Mat•011•Agenda•Day•19•June•21,•2004

• Return Quiz
• Quadratic Equations, S239•PowerPoint•Lecture•30
• Graphing a Parabola•PowerPoint•Lecture•31
• Quiz on Factoring

Homework: Topic 32•p•313
\[ P = R - C \]
\[ P = (-.2x^2 + 65x) - (.8x^2 - 35x + 225) \]
\[ P = -.2x^2 + 65x - .8x^2 + 35x - 225 \]
\[ P = -1x^2 + 100x - 225 \]
Unit 4 Lecture 30

Solving Quadratic Equations

Two Methods
Solving Quadratic Equations

$$0 = ax^2 + bx + c$$
Objectives

- Solve a quadratic equation by factoring
- Solve a quadratic equation by using the quadratic formula
Solving Quadratic Equations

\[ 0 = ax^2 + bx + c \]

Find values of \( x \) that make the equation = 0

Sometimes called the **zeros** or **roots** of the equation

In graphing they are called the **x-intercepts**
Solving Quadratic Equations

• Factor the quadratic, if possible
• Remember that if \( A \times B = 0 \), then either \( A = 0 \) or \( B = 0 \), or both = 0
• Use the quadratic formula, if the factors are not obvious
Solve: $x^2 + 5x + 6 = 0$

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

$x+2 = 0$ or $x+3 = 0$

$x = -2$ or $x = -3$
\[2 \cdot 2 \cdot 2 \times x^2 - 2 \cdot 2 \cdot 2 \cdot 2 \cdot x^7 x^2 - 9 x \]

\[8 \cdot x^2 (x - 2) \]

\[7 \cdot x \cdot x - 3 \cdot 3 \cdot x \]

\[x (7x - 9) \]

Factors: \(x^2 - 16x + 15 = (x - 1)(x - 15)\)

Solve: \(x^2 - 16x + 15 = 0\)

\((x - 1)(x - 15) = 0\)

\(x - 1 = 0\) or \(x - 15 = 0\)

\(x = 1\) or \(x = 15\)
\[ 8x^2 - 16 = 0 \]
\[ 8x(x - 2) = 0 \]
\[ 8x = 0 \quad \text{or} \quad x - 2 = 0 \]
\[ x = 0 \quad \text{or} \quad x = 2 \]

\[ x = 0 \]
\[ x^2 - 36 = (x+6)(x-6) \]
\[ x^2 - 25 = (x+5)(x-5) \]
\[ x^2 - 25x = x(x-25) \]
\[ x^2 + 36 = (x+6)(x+6) = x^2 + 12x + 36 \]

= non-factorable over reals
$7x^2 - 9x = 0$

$7 \cdot \frac{x}{x} - 3.3 \cdot \frac{x}{x} = 0$

$x(7x - 9) = 0$

$x = 0$ or $7x - 9 = 0$

$x = 9$
Solve: \( x^2 + 5x + 6 = 0 \)

\[
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
\]

\[
= \frac{-5 \pm \sqrt{25 - 4(1)(6)}}{2(1)}
\]

\[
= \frac{-5 \pm \sqrt{25 - 24}}{2}
\]

\[
= \frac{-5 \pm \sqrt{1}}{2}
\]

\[
= \frac{-5 \pm 1}{2}
\]

\[
= \frac{-5 + 1}{2} = -2
\]

\[
= \frac{-5 - 1}{2} = -3
\]
0 = ax^2 + bx + c

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

b = -5
Solve: $x^2 + 5x + 6 = 0$

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

$x + 3 = 0 \text{ or } x + 2 = 0$

$x = -3 \text{ or } x = -2$
Solve: $x^2 - 12x + 35 = 0$

$(x - 7)(x - 5) = 0$

$x - 7 = 0$ or $x - 5 = 0$

$x = 7$ or $x = 5$

Title: 11/19/2001 9:02 PM (16 of 70)
Solve: \( x^2 - 12x + 35 = 0 \)

\((x - 7)(x - 5) = 0\)

\(x - 7 = 0 \text{ or } x - 5 = 0\)

\(x = 7 \text{ or } x = 5\)
Solve: $x^2 + 5x - 6 = 0$

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

$x + 6 = 0 \quad \text{or} \quad x - 1 = 0$

$x = -6 \quad x = 1$
Solve: \( x^2 + 5x - 6 = 0 \)

\[(x + 6)(x - 1) = 0\]

\( x + 6 = 0 \) \( \text{or} \) \( x - 1 = 0 \)

\( x = -6 \) \( \text{or} \) \( x = 1 \)
Solve: $x^2 - 5x - 6 = 0$
Solve: \( x^2 - 5x - 6 = 0 \)

