4) How many tickets will be sold and what is the ticket price when the revenue is max?
Ticket price = $30 + $10 = $40
Tickets sold = 500 - 10(10) = 400

**FACTOR PERFECT SQUARE TRINOMIALS**

ex. \( p^2 + 10p + 25 \)  
\[ = (p + 5)(p + 5) \]
\[ = (p + 5)^2 \]

ex. \( p^2 - 8p + 16 \)  
\[ = (p - 4)(p - 4) \]
\[ = (p - 4)^2 \]

**FACTOR DIFFERENCE OF SQUARES**

ex. \( x^2 - 36 \)  
\[ = (x + 6)(x - 6) \]

ex. \( 81 - x^2 \)  
\[ = (9 - x)(9 + x) \]
When does something land?  zeros
Max/min vertex
Break-even price zeros (when revenue = 0)
Starting height of a projectile y-int.

WORD PROBLEMS
1) Path of a Projectile
2) Numbers
3) Revenue & Money
4) Measurements (Area & Perimeter)
5) Framing

NATURE OF ROOTS

<table>
<thead>
<tr>
<th>RELATION</th>
<th>ROOTS CALCULATED</th>
<th>QUANTITY</th>
<th>SKETCH OF GRAP</th>
<th>NUMBER OF ZEROS</th>
</tr>
</thead>
<tbody>
<tr>
<td>$y = x^2 + 2x - 9$</td>
<td>$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>$x = -2 \pm \sqrt{4+4(9)}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$x = -2 \pm 2\sqrt{10}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y = 2x^2 - 12x + 18$</td>
<td>$x = \frac{12 \pm \sqrt{144 - 44}}{4}$</td>
<td>0</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>$x = \frac{12 \pm 12}{4}$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$x = 3$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$y = 3x^2 + 4$</td>
<td>$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$</td>
<td>-</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>$x = \frac{0 \pm \sqrt{48}}{6}$</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The expression under the radical sign ($b^2-4ac$) is called the discriminant.

If $b^2-4ac > 0$, there are two real roots.

If $b^2-4ac = 0$, there are one real/two equal roots.

If $b^2-4ac < 0$, there are no real/2 imaginary roots.
8. **SINE LAW & COSINE LAW**

**SINE LAW:** \( \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \)

\[ \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \]

*Use it when you are given an angle side pair*

**COSINE LAW:** \( a^2 = b^2 + c^2 - 2bc \cos A \) (find side)

\[ \cos A = \frac{b^2 + c^2 - a^2}{2bc} \] (find angle)

*Use it when you are given two sides and the contained angle or three sides*

**SUMMARY**

**Sine Law**
- Find a side when given: angle side pair + another angle
- Find an angle when given: angle side pair + another side

**Cosine Law**
- Find a side when given: two sides + contained angle
- Find an angle when given: three sides

**Primary Trig. Ratios (SOH-CAH-TOA)** *must be a right triangle*
- Find a side when given: 90° angle + angle + side
- Find an angle when given: 90° angle + 2 sides