

Name: _____

Level 2 Further Maths



Exponential Graphs

Corbettmaths

Ensure you have: Pencil or pen

Guidance

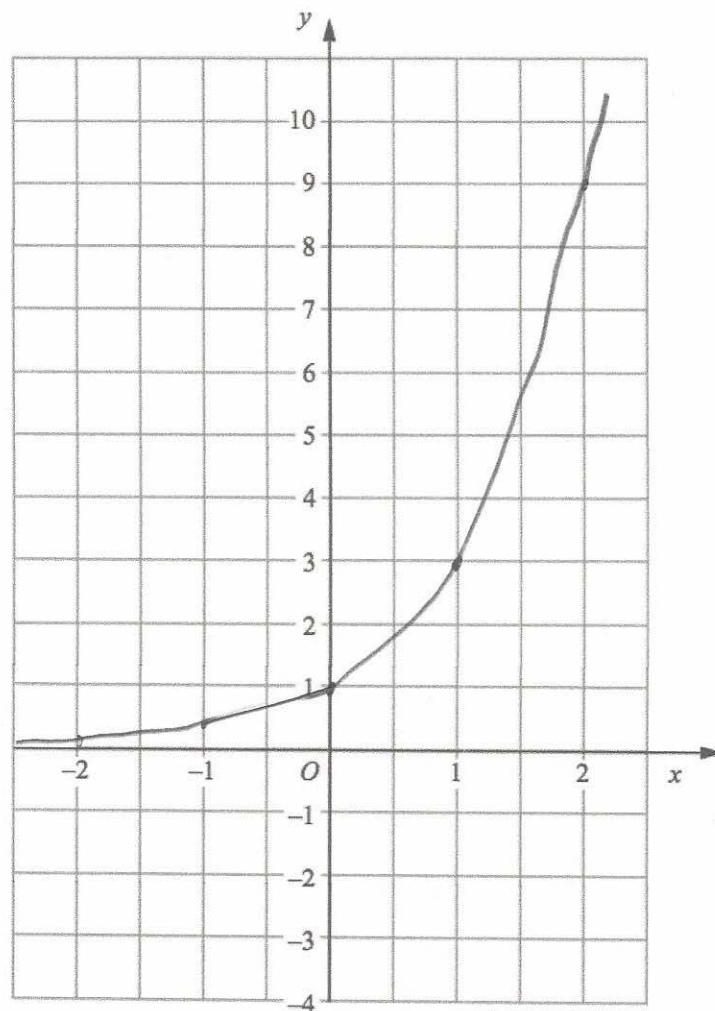
1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Revision for this topic

