



- 1 Write down the value of 100^3

(1 mark)

100^3 means $100 \times 100 \times 100$

$100 \times 100 = 10,000$ and $10,000 \times 100 = 1,000,000$

1000000

- 2 a. Write down the value of 5^0
b. Write down the value of 2^{-3} as a fraction

(2 marks)

a)

anything⁰ = 1

1

b)

Negative power: one over the positive power

$$2^{-3} = \frac{1}{2^3}$$

$$= \frac{1}{8}$$

$\frac{1}{8}$

- 3 a. Write $7^4 \times 7^3$ as a single power of 7
b. Write $12^9 \div 12^4$ as a single power of 12

(2 marks)

a) When multiplying powers of the same base, add the indices

$$4 + 3 = 7, \text{ so the answer is } 7^7$$

b) When dividing powers of the same base, subtract the indices: $9 - 4 = 5$, so the answer is 12^5

The first product contains four factors of 7 followed by three more: seven altogether. For division, cancel four of the nine factors of 12, leaving five

4 Write $(4^3 \times 4^5) \div 4^2$ as a single power of 4

(2 marks)

Multiply: add the powers

$$4^3 \times 4^5 = 4^{3+5} = 4^8$$

Divide: subtract the powers

$$4^8 \div 4^2 = 4^{8-2}$$

$$\boxed{4^6}$$

5 a. Write $(5^3)^4$ as a single power of 5

b. Write down the value of 8^0

(2 marks)

a) For a power of a power, multiply the indices

$$3 \times 4 = 12, \text{ so the answer is } 5^{12}$$

b) Any non-zero number to the power 0 is 1

For the zero power, $8^3 \div 8^3 = 1$, and the division rule writes the same calculation as $8^{(3-3)} = 8^0$

6 a. Write down the value of 10^{-3} as a decimal.

b. Write down the value of 100^2

c. Write $\frac{1}{9}$ as a power of 3.

(3 marks)

a)

$$10^{-3} = \frac{1}{10^3} = \frac{1}{1000}$$

$$\boxed{0.001}$$

b)

$$100 \times 100 = 10\,000$$

$$\boxed{10\,000}$$

c)

$$9 = 3^2$$

$$\frac{1}{9} = \frac{1}{3^2}$$

$$\boxed{3^{-2}}$$

7 Work out the value of $(3^5 \times 3^{-2}) \div 3$

(2 marks)

$$3^5 \times 3^{-2} = 3^{(5-2)} = 3^3$$

$$3^3 \text{ divided by } 3 = 3^{(3-1)} = 3^2$$

$$3^2 = 9$$

9

8 Work out the value of $(2^5 \times 2^{-2}) \div 2^2$

(3 marks)

$$2^5 \times 2^{-2} = 2^{5-2} = 2^3$$

$$2^3 \div 2^2 = 2^{3-2} = 2^1$$

2

9 $\frac{2^6 \times 2^k}{2^3} = 2^{11}$

Find the value of k .

(3 marks)

Using the index laws, the left-hand side is $2^{(6+k-3)} = 2^{(k+3)}$

$$\text{So } k + 3 = 11$$

$$k = 8$$

8

10 a. $3^k \div 3^2 = 3^6$. Find the value of k .

b. $(2^3)^m = 2^{12}$. Find the value of m .

(3 marks)

a)

Divide: subtract the powers

$$\begin{array}{rcl} k - 2 & = & 6 \\ +2 & & +2 \\ \hline k & = & 8 \end{array}$$

$$k = 8$$

b)

Power of a power: multiply the powers

$$\begin{array}{rcl} 3 \times m & = & 12 \\ \div 3 & & \div 3 \\ \hline m & = & 4 \end{array}$$

$$m = 4$$

11

- a. Write $7^{-2} \times 7^{-3}$ as a single power of 7
 b. Work out the value of $7^{-2} \times 7^{-3}$ as a fraction.

(3 marks)

a)

$$7^{-2} \times 7^{-3} = 7^{-2+3}$$

$$\boxed{7^{-5}}$$

b)

$$7^{-5} = \frac{1}{7^5}$$

$$7^5 = 16807$$

$$\boxed{\frac{1}{16807}}$$

12

- a. Write 8×2^4 as a power of 2
 b. Write 25×5^3 as a power of 5

(3 marks)

a)

$$8 = 2^3$$

$$2^3 \times 2^4 = 2^{3+4}$$

$$\boxed{2^7}$$

b)

$$25 = 5^2$$

$$5^2 \times 5^3 = 5^{2+3}$$

$$\boxed{5^5}$$

13

- a. Write $(7^2)^5$ as a single power of 7
 b. Zara writes
 $3^4 \times 3^5 = 9^9$

Explain what Zara has done wrong, and write down the correct answer as a single power.

(4 marks)

a) Multiply the indices

$$7^{(2 \times 5)} = 7^{10}$$

b) When multiplying powers of the same base you add the indices but keep the base the same

b) Zara multiplied the bases ($3 \times 3 = 9$) as well - the correct answer is $3^{(4+5)} = 3^9$