



Index laws

About 45 minutes No calculator 42 marks

Date _____

A Do Now

The first question is what today's lesson needs. The others bring back earlier topics.

- A1** Needed today [2 marks] **A2** From chapter 10 [2 marks]
Find n when $\frac{1}{27^4} = 3^n$.
The point $(k, -3k)$ lies on the line $y = x - 20$. Find k .

Answer

Answer

- A3** Last lesson [2 marks] **A4** Key Stage 3 [2 marks]
There are 26 people. 17 like rock music, 8 like pop music and 3 like neither. A person who likes pop music is chosen at random. Find the probability that they also like rock music.
Write 135 cm : 3.15 m as a ratio in its simplest form.

Answer

Answer

B Example, then your turn

Your teacher works through each example with you. Then try the one beside it.

EXAMPLE 1

Simplify $4x^5 \times 3x^2$.**Hint** Multiply the numbers. Add the powers of x .

- B1** Simplify $7m^2 \times 4m^6$. [2 marks]

Answer

EXAMPLE 2

Simplify $\frac{20a^9}{4a^3}$.**Hint** Divide the numbers. Subtract the powers of a .

- B2** Simplify $\frac{36t^{10}}{9t^4}$. [2 marks]

Answer

C Practice

C1 Work out the value of 4^{-2} and the value of 9^0 . [2 marks]

Answer $4^{-2} = \dots\dots$ $9^0 = \dots\dots$

C3 Simplify $(2p^4)^3$. [2 marks]

Answer

C5 Write $\frac{1}{125}$ as a power of 5. [1 mark]

Answer

C2 Write $\frac{3^7 \times 3^2}{3^5}$ as a single power of 3. [2 marks]

Answer

C4 $7^{2n} \times 7^3 = 7^{11}$. Work out the value of n . [2 marks]

Answer

C6 Simplify $\frac{6y^3}{18y^7}$. Give your answer as a fraction with no negative power. [2 marks]

Answer

C7 Simplify $3a^2b^4 \times 5a^3b$. [2 marks]

Answer

C8 Which is larger, 2^{15} or 4^7 ? Show how you decide, without working out either one. [2 marks]

D Exam-style questions

D1 Jo says, " $3^4 \times 3^2 = 9^6$, because you multiply the 3s and add the powers." [2 marks]

Explain why Jo is wrong, and write $3^4 \times 3^2$ as a single power of 3.

Answer

D2 A rectangle has length $8x^5$ cm and width $2x^3$ cm.



(a) Write an expression for the area of the rectangle. Give your answer in its simplest form. [2 marks]

Answer

- (b) A square has the same area as the rectangle. Write an expression for the side length of the square. [2 marks]

Answer

- (c) The length of the rectangle is k times its width. Write k in terms of x . [2 marks]

Answer

Total for D2: 6 marks

- D3 Write $\frac{(a^3)^4 \times a^{-2}}{a^5}$ as a single power of a . [3 marks]

Answer

E Extension

No route is given. The hints are at the end of the sheet. Use one at a time.

- E1 Solve $\frac{4^x \times 32}{8^{x-1}} = 2^{10}$. [4 marks]

Answer

Extension hints

Cover these with paper. Uncover one at a time.

- E1 **Hint 1** Write every number as a power of 2.
Hint 2 $4^x = 2^{2x}$, $32 = 2^5$ and $8^{x-1} = 2^{3x-3}$.
Hint 3 The power on the left is $2x + 5 - (3x - 3) = 8 - x$. So $8 - x = 10$ and $x = -2$.

How did it go?

Colour one circle on each line: not yet, nearly, yes.

- I can work out zero and negative powers. ☐ ☐ ☐
- I can multiply, divide and raise powers, with numbers in front. ☐ ☐ ☐
- I can compare powers and solve for an unknown power. ☐ ☐ ☐