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

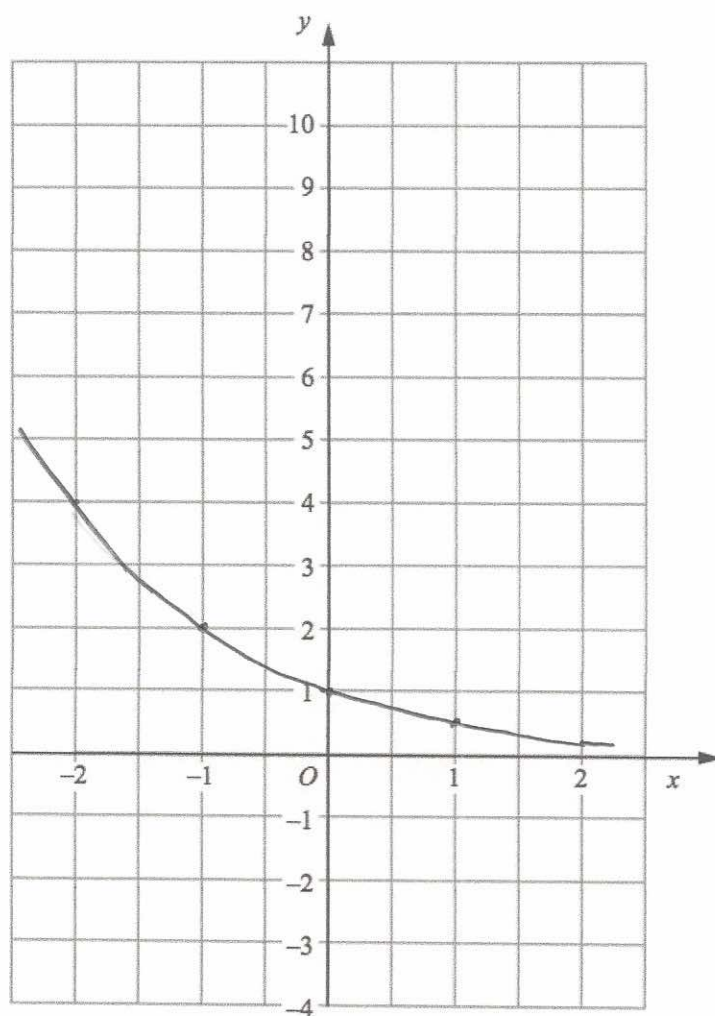


1. Draw the graph of $y = 3^x$ for values of x from -2 to 2



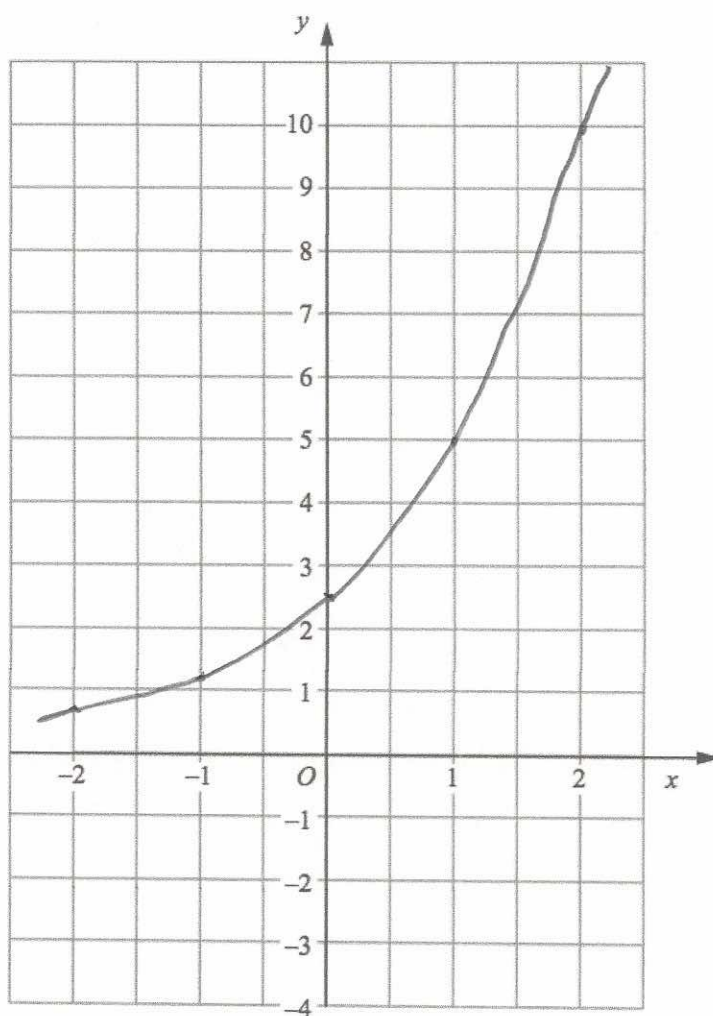
(2)

