F.BF.B.5: Logarithmic Equations 3

1 If $\log 28 = \log 4 + \log x$, what is the value of x?
1) 7 2) 14 3) 24 4) 32

2 In the equation $\log_x 4 + \log_x 9 = 2$, x is equal to
1) $\sqrt{13}$ 2) 6 3) 6.5 4) 18

3 If $\log_3(x+1) - \log_3 x = 2$, then x equals
1) $-\frac{9}{8}$ 2) $-\frac{6}{5}$ 3) $\frac{1}{8}$ 4) $\frac{1}{5}$

4 Solve for x: $\log_b 36 - \log_b 2 = \log_b x$

5 Solve for x: $\log_8(x-6) + \log_8(x+6) = 2$

6 Solve for all values of x: $\log_3(x+4) + \log_3(x-2) = 3$

7 Solve for x: $\log_4(x^2+3x) - \log_4(x+5) = 1$

8 Solve for x: $\log_3(x^2-4) - \log_3(x+2) = 2$

9 Solve algebraically for all values of x: $\log_{(x+3)}(2x+3) + \log_{(x+3)}(x+5) = 2$

10 Solve algebraically, to the *nearest hundredth*, for all values of x: $\log_2(x^2-7x+12) - \log_2(2x-10) = 3$

11 Solve for p algebraically: $\log_{16}(p^2-p+4) - \log_{16}(2p+11) = \frac{3}{4}$

F.BF.B.5: Logarithmic Equations 3
Answer Section

1 ANS: 1 REF: 069626siii

2 ANS: 2

$$\log_x 4 + \log_x 9 = 2$$
$$\log_x (4 \cdot 9) = 2$$
$$x^2 = 36$$
$$x = 6$$

REF: 080209b

3 ANS: 3

$$\log_3 (x+1) - \log_3 x = 2$$
$$\log_3 \frac{x+1}{x} = 2$$
$$\frac{x+1}{x} = 3^2$$
$$9x = x + 1$$
$$x = \frac{1}{8}$$

REF: 011711a2

4 ANS:

$$\log_9 36 - \log_9 2 = \log_9 x$$

18. $$\log_9 \frac{36}{2} = \log_9 x$$
$$x = 18$$

REF: 080624b

5 ANS:
10

REF: 089342siii

6 ANS:
5

REF: 010439siii

7 ANS:

$$\log_4(x^2+3x)-\log_4(x+5)=1$$
$$\log_4\left(\frac{x^2+3x}{x+5}\right)=1$$
$$\frac{x^2+3x}{x+5}=4^1$$
$$4x+20=x^2+3x$$
$$x^2-x-20=0$$
$$(x-5)(x+4)=0$$
$$x=5 \text{ or } x=-4$$

{5,–4}.

REF: 060230b

8 ANS:

$$\log_3(x^2-4)-\log_3(x+2)=2$$
$$\log_3\left(\frac{x^2-4}{x+2}\right)=2$$
$$\frac{x^2-4}{x+2}=3^2$$
$$\frac{(x+2)(x-2)}{x+2}=9$$
$$x-2=9$$
$$x=11$$

11.

REF: 060833b

9 ANS:

$\log_{(x+3)}(2x+3)(x+5)=2$ –6 is extraneous

$$(x+3)^2=(2x+3)(x+5)$$
$$x^2+6x+9=2x^2+13x+15$$
$$x^2+7x+6=0$$
$$(x+6)(x+1)=0$$
$$x=-1$$

REF: 011439a2

10 ANS:

$\log_2\left(\frac{x^2-7x+12}{2x-10}\right)=3 \qquad x=\frac{23\pm\sqrt{(-23)^2-4(1)(92)}}{2(1)}\approx 17.84, 5.16$

$$\frac{x^2-7x+12}{2x-10}=8$$

$$x^2-7x+12=16x-80$$

$$x^2-23x+92=0$$

REF: 081539a2

11 ANS:

$$\log_{16}\left(\frac{p^2-p+4}{2p+11}\right)=\frac{3}{4}$$

$$\frac{p^2-p+4}{2p+11}=16^{\frac{3}{4}}$$

$$\frac{p^2-p+4}{2p+11}=8$$

$$p^2-p+4=16p+88$$

$$p^2-17p-84=0$$

$$(p-21)(p+4)=0$$

$$p=21,-4$$

REF: 061639a2