5.4 Standard Form: 1-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Write 4.05×10^{-1} as an ordinary number.

(Total for Question 1 is 1 mark)

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2 Write the number 45000 in standard form.

(Total for Question 2 is 1 mark)

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3 Write the number 0.0032 in standard form.

(Total for Question 3 is 1 mark)

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4 Write each of these numbers as an ordinary number.

(a) 3.6×10^{5} **(1)**

(b) 4.02×10^{-3} **(1)**

(Total for Question 4 is 2 marks)

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5 Write the number 68000 in standard form.

(Total for Question 5 is 1 mark)

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6 Write 9.1×10^4 as an ordinary number.

(Total for Question 6 is 1 mark)

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7 Write each of the following in standard form.

(a) 12000 **(2)**

(b) 0.00056 **(2)**

(Total for Question 7 is 4 marks)

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8 Write 4×10^{-1} as an ordinary number.

(Total for Question 8 is 1 mark)

---

9 Write the number 0.000047 in standard form.

(Total for Question 9 is 1 mark)

---

10 Write 2.06×10^{-3} as an ordinary number.

(Total for Question 10 is 1 mark)

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11 Write the number 0.0000059 in standard form.

(Total for Question 11 is 1 mark)

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12 Write 7.2×10^{-4} as an ordinary number.

(Total for Question 12 is 1 mark)

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13 Write 3.15×10^{6} as an ordinary number.

(Total for Question 13 is 1 mark)

---

14 Write 0.000742 in standard form.

(Total for Question 14 is 1 mark)

---

15 Write 4.06×10^{5} as an ordinary number.

(Total for Question 15 is 1 mark)

---

16 Light travels at a speed of 3×10^{8} metres per second.
The distance from the Sun to Neptune is 4.5×10^{12} metres.

(a) Work out how long it takes light to travel from the Sun to Neptune. Give your answer, in seconds, in standard form. **(3)**

.....

(b) Given that 1 hour = 3600 seconds, work out the time taken in hours, to the nearest hour. **(1)**

.....

(Total for Question 16 is 4 marks)

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17 The mass of a hydrogen atom is 1.67×10^{-27} kg.
The mass of a carbon atom is 1.99×10^{-26} kg.
Work out how many times heavier a carbon atom is than a hydrogen atom. Give your answer correct to 3 significant figures.

(Total for Question 17 is 3 marks)

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18 Work out $(3 \times 10^4)^2$. Give your answer in standard form.

(Total for Question 18 is 3 marks)

---

19 $a = 3 \times 10^5$
$b = 4 \times 10^{-2}$

(a) Work out a x b. Give your answer in standard form. **(2)**

(b) Work out a / b. Give your answer in standard form. **(2)**

(Total for Question 19 is 4 marks)

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20 The mass of a grain of sand is 7.8×10^{-6} g. A bucket holds 6.6×10^3 grains. Work out the total mass of the sand in the bucket. Give your answer in standard form.

(Total for Question 20 is 3 marks)

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21 The Andromeda Galaxy is 2.4×10^{19} km from Earth.
A spacecraft travels at a constant speed of 4.0×10^{4} km/h.

(a) Work out how long the journey would take. Give your answer, in hours, in standard form, correct to 3 significant figures. **(3)**

(b) There are approximately 8.76×10^{3} hours in a year. Use your answer to part (a) to work out how many years the journey would take, correct to 3 significant figures. **(2)**

(Total for Question 21 is 5 marks)

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22 $M^2 = 4 \times 10^{10}$, where $M > 0$.
Find the value of M. Give your answer in standard form.