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

\(x - 6 = 0 \) or \(x + 1 = 0\)

\(x = 6\) or \(x = -1\)
Solve: \( x^2 - 5x - 4 = 0 \)

\[
(x-4)(x+1) = 0
\]
Solve: \(x^2 - 5x - 4 = 0\)

\[a = 1\]
\[b = -5\]
\[c = -4\]

\[x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\]

\[= \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(-4)}}{2(1)}\]

\[= \frac{5 \pm \sqrt{25 + 16}}{2}\]

\[= \frac{5 \pm \sqrt{41}}{2}\]

\[= \frac{5 \pm 6.40}{2}\]

\[\frac{5 + 6.40}{2} = \frac{11.40}{2} = 5.7\]
\[\frac{5 - 6.40}{2} = \frac{-1.40}{2} = -0.7\]
Solve: $x^2 - 5x - 4 = 0$

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

**NO, NO, NO!**
Use the Quadratic Formula to solve:

\[ 0 = x^2 - 5x - 4 \]
Use the Quadratic Formula to solve:

\[0 = x^2 - 5x - 4\]

\[0 = ax^2 + bx + c\]

\[x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\]
Use the Quadratic Formula to solve:

\[ 0 = x^2 - 5x - 4 \]

\[ 0 = ax^2 + bx + c \]

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

\[ a = 1 \quad b = -5 \quad c = -4 \]

\[ x = \frac{5 \pm \sqrt{5^2 - 4(1)(-4)}}{2(1)} \]

\[ x = \frac{5 \pm \sqrt{25 + 16}}{2} \]
Use the Quadratic Formula to solve:

\[ 0 = x^2 - 5x - 4 \]

\[ 0 = ax^2 + bx + c \]

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

\[ x = \frac{5 \pm \sqrt{25 + 16}}{2} \]

\[ x = \frac{5 \pm \sqrt{41}}{2} \]
Use of the calculator to evaluate a square root.

To find the square root of a number, use 2nd key, then use $\sqrt{}$ key in row 6 column 1.

\[\sqrt{41}\]

is keyed in as 2nd, $\sqrt{}$, 41, ENTER
Use of the calculator to evaluate a square root.

To find the square root of a number, use the 2nd key, then use the √ key in row 6 column 1.

\[ \sqrt{41} \]

is keyed in as 2nd, \( \sqrt{} \), 41, ENTER

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Use the Quadratic Formula to solve:

0 = x^2 - 5x - 4

0 = ax^2 + bx + c

x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}

x = \frac{5 \pm \sqrt{25 + 16}}{2}

x = \frac{5 \pm \sqrt{41}}{2}

x = \frac{5 \pm 6.4}{2}
Use the Quadratic Formula to solve:

\[ 0 = x^2 - 5x - 4 \]

\[
X = \frac{5 \pm 6.4}{2} \\
X = \frac{5 \pm 6.4}{2} \\
X = \frac{5 + 6.4}{2} = \frac{11.4}{2} = 5.7 \\
X = \frac{5 - 6.4}{2} = \frac{-1.4}{2} = -0.7
\]
Use the Quadratic Formula to solve:

\[ 0 = x^2 - 5x - 4 \]

\[ x = \frac{5 \pm 6.4}{2} \]

\[ x = \frac{5 + 6.4}{2} = \frac{11.4}{2} = 5.7 \]

\[ x = \frac{5 - 6.4}{2} = \frac{-1.4}{2} = -0.7 \]

**Two solutions:** \( x = 5.7 \) and \( x = -0.7 \)
<table>
<thead>
<tr>
<th>Combine Like Terms:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$-8x^2 + 2x - 8 - 6x^2 + 10x + 2$</td>
</tr>
</tbody>
</table>
\[ \frac{5}{2} \left( \frac{5}{x} \right) \cdot \frac{2}{3} \left( \frac{2x - 4}{x^2 + 2x} \right) \]
Profit = Revenue - Cost

The **revenue** equation for a company is $R = -5x^2 + 17x$

The **cost** equation for a company is $C = 3x^2 - 27x + 40$

$$P = R - C$$

$$= (-5x^2 + 17x) - (3x^2 - 27x + 40)$$

$$= -5x^2 + 17x - 3x^2 + 27x - 40$$

$$P = -8x^2 + 44x - 40$$

$$O = -8x^2 + 44x - 40$$

$P = 0$
\[ O = -8x^2 + 44x - 40 \]

\[ a = -8 \]
\[ b = 44 \]
\[ c = -40 \]

