Name:_____

Number of Zeros

State the number of zeros each quadratic has without graphing or solving

1. $y = (x-4)^2 - 3$

2. $y = -5(x+6)^2$

3. $y = -3(x+1)^2 - 1$

4. $y = 2x^2 + 6$

5. $y = 7(x+4)^2 + 3$

6. For what value(s) of k will the function $f(x) = 3x^2 - 4x + k$ have one x-intercept?

7. For what value(s) of k will the function $f(x) = kx^2 - 4x + k$ have no zeros?

can
skip

8. For what values of k will the function $f(x) = 3x^2 + 4x + k = 0$ have no zeros? one zero? two zeros?

9. The graph of the function $f(x) = x^2 - kx + k + 8$ touches the x-axis at one point. What are the possible values of k?

10. Is it possible for $n^2 + 25$ to equal $-8n$? Explain.

State the number of zeros each quadratic has without graphing or solving

11. $y = 4x^2 + 10x - 12$

12. $y = x^2 + 2x + 9$

13. $y = x^2 - 10x + 25$

Name:_____

Number of Zeros

State the number of zeros each quadratic has without graphing or solving

1. $y = (x-4)^2 - 3$

   opens up
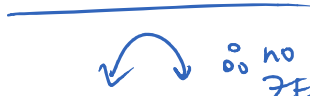   shift down
   ∴ 2 zeros

2. $y = -5(x+6)^2$

   no shift up/down
   ∴ one ZERO

3. $y = -3(x+1)^2 - 1$

   opens down
   shift down
   ∴ no ZEROS

4. $y = 2x^2 + 6$

   opens up
   shift up
   ∴ no ZEROS

5. $y = 7(x+4)^2 + 3$

   opens up
   shift up
   ∴ no ZEROS

6. For what value(s) of k will the function $f(x) = 3x^2 - 4x + k$ have one x-intercept?

   one x-int if discriminant = 0
   $b^2 - 4ac = 0$
   $(-4)^2 - 4(3)k = 0$
   $16 - 12k = 0$
   $16 = 12k$
   ∴ $\dfrac{4}{3} = k$

7. For what value(s) of k will the function $f(x) = kx^2 - 4x + k$ have no zeros?

   no zeros if discriminant < 0
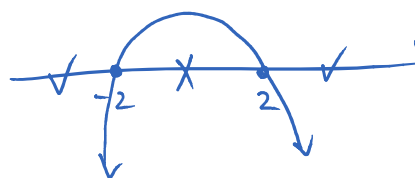 $b^2 - 4ac < 0$
   $(-4)^2 - 4(k)(k) < 0$
   $16 - 4k^2 < 0$
   $4(4 - k^2) < 0$
   $4(2+k)(2-k) < 0$

   ∴ for k less than -2
   OR k more than 2

8. For what values of k will the function $f(x) = 3x^2 + 4x + k = 0$ have no zeros? one zero? two zeros?

one zero
$$b^2 - 4ac = 0$$
$$4^2 - 4(3)k = 0$$
$$16 - 12k = 0$$
$$\boxed{\frac{4}{3} = k}$$

no zeros
$$b^2 - 4ac < 0$$
same steps →
$$\frac{4}{3} < k$$

two zeros
$$b^2 - 4ac > 0$$
$$\frac{4}{3} > k$$

9. The graph of the function $f(x) = x^2 - kx + k + 8$ touches the x-axis at ⬭one point⬭ What are the possible values of k?

one solution if discrim = 0
$$b^2 - 4ac = 0$$
$$(-k)^2 - 4(1)(k+8) = 0$$
$$k^2 - 4k - 32 = 0$$
$$(k-8)(k+4) = 0$$
$$\therefore \boxed{k = 8 \text{ or } k = -4}$$

10. Is it possible for $n^2 + 25$ to equal $-8n$? Explain.

$$n^2 + 25 = -8n$$
$$n^2 + 8n + 25 = 0$$
$$b^2 - 4ac$$
$$= 8^2 - 4(1)(25)$$
$$= -36 \qquad \therefore \text{ no solutions} \quad \therefore \text{ impossible}$$

State the number of zeros each quadratic has without graphing or solving

11. $y = 4x^2 + 10x - 12$

$$b^2 - 4ac$$
$$= 10^2 - 4(4)(-12)$$
$$= 100 + 192$$
$$= 292 > 0$$
$$\therefore \text{ two ZEROS}$$

12. $y = x^2 + 2x + 9$

$$b^2 - 4ac$$
$$= 2^2 - 4(1)(9)$$
$$= 4 - 36$$
$$= -32 < 0$$
$$\therefore \text{ no ZEROS}$$

13. $y = x^2 - 10x + 25$

$$b^2 - 4ac$$
$$= (-10)^2 - 4(1)(25)$$
$$= 100 - 100$$
$$= 0$$
$$\therefore \text{ one ZERO}$$