(Total for Question 22 is 3 marks)

---

23 Solve the equation $(5 \times 10^{n})^2 = 2.5 \times 10^{15}$, where n is an integer.

(Total for Question 23 is 3 marks)

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Mark scheme · 5.4 Standard Form: 1-hour Pack

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

Question 1

0.405 cao **B1**

Answer: 0.405

Question 2

4.5×10^4 oe **B1**

Answer: 4.5×10^4

Question 3

3.2×10^{-3} oe **B1**

Answer: 3.2×10^{-3}

Question 4

(a) 360000 cao **B1**

(a) Answer: 360000

(b) 0.00402 cao **B1**

(b) Answer: 0.00402

Question 5

6.8×10^4 oe **B1**

Answer: 6.8×10^4

Question 6

91000 cao **B1**

Answer: 91000

Question 7

(a) show $12000 = 1.2 \times 10^4$ or equivalent method **M1**

(a) 1.2×10^4 cao **A1**

(a) Answer: 1.2×10^4

(b) show $0.00056 = 5.6 \times 10^{-4}$ or equivalent **M1**

(b) 5.6×10^{-4} cao **A1**

(b) Answer: 5.6×10^{-4}

Question 8

0.4 cao **B1**

Answer: 0.4

Question 9

4.7×10^{-5} oe **B1**

Answer: 4.7×10^{-5}

Question 10

0.00206 cao **B1**

Answer: 0.00206

Question 11

5.9×10^{-6} oe **B1**

Answer: 5.9×10^{-6}

Question 12

0.00072 cao **B1**

Answer: 0.00072

Question 13

3150000 cao **B1**

Answer: 3150000

Question 14

7.42×10^{-4} cao **B1**

Answer: 7.42×10^{-4}

Question 15

406000 cao **B1**

Answer: 406000

Question 16

(a) sets up time = distance / speed, e.g. $(4.5 \times 10^{12}) / (3 \times 10^8)$ **M1**

(a) $4.5 / 3 = 1.5$ and $10^{12} / 10^8 = 10^4$ seen **M1**

(a) 1.5×10^4 (seconds) cao **A1**

(a) Answer: 1.5×10^4 seconds

(b) 4 (hours), ft their part (a) answer / 3600 **B1**

(b) Answer: 4 hours

Question 17

sets up $(1.99 \times 10^{-26}) / (1.67 \times 10^{-27})$ **M1**

11.9... or 11.916... seen (unrounded or truncated value) **M1**

awrt 11.9 **A1**

Answer: 11.9 (times heavier)

Question 18

squares the coefficient, $3^2 = 9$ **M1**

squares the power of 10, $(10^4)^2 = 10^8$ **M1**

9×10^8 cao **A1**

Answer: 9×10^8

Question 19

(a) $3 \times 4 = 12$ and $10^5 \times 10^{-2} = 10^3$ seen, or 12×10^3 oe unsimplified **M1**

(a) 1.2×10^4 cao **A1**

(a) Answer: 1.2×10^4

(b) $3 / 4 = 0.75$ and $10^5 / 10^{-2} = 10^7$ seen, or 0.75×10^7 oe unsimplified **M1**

(b) 7.5×10^6 cao **A1**

(b) Answer: 7.5×10^6

Question 20

$(6.6 \times 10^3) \times (7.8 \times 10^{-6})$ oe **M1**

multiplies mantissas and adds powers **M1**

5.148×10^{-2} cao **A1**

Answer: 5.148×10^{-2}

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Question 21

(a) sets up time = distance / speed, e.g. $(2.4 \times 10^{19}) / (4.0 \times 10^{4})$	**M1**
(a) $2.4 / 4.0 = 0.6$ and $10^{19} / 10^{4} = 10^{15}$ seen	**M1**
(a) awrt 6.00×10^{14} (hours)	**A1**

(a) Answer: 6.00×10^{14} hours

(b) ft, divides their part (a) answer by 8.76×10^{3}	**M1**
(b) ft, awrt 6.85×10^{10} (years)	**A1**

(b) Answer: 6.85×10^{10} years (awrt)

Question 22

finds the square root of the coefficient, $\sqrt{4} = 2$	**M1**
finds the square root of the power of 10, $\sqrt{10^{10}} = 10^{5}$, e.g. by writing 10^{10} as $(10^{5})^{2}$	**M1**
2×10^{5} cao	**A1**

Answer: $M = 2 \times 10^{5}$

Question 23

squares the left-hand side, $(5 \times 10^{n})^{2} = 25 \times 10^{2n}$ oe unsimplified	**M1**
dependent, converts to standard form and equates powers, $25 \times 10^{2n} = 2.5 \times 10^{2n + 1}$, so $2n + 1 = 15$	**M1**
$n = 7$ cao	**A1**

Answer: $n = 7$

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