

Name: _____

Level 2 Further Maths

Laws of Indices



Corbettmaths

Ensure you have: Pencil or pen

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Revision for this topic

www.corbettmaths.com/more/further-maths/



1. Write $(x^3)^2$ as a single power of x

$$x^6$$

(1)

2. (a) $c^4 \times c^n = c^8$

Work out the value of n

$$n = 4$$

(1)

(b) $\frac{y^{12}}{y^4} = y^m$

Work out the value of m

$$m = 8$$

(1)

(c) $(a^n)^4 = \frac{(a^3)^6}{a^7}$

Work out the value of n

$$a^{4n} = \frac{a^{18}}{a^7}$$

$$a^{4n} = a^{11}$$

$$4n = 11$$

$$n = 2.75$$

$$n = 2.75$$

(3)

3. $\frac{y^7 \times y^8}{y^4 \times y^n} = y^5$

$$y^{n+4} = y^{10}$$

Find the value of n

$$\frac{y^{15}}{y^{n+4}} = y^5$$

$$n=6$$

.....
(2)

4. (a) $y^4 \times y^n = 1$

Work out the value of n

$$y^0 = 1$$

$$n=-4$$

.....
(1)

(b) Simplify fully $\frac{a^8}{a^3 \times a^{-9}}$

$$\frac{a^8}{a^{-6}}$$

$$a^{14}$$

.....
(2)

5. Work out the value of $(2^{\frac{7}{2}} - 2^{\frac{1}{2}})^2$

$$(2^{3.5} - 2^{0.5})(2^{3.5} - 2^{0.5})$$

$$2^7 - 2^4 - 2^4 + 2^1$$

$$128 - 16 - 16 + 2$$

98

.....
(3)

6. (a) Simplify $(2xy^2)^4$

$$16x^4y^8$$

.....
(2)

- (b) Simplify $(3x^3y^5)^3$

$$27x^9y^{15}$$

.....
(2)

7. Simplify fully $(\frac{3}{4}x^5y)^3$

$$\frac{27}{64}x^{15}y^3$$

.....
(2)

8. $-1 < x < 0$

Write the following expressions in order, starting with the smallest.

x x^2 x^3 x^4

let $x = -0.5$

-0.5 0.25 -0.125 0.0625

x, x^3, x^4, x^2

 (2)

9. Simplify fully $\frac{(6xy^3)^3}{4xy^5}$

$$\frac{216x^3y^9}{4xy^5}$$

$54x^2y^4$

 (3)

10. Write $\sqrt[3]{w^{-10}} \times w^{-2}$ as an integer power of w.

$$\sqrt[3]{w^{-12}}$$

w^{-4}

 (2)

11. Given that $a = 3^x$ and $b = 3^y$

(a) Write 3^{x+1} in terms of a

$$3^x \times 3^1$$

$$a \times 3$$

$$3a$$

(2)

(b) Write 3^{x+y} in terms of a and b

$$3^x \times 3^y$$

$$a \times b$$

$$ab$$

(1)

(c) Write 3^{2y} in terms of b

$$(3^y)^2$$

$$b^2$$

(1)

12. Given that $125^x = 25^{x+5}$

$$(5^3)^x = (5^2)^{x+5}$$

$$5^{3x} = 5^{2x+10}$$

$$3x = 2x + 10$$

$$x = 10$$

$$x = 10$$

(3)

13. Given that $16^x = 4^{10-x}$

$$(4^2)^x = 4^{10-x}$$

$$4^{2x} = 4^{10-x}$$

$$2x = 10 - x$$

$$3x = 10$$

$$x = \frac{10}{3}$$

$$x = \frac{10}{3}$$

(3)

14. Find the value of y

$$2^y \times 4^{y+3} = 16$$

$$2^y \times (2^2)^{y+3} = 2^4$$

$$2^y \times 2^{2y+6} = 2^4$$

$$2^{3y+6} = 2^4$$

$$3y + 6 = 4$$

$$3y = -2$$

$$y = -\frac{2}{3}$$

(3)

15. Solve $\frac{16^{2x+3}}{4^x} = 32$

$$\frac{(2^4)^{2x+3}}{(2^2)^x} = 2^5$$

$$\frac{2^{8x+12}}{2^{2x}} = 2^5$$

$$6x+12 = 5$$

$$6x = -7$$

$$x = -\frac{7}{6}$$

(4)

16. Find the exact values of w

$$3^{w^2} = 9 \times 27^{w+5}$$

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

$$3^{w^2} = 3^2 \times 3^{3w+15}$$

$$3^{w^2} = 3^{3w+17}$$

$$w^2 = 3w + 17$$

$$w^2 - 3w - 17 = 0$$

$$a = 1 \quad b = -3 \quad c = -17$$

$$w = \frac{3 \pm \sqrt{9 - 4(1)(-17)}}{2}$$

$$w = \frac{3 \pm \sqrt{77}}{2}$$

$$w = \frac{3 + \sqrt{77}}{2} \quad \text{or} \quad w = \frac{3 - \sqrt{77}}{2}$$

(4)

17. Solve

$$\frac{81^x}{9^{x+1}} = 3\sqrt{3}$$

$$\frac{(3^4)^x}{(3^2)^{x+1}} = 3^1 \times 3^{1/2}$$

$$\frac{3^{4x}}{3^{2x+2}} = 3^{1.5}$$

$$4x - (2x + 2) = 1.5$$

$$2x - 2 = 1.5$$

$$2x = 3.5$$

$$x = 1.75$$

$$\underline{\underline{x = 1.75}}$$

(4)