

Name(s): KEY

Name(s): \_\_\_\_\_

Work with partners in groups of 2-4. This is required.

1.  $2^{x-x^2} = \frac{1}{4}$

$$2^{x-x^2} = \frac{1}{4}$$

$$2^{x-x^2} = 2^{-2}$$

$$x-x^2 = -2$$

$$0 = x^2 - x - 2$$

$$\Rightarrow 0 = (x+1)(x-2)$$

$$\boxed{x = -1, 2}$$

2.  $4^x + 2^x = 12$

$$4^x + 2^x = 12$$

$$(2^2)^x + 2^x = 12$$

$$(2^x)^2 + 2^x = 12$$

Let  $u = 2^x$ . Then

$$u^2 + u = 12$$

$$\Rightarrow u^2 + u - 12 = 0$$

$$(u+4)(u-3) = 0$$

$$u = -4$$

$$u = 3$$

$$2^x = -4$$

$$2^x = 3$$

DNE

$$\boxed{x = \log_2 3}$$

3. If  $4^x = 7$ , what does  $4^{-2x}$  equal?

$$4^x = 7$$

$$4^{-2x} = \frac{1}{(4^x)^2} = \frac{1}{7^2} = \boxed{\frac{1}{49}}$$

4.  $2 \cdot 4^x - 3 \cdot 2^x = 2$

$$2 \cdot 4^x - 3 \cdot 2^x = 2$$

$$2 \cdot (2^2)^x - 3 \cdot 2^x = 2$$

$$2 \cdot (2^x)^2 - 3 \cdot 2^x = 2$$

$$\text{Let } u = 2^x$$

$$2u^2 - 3u = 2$$

$$2u^2 - 3u - 2 = 0$$

$$D (2u+1)(u-2) = 0$$

$$2u+1=0$$

$$u = -\frac{1}{2}$$

$$2^x = -\frac{1}{2}$$

DNE

$$u-2=0$$

$$u=2$$

$$2^x = 2$$

$$\boxed{x=1}$$