Mat 011 • Agenda

- Square Roots
- Quadratic Equations, S239 • PowerPoint Lecture 30
- Quiz

Homework: Topic 29, 30, 31 • p. 293
Factor: $x^2 - 4x - 12$

$(x + 2)(x - 6)$

$1, 12$
$2, 6$
$3, 4$

$(+)(-) = -$
$(-)(+) = -$

$x^2 - 6x + 2x - 12$
$x^2 - 4x - 12$
\[ x^2 - 7x + 10 \]

\[ (x - 5)(x - 2) \]

\[ x^2 - 2x - 5x + 10 \]

\[ x^2 - 7x + 10 \]

\[ (+)(+)=+ \]

\[ (-)(-)=+ \]
### Factor:

<table>
<thead>
<tr>
<th>Expression</th>
<th>Factored Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>$6x^2 + 9$</td>
<td>$3(2x + 3)$</td>
</tr>
<tr>
<td>$14x - 7$</td>
<td>$7(2x - 1)$</td>
</tr>
<tr>
<td>$-10x + 50$</td>
<td>$-10(x - 5)$</td>
</tr>
<tr>
<td>$8x^2 - 6x$</td>
<td>$2x(4x - 3)$</td>
</tr>
</tbody>
</table>

**Linear**

$4(4x^2 - 3x)$
$8x^2 - 6x$

$2 \cdot 2 \cdot 2 \boxtimes x \times -2 \cdot 3 \cdot x$

$2x(4x - 3)$
\[-10x + 50\]

\[-2.5x + 2.5 \cdot 5 = 10(-x + 5)\]

\[-10x + 50\]

\[-2 \cdot 5 \cdot (x - 5)\]

\[-10 \cdot (x - 5)\]

\[
\frac{24}{18} = \frac{12}{9} = \frac{4}{3}\]

\[4.6\]

\[2.2\, 2.3\]
\[ 5 \left( -2x + 10 \right) = -10x + 50 \]
14x - 7
2(7x - 7),
7(2x - 1)
\[ y = 6x + 9 \]
<table>
<thead>
<tr>
<th>Factor:</th>
<th>5x(3x² - x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>27x² - 18x</td>
<td>9x(3x - 2)</td>
</tr>
<tr>
<td>15x³ - 5x²</td>
<td>5x²(3x - 1)</td>
</tr>
<tr>
<td>x² + 7x + 6</td>
<td>(x + 6)(x + 1)</td>
</tr>
<tr>
<td>x² - 8x + 15</td>
<td>(x - 3)(x - 5)</td>
</tr>
</tbody>
</table>

Title: Jun 16 - 12:56 PM (10 of 87)
### Factor:

<table>
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<tr>
<th>Expression</th>
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</tr>
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<tbody>
<tr>
<td>$x^2 - 6x + 9$</td>
<td>$(x-3)(x-3)$</td>
</tr>
<tr>
<td>$x^2 - 3x - 18$</td>
<td>$(x+3)(x-6)$</td>
</tr>
<tr>
<td>$x^2 + 13x + 30$</td>
<td>$(x+2)(x+15)$</td>
</tr>
<tr>
<td>$x^2 - 15x + 50$</td>
<td>$(x-5)(x-10)$</td>
</tr>
</tbody>
</table>

Additional notes:
- $1, 18$
- $2, 9$
- $3, 6$
- $1, 50$
- $2, 25$
- $3, 10$
- $5, 6$
1
4
9
16
25

1²
2²
3²
4²

Perfect Square

gross

36
49
64
81
100
121
144
### Factor: Difference of Two Squares

<table>
<thead>
<tr>
<th>Expression</th>
<th>Factored Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x^2 - 100$</td>
<td>$(x + 10)(x - 10)$</td>
</tr>
<tr>
<td>$x^2 - 36$</td>
<td>$(x + 6)(x - 6)$</td>
</tr>
<tr>
<td>$x^2 - 81$</td>
<td>$(x + 9)(x - 9)$</td>
</tr>
</tbody>
</table>

$x^2 - 25x$  
$x(x - 25)$
Add y

\[ x^2 + 25 = (x - 5)(x - 5) \]

\[ x^2 - 10x + 25 \]

\[ (x + 5)(x + 5) = x^2 + 10x + 25 \]

\[ x(+5) \quad x(+5) \]
\( x^2 + 25 = (x + 5i)/(x - 5i) \)

