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Graphs of Related Functions - Lesson 5

Exponential Graphs

LI

- Know the Exponential Function and Exponential Graphs.
- Sketch related graphs of exponential functions.

SC

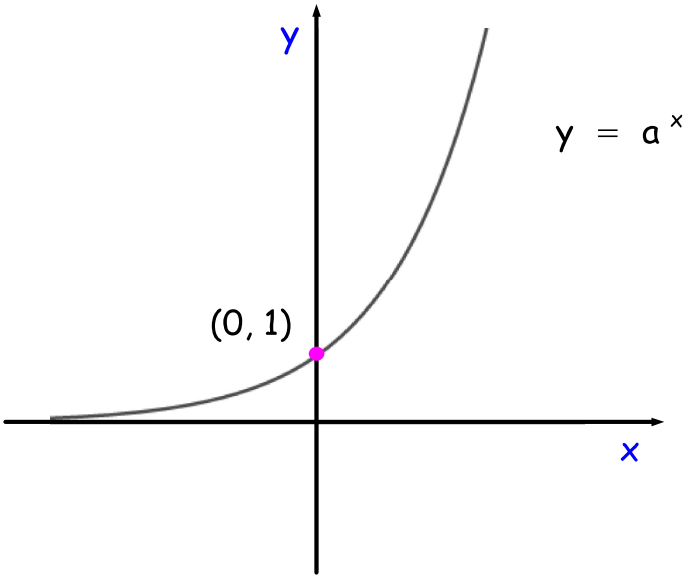
- Graphs of related functions.

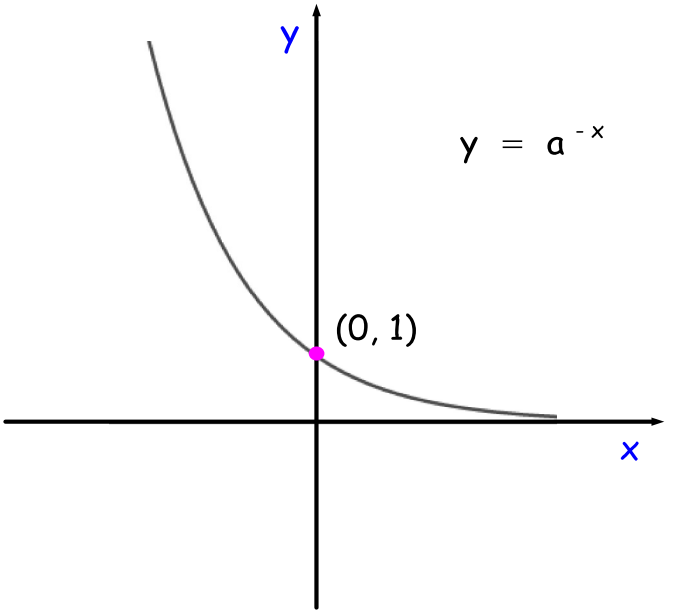
Jan 10-12:11

The Exponential Graph

For any $a > 0$, the Exponential Function to Base a is the function $y = a^x$

For any $a > 0$, the Exponential Graph to Base a is the graph of the exponential function $y = a^x$





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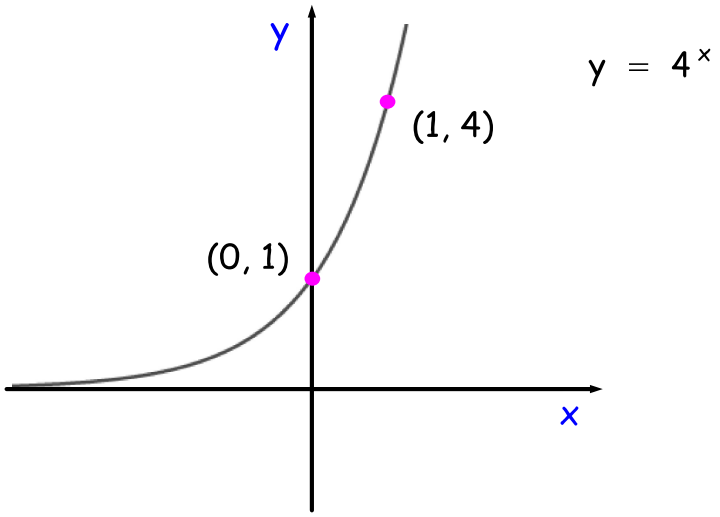
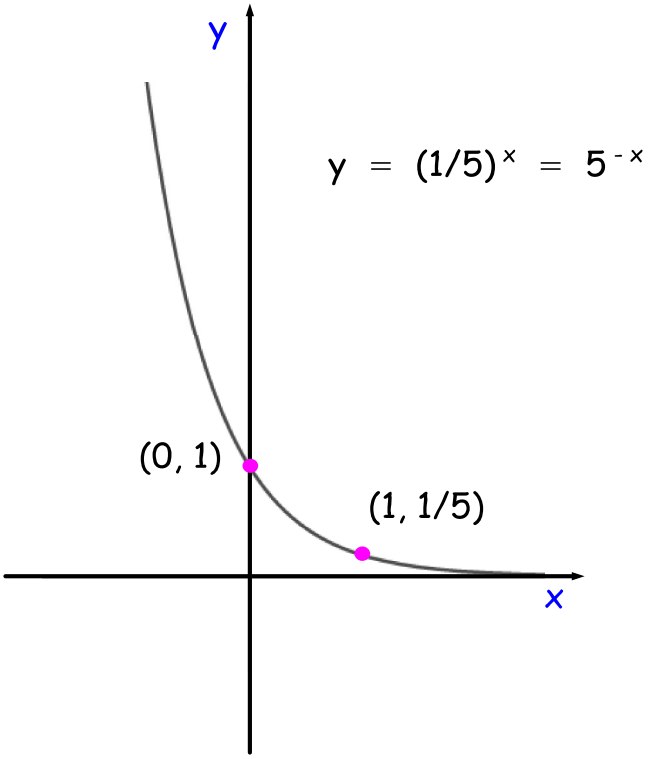
Example 1