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

\[ = \frac{-44 \pm \sqrt{1936 - 4(-8)(-40)}}{2(-8)} \]

\[ = \frac{-44 \pm \sqrt{1936 - 1280}}{-16} \]

\[ = \frac{-44 \pm \sqrt{656}}{-16} \]

\[ = \frac{-44 \pm 25.61}{-16} \]

\[ - \frac{44 + 25.61}{-16} = 4.35 \]

\[ - \frac{-44 - 25.61}{-16} = 1.14 \]
\[ x^2 + x - 12 = (x+4)(x-3) \]
\[ x^2 - x - 12 = (x+3)(x-4) \]

\[ \frac{\text{Solve } 2 (x - x - 12) = 0}{\text{Solve } x - x - 12 = 0} \]
\[ (x-4)(x+3) = 0 \]
\[ x-4 = 0 \quad \text{or} \quad x+3 = 0 \]
\[ x = 4 \quad \text{or} \quad x = -3 \]
\[6x^3 - 24x^2 = 6x(x^2 - 4x)\]

\[= 6x(x - 4)\]

\[= 6x^2 \cdot x - 6x^2 \cdot 4\]
You drop a rock from the top of the 1600 feet tall Rears Tower. The height (in feet) of the rock from the ground is given by the equation:
\[ h = -16t^2 + 1600 \]
h is in feet and t is in seconds. How long until the rock hits the ground?

\[ 0 = at^2 + bt + c \]
\[ 0 = -16t^2 + 1600 \]

\[ t = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]
\[ t = \frac{-0 \pm \sqrt{0 - 4(-16)(1600)}}{2(-16)} \]
\[ t = \frac{320 \pm \sqrt{102400}}{-32} \]
\[ t = \frac{+320}{-32} = -10 \]
\[ t = \frac{-320}{-32} = 10 \]
You drop a rock from the top of the 1600 feet tall Rears Tower. The height (in feet) of the rock from the ground is given by the equation:

\[ h = -16t^2 + 1600 \]

\( h \) is in feet and \( t \) is in seconds. How long until the rock hits the ground?

\[
\begin{align*}
0 &= -16t^2 + 1600 \\
0 &= -16(t^2 - 100) \\
0 &= -16(t - 10)(t + 10) \\
(t - 10) &= 0 \text{ or } (t + 10) = 0 \\
&= 10 \text{ or } \]

\( t = 10 \) or \( t = -10 \)
You drop a rock from the top of the 1600 feet tall Rears Tower. The height (in feet) of the rock from the ground is given by the equation:

\[ h = -16t^2 + 1600 \]

\( h \) is in feet and \( t \) is in seconds. How long until the rock hits the ground?

\[ h = -16t^2 + 1600 \]

\[ 0 = -16t^2 + 1600 \]

\[ 0 = -16(t^2 - 100) \]

\[ 0 = -16(t - 10)(t + 10) \]

\( t - 10 \) = 0 or \( t + 10 \) = 0

\[ t = 10 \text{ or } t = -10 \]

\( t = -10 \) is the only reasonable answer.
The equation for profit is,
Profit = Revenue - Cost

Revenue:
R = 280x - 0.4x^2

Cost:
C = 5000 + 0.6x^2

\[
P = (280x - 0.4x^2) - (5000 + 0.6x^2)
\]
\[
P = 280x - 0.4x^2 - 5000 - 0.6x^2
\]
\[
P = -1x^2 + 280x - 5000
\]
\[
549 = -1x^2 + 280x - 5000
\]
\[
0 = -1x^2 + 280x - 5549
\]
The equation for profit is,

\[ \text{Profit} = \text{Revenue} - \text{Cost} \]

\[ R = 280x - 0.4x^2 \quad \text{Cost:} \quad C = 5000 + 0.6x^2 \]

\[ P = (280x - 0.4x^2) - (5000 + 0.6x^2) \]

\[ P = 280x - 0.4x^2 - 5000 - 0.6x^2 \]

\[ P = -1x^2 + 280x - 5000 \]
How many items must be made and sold to generate a $439 profit.

\[ P = -1x^2 + 280x - 5000 \]
How many items must be made and sold to generate a $439 profit.

\[ P = -1x^2 + 280x - 5000 \]

\[ 439 = -1x^2 + 280x - 5000 \]

Subtract 439 from both sides

\[ 0 = -1x^2 + 280x - 5439 \]
Use the Quadratic Formula to solve:

\[ 0 = -1x^2 + 280x - 5439 \]

\[ 0 = ax^2 + bx + c \]