Non-factorable complex over reals

\( \sqrt{-1} \)

Rational Numbers

Real Numbers

\( a + bi \)

\( i = \sqrt{-1} \)
\[ x^2 + 49 = \]
\[ x^2 - 49 = (x+7)(x-7) \]
\[ x^2 - 49 \cdot x = x(x-49) \]
\[ x^2 - 14x + 49 = (x-7)(x-7) \]
\[(x + 10)(x - 10)\]

\[x^2 - 100\]

\[x^2 - 100\]
### Factor:

<table>
<thead>
<tr>
<th>Expression</th>
<th>Factored Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>$x^2 - 5x + 6$</td>
<td>$(x - 3)(x - 2)$</td>
</tr>
<tr>
<td>$x^2 - 5x - 6$</td>
<td>$(x + 1)(x - 6)$</td>
</tr>
<tr>
<td>$x^2 - 5x$</td>
<td>$x(x - 5)$</td>
</tr>
<tr>
<td>$x^2 - 25$</td>
<td>$(x + 5)(x - 5)$</td>
</tr>
</tbody>
</table>
Perfect Squares:
Radicals
A number $b$ is a square root of a number $a$ if $b^2$ equals $a$.

$$b = \sqrt{a}$$

$$5 = \sqrt{25}$$

$$b^2 = a$$

$$5^2 = 25$$
A number $b$ is a square root of a number $a$ if $b^2$ equals $a$.

A number 5 is a square root of a number 25 because $5^2$ equals 25.
\begin{align*}
\sqrt{25} &= 5 \\
\sqrt{9} &= 3 \\
\sqrt{36} &= 6 \\
\sqrt{-36} &= 6i \\
\sqrt{-36} &= 6i \\
\sqrt{10} &= 3.162
\end{align*}

\begin{align*}
-\sqrt{36} &= -6 \\
\sqrt{-36} &= 6i \\
(\sqrt{25})^2 &= 25 \\
(\sqrt{25})^2 &= 25 \\
\sqrt{25} &= 5 \\
\sqrt{25} &= 5 \\
2x^2 &= 25 \\
2x^2 &= 25 \\
x - 25 &= 0 \\
x - 25 &= 0 \\
-\sqrt{25} &= -5 \quad (x+5)(x-5) = 0 \\
-\sqrt{25} &= -5 \quad (x+5)(x-5) = 0 \\
x + 5 &= 0 \text{ or } x - 5 = 0 \\
x + 5 &= 0 \text{ or } x - 5 = 0 \\
x &= -5 \quad x = 5
\end{align*}
\[ \sqrt{-36} = x \]
\[ \left( \begin{array}{c} 2 \\ 36 \\ 2 \\ +36 \end{array} \right) \]
\[ x^2 = -36 \]
\[ x + 36 = 0 \]
\[ \sqrt{25} = 5 \]
\[ 5^2 = 25 \]
Solving a quadratic equation:
Second-degree equation in one variable is called a quadratic equation (quadratic means of the second degree).
A **quadratic equation** in one variable is any equation that can be written in the form:

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

\[ x^2 - 5x - 6 = 0 \]

\[ 4x^2 + 9x - 13 = 0 \]

\[ a = 1 \]

\[ b = -5 \]

\[ c = -6 \]

\[ a = 4 \]

\[ b = 9 \]

\[ c = -13 \]
Factoring a quadratic expression: \( x^2 - 5x - 6 \)

Solving a Quadratic Equation: \( x^2 - 5x - 6 = 0 \)

\[
(x + 1)(x - 6) = 0 \quad (-1, 0) \quad (4, 0)
\]

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

-1 - 1

\[
x = -1
\]

\[
y = x^2 - 5x + 6
\]

\[
x = 6
\]
Unit 4 Lecture 30
Solving Quadratic Equations

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: \( x^2 + 5x + 6 = 0 \)
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: \( x^2 - 12x + 35 = 0 \)
Solve: \[ x^2 - 12x + 35 = 0 \]

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

\[ x - 7 = 0 \quad \text{or} \quad x - 5 = 0 \]

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

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

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

\[x = 6 \quad \text{or} \quad x = -1\]
Solve: \( x^2 - 5x - 4 = 0 \)
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 the $2^{nd}$ key, then use the $\sqrt{}$ key in row 6 column 1.