Sketch the graphs of $y = 4^x$ and $y = (1/5)^x$ on separate diagrams, indicating where each graph crosses the y - axis.

Also indicate the coordinates $(1, p)$ for $y = 4^x$ and $(1, q)$ for $y = (1/5)^x$.





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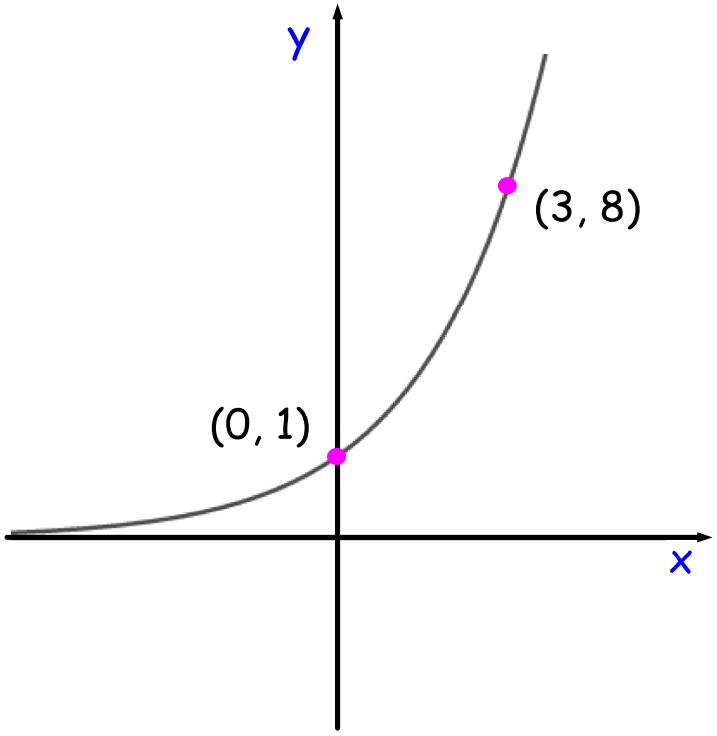
Example 2

State the equation of the following graph :