2. Draw the graph of $y = \left(\frac{1}{2}\right)^x$ for values of x from -2 to 2



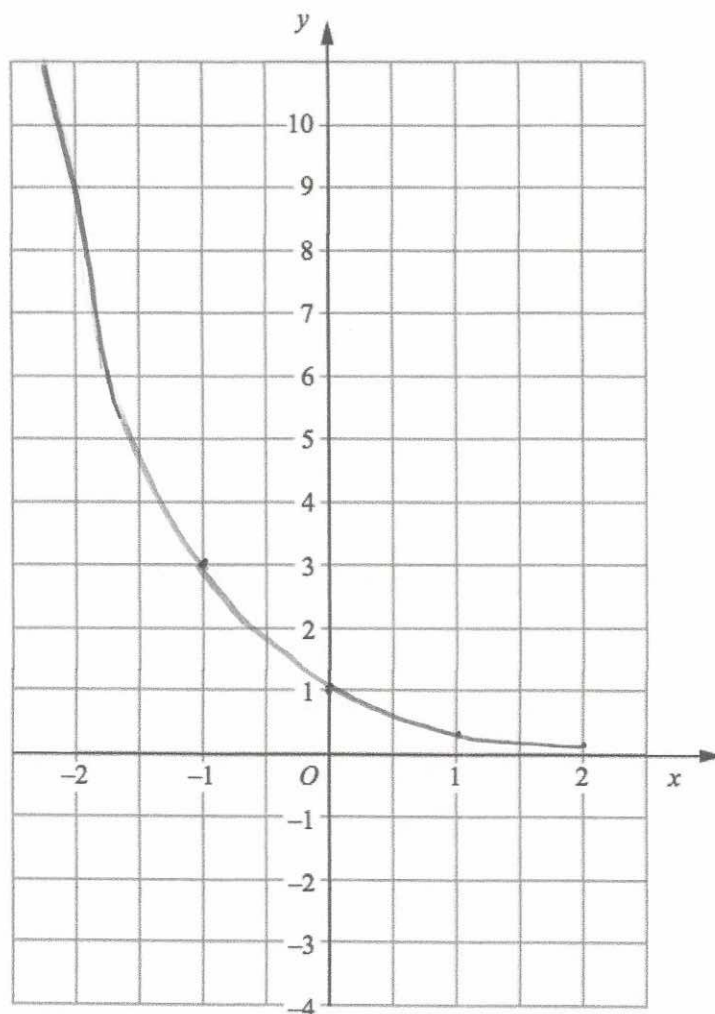
(2)

3. Draw the graph of $y = 2.5 \times 2^x$ for values of x from -2 to 2



(2)

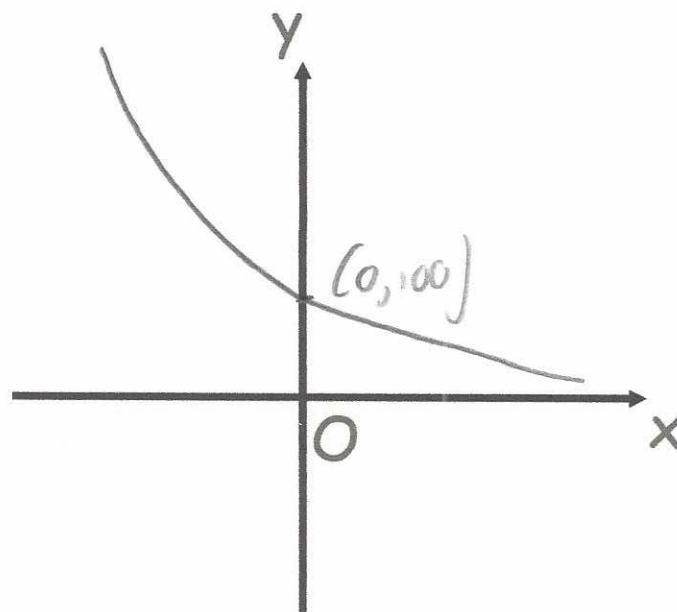
4. Draw the graph of $y = 3^{-x}$ for values of x from -2 to 2



(2)

