

2. For each of the following exponential functions,

1. determine the base.      2. indicate if the function is increasing or decreasing.

a)  $f(x) = \left(\frac{4}{3}\right)^x$   $\frac{4}{3}$ ; increasing      b)  $f(x) = \left(\frac{4}{5}\right)^x$   $\frac{4}{5}$ ; decreasing  
 c)  $f(x) = 2^{-x}$   $\frac{1}{2}$ ; decreasing      d)  $f(x) = \left(\frac{2}{3}\right)^{-x}$   $\frac{3}{2}$ ; increasing  
 e)  $f(x) = 3^{2x}$  9; increasing      f)  $f(x) = \left(\frac{9}{4}\right)^{-\frac{x}{2}}$   $\frac{2}{3}$ ; decreasing

3. In each of the following cases, the point A belongs to the graph of an exponential function defined by the rule  $y = c^x$ . Determine the rule of each function.

a) A(2, 9)  $y = 3^x$       b) A $\left(\frac{1}{2}, 2\right)$   $y = 4^x$       c) A $\left(-\frac{1}{2}, \frac{3}{2}\right)$   $y = \left(\frac{4}{9}\right)^x$   
 d) A $\left(-\frac{1}{3}, \frac{1}{2}\right)$   $y = 8^x$       e) A $\left(-\frac{1}{2}, \frac{5}{4}\right)$   $y = \left(\frac{16}{25}\right)^x$       f) A $\left(-\frac{3}{2}, \frac{8}{27}\right)$   $y = \left(\frac{9}{4}\right)^x$

4. The point A $\left(-\frac{1}{2}, \frac{2}{3}\right)$  belongs to the graph of an exponential function defined by the rule  $y = c^x$ .

- a) A point B on this graph has an x-coordinate of -2. What is its y-coordinate?  $\left(\frac{9}{4}\right)^{-2} = \frac{16}{81}$   
 b) A point C on this graph has a y-coordinate of  $\frac{4}{9}$ . What is its x-coordinate? -1

5. On the right, we have represented the exponential functions defined by the rules:

$$y = 2^x, y = \left(\frac{3}{2}\right)^x, y = 3^x, y = \left(\frac{1}{2}\right)^x, y = \left(\frac{2}{3}\right)^x, y = \left(\frac{1}{3}\right)^x.$$

a) Associate each curve to its equation.

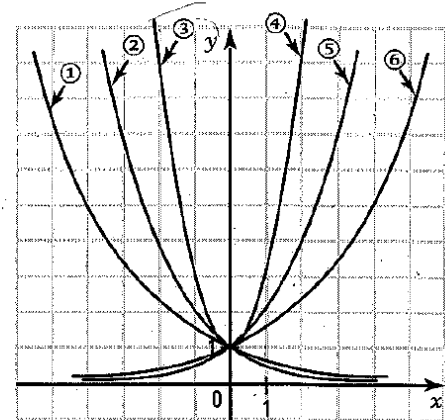
1.  $y = \left(\frac{2}{3}\right)^x$       2.  $y = \left(\frac{1}{2}\right)^x$       3.  $y = \left(\frac{1}{3}\right)^x$   
 4.  $y = 3^x$       5.  $y = 2^x$       6.  $y = \left(\frac{3}{2}\right)^x$

b) Of the three increasing exponential functions, which one increases the fastest? Justify your answer.

$y = 3^x$ . It is the one with the biggest base.

c) Of the three decreasing exponential functions, which one decreases the fastest? Justify your answer.

$y = \left(\frac{1}{3}\right)^x$ . It is the one with the smallest base.



6. The functions  $f(x) = 2^x$  and  $g(x) = \left(\frac{1}{2}\right)^x$  are represented on the right.

a) Verify that  $f(2) = g(-2)$ .  $f(2) = 4$ ;  $g(-2) = 4$

b) 1. Show that  $f(x) = g(-x)$  for any real number  $x$ .

$$g(-x) = \left(\frac{1}{2}\right)^{-x} = 2^x = f(x), \forall x \in \mathbb{R}$$

2. What can be deduced from the curves of the exponential functions representing the functions  $f$  and  $g$ ?

The curves are symmetrical about the y-axis.

