1.13 Standard Form: Test Pack

Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Write each number in standard form (scientific notation).

(a) Write 4300000 in standard form. **(1)**

(b) Write 0.00072 in standard form. **(1)**

(c) Write 12500 in standard form. **(1)**

(d) Write 0.03 in standard form. **(1)**

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2 Convert 0.0064 to standard form and give the coefficient to 2 significant figures.

(2)

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3 Show your working: Simplify $(1.2 \times 10^6) + (3.8 \times 10^5)$ and give the answer in standard form.

(4)

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4 Explain why a number written as 10.2×10^3 is not in standard form and rewrite it correctly.

(2)

5 Work out $(2.1 \times 10^3) \times (1.6 \times 10^8)$.
Give your answer in standard form.

(2)

6 Order these numbers from smallest to largest. Express each comparison using their standard form where helpful: 3.2×10^{-3}, 0.00045, 1.1×10^{-2}.

(3)

7 Write these numbers in order, largest first.
8.4×10^{-5}, 6.5×10^{-4}, 1.6×10^{-4}, 9.4×10^{1}

(2)

8 Write 6.31×10^{-6} as an ordinary number.

(1)

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9 Divide and give your answer in standard form.

(a) Work out $(6 \times 10^5) / (2 \times 10^2)$. **(2)**

.....

(b) Work out $(8.4 \times 10^{-1}) / (2 \times 10^2)$. **(1)**

.....

10 Write 5.19×10^6 as an ordinary number.

(1)

11 A star is 4.2×10^{16} metres from Earth. A light wave from the star travels at 3×10^8 m/s. Estimate how many seconds the light takes to reach Earth. Give your answer in standard form, to 2 significant figures.

(2)

12 Work out $(4.5 \times 10^6) - (2.9 \times 10^3)$.
Give your answer in standard form.

(3)

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13 Express each of these in standard form, using integers for powers of ten and one decimal place for the coefficient if needed.

(a) 0.0009 **(1)**

(b) 2500000 **(1)**

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14 A small library has 6.4×10^4 books. A national library holds 3.5×10^8 books. How many times as many books does the national library hold?
Give your answer in standard form, with the number rounded to 3 significant figures.

(3)

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15 State whether 3.4×10^0 is greater than, equal to, or less than 1. Give a reason.

(2)

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16 The mass of one grain of a fine powder is 3.6×10^{-22} kg. Find the total mass of 4×10^5 grains. Give your answer in standard form.

(3)

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17 Simplify $(2.6 \times 10^7) + (9.4 \times 10^6)$. Give your answer in standard form.

(3)

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18 A bacteria colony has 4.5×10^6 cells at 9am. By 5pm it has grown to 5.4×10^7 cells. Find the factor by which the colony grew. Give your answer in standard form.

(3)

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19 Write 2.04×10^5 as an ordinary number.

(1)

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Mark scheme · 1.13 Standard Form: Test Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

(a) 4.3×10^6 cao — **B1**

(a) Answer: **4.3×10^6**

(b) 7.2×10^{-4} cao — **B1**

(b) Answer: **7.2×10^{-4}**

(c) 1.25×10^4 cao — **B1**

(c) Answer: **1.25×10^4**

(d) 3×10^{-2} cao — **B1**

(d) Answer: **3×10^{-2}**

Question 2

write 0.0064 as 6.4×10^{-3} then round coefficient to 2 s.f — **M1**

6.4×10^{-3} cao — **A1**

Answer: **6.4×10^{-3}**

Question 3

write 3.8×10^5 as 0.38×10^6 or convert 1.2×10^6 to same power and add coefficients — **M1**

add coefficients: 1.2 + 0.38 = 1.58 — **M1**

express as standard form 1.58×10^6 — **M1**

1.58×10^6 cao — **A1**

Answer: **1.58×10^6**

Question 4

explain that coefficient must be between 1 and 10, and 10.2 is ≥10 so not standard form — **M1**

correct rewrite 1.02×10^4 cao — **A1**

Answer: **1.02×10^4**

Question 5

$2.1 \times 1.6 = 3.36$ seen — **M1**

3.36×10^{11} cao — **A1**

Answer: **3.36×10^{11}**

Question 6

convert to same form or decimals, e.g. $3.2 \times 10^{-3} = 0.0032$, $1.1 \times 10^{-2} = 0.011$ — **M1**

correct order: 0.00045, 3.2×10^{-3}, 1.1×10^{-2} cao — **A1**

one correct comparison shown (allow follow through if order given correctly) — **B1**

Answer: **0.00045, 3.2×10^{-3}, 1.1×10^{-2}**

Question 7

compares the powers of 10 first, or at least three numbers in order — **M1**

9.4×10^1, 6.5×10^{-4}, 1.6×10^{-4}, 8.4×10^{-5} cao — **A1**

Answer: **9.4×10^1, 6.5×10^{-4}, 1.6×10^{-4}, 8.4×10^{-5}**

Question 8

0.00000631 cao — **B1**

Answer: **0.00000631**

Question 9

(a) divide coefficients and subtract powers: 6/2 = 3 and $10^{5-2} = 10^3$ — **M1**

(a) 3×10^3 cao — **A1**

(a) Answer: **3×10^3**

(b) 4.2×10^{-3} cao — **B1**

(b) Answer: **4.2×10^{-3}**

Question 10

5190000 (accept 5190000.00) — **B1**

Answer: **5190000**

Question 11

distance divided by speed: $4.2 \times 10^{16} / 3 \times 10^8$ or equivalent method — **M1**

1.4×10^8 s cao to 2 significant figures — **A1**

Answer: **1.4×10^8 s**

Question 12

writes both numbers with the same power of 10 or as ordinary numbers — **M1**

adds or subtracts correctly — **M1**

4.4971×10^6 cao — **A1**

Answer: **4.4971×10^6**

Question 13

(a) 9.0×10^{-4} cao — **B1**

(a) Answer: **9.0×10^{-4}**

(b) 2.5×10^6 cao — **B1**

(b) Answer: **2.5×10^6**

Question 14

chooses the correct operation (x or ÷) — **M1**

correct calculation with the numbers and the powers of 10 — **M1**

5.47×10^3 cao — **A1**

Answer: **5.47×10^3**

Question 15

evaluate $3.4 \times 10^0 = 3.4$ ($10^0 = 1$) — **M1**

correct conclusion: greater than 1, because $3.4 \times 10^0 = 3.4$ cao — **A1**

Answer: **Greater than 1, because $3.4 \times 10^0 = 3.4$**

Question 16

multiply coefficients and add powers: $3.6 \times 4 = 14.4$ and $10^{-22} \times 10^5 = 10^{-17}$ — **M1**

convert 14.4×10^{-17} into standard form: 1.44×10^{-16} — **M1**

1.44×10^{-16} kg cao — **A1**

Answer: **1.44×10^{-16} kg**

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Question 17

write 9.4×10^6 with a matching power of ten, e.g. 0.94×10^7	**M1**
add coefficients: 2.6 + 0.94 = 3.54	**M1**
3.54×10^7 cao	**A1**

Answer: **3.54×10^7**

Question 18

set up division: $(5.4 \times 10^7) / (4.5 \times 10^6)$	**M1**
divide coefficients and subtract powers: 5.4 / 4.5 = 1.2 and $10^{7-6} = 10^1$	**M1**
1.2×10^1 (12) cao	**A1**

Answer: **1.2×10^1 (a growth factor of 12)**

Question 19

204000 cao	**B1**

Answer: **204000**

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