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

\[ a = -1 \quad b = 280 \quad c = -5439 \]

\[ x = \frac{-280 \pm \sqrt{280^2 - 4(-1)(-5439)}}{2(-1)} \]

\[ x = \frac{-280 \pm \sqrt{78400 - 21756}}{-2} \]
Use the Quadratic Formula to solve:

\[ 0 = -1x^2 + 280x - 5439 \]

\[ 0 = ax^2 + bx + c \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

\[ x = \frac{-280 \pm \sqrt{280^2 - 4(-1)(-5439)}}{2(-1)} \]

\[ x = \frac{-280 \pm \sqrt{78400 - 21756}}{-2} \]

\[ x = \frac{-280 \pm \sqrt{56644}}{-2} \]
Use of the calculator to evaluate a square root.

To find the square root of a number, use \( \sqrt{\text{key in row 6 column 1}} \).

\[ \sqrt{56644} \]

is keyed in as

2nd, \( \sqrt{\text{, 56644,}} \), ENTER
Use the Quadratic Formula to solve:

\[ 0 = -1x^2 + 280x - 5439 \]

\[ 0 = ax^2 + bx + c \]

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

\[ x = \frac{-280 \pm \sqrt{280^2 - 4(-1)(-5439)}}{2(-1)} \]

\[ x = \frac{-280 \pm \sqrt{78400 - 21756}}{-2} \]

\[ x = \frac{-280 \pm \sqrt{56644}}{-2} \]

\[ x = \frac{-280 \pm 238}{-2} \]
Use the Quadratic Formula to solve:

\[ 0 = -1x^2 + 280x - 5439 \]

\[
\begin{align*}
  x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\
  &= \frac{-280 \pm \sqrt{280^2 - 4(-1)(-5439)}}{-2} \\
  &= \frac{-280 \pm \sqrt{78400 - 21756}}{-2} \\
  &= \frac{-280 \pm \sqrt{56644}}{-2} \\
  &= \frac{-280 \pm 238}{-2} \]
\]

\[
\begin{align*}
  x &= \frac{-280 + 238}{-2} \\
  &= \frac{-42}{-2} \\
  &= 21 \\

  x &= \frac{-280 - 238}{-2} \\
  &= \frac{-518}{-2} \\
  &= 259
\end{align*}
\]
Use the Quadratic Formula to solve:

$$0 = -1x^2 + 280x - 5439$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-280 \pm 238}{-2}$$

$$x = \frac{-280 + 238}{-2} = \frac{-42}{-2} = 21$$

$$x = \frac{-280 - 238}{-2} = \frac{-518}{-2} = 259$$

Two solutions to make $P = \$439$:

$x = 21$ and $x = 259$ items
Graph \( y = ax^2 + bx + c \).

Graph of a quadratic in the form \( y = ax^2 + bx + c \) is a parabola.

Graph of \( y = 1x^2 - 6x + 8 \) is a parabola which opens **upward** because \( a \) is positive coefficient.

Graph of \( y = -1x^2 + 2x + 8 \) is a parabola which opens **downward** because \( a \) is negative coefficient.
Graph $y = ax^2 + bx + c$.

Graph of $y = 1x^2 - 6x + 8$ is a parabola which opens **upward** because $a$ is positive coefficient.
Think of a happy face!

Graph of $y = -1x^2 + 2x + 8$ is a parabola which opens **downward** because $a$ is negative coefficient.
Think of an unhappy face!
Enclose a rectangle with a 40 inch string and use a wall of the room for one side of the rectangle. Make a table and find the formula for the area of the rectangle.

<table>
<thead>
<tr>
<th>Width</th>
<th>Length</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Lecture 31
Enclose a rectangle with a 40 inch string and use a wall of the room for one side of the rectangle. Make a table and find the formula for the area of the rectangle.

<table>
<thead>
<tr>
<th>Width</th>
<th>Length</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>40-2(5)=30</td>
<td>5(30)=150</td>
</tr>
<tr>
<td>10</td>
<td>40-2(10)=20</td>
<td>10(20)=200</td>
</tr>
<tr>
<td>15</td>
<td>40-2(15)=10</td>
<td>15(10)=150</td>
</tr>
<tr>
<td>X</td>
<td>40-2(X)</td>
<td>X(40-2X)=40X-2X²</td>
</tr>
</tbody>
</table>
Enclose a rectangle with a 40 inch string and use a wall of the room for one side of the rectangle. Find the dimensions of the rectangle if the area is 65 square inches.

\[ A = 40X - 2X^2 \]
\[ 65 = -2x^2 + 40x \]
Enclose a rectangle with a 40 inch string and use a wall of the room for one side of the rectangle. Find the dimensions of the rectangle if the area is 65 square inches.

