

# POWERS AND ROOTS

[ESTIMATED TIME: 50 minutes]

# GCSE

(+ IGCSE) EXAM QUESTION PRACTICE

1.

[3 marks]

(a) Write  $3 \times 3 \times 3 \times 3 \times 3$  as a single power of 3

.....  
(1)

(b) Write  $\frac{7^5 \times 7^9}{7^6}$  as a single power of 7

.....  
(2)

2.

[4 marks]

(a) Write  $2^3 \times 2^6$  as a single power of 2

.....  
(1)

(b) Write  $\frac{3^9}{3^4}$  as a single power of 3

.....  
(1)

(c)  $\frac{5^n}{5^4 \times 5^6} = 5^3$

Find the value of  $n$ .

$n =$  .....  
(2)

**3.****[3 marks]**

(a) Write  $2^3 \times 2^4$  as a single power of 2

.....  
(1)

(b)  $280 = 2^n \times 5 \times 7$

Find the value of  $n$ .

$n =$  .....  
(2)

**4.****[4 marks]**

(a) Simplify, leaving your answers in index form,

(i)  $7^5 \times 7^3$

.....

(ii)  $5^9 \div 5^3$

.....

(2)

(b) Solve  $\frac{2^9 \times 2^4}{2^n} = 2^8$

$n =$  .....

(2)

5.

[4 marks]

(a) Simplify, leaving your answers in index form,

(i)  $6^5 \times 6^2 \times 6$

.....

(ii)  $(9^7)^2$

.....

(2)

(b)  $\frac{5^n \times 5^3}{5^6} = 5^4$

Find the value of  $n$ .

$n =$  .....

(2)

6.

[3 marks]

(a) Simplify, leaving your answer in index form

(i)  $2^4 \times 2^3$

.....

(ii)  $3^8 \div 3^2$

.....

(2)

(b)  $5^x = 1$

Find the value of  $x$ .

$x =$  .....

(1)

**7.****[3 marks]**

Evaluate the following.  
Give your answers as fractions.

(a)  $2^{-3}$

.....  
**(1)**

(b)  $\left(\frac{27}{343}\right)^{\frac{1}{3}}$

.....  
**(1)**

(c)  $\left(\sqrt{\frac{3}{8}}\right)^4$

.....  
**(1)**

**8.****[5 marks]**

(a) Find the value of  $\left(9^{\frac{1}{2}}\right)^4$

.....  
**(1)**

(b) Express  $5^{20}$  as a power of 25

.....  
**(2)**

(c) Express  $\sqrt{8}$  as a power of 2

.....  
**(2)**

(a) Simplify  $\left(4h^{\frac{2}{3}}\right)^3$

.....  
(2)

$$\frac{a\sqrt{a}}{\sqrt[3]{a^2}} = a^k$$

(b) Work out the value of  $k$ .

$k =$  .....  
(3)

(a) Express  $8^{\frac{1}{2}}$  as a power of 2

.....  
(2)

(b) Express  $\sqrt{3}$  as a power of 9

.....  
(2)

(c) Express  $\frac{1}{4\sqrt{2}}$  as a power of 2

.....  
(3)

- (a) (i) Write down the value of  $10^0$ .

.....

- (ii) Write down the value of  $10^{-2}$ .

.....

**(2)**

- (b) (i) Write 8 as a power of 2

.....

- (ii) Write 2 as a power of 8

.....

- (iii) Write  $\frac{1}{4}$  as a power of 2

.....

**(3)**

- (c) Evaluate  $\left(\frac{27}{343}\right)^{\frac{2}{3}}$

.....

**(2)**

12.

[4 marks]

Solve  $3 \times 4^{2k+8} = 24$

Show your working clearly.

$k = \dots\dots\dots$

13.

[3 marks]

$y = 16 \times 10^{8k}$  where  $k$  is an integer.

Find an expression, in terms of  $k$ , for  $y^{\frac{5}{4}}$

Give your answer in standard form.

$\dots\dots\dots$

(a)  $(\sqrt{a})^7 = k\sqrt{a}$ , where  $k = a^n$

Find the value of  $n$ .

$$n = \dots\dots\dots (2)$$

(b) Express  $\frac{1}{2\sqrt{2}}$  as a power of 2

$$\dots\dots\dots (2)$$