Name: Key Date:

## Day 1: Quadratic Functions

I can find the roots of a quadratic function by factoring.

Do Now: Factor the following trinomials.

1) $x^2 + 14x + 48$

$(x+6)(x+8)$

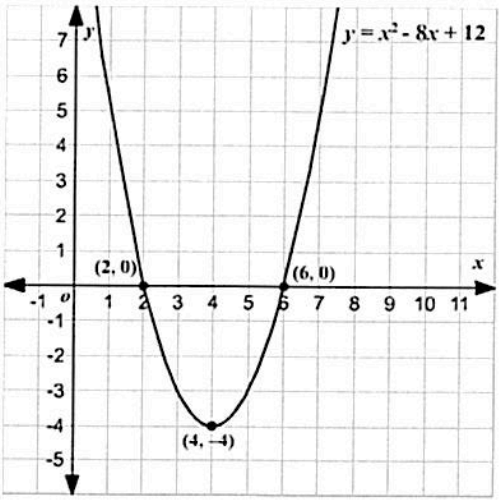
48
1 48
2 24
4 12
3 16
6 8

2) $x^2 - 8x + 7$

$(x-1)(x-8)$

7
1 7

Remember that a quadratic equation is an equation whose highest power of the variable is a 2, and every quadratic equation can be written in *standard form* as $ax^2 + bx + c = 0$, where $a$, $b$, and $c$ are numbers.




When solving a quadratic equation, we are trying to find the x-values where the function crosses over the x-axis. For example, in the graph shown below, the roots would be x=2 and x=6.

### Steps to solve a quadratic equation:

Step 1: Set the equation equal to zero. Make every effort to make the squared term positive in sign.

Step 2: Factor completely.

Step 3: Apply the zero product property and set each factor equal to zero.

(set factors equal to 0)

Step 4: Solve each resulting equation for the variable. You will get two equations. Note that it is possible to get two duplicate answers.

Step 5: Check your answers (if necessary) by substituting into the original equation and checking for a true sentence.

