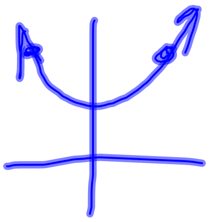
Word Problems Involving the Quadratic Formula

Recall:

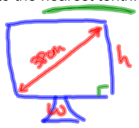
Solving a quadratic equation means finding the zeroes.
- factored form
- general quadratic formula

When you see minimize, maximize, optimal, etc., you are usually looking for the vertex.
- factored form (if possible)
- quadratic formula (if possible)
  - check using discriminant
- complete the square
- partial factoring (symmetry, matching point)



May 10-9:55 AM

Ex.1. The size of a television screen or computer monitor is usually stated as the length of the diagonal. A screen has a 38-cm diagonal. The width of the screen is 6 cm more than the height. Find the dimensions of the screen to the nearest tenth.



$w = h + 6$

$h^2 + w^2 = 38^2$

$h^2 + (h+6)^2 = 38^2$

$h^2 + (h^2 + 12h + 36) - 1444 = 0$

$2h^2 + 12h - 1408 = 0 \quad [\div 2]$

$\frac{2(h^2 + 6h - 704)}{2} = \frac{0}{2}$

$a = 1$
$b = 6$
$c = -704$

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

$= \frac{-6 \pm \sqrt{36 - 4(1)(-704)}}{2}$

$= \frac{-6 \pm \sqrt{36 + 2816}}{2}$

$= \frac{-6 \pm \sqrt{2852}}{2}$

$h = \frac{-6 + \sqrt{2852}}{2}$ or $h = \frac{-6 - \sqrt{2852}}{2}$

$h \doteq 23.7$ $\qquad h \doteq -29.7$ inad (inadmissible)

$w = h + 6$
$\doteq 29.7$

$\therefore$ the ....

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Ex.2. A sporting goods store sells 90 ski jackets in a season for \$200 each. Each \$10 decrease in price would result in five more jackets being sold.
(a) Find the number of jackets sold and the selling price to give maximum revenues.
(b) What is the lowest price that would produce revenues of at least \$15600? How many jackets would be sold at this price?

(a) $R=(90+5x)(200-10x)$

Let x represent the # of \$10 decreases

set $R=0$, $0=(90+5x)(200-10x)$

$90+5x=0$ or $200-10x=0$

$5x=-90$ $\quad -10x=-200$

$x=-18$ $\quad x=20$

$$x_v=\frac{-18+20}{2}=\frac{2}{2}$$

$x_v=1$

∴ # sold is $90+5(1)=95$

Price is $200-10(1)=\$190$

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$R=(90+5x)(200-10x)$

set $R=15600$, solve for x

$15600=(90+5x)(200-10x)$

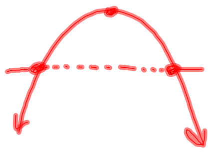
$15600=18000-900x+1000x-50x^2$

$50x^2-100x-2400=0$ $\quad [\div 50]$

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

$$x=\frac{2\pm\sqrt{4-4(1)(-48)}}{2}=\frac{2\pm\sqrt{4+192}}{2}=\frac{2\pm\sqrt{196}}{2}=\frac{2\pm 14}{2}$$

$x=8$ or $x=-6$



∴ for lowest price where $R=\$15600$ use $x=8$

Price $=200-10(8)$ $=\$120$

May 10-11:24 AM

Assigned Work:

p. 404 # 12, 14, 16, 18, 19

Nov 14 - 11:15 PM