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From the "Introduction to Quadratics" worksheet

3. Copy your data from your table above.

| Ticket Price ($) 0 | 2 | 4 | 6 | 8 | 10 | 12 | 14 |
|---|---|---|---|---|---|---|---|
| # of people out of 4000 who would be willing to pay this price 4000 | 3500 | 3000 | 2500 | 2000 | 1500 | 1000 | 500 |

4.a. What type of relationship is this? Linear

$m = \frac{-500}{2}$

b. Write an equation to model the situation: Let x = ticket price, y = # tickets sold

$y = mx + b$

$y = -250x + 4000$

5. d. Suppose $-250x + 4000$ tickets are sold @ "x" dollars per ticket. **What is the income?**
(Write your answer in factored form and in expanded form.)

Put your equation from problem 4b here.

$I = x(-250x + 4000)$ $I = -250x^2 + 4000x$

6. d. If income is $x(-250x + 4000)$. What is the profit? $P = x(-250x + 4000) - 7500$

Put your equation from problem 5d here.

(Write your answer in factored form and in expanded form.)

$P = -250x^2 + 4000x - 7500$

e. Use the Y= button on your calculator. Input the profit equation. Use tables to answer the following questions. Show a portion of the table to verify your answer.

i. For what ticket price or prices will the promoter break even?

ii. What ticket price will provide the maximum **profit?**

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Summarize the effect of **a** on the appearance of the graph compared to $y = x^2$ by completing the following statements.

a. If $|a| > 1$ then... (if $a > 1$ or $a < -1$) the parabola is narrower/steeper than $y = x^2$

b. If $|a| < 1$ then... (if a is between -1 and 1) the parabola is wider than $y = x^2$

c. If $a > 0$ then... opens upward ↑ has min.

d. If $a < 0$ then... opens downward ↓ has max.

Complete the following table. Leave the last two columns blank for now.

| Equation | Vertex ( x , y ) | X: $\frac{-b}{2a}$ unsimplified | simplified |
|---|---|---|---|
| $y = x^2 - 4x + 5$ | (2, 1) | $\frac{4}{2(1)}$ | 2 |
| | | | |

# 44 Quadratic Graphs

**Standard Form**

$y = 2x^2 - 8x + 6$

$y = ax^2 + bx + c$

**Axis of Symmetry**

$x = \frac{-b}{2a}$

$x = \frac{8}{2(2)} = \frac{8}{4}$

$x = 2$ dotted vertical line

**Vertex** (2, ?)

$y = 2(2)^2 - 8(2) + 6$

$y = 8 - 16 + 6$

$y = -8 + 6 = -2$

$(2, -2)$

**Miscellaneous**

y-intercept = c

$c = 6$

**Graph**

Graph the vertex and axis of symmetry.
Plot the y-intercept and its reflection.
Use the equation to find one other point and its reflection.

