^{10}$

[Question 4: 2 marks]

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5) The mass of the Earth is 6×10^{24} kg. The mass of the Moon is 7.3×10^{22} kg. Show that the Earth is about 80 times as heavy as the Moon.

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[Question 5: 2 marks]

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6) Ben says $5 \times 10^{3} + 5 \times 10^{2} = 10 \times 10^{5}$. Explain his mistake and give the correct answer in standard form.

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[Question 6: 2 marks]

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7) Show that $(2 \times 10^4)^2 = 4 \times 10^8$

[Question 7: 2 marks]

8) Light travels at 3×10^8 m/s. Show that it travels 1.08×10^{12} m in one hour.

[Question 8: 2 marks]

9) Show that $4.5 \times 10^{-3} = 0.0045$

[Question 9: 1 marks]

10) A virus is 1.2×10^{-7} m long. Show that one million of them in a line would be 12 cm long.

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[Question 10: 2 marks]

11) Explain why multiplying a number in standard form by 10 increases the power of 10 by 1

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[Question 11: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	23 is not between 1 and 10	C1.
2	Shown	24×10^8 (M1); 2.4×10^9 (C1).
3	3×10^{-4}	0.0003 and 0.00005 (M1); conclusion (C1).
4	Shown	$3 \times 10^{8+2}$ (M1); result (C1).
5	Shown	$\frac{6 \times 10^{24}}{7.3 \times 10^{22}} \approx 82$ (M1); about 80 (C1).
6	5.5×10^3	Cannot add the numbers and multiply the powers (C1); $5500 = 5.5 \times 10^3$ (B1).
7	Shown	4×10^8 via 2^2 and $(10^4)^2$ (M1); result (C1).
8	Shown	$\times 3600$ (M1); 10.8×10^{11} (C1).
9	Shown	Move the decimal point 3 places left (C1).
10	Shown	1.2×10^{-1} m (M1); = 0.12 m = 12 cm (C1).
11	Explanation	$10 = 10^1$ (C1); indices add (C1).