F.LE.A.4: Exponential Equations 2

1 If $\left(a^{x}\right)^{\frac{2}{3}} = \frac{1}{a^{2}}$, what is the value of x?
1) 1 2) 2 3) -3 4) -1

2 If $2^{4x+1} = 8^{x+a}$, which expression is equivalent to x?
1) $a-1$ 2) $3a-1$ 3) $\frac{a-1}{15}$ 4) $\frac{a-1}{3}$

3 The solution set of $2^{x^2+2x} = 2^{-1}$ is
1) $\{1\}$ 2) $\{-1\}$ 3) $\{-1,1\}$ 4) $\{\}$

4 The solution set of $4^{x^2+4x} = 2^{-6}$ is
1) $\{1,3\}$ 2) $\{-1,3\}$ 3) $\{-1,-3\}$ 4) $\{1,-3\}$

5 If $2^{(16x^2-8x-3)} = 1$, what does x equal?
1) $\frac{1}{4}$, only 2) $\frac{3}{4}$, only 3) $\frac{1}{4}$ and $-\frac{3}{4}$ 4) $-\frac{1}{4}$ and $\frac{3}{4}$

6 Determine the value of x and y if $2^{y} = 8^{x}$ and $3^{y} = 3^{x+4}$.
1) $x=6, y=2$ 2) $x=-2, y=-6$ 3) $x=2, y=6$ 4) $x=y$

7 Solve algebraically for x: $9^{3x} = 3^{3x+1}$

8 Solve algebraically for x: $5^{4x} = 125^{x-1}$

9 Solve for x: $\frac{1}{16} = 2^{3x-1}$

10 Solve for m: $3^{m+1} - 5 = 22$

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Answer Section

1 ANS: 3

$$a^{\frac{2x}{3}} = \frac{1}{a^2}$$
$$a^{\frac{2x}{3}} \cdot a^2 = 1$$
$$a^{\frac{2x}{3}+2} = 1$$
$$a^{\frac{2x}{3}+2} = a^0$$
$$\frac{2x}{3} + 2 = 0$$
$$\frac{2x}{3} = -2$$
$$2x = -6$$
$$x = -3$$

REF: 060516b

2 ANS: 2

$$2^{4x+1} = 8^{x+a}$$
$$2^{4x+1} = (2^3)^{x+a}$$
$$2^{4x+1} = 2^{3x+3a}$$
$$4x + 1 = 3x + 3a$$
$$x = 3a - 1$$

REF: 060814b

3 ANS: 2

$$2^{x^2+2x} = 2^{-1}$$
$$x^2 + 2x = -1$$
$$x^2 + 2x + 1 = 0$$
$$(x+1)(x+1) = 0$$
$$x = -1$$

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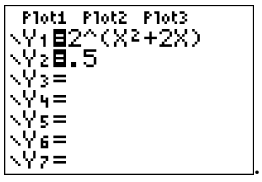

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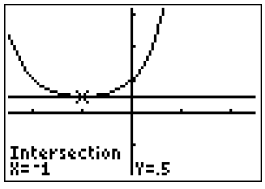

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4 ANS: 3

$4^{x^2+4x} = 2^{-6}$. $2x^2 + 8x = -6$

$(2^2)^{x^2+4x} = 2^{-6}$ $2x^2 + 8x + 6 = 0$

$2^{2x^2+8x} = 2^{-6}$ $x^2 + 4x + 3 = 0$

$(x+3)(x+1) = 0$

$x = -3 \;\; x = -1$

REF: 061015a2

5 ANS: 4

$2^{(16x^2-8x-3)} = 1$

$2^{(16x^2-8x-3)} = 2^0$

$16x^2 - 8x - 3 = 0$

$(4x+1)(4x-3) = 0$

$x = -\frac{1}{4} \;\; x = \frac{3}{4}$

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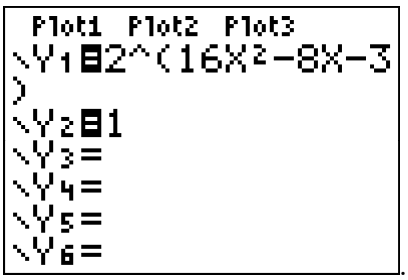

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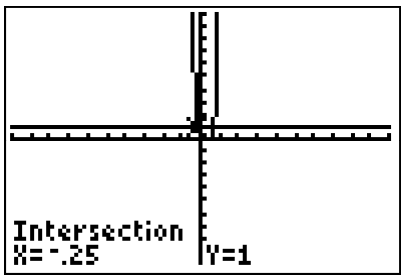

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6 ANS: 3

$2^y = 8^x$

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

$y = 3x$

$3x = x + 4$

$x = 2$

.

$3^y = 3^{x+4}$

$y = x + 4$

$y = x + 4$

$y = 2 + 4 = 6$

REF: 080118b

7 ANS:

$9^{3x} = 3^{3x+1}$

$(3^2)^{3x} = 3^{3x+1}$

$3^{6x} = 3^{3x+1}$

$6x = 3x + 1$

$3x = 1$

$x = \frac{1}{3}$

$\frac{1}{3}$.

REF: 060923b

8 ANS:

$5^{4x} = \left(5^3\right)^{x-1}$

$4x = 3x - 3$

$x = -3$

REF: 061528a2

9 ANS:

$2^{-4} = 2^{3x-1}$

$-4 = 3x - 1$

$-3 = 3x$

$-1 = x$

REF: 081529a2

10 ANS:

$3^{m+1} - 5 = 22$

$3^{m+1} = 27$

$\log 3^{m+1} = \log 27$

2. $(m+1)\log 3 = \log 27$.

$m + 1 = \dfrac{\log 27}{\log 3}$

$m + 1 = 3$

$m = 2$

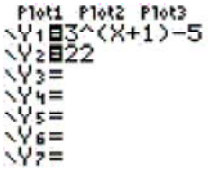
$3^{m+1} - 5 = 22$

$3^{m+1} = 27$

$3^{m+1} = 3^3$.

$m + 1 = 3$

$m = 2$



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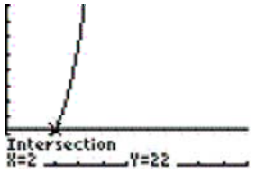

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