1.13 Standard Form: 30-minute Pack

Calculators not allowed · about 30 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A comet travels 2.5×10^9 metres in 5.0×10^4 seconds. Find its average speed in metres per second in standard form.

(3)

2 A radio signal has wavelength 0.0025 metres. Express this wavelength in standard form and then calculate how many wavelengths fit into 1 kilometre. Give the final answer in standard form to 2 significant figures.

(3)

3 Stretch question: The brightness of a distant star is 2.4×10^{-8} units. After a change it is measured as 6.0×10^{-9} units. By what factor did the brightness change? Give your answer in standard form and explain whether it increased or decreased.

(3)

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4 Write these numbers in order, smallest first.
3.6×10^6, 5.4×10^3, 8.7×10^{-1}, 2.9×10^0

(2)

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5 Write these standard form numbers as ordinary numbers.

(a) Write 6.5×10^3 as an ordinary number. **(1)**

.....

(b) Write 9.1×10^{-5} as an ordinary number. **(1)**

.....

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6 Write 2.52×10^4 as an ordinary number.

(1)

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7 A grain of sand has a mass of 8.8×10^6 grams. How many grains are in 7.9×10^9 grams of sand?
Give your answer in standard form, with the number rounded to 3 significant figures.

(3)

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8 Multiply and give your answer in standard form.

(a) Work out $(3 \times 10^4) \times (2 \times 10^3)$. **(2)**

.....

(b) Work out $(4.5 \times 10^{-2}) \times (2 \times 10^3)$. **(2)**

.....

9 Work out $(9 \times 10^7) / (3 \times 10^2)$. Give your answer in standard form.

(2)

10 Order these numbers from smallest to largest: 6.1×10^{-2}, 0.0075, 5.9×10^{-3}.

(2)

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Mark scheme · 1.13 Standard Form: 30-minute Pack

Question 1

divide coefficients and subtract powers: 2.5/5.0 = 0.5 and $10^{9-4} = 10^5$ giving 0.5×10^5	M1
adjust to standard form 5.0×10^4	M1
5.0×10^4 m/s cao	A1

Answer: **5.0×10^4 m/s**

Question 2

convert 0.0025 to 2.5×10^{-3} and 1 km = 1000 m = 1.0×10^3 m	M1
divide: $(1.0 \times 10^3) / (2.5 \times 10^{-3}) = 0.4 \times 10^6$ or equivalent	M1
4.0×10^5 cao to 2 s.f	A1

Answer: **4.0×10^5**

Question 3

find ratio $6.0 \times 10^{-9} / 2.4 \times 10^{-8}$ or $2.4 \times 10^{-8} / 6.0 \times 10^{-9}$ depending on wording	M1
compute ratio = $0.25 = 2.5 \times 10^{-1}$ or inverse 4.0×10^0; identify decrease	M1
brightness decreased by a factor of 2.5×10^{-1} (ie it is 0.25 of original) cao	A1

Answer: **2.5×10^{-1} (decreased)**

Question 4

compares the powers of 10 first, or at least three numbers in order	M1
8.7×10^{-1}, 2.9×10^0, 5.4×10^3, 3.6×10^6 cao	A1

Answer: **8.7×10^{-1}, 2.9×10^0, 5.4×10^3, 3.6×10^6**

Question 5

(a) 6500 cao	B1

(a) Answer: **6500**

(b) 0.000091 cao	B1

(b) Answer: **0.000091**

Question 6

25200 (accept 25200.00)	B1

Answer: **25200**

Question 7

chooses the correct operation (x or ÷)	M1
correct calculation with the numbers and the powers of 10	M1
8.98×10^2 cao	A1

Answer: **8.98×10^2**

Question 8

(a) multiply coefficients and add powers: 3 x 2 = 6 and $10^4 \times 10^3 = 10^7$	M1
(a) 6×10^7 cao	A1

(a) Answer: **6×10^7**

(b) multiply coefficients and add powers: 4.5 x 2 = 9.0 and $10^{-2} \times 10^3 = 10^1$	M1
(b) 9×10^1 cao	A1

(b) Answer: **9×10^1**

Question 9

divide coefficients and subtract powers: 9 / 3 = 3 and $10^{7-2} = 10^5$	M1
3×10^5 cao	A1

Answer: **3×10^5**

Question 10

convert to the same form or decimals, e.g. 6.1×10^{-2} = 0.061, 5.9×10^{-3} = 0.0059	M1
correct order: 5.9×10^{-3}, 0.0075, 6.1×10^{-2} cao	A1

Answer: **5.9×10^{-3}, 0.0075, 6.1×10^{-2}**

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