$y = a^x$

Substituting the coordinate (3, 8) into the general equation gives,

$$y = a^x$$

$$8 = a^3$$

$$\Rightarrow \quad a = 2$$

$$\therefore \quad \boxed{y = 2^x}$$

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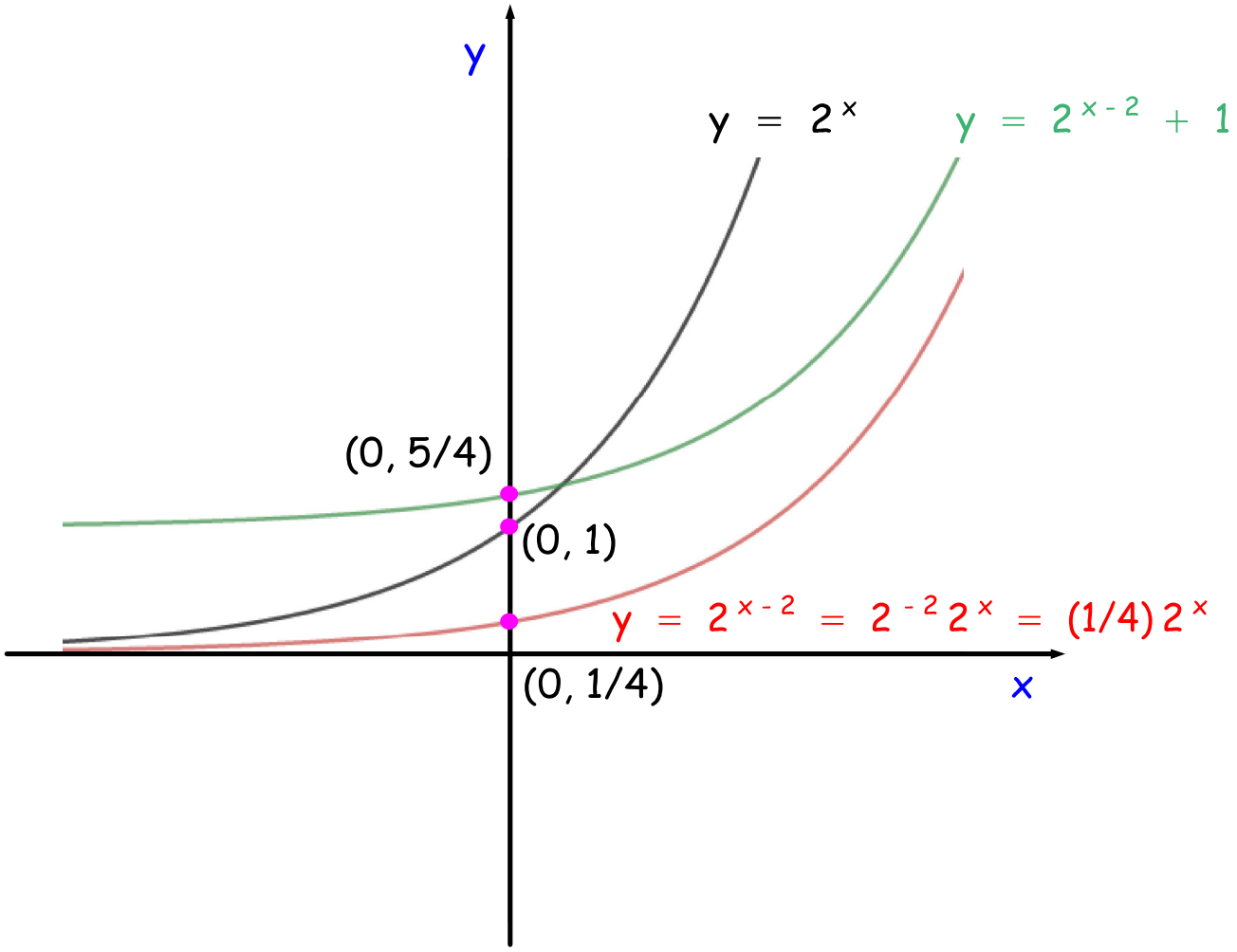
Example 3

Sketch the graphs of $y = 2^x$, $y = 2^{(x-2)}$ and $y = 2^{(x-2)} + 1$, indicating where all three graphs cross the y - axis.



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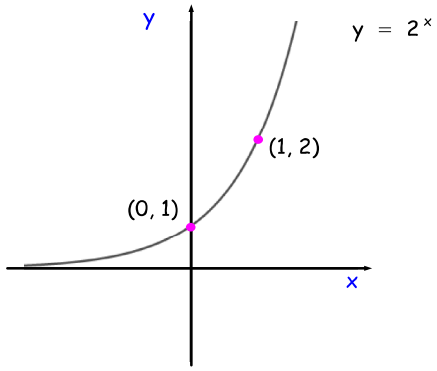
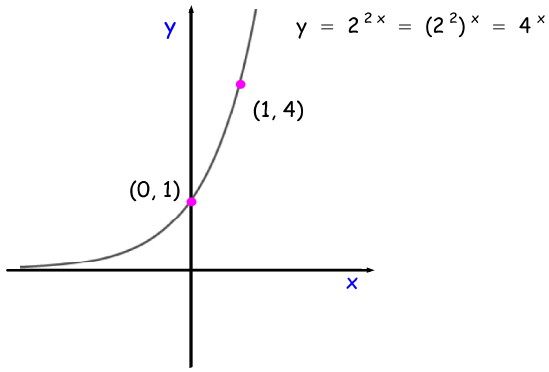
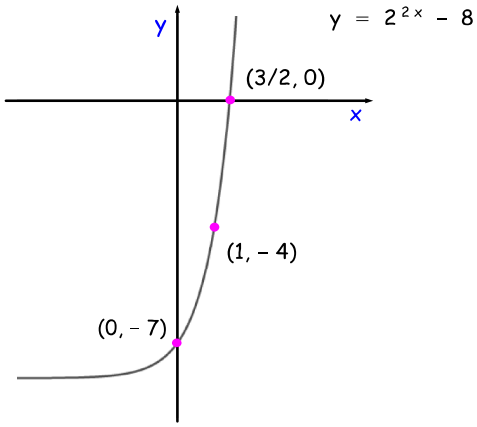
Example 4

The graph of $y = 2^x$ is shown below.



Sketch the graph of $y = 2^{(2x)} - 8$, indicating where it crosses the x - and y - axes.





The graph of $y = 2^{(2x)} - 8$ clearly crosses the y - axis at $(0, -7)$, as it's the graph of $y = 2^{(2x)}$ shifted 8 units down. To find the x - intercept, put $y = 0$ to get,

$$\begin{aligned} 0 &= 2^{(2x)} - 8 \\ \Rightarrow \quad 2^{(2x)} &= 8 \\ \Rightarrow \quad 2x &= 3 \\ \Rightarrow \quad x &= 3/2 \end{aligned}$$

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