5. Sketch the graph of $y = 100 \times 4^{-x}$

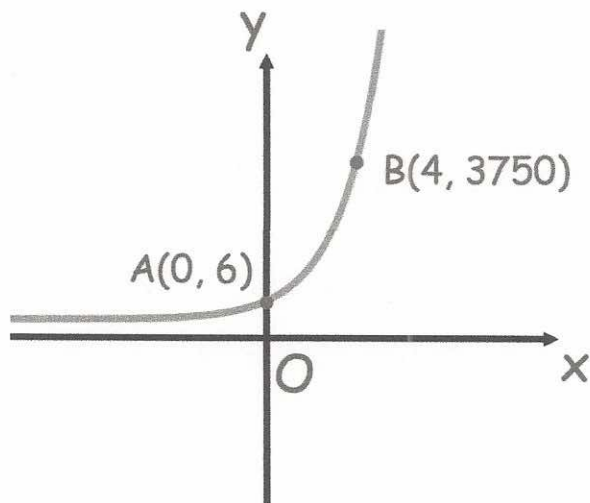
Label the coordinates of any points of intersection with the coordinate axes.



(2)

6. The sketch shows a curve with equation $y = ab^x$ where $a > 0$ and $b > 0$

The curve passes through the points $(0, 6)$ and $(4, 3750)$



Calculate the value of a and b

$$\begin{matrix} x & y \\ (0, & 6) \end{matrix}$$

$$6 = a \times b^0$$

$$a = 6$$

$$y = 6 \times b^x$$

$$\begin{matrix} x & y \\ (4, & 3750) \end{matrix}$$

$$y = 6 \times b^4$$

$$3750 = 6 \times b^4$$

$$b^4 = 625$$

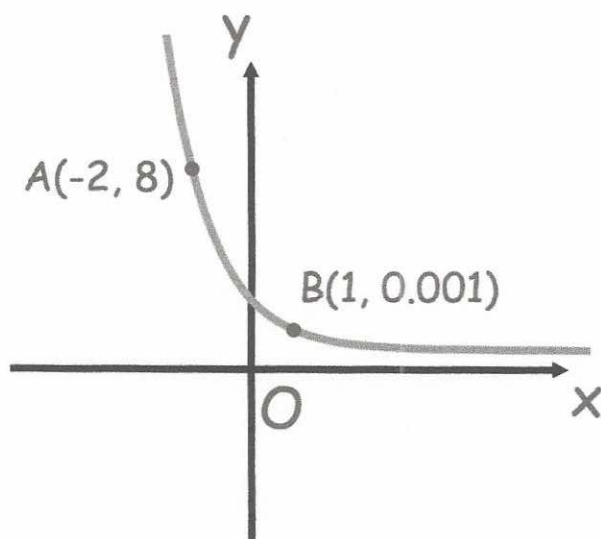
$$b = 5$$

$$y = 6 \times 5^x$$

$$\underline{a = 6 \quad b = 5}$$

(3)

7. The sketch shows a curve with equation $y = ab^{-x}$ where $a > 0$ and $b > 0$



The curve passes through the points $\begin{matrix} x & y \\ -2 & 8 \end{matrix}$ and $\begin{matrix} x & y \\ 1 & 0.001 \end{matrix}$