\[ A = 40x - 2x^2 \]

\[ 65 = -2x^2 + 40x \]

\[ 0 = -2x^2 + 40x - 65 \]

Subtract 65 from both sides.
Use the Quadratic Formula to solve:

\[ 0 = -2x^2 + 40x - 65 \]
Use the Quadratic Formula to solve:

\[ 0 = -2x^2 + 40x - 65 \]

The Quadratic Formula is:

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

In this case:

- \( a = -2 \)
- \( b = 40 \)
- \( c = -65 \)

Substituting the values:

\[ x = \frac{-40 \pm \sqrt{40^2 - 4(-2)(-65)}}{2(-2)} \]

\[ x = \frac{-40 \pm \sqrt{1600 - 520}}{-4} \]

\[ x = \frac{-40 \pm \sqrt{1080}}{-4} \]

\[ x = \frac{-40 \pm 30}{-4} \]

So the solutions are:

\[ x_1 = \frac{-40 + 30}{-4} = \frac{-10}{-4} = \frac{5}{2} \]

\[ x_2 = \frac{-40 - 30}{-4} = \frac{-70}{-4} = \frac{35}{2} \]

Therefore, the solutions are \( x_1 = \frac{5}{2} \) and \( x_2 = \frac{35}{2} \).
Use the Quadratic Formula to solve:

\[ 0 = -2x^2 + 40x - 65 \]

\[
x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}
\]

\[
x = \frac{-280 \pm 238}{-2}
\]

\[
x = \frac{-40 \pm 32.86}{-4}
\]

Two solutions to make \( A = 65 \) sq in:

\[ x = 1.8 \text{ and } x = 18.2 \text{ inches} \]
A 10 cm stick is broken into two pieces. One is placed at a right angle to form an upside down “T” shape. By attaching wires from the ends of the base to the end of the upright piece, a framework for a sail will be formed.

<table>
<thead>
<tr>
<th>Base</th>
<th>Height</th>
<th>Area (A=.5bh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A 10 cm stick is broken into two pieces. One is placed at a right angle to form an upside down “T” shape. By attaching wires from the ends of the base to the end of the upright piece, a framework for a sail will be formed.

<table>
<thead>
<tr>
<th>Base</th>
<th>Height</th>
<th>Area (A=.5bh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10-0=10</td>
<td>(.5)(0)(10)=0 sq cm</td>
</tr>
<tr>
<td>2</td>
<td>10-2=8</td>
<td>(.5)(2)(8)= 8 sq cm</td>
</tr>
<tr>
<td>4</td>
<td>10-4=6</td>
<td>(.5)(4)(6)=12 sq cm</td>
</tr>
<tr>
<td>6</td>
<td>10-6=4</td>
<td>(.5)(6)(4)=12 sq cm</td>
</tr>
<tr>
<td>8</td>
<td>10-8=2</td>
<td>(.5)(8)(2)=8 sq cm</td>
</tr>
<tr>
<td>10</td>
<td>10-10=0</td>
<td>(.5)(10)(0)=0 sq cm</td>
</tr>
<tr>
<td>b</td>
<td>10-b</td>
<td>(.5)(b)(10-b)= 5b-.5b^2</td>
</tr>
</tbody>
</table>
What should the base of the sail be if the area must be 10 sq cm?

\[ A = 5b - 0.5b^2 \]

\[ 10 = 5b - 0.5b^2 \]
What should the base of the sail be if the area must be 10 sq cm?

\[ A = 5b - 0.5b^2 \]

\[ 10 = 5b - 0.5b^2 \] Subtract 10 from both sides

\[ 0 = -0.5b^2 + 5b - 10 \]
Use the Quadratic Formula to solve:

\[ 0 = -0.5b^2 + 5b - 10 \]

\[ 0 = ax^2 + bx + c \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

\[ a = -0.5 \quad b = 5 \quad c = -10 \]

\[ x = \frac{-5 \pm \sqrt{5^2 - 4(-0.5)(-10)}}{2(-0.5)} \]

\[ x = \frac{-5 \pm \sqrt{25 - 20}}{-1} \]
Use the Quadratic Formula to solve:

$$0 = -.5x^2 + 5x - 10$$

$$x = \frac{-5 \pm 2.24}{-1}$$

$$x = \frac{-5 + 2.24}{-1} = \frac{-2.76}{-1} = 2.8$$

$$x = \frac{-5 - 2.24}{-1} = \frac{-7.24}{-1} = 7.2$$

Two solutions to make $A = 10$ sq in:

$x = 2.8$ and $x = 7.2$ inches