$\sqrt{41}$

is keyed in as $2^{nd}$, $\sqrt{}$, 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 \( \sqrt \) key in row 6 column 1.

\[
\sqrt{41}
\]

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

6.403
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:

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

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

\[x = \frac{5 - 6.4}{2} = \frac{-1.4}{2} = -0.7\]
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 \( x = -0.7 \)
Identify each of the following as a quadratic or linear equation by clicking on the term and dragging the arrow to the corresponding equation.

<table>
<thead>
<tr>
<th>Quadratic</th>
<th>Linear</th>
</tr>
</thead>
<tbody>
<tr>
<td>(-x^2 - 3x + 4 = 0)</td>
<td>(5x + 10 = 0)</td>
</tr>
<tr>
<td>(2x^2 - 5x - 3 = 0)</td>
<td>(x^2 - 9 = 0)</td>
</tr>
<tr>
<td></td>
<td>(3x - 6 = 0)</td>
</tr>
</tbody>
</table>
Combine Like Terms:

$$-8x^2 + 2x - 8 - 6x^2 + 10x + 2$$
\frac{5}{3} \left(2x^2 + 5\right) \div \left(8x^2 + 2x - 4\right)
Identify the Polynomials
How many terms do the following polynomials have?

\[ x^2 - 9 \quad x^2 + 6x + 9 \quad 3x^2 \]

\[ 5x \quad 4x - 9 \quad x^2 + xy + 3y^2 \]
Determine the Degree of the Polynomial

What are the degrees of the following polynomials?

\( x^2 - 9 \)  \( x^2 + 6x + 9 \)  \( 3x^2 \)

\( 5x \)  \( 4x^5 - 9 \)  \( x^2 + x^3y + 2y^3 \)
Profit = Revenue - Cost

The revenue equation for a company is \( R = -5x^2 + 17x \)

The cost equation for a company is \( C = 3x^2 - 27x + 40 \)
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?
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?

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

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

\[ t = 10 \] or \[ t = -10 \]

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

Revenue: \[ R = 280x - .4x^2 \]
Cost: \[ C = 5000 + .6x^2 \]
The equation for profit is,
\[ \text{Profit} = \text{Revenue} - \text{Cost} \]
Revenue: \[ R = 280x - .4x^2 \]
Cost: \[ C = 5000 + .6x^2 \]
\[ P = (280x - .4x^2) - (5000 + .6x^2) \]
\[ P = 280x - .4x^2 - 5000 - .6x^2 \]
\[ P = -1x^2 + 280x - 5000 \]
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:

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

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

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

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

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

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

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

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

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

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

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

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

$\sqrt{56644}$

is keyed in as

2nd, $\sqrt{}$, 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:

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

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

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

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

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

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

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

\[
= \frac{-280 + 238}{-2} = \frac{-42}{-2} = 21
\]

\[
= \frac{-280 - 238}{-2} = \frac{-518}{-2} = 259
\]

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

\[ x = 21 \text{ and } x = 259 \text{ items} \]
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>
</tbody>
</table>

![Diagram of a rectangle with a wall]
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)=</td>
</tr>
<tr>
<td></td>
<td></td>
<td>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:

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

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

\[ a = -2 \quad b = 40 \quad c = -65 \]

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

\[
X = \frac{-40 \pm \sqrt{1600 - 520}}{-4}
\]
Use the Quadratic Formula to solve:

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

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

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

\[ \frac{-40 + 32.86}{-4} = \frac{-7.14}{-4} = 1.8 \]

\[ \frac{-40 - 32.86}{-4} = \frac{-72.86}{-4} = 18.2 \]

**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>

Lecture 31
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-.5b²</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?

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

\[ 10 = 5b - .5b^2 \quad \text{Subtract 10 from both sides} \]

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

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

\[
x = \frac{-5 \pm 2.24}{-1}
\]

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

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

Two solutions to make \( A = 10 \) sq in:
\( x = 2.8 \) and \( x = 7.2 \) inches