The x-coordinate of the vertex is: $\frac{-b}{2a}$ = =

$y = 2x^2 - 8x + 6$

$x = 1$

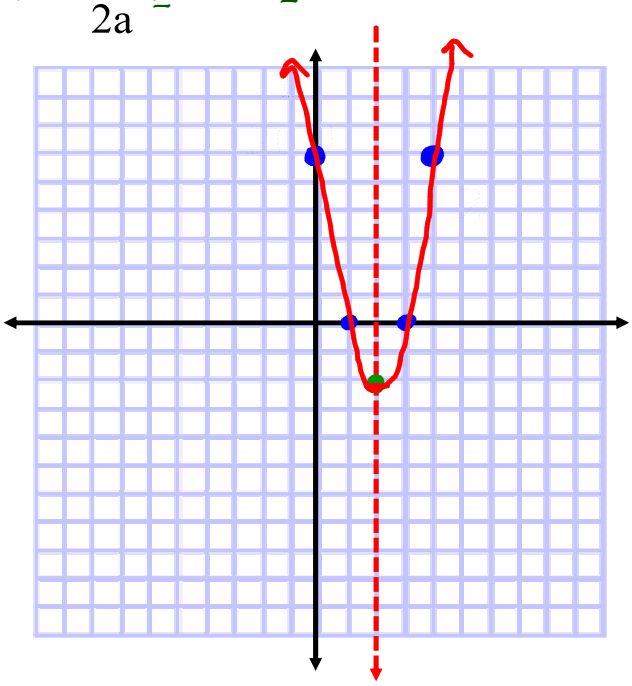
$(1, ?$

$y = 2(1)^2 - 8(1) + 6$

$= 2 - 8 + 6$

$= 0$

$(1, 0)$



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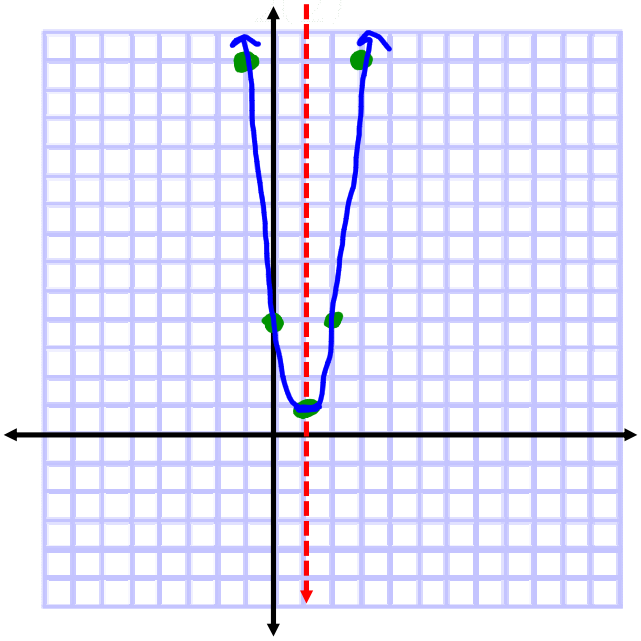
# 22 from the homework

Graph: $y = 3x^2 - 6x + 4$

The x-coordinate of the vertex is: $\frac{-b}{2a} = \frac{6}{2(3)} = \frac{6}{6} = 1$



$y = 3x^2 - 6x + 4$

$(1, ?)$

$y = 3(1)^2 - 6(1) + 4$

$= 3 - 6 + 4$

$= -3 + 4 = 1$

$(1, 1)$

$(-1, ?)$

$y = 3(-1)^2 - 6(-1) + 4$

$= 3 + 6 + 4 = 13$ $\quad (-1, 13)$

Plot the vertex and axis of symmetry. Plot the y-intercept and its reflection. Find one other point using the equation. Plot it and its reflection.

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**MINIMUMS OR MAXIMUMS** Tell whether the function has a *minimum value* or a *maximum value*. Then find the minimum or maximum value.

34. $y = 9x^2 + 7$


$x: -\frac{b}{2a}$

35. $f(x) = 2x^2 + 8x + 7$

55. **ONLINE MUSIC** An online music store sells about 4000 songs each day when it charges \$1 per song. For each \$.05 increase in price, about 80 fewer songs per day are sold. Use the verbal model and quadratic function to find how the store can maximize daily revenue.

| Revenue (dollars) | = | Price (dollars/song) | · | Sales (songs) |
|---|---|---|---|---|
| $R(x)$ | = | $(1 + 0.05x)$ | · | $(4000 - 80x)$ |

$y = (1+.05x)(4000-80x)$

56. **DIGITAL CAMERAS** An electronics store sells about 70 of a new model of digital camera per month at a price of \$320 each. For each \$20 decrease in price, about 5 more cameras per month are sold. Write a function that models the situation. Then tell how the store can maximize monthly revenue from sales of the camera.

$R(x) = (320-20x)(70+5x)$

#59 also uses this model