

7.4 More Uses of Factors

HW: pg. 120 #23-26

Solving Quadratic Inequalities

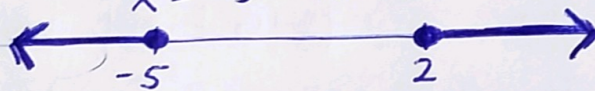
- ① Replace inequality with "=" and make sure its = 0.
- ② Factor and place solutions on number line.
- ③ Test points to determine where to shade.
- ④ WRITE THE ANSWER!

Ex #1 Solve $x^2 + 3x - 10 \geq 0$.

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

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

$$x = -5 \quad x = 2$$



$$x \leq -5 \text{ or } x \geq 2$$

~~Factor tree for $x^2 + 3x - 10$ showing factors 5 and -2, and 3 and -10.~~

Test $x = -6$: $36 - 18 - 10 \geq 0$
 $8 \geq 0$
 Yes!

Test $x = 0$: $0 + 0 - 10 \geq 0$
 $-10 \geq 0$
 No!

Test $x = 3$: $9 + 9 - 10 \geq 0$
 $8 \geq 0$
 Yes!

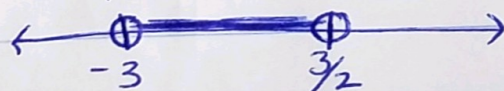
$$(-\infty, -5] \cup [2, \infty)$$

Ex #2 Solve $2x^2 + 3x - 9 < 0$.

$$2x^2 + 3x - 9 = 0$$

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

$$x = -3 \quad x = 3/2$$



$$-3 < x < 3/2$$

~~Factor tree for $2x^2 + 3x - 9$ showing factors 6 and 3, and -3 and 2.~~

Test $x = -5$: $50 - 15 - 9 < 0$
 $26 < 0$
 No!

Test $x = 0$: $-9 < 0$
 Yes!

Test $x = 2$: $8 + 6 - 9 < 0$
 $5 < 0$
 No!

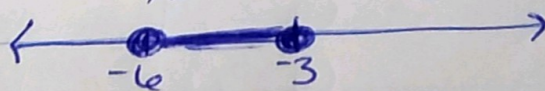
$$(-3, 3/2)$$

Ex #3 Solve $x^2 + 9x + 18 \leq 0$.

$$x^2 + 9x + 18 = 0$$

$$(x+6)(x+3) = 0$$

$$x = -6 \quad x = -3$$



$$-6 \leq x \leq -3$$

$$[-6, -3]$$

~~Factor tree for $x^2 + 9x + 18$ showing factors 6 and 3, and 3 and 6.~~

Test $x = -10$: $100 - 90 + 18 \leq 0$
 $18 \leq 0$
 No!

Test $x = -5$: $25 - 45 + 18 \leq 0$
 $-2 \leq 0$
 Yes!

Test $x = 0$: $18 \leq 0$
 No!

Ex #4 The function $p(s) = -500s^2 + 15,000s - 100,000$ models the yearly profit Fence Me In will make installing wooden fences when the installation price is s dollars per foot.

a) Write an inequality that can be used to determine s when the yearly profit is at least \$8,000.

$$\boxed{-500s^2 + 15,000s - 100,000 \geq 8000}$$

b) Write the inequality in standard form.

$$-500s^2 + 15,000s - 100,000 \geq 8000$$

$$\frac{-500s^2 + 15,000s - 108,000 \geq 0}{-500 \quad -500 \quad -500 \quad -500}$$

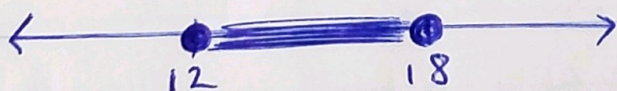
$$\boxed{s^2 - 30s + 216 \leq 0}$$

c) Solve & interpret the solutions.

$$s^2 - 30s + 216 = 0$$

$$(s-12)(s-18) = 0$$

$$s=12 \quad s=18$$



~~$$\begin{array}{cc} 216 & \\ -12 & -18 \\ & -30 \\ \text{test } s=0 & \\ 216 \leq 0 & \\ \text{NO!} & \end{array}$$~~

$$\begin{array}{l} s=15 \\ -5 \leq 0 \\ \text{YES!} \end{array}$$

$$\begin{array}{l} s=20 \\ 16 \leq 0 \\ \text{NO!} \end{array}$$

$$\boxed{12 \leq s \leq 18}$$

$$\boxed{[12, 18]}$$

When the price is equal to \$12 or \$18 or anything in between, the profit is at least \$8,000.