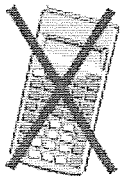
Solutions 63

Edexcel GCSE
Mathematics (Linear) – 1MA0

ALGEBRA: INDICES

Materials required for examination
Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers
Nil



Instructions

Use black ink or ball-point pen.
Fill in the boxes at the top of this page with your name, centre number and candidate number.
Answer all questions.
Answer the questions in the spaces provided – there may be more space than you need.
Calculators may be used.

Information

The marks for each question are shown in brackets – use this as a guide as to how much time to spend on **each** question.
Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed – you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.

Advice

Read each question carefully before you start to answer it.
Keep an eye on the time.
Try to answer every question.
Check your answers if you have time at the end.

1. (a) Simplify $m^3 \times m^6$ $= m^{3+6}$

m^9

(1)

(b) Simplify $\frac{p^8}{p^2}$ p^{8-2}

p^6

(1)

(c) Simplify $(2n^3)^4$ $16n^{3\times4}$

$16n^{12}$

(2)

(4 marks)

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2. (a) Simplify $m^6 \times m^7$ m^{6+7}

(1)

m^{13}

(b) Simplify x^0

(1)

1

(c) Simplify $(16y^6)^{\frac{1}{2}}$ $\sqrt{16}\, y^{\frac{6}{2}}$

(2)

$4y^3$

(4 marks)

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3. (a) Simplify $m^5 \div m^3$ m^{5-3}

m^2

(1)

(b) Simplify $5x^4y^3 \times x^2y$ $5x^{4+2}y^{3+1}$

$5x^6y^4$

(2)

(3 marks)

4. (a) Simplify $a^4 \times a^5$

a^{4+5}

a^9

(1)

(b) Simplify $\frac{45e^6 f^8}{5ef^2}$

$9e^{6-1} f^{8-2}$

$9e^5 f^6$

(2)

(c) Write down the value of $9^{\frac{1}{2}}$

$\sqrt{9}$

3

(1)

(4 marks)

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5. (a) Simplify $m^2 \times m^4$

m^{2+4}

m^6

(1)

(b) Simplify $y^7 \div y^5$

y^{7-5}

y^2

(1)

(c) Simplify $(m^3)^5$

$m^{3\times5}$

m^{15}

(2)

(4 marks)

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6. Simplify fully

(a) $p^2 \times p^7$

p^{2+7}

p^9 **(1)**

(b) $\frac{3q^4 \times 2q^5}{q^3}$

$\frac{(3\times2)q^{4+5}}{q^3} = 6q^{9-3}$

$6q^6$ **(2)**

(c) $(2xy^3)^5$

$2^5 x^5 y^{3\times5}$

$32x^5y^{15}$ **(2)**

(4 marks)

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7. (a) Simplify $15y^6 \div 3y^2$

$15 \div 3 = 5$

$5y^{6-2}$

$5y^3$

(2)

(b) Simplify $7wx^2 \times 3w^3x$

$7 \times 3 = 21$

$21w^{1+3}x^{2+1}$

$21w^4x^3$

(2)

(4 marks)

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8. Work out the value of

(a) $(2^2)^3$

$2^{2\times3} = 2^6 = 64$

$2^6 = 64$

(1)

(b) $(\sqrt{3})^2$

$\left(3^{\frac{1}{2}}\right)^2 = 3^{2/2} = 3^1$

3

(1)

(c) $\sqrt{2^4 \times 9}$

$= 2^2 \times 3$

$= 4 \times 3$

12

(2)

(d) 4^{-2}

$= \frac{1}{4^2} = \frac{1}{16}$

$\frac{1}{16}$ or 0.0625

(1)

(5 marks)

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9. (a) Write down the value of $49^{\frac{1}{2}}$

$= \sqrt{49}$

7

(1)

(b) Simplify

(i) $\frac{x^6}{x^2}$

x^{6-2}

x^4

(ii) $(y^4)^3$

$y^{4\times3}$

y^{12}

(2)

(3 marks)

10. Simplify $\dfrac{15a^3 b^7}{3a^2 b^3}$ $5a^{3-2}b^{7-3}$

$5ab^4$

(2 marks)

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11. $7^5 \times 7^6 = 7^3 \times 7^k$

Find the value of k. $7^{5+6} = 7^{3+k}$

$5+6 = 11$

$11-3 = 8$

$k = 8$

(2 marks)

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12. (a) Simplify $p^3 \times p^2$ p^{3+2}

p^5

(1)

(b) Simplify $\dfrac{q^3 \times q^4 \times q}{q^2}$ $= \dfrac{q^{3+4+1}}{q^2} = \dfrac{q^8}{q^2} = q^{8-2} = q^6$

q^6

(2)

(3 marks)

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13. Find the value of

(i) $36^{\frac{1}{2}} = \sqrt{36}$

6

(ii) $3^{-2} = \dfrac{1}{3^2}$

$\dfrac{1}{9}$ or 0.1

(2 marks)

14. (a) Write as a power of 7

(i) $7^8 \div 7^3$ $7^{8-3} = 7^5$

7^5

(ii) $\dfrac{7^2 \times 7^3}{7}$ $= \dfrac{7^{2+3}}{7} = 7^{5-1}$

7^4

(3)

(b) Write down the reciprocal of 2

$\frac{1}{2}$

(1)

(4 marks)

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15. (a) Simplify

$12y^3 \div 3y^5$ $4y^{3-5}$ $= 4y^{-2}$ $= \frac{1}{4y^2}$

$\frac{1}{4y^2}$

(2)

(b) Simplify

$2w^3x^2 \times 3w^4x$

$6w^{3+4}x^{2+1}$

$6w^7x^3$

(2)

(4 marks)

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16. (a) Work out the value of

(i) 4^2 4×4

16

(ii) $\sqrt{64}$

8

(iii) 3×2^3 3×8

24

(3 marks)

17. Simplify

(i) $x^4 \times x^5$ x^{4+5} x^9

(ii) $\frac{p^8}{p^3}$ p^{8-3} p^5

(iii) $3s^2t^3 \times 4s^4t^2$ $12s^{2+4}t^{3+2}$ $12s^6t^5$

(iv) $(q^3)^4$ $q^{3\times4}$ q^{12}

(6 marks)

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18. Simplify fully

(i) $(p^3)^3$ $p^{3\times3}$ p^9

(ii) $\frac{3q^4 \times 2q^5}{q^3}$ $\frac{6q^{4+5}}{q^3} = 6q^{9-3}$ $6q^6$

(4 marks)

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19. Work out

(i) 4^0 1

(ii) 4^{-2} $= \frac{1}{4^2}$ $\frac{1}{16}$ or 0.0625

(iii) $16^{\frac{3}{2}}$ $= \left(\sqrt{16}\right)^3$ $= 4^3 =$ 64

(4 marks)

20. (a) Find the value of

(i) $64°$

1

(ii) $64^{\frac{1}{2}}$ $\sqrt{64}$

8

(iii) $64^{-\frac{2}{3}}$ $= \frac{1}{64^{2/3}}$

$= (\sqrt[3]{64})^2 = \frac{1}{4^2}$

$\frac{1}{16}$ or 0.0625

(4 marks)