**Practice. Solve for the variable.**

1. $(y+5)(y+6)=0$

$y+5=0$ | $y+6=0$

$y=-5$ | $y=-6$

2. $(4y-1)(y+2)=0$

$4y-1=0$ | $y+2=0$

$y=\frac{1}{4}$ | $y=-2$

3. $m^2-100=0$

$(m-10)(m+10)=0$

$m-10=0$ | $m+10=6$

$m=10$ | $m=-10$

4. $x(x+7)=0$

$x=0$ | $x+7=0$

$x=-7$

5. $b^2-144=0$

$(b-12)(b+12)=0$

$b-12=0$ | $b+12=0$

$b=12$ | $b=-12$

6. $y^2-8y+12=0$

12: 1 12, 2 6, 3 4

$(y-6)(y-2)=0$

$y-6=0$ | $y-2=0$

$y=6$ | $y=2$

7. $x^2-5x+6=0$

6: 1 6, 2 3

$(x-6)(x+1)=0$

$x-6=0$ | $x+1=0$

$x=6$ | $x=-1$

8. $8t^2-32=0$

$8(t^2-4)=0$

$8(t-2)(t+2)=0$

~~$8=0$~~ reject; $t-2=0$ | $t+2=0$

$t=2$ | $t=-2$

9. $10x^2-10x=0$

$10x(x-1)=0$

$10x=0$; $x-1=0$

$x=0$ | $x=1$

10. $x^2+9x=36$ $x^2+9x-36=0$

36: 1 36, 2 18, 3 12

$(x+12)(x-3)=0$

$x+12=0$ | $x-3=0$

$x=-12$ | $x=3$

11. $x^2-3x=10$

$x^2-3x-10=0$

$(x+2)(x-5)=0$

$x+2=0$ | $x-5=0$

$x=-2$ | $x=5$

12. $x^2-3=-2x$

$+2x$ $+2x$

$x^2+2x-3=0$

$(x+3)(x-1)$

$x+3=0$ | $x-1=6$

$x=-3$ | $x=1$

13. $2x^2-50=0$

$2(x^2-25)=0$

$2(x+5)(x-5)=0$

~~$2=0$~~ | $x+5=0$ | $x-5=0$

$x=-5$ | $x=5$

14. $3x^2=12x$

$3x^2-12x=0$

$3x(x-4)=0$

$3x=0$ | $x-4=0$

$x=0$ | $x=4$

15. $x^2=8x+48$

48: 1 48, 2 24, 4 12

$x^2-8x-48=0$

$(x-12)(x+4)$

$x-12=0$ | $x+4=0$

$x=12$ | $x=-4$

16. $m^2 - 56 = m$

56
1 56
2 28
4 14
7 8

$m^2 - m - 56 = 0$

$(m-8)(m+7)=0$

| $m-8=0$ | $m+7=0$ |
|---|---|
| $m=8$ | $m=-7$ |

17. $15x^2 - 5x = 0$

$5(3x-1)=0$

| $5 \neq 0$ | $3x-1=0$ |
|---|---|
| | $x=\frac{1}{3}$ |

18. $6x^2 = 54x$

$6x^2 - 54x$

$6x(x-9)=0$

| $6x=0$ | $x-9=0$ |
|---|---|
| $x=0$ | $x=9$ |

19. $4t^2 - 36 = 0$

$4(t^2-9)=0$

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

| $4 \neq 0$ | $t-3=0$ | $t+3=0$ |
|---|---|---|
| | $t=3$ | $t=-3$ |

20. $z^2 - 12z = 13$

13
1 13

$z^2 - 12z - 13 = 0$

$(z-13)(z+1)=0$

| $z-13=0$ | $z+1=0$ |
|---|---|
| $z=13$ | $z=-1$ |

21. $x^2 - 5x = x - 8$

$-x+8 \quad -x+8$

$x^2 - 6x + 8 = 0$

8
1 8
2 4

$(x-2)(x-4)=0$

| $x-2=0$ | $x-4=0$ |
|---|---|
| $+2 \quad +2$ | $+4 \quad +4$ |
| $x=2$ | $x=4$ |

22. $5x^2 = x$

$5x^2 - x = 0$

$x(5x-1)=0$

| $x=0$ | $5x-1=0$ |
|---|---|
| | $x=\frac{1}{5}$ |

23. $x^2 = 10x - 25$

25
1 25
5 5

$x^2 - 10x + 25 = 0$

$(x-5)(x-5)=0$

| $x-5=0$ | $x-5=0$ |
|---|---|
| $x=5$ | $x=5$ |

24. $x^2 + 3x = -12 - 4x$

$x^2 + 3x + 4x + 12 = 0$

$x^2 + 7x + 12 = 0$

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

| $x+3=0$ | $x+4=0$ |
|---|---|
| $x=-3$ | $x=-4$ |

12
1 12
2 6
3 4

25. $6x^2 - 3x = 9x$

$-9x \quad -9x$

$6x^2 - 12x = 0$

$6x(x-2) = 0$

| $6x=0$ | $x-2=0$ |
|---|---|
| $x=0$ | $x=2$ |

26. $x(x+2) = 25 + 2x$

$x^2+2x-25-2x=0$

$x^2-25=0$

$(x+5)(x-5)$

| $x=-5$ | $x=5$ |
|---|---|

27. $\frac{x}{4} = \frac{16}{x}$

$x^2 = 64$

$x^2-64=0$

$(x+8)(x-8)=0$

| $x=-8$ | $x=8$ |
|---|---|

28. $\frac{x}{9} = \frac{4}{x}$

$x^2 = 36$

$x^2-36=0$

$(x+6)(x-6)=0$

| $x=-6$ | $x=6$ |
|---|---|

29. $\frac{4x}{25} = \frac{4}{x}$

$4x^2 = 100$

$4x^2-100=0$

$4(x^2-25)=0$

$4(x-5)(x+5)=0$

| $4 \neq 0$ | $x-5=0$ | $x+5=0$ |
|---|---|---|
| | $x=5$ | $x=-5$ |

30. $x(x+7) = 18$

$x^2+7x-18=0$

$(x+9)(x-2)=0$

| $x+9=0$ | $x-2=6$ |
|---|---|
| $x=-9$ | $x=2$ |

18
1 18
2 9
3 6

31. $\frac{t-1}{3} = \frac{4}{t}$

$t^2-t=12$

$t^2-t-12=0$

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

| $x=4$ | $x=-3$ |
|---|---|

12
1 12
2 6
3 4

32. $\frac{4x-7}{x-2} = \frac{x+2}{1}$ $(x+2)(x+2)$

$4x-7 = x^2+2x+2x+4$

$4x-7 = x^2+4x+4$

$-4x \quad -4x+7$

$x^2-11=0$

$\sqrt{x^2} = \sqrt{11}$

$x = \pm\sqrt{11}$

33. $\frac{1}{x} = \frac{x+1}{6}$

$6 = x^2+x$

$x^2+x-6=0$

$(x+3)(x-2)=0$

| $x+3=0$ | $x-2=6$ |
|---|---|
| $x=-3$ | $x=2$ |