

Questions from Homework

③ a) $\log_a 8$

$$a^y = 8$$

$$a^y = a^3$$

$$y = 3$$

e) $\log_a \left(\frac{1}{3a}\right)$

$$a^y = \frac{1}{3a}$$

$$a^y = a^{-5}$$

$$y = -5$$

⑤

a)

$$a^{\log_a 4}$$

$$a^a$$

$$4$$

* $a^y = 4$

$$a^y = a^a$$

$$y = a$$

Logarithms

exponential form

$$x = b^y$$

Say "the base ***b*** to the exponent ***y*** is ***x***."

logarithmic form

$$y = \log_b x$$

Say "***y*** is the exponent to which you raise base ***b*** to get the answer ***x***."

Skills with logarithms are needed to solve equations involving logarithms. When solving these equations, you must remember the meanings of the exponential form and the logarithmic form.

$$x = b^y \longleftrightarrow y = \log_b x$$

Example 1

$$\log_3 m = 4$$

$$3^4 = m$$

$$\boxed{81 = m}$$

$$x = b^y \longleftrightarrow y = \log_b x$$

Example 2

$$\log_8 4 = y$$

$$8^y = 4$$

$$(2^3)^y = 2^2$$

$$\cancel{2}^{3y} = \cancel{2}^2$$

$$3y = 2$$

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

$$x = b^y \longleftrightarrow y = \log_b x$$

Example 3

a) $\log_x 49 = 2$

$$(x^2)^{1/2} = (49)^{1/2}$$

$$x = \sqrt{49}$$

$$x = 7$$

b) $\log_x 4 = \frac{2}{3}$

$$(x^{2/3})^{3/2} = (4)^{3/2}$$

$$x = \sqrt{(4)^3}$$

$$x = \sqrt{64}$$

$$x = 8$$

c) $\log_x 81 = 4$

$$(x^4)^{1/4} = (81)^{1/4}$$

$$x = \sqrt[4]{81}$$

$$x = 3$$

When solving some logarithmic equations, or simplifying logarithmic expressions, you will use the following property.

$$b^{\log_b m} = m$$

Example 4

a) $2^{\log_2 4} = 4$

b) $7^{\log_7 2401} = 2401$

Homework