

1. Factor the following Quadratic Expressions:

A)  $x^2 + 7x + 10$       B)  $7x^2 - 14x + 7$       C)  $7x^2 + 15x + 2$       D)  $15x^2 + 4x - 3$       E)  $(6x^3 - 16x^2) + (21x - 56)$

$(x+2)(x+5)$        $7(x^2 - 2x + 1)$        $(7x+1)(x+2)$        $(5x+3)(3x-1)$        $2x^2(3x-8) + 7(3x-8)$

$7(x-1)(x-1)$        $7(x-1)^2$        $(2x^2+7)(3x-8)$

2. The height that the soccer ball traveled is described by the following quadratic function. The soccer ball traveled by the path:  $f(x) = -16x^2 + 40x + 2$ . (Calculator Allowed)

- a) How high did the ball reach? 27 feet
- b) At what time did the ball reach the maximum height? 1.25 sec.
- c) At what time does the ball hit the ground? 2.55 sec.
- d) What was the height of the ball after .5 seconds? 18 ft.
- e) How long is the soccer ball higher than 20 ft?  
0.58856217 → 1.9114378 ~ 1.3 sec.

3) Describe the transformation(s) from the parent function  $y = x^2$  for each of the following. Then state the Domain and Range.

<p>a) <math>y = -(x-2)^2 - 7</math></p> <p>Reflect over X-axis Right 2 Down 7</p> <p>D: <math>-\infty &lt; x &lt; \infty</math>    R: <math>y \leq -7</math></p>	<p>b) <math>y = 4(x+3)^2 + 4</math></p> <p>Narrower left 3 up 4</p> <p>D: <math>-\infty &lt; x &lt; \infty</math>    R: <math>y \geq 4</math></p>	<p>c) <math>y = \frac{1}{3}(x)^2</math></p> <p>Wider</p> <p>D: <math>-\infty &lt; x &lt; \infty</math>    R: <math>y \geq 0</math></p>
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4) Given the following transformations to the parent function,  $y = x^2$ , write the equation:

Vertical Stretch by a factor of 3, left 4, down 7.

$y = 3(x+4)^2 - 7$

5) Convert the following functions

a. Standard form to Vertex Form:  $y = 6x + 3x^2$

$y = 3(x+1)^2 - 3$

$y = 3x^2 + 6x + 0$        $3 - 6 + 0$

$\frac{-6}{3 \cdot 2} = -1$

vertex =  $(-1, -3)$

b. Vertex form to Standard Form:  $y = -2(x-4)^2 + 1$

$y = -2x^2 + 16x - 31$

$-2(x^2 - 8x + 16) + 1$

$-2x^2 + 16x - 32 + 1$

6) Find the following for the function:  $y = 3x^2 - 4x - 4$

a) Vertex

$3 \cdot \frac{4}{9} - 4 \cdot \frac{2}{3} - 4$

$\frac{12}{9} - \frac{24}{9} - \frac{36}{9} = \frac{-48}{9} = \frac{-16}{3}$

b) y-intercept

$(0, -4)$

c) Axis of symmetry

$\frac{2}{3}$

$\frac{-b}{2a} = \frac{4}{2 \cdot 3} = \frac{2}{3}$

7) Given the following function  $y = 4(x - 2)^2 + 3$

a) Transform up 5 units and left 6 units. What is the new equation?  $4(x - 2 + 6)^2 + 3 + 5$

b) Find the y-intercept.  $(0, 72)$

c) Find the vertex.  $(-4, 8)$

$$y = 4(x + 4)^2 + 8$$

$$4(4)^2 + 8 = 64 + 8$$

of the new equ.

8) Perform the following Polynomial Operations. Write your answer in Standard Form.

a)  $(x + 5)^2 - 8$   $x^2 + 10x + 25 - 8$   
 $x^2 + 10x + 17$

b)  $(5x + x^4) - (3x^4 + 4x)$   
 $5x + x^4 - 3x^4 - 4x$   
 $-2x^4 + x$

9) The following table give the average cost, to the nearest hundred, of a new 4-door sedan. (Calculator Allowed)

X = years since 1990

Year	Value
1991	\$12,800
1994	\$15,500
1997	\$19,200
2000	\$24,300
2003	\$30,100

a. Use this information to construct a quadratic regression to represent the model, rounding all constants to 3 decimal places.

$$y = 60.317x^2 + 602.222x + 12123.175$$

b. Using this regression model, estimate during which year the average cost of a new 4-door sedan reached 37,000.  $y = 37,000 \rightarrow$  Intersect

2005 before 2006

c. Using the regression model, find the value of a new 4-door sedan in 2016.

$$\$68,555.56$$

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