Edexcel GCSE
Mathematics (Linear) – 1MA0
FRACTIONAL AND NEGATIVE 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. Find the value of

(i) $36^{\frac{1}{2}}$ ← square root

6

(ii) 3^{-2} ← square and flip

$\frac{1}{9}$

(Total 2 marks)

2. Write down the value of

(a) 7^0 ← anything to the power of zero is 1

1

(1)

(b) 4^{-1} ← flip

$\frac{1}{4}$

(1)
(Total 2 marks)

3. (a) Simplify 2^0

1

(1)

(b) Simplify 5^{-1}

$\frac{1}{5}$

(1)
(Total 2 marks)

4. (a) Write down the value of 2^{-1}

$\frac{1}{2}$

(1)

(b) Write down the value of $64^{\frac{1}{2}}$

8

(1)
(Total 2 marks)

5. Write down the value of

(i) 5^0

1

(ii) 4^{-2}

$\frac{1}{16}$

(iii) $100^{\frac{1}{2}}$

10

(Total 3 marks)

6. (a) Write down the value of

(i) 9^0

1

(ii) $169^{\frac{1}{2}}$

13

(2)

(b) Work out $64^{\frac{2}{3}}$ ← *cube root and square*

16

(2)
(Total 4 marks)

7. (a) Find the value of $36^{\frac{1}{2}}$

6

(1)

(b) Find the value of $8^{-\frac{2}{3}}$ ← *cube root, square and flip*

$\frac{1}{4}$

(2)
(Total 3 marks)

8. Work out

(i) 4^0

.... *1* ....

(ii) 4^{-2}

.... $\frac{1}{16}$ ....

(iii) $16^{\frac{3}{2}}$

.... *64* ....

(Total 3 marks)

9. Write down the value of

(a) $25^{\frac{1}{2}}$

.... *5* ....

(1)

(b) 9^0

.... *1* ....

(1)

(Total 2 marks)

10. (a) Evaluate

(i) 3^{-2}

.... $\frac{1}{9}$ ....

(ii) $36^{\frac{1}{2}}$

.... *6* ....

(iii) $27^{\frac{2}{3}}$

.... *9* ....

(iv) $\left(\frac{16}{81}\right)^{-\frac{3}{4}}$

.... $\frac{27}{8}$ ....

(5)

11. (a) Find the value of

(i) $64°$

..............*1*..............

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

..............*8*..............

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

..............$\dfrac{1}{16}$..............
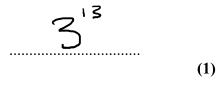
(4)

(b) $3 \times \sqrt{27} = 3^n$

Find the value of n.

$3^1 \times 3^{\frac{3}{2}} = 3^{\frac{5}{2}}$

$n = \dfrac{5}{2}$ or 2.5

(2)

(Total 6 marks)

6 - -7

12. (a) Work out $3^6 \div 3^{-7}$ = 3^{13}

3^{13}

....

(1)

(b) Write down the value of $36^{\frac{1}{2}}$

6

....

(1)

(c) $3^n = \frac{1}{9}$

Find the value of n.

$n =$ ....-2........

(1)

(Total 3 marks)

13. (a) Simplify

(i) $(3x^2y)^3$

$27x^6y^3$

....

(ii) $(2t^{-3})^{-2}$

$\frac{1}{4}t^6$

....

(4)

14. $x = 2^p, \quad y = 2^q$

(a) Express in terms of x and/or y,

(i) 2^{p+q}

$$2^p \times 2^q$$

$$\frac{xy}{\smile}$$

(ii) 2^{2q}

$$2^q \times 2^q$$

$$y^2$$

(iii) 2^{p-1}

$$2^p \div 2^1$$

$$\frac{x}{2}$$

(3)

$$xy = 32$$

and

$$2xy^2 = 32$$

$$32 = 2^5$$

(b) Find the value of p and the value of q.

$$x = 2^p$$
$$y = 2^q$$

$$xy = 32 \qquad\qquad 2xy^2 = 32$$
$$2^p \times 2^q = 2^5 \qquad 2^1 \times 2^p \times 2^q \times 2^q = 2^5$$
$$2^{p+q} = 2^5 \qquad 2^{2q+p+1} = 2^5$$
$$p+q = 5 \qquad\qquad 2q + p + 1 = 5$$
$$\qquad\qquad\qquad 2q + p = 4$$

$$p + q = 5$$
$$\underline{p + 2q = 4}$$
$$q = -1$$
$$p = 6$$

$p =$ ....**6**.......

$q =$ ......**−1**......

(2)

(Total 5 marks)

16. (a) Write down the value of $8^{\frac{1}{3}}$

$$2$$

(1)

$8\sqrt{8}$ be written in the form 8^k

$$8^1 \times 8^{\frac{1}{2}} = 8^{\frac{3}{2}}$$

(b) Find the value of k.

$$k = \frac{3}{2}$$

(1)

$8\sqrt{8}$ can also be expressed in the form $m\sqrt{2}$ where m is a positive integer.

(c) Express $8\sqrt{8}$ in the form $m\sqrt{2}$

$$\sqrt{8} = \sqrt{4} \times \sqrt{2}$$
$$= 2\sqrt{2}$$

$$8\left(2\sqrt{2}\right)$$

$$16\sqrt{2}$$

(2)

(d) Rationalise the denominator of $\dfrac{1}{8\sqrt{8}}$

Give your answer in the form $\dfrac{\sqrt{2}}{p}$ where p is a positive integer.

$$\frac{1}{8\sqrt{8}} = \frac{1}{16\sqrt{2}} \overset{\times \sqrt{2}}{\underset{\times \sqrt{2}}{}} = \frac{\sqrt{2}}{16 \times 2}$$

$$\frac{\sqrt{2}}{32}$$

(2)

(Total 6 marks)