Calculate the value of a and b

$$8 = a \times b^{-(-2)}$$

$$8 = a \times b^2$$

$$0.001 = a \times b^{-1}$$

$$\frac{8}{0.001} = \frac{a \times b^2}{a \times b^{-1}}$$

$$8000 = b^3$$

$$b^{\wedge} = 20$$

$$8 = a \times 20^2$$

$$8 = a \times 400$$

$$a = 0.02$$

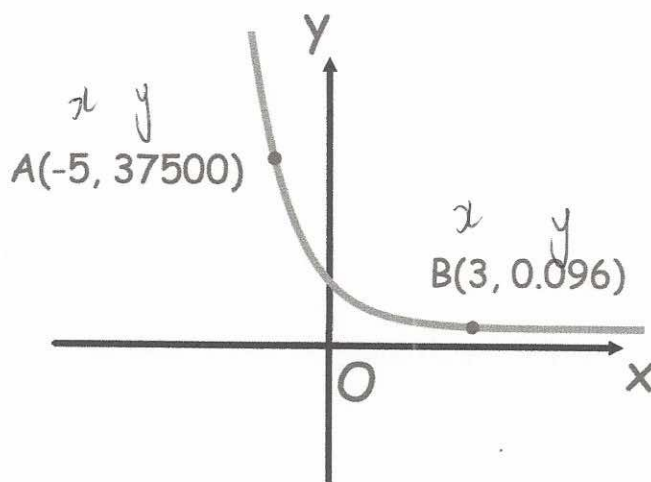
$$y = 0.02 \times 20^{-x}$$

$$a = 0.02$$

$$b = 20$$

(4)

8. The sketch shows a curve with equation $y = ab^x$ where $a > 0$ and $b > 0$



The curve passes through the points $(-5, 37500)$ and $(3, 0.096)$

Calculate the value of a and b

$$37500 = a \times b^{-5}$$

$$0.096 = a \times b^3$$

$$\frac{0.096}{37500} = \frac{a \times b^3}{a \times b^{-5}}$$

$$\frac{1}{390625} = b^8$$

$$b = \frac{1}{5}$$

$$0.096 = a \times 0.2^3$$

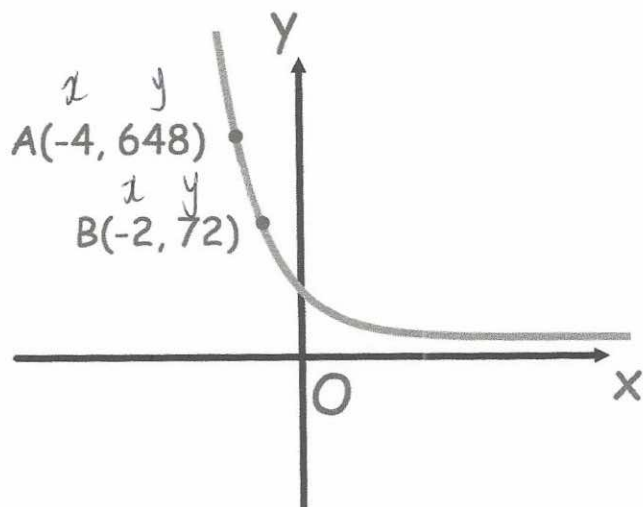
$$a = 12$$

$$y = 12 \times \left(\frac{1}{5}\right)^x$$

$$a = 12 \quad b = \frac{1}{5}$$

(4)

9. The sketch shows a curve with equation $y = ab^{-x}$ where $a > 0$ and $b > 0$



The curve passes through the points $(-4, 648)$ and $(-2, 72)$

Calculate the value of a and b

$$648 = a \times b^4$$

$$72 = a \times b^2$$

$$\frac{648}{72} = \frac{a \times b^4}{a \times b^2}$$

$$9 = b^2$$

$$b = 3$$

$$72 = a \times 9$$

$$a = 8$$

$$y = 8 \times 3^{-x}$$

$$a = 8$$

$$b = 3$$

(4)

10. A scientist is carrying out an experiment to remove microplastics from water. In an experiment 20,000 microplastics are added to a sample of water.

The number of microplastics, M , after t minutes is $M = 20000 \times 2^{-t}$

- (a) Calculate the number of microplastics in the water after 3 minutes.

$$M = 20000 \times 2^{-3}$$

$$M = 2500$$

$$\begin{array}{r} 2500 \\ \hline (2) \end{array}$$

- (b) After how many complete minutes does it take for the number of microplastics to fall below 100?

$$t = 8$$

$$20000 \times 2^{-8} = 78.125$$

$$20000 \times 2^{-7} = 156.25$$

$$\begin{array}{r} 8 \text{ minutes} \\ \hline (2) \end{array}$$