PEARSON EDEXCEL INTERNATIONAL GCSE MATHEMATICS A (4MA1) · HIGHER TIER

Indices and Standard Form: exam questions

10 questions · 26 marks · mark schemes at the end

Name _____ Date _____ Score / 26

- Calculators are allowed on both 4MA1 Higher papers (1H and 2H). Show your working: most marks are for method.
- Mark schemes start after the questions. M marks are for a correct method, A marks for an accurate answer that follows a correct method, and B marks for a correct result on its own.
- Online, with more practice: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/indices-and-standard-form

1. **2 marks**

Simplify fully $(3x^2y)^3$.

2. **2 marks**

Find the value of $125^{-\frac{2}{3}}$.

3. **3 marks**

Solve $8^x = 4^{x+3}$.

4. **2 marks**

Work out $(4.2 \times 10^5) \times (3 \times 10^{-8})$. Give your answer in standard form.

5. **3 marks**

A radio signal travels at 3×10^5 km per second. A space probe is 7.2×10^7 km from Earth.

Work out how long a signal takes to reach the probe. Give your answer in minutes.

6. **2 marks**

Simplify fully $(16x^8)^{\frac{3}{4}}$.

7. **2 marks**

Write $\dfrac{2^{-3} \times 4^5}{8^2}$ as a power of 2.

8. 4 marks

The population of country A is 6.4×10^7. The population of country B is 8×10^5.

(a) How many times bigger is the population of A than the population of B? **(2)**

(b) Work out the total population of A and B. Give your answer in standard form. **(2)**

9. 3 marks

$3^{2x} \times 9^{x-1} = 27^4$

Find the value of x.

10. 3 marks

Simplify fully $\left(27a^9b^{-6}\right)^{-\frac{1}{3}}$.

Answers and worked solutions

Question 1 — 2 marks

B2 $27x^6y^3$

B1 for two of the three parts correct, e.g. $9x^6y^3$ or $27x^5y^3$.

Answer: $27x^6y^3$

Question 2 — 2 marks

M1 $\sqrt[3]{125} = 5$ or $125^{\frac{2}{3}} = 25$

A1 $\dfrac{1}{25}$

Answer: $\dfrac{1}{25}$

Question 3 — 3 marks

M1 $2^{3x} = 2^{2(x+3)}$

M1 $3x = 2x + 6$

A1 $x = 6$

Answer: $x = 6$

Question 4 — 2 marks

M1 12.6×10^{-3} or 0.0126

A1 1.26×10^{-2}

Answer: 1.26×10^{-2}

Question 5 — 3 marks

M1 $\dfrac{7.2 \times 10^7}{3 \times 10^5}$

A1 240 seconds

A1 4 minutes

Answer: 4 minutes

Question 6 — 2 marks

M1 $16^{\frac{3}{4}} = 8$ or x^6

A1 $8x^6$

Answer: $8x^6$

Question 7 — 2 marks

M1 $\dfrac{2^{-3} \times 2^{10}}{2^6}$

A1 2^1

Answer: 2^1

Question 8 — 4 marks

(a)

M1 $\dfrac{6.4 \times 10^7}{8 \times 10^5}$

A1 80

(b)

M1 $64\,000\,000 + 800\,000$ or $6.4 \times 10^7 + 0.08 \times 10^7$

A1 6.48×10^7

Answer: (a) 80; (b) 6.48×10^7

Question 9 — 3 marks

M1 $3^{2x} \times 3^{2x-2} = 3^{12}$

M1 $4x - 2 = 12$

A1 $x = 3.5$

Answer: $x = 3.5$

Question 10 — 3 marks

B1 $27^{-\frac{1}{3}} = \dfrac{1}{3}$

B1 a^{-3}

B1 b^2, giving $\dfrac{b^2}{3a^3}$

Answer: $\dfrac{b^2}{3a^3}$

Online, with every solution: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/indices-and-standard-form
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