

# Review

Key

1. GC: The table gives the stopping distance for an automobile under certain road conditions. A) Find a quadratic model for the data. B) Estimate the stopping distance with a speed of 85 mi/h

Speed mi/hr	20	30	40	50	55
Stopping Distance	17	38	67	105	127

1  
A)  $y = .0424x^2 - .0708x + .889$   
B) 304.01

2. GC: A toy rocket is shot upward from ground level. The table shows the height of the rocket at different times. A) Find the quadratic model for the data. B) Use the model to estimate the height of the rocket after 1.5 seconds.

Time (seconds)	0	1	2	3	4
Height (feet)	0	256	480	672	832

2  
A)  $h = -16t^2 + 272t$   
B) 372

3. GC: Find a quadratic model for the set of values? (show equations, show matrices...show work).  $(-4, 8), (-1, 5), (1, 13)$

$8 = a(-4)^2 - 4b + c \rightarrow 8 = 16a - 4b + c$   
 $5 = (-1)^2 a - 1b + c \rightarrow 5 = 1a - b + c$   
 $13 = 1a + 1b + c \rightarrow 13 = a + b + c$

$$\begin{bmatrix} 16 & -4 & 1 \\ 1 & -1 & 1 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 8 \\ 5 \\ 13 \end{bmatrix}$$

3  
 $y = x^2 + 4x + 8$

4. GC: Find a quadratic model for the set of values? (show equations, show matrices...show work).  $ax^2 + bx + c = y$

x	-1	2	3
f(x)	12	3	4

$12 = a(-1)^2 + b(-1) + c \rightarrow 12 = a - b + c$   
 $3 = a(2)^2 + b(2) + c \rightarrow 3 = 4a + 2b + c$   
 $4 = a(3)^2 + b(3) + c \rightarrow 4 = 9a + 3b + c$

$$\begin{bmatrix} 1 & -1 & 1 \\ 4 & 2 & 1 \\ 9 & 3 & 1 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 12 \\ 3 \\ 4 \end{bmatrix}$$

4  
 ~~$y = -2x^2 + 12$~~   
 $y = x^2 - 4x + 7$

5. Write  $y = -2x^2 - 8$  in vertex form. Show work

6. Write  $y = 2x^2 + 6x + 10$  in vertex form. Show work.

$$x = \frac{-b}{2a} = \frac{-6}{2(2)} = \frac{-6}{4} = -\frac{3}{2}$$

$$y = 2\left(-\frac{3}{2}\right)^2 + 6\left(-\frac{3}{2}\right) + 10$$

$$y = 2\left(\frac{9}{4}\right) + 6\left(-\frac{3}{2}\right) + 10$$

$$y = \frac{9}{2} - 9 + 10 \quad y = \frac{9}{2} + 1 = \frac{11}{2}$$

5  
 $y = -2(x+2)^2 + 8$

6  
 $y = 2\left(x + \frac{3}{2}\right)^2 + \frac{11}{2}$

7. Write the equation of the parabola in vertex form with a vertex of  $(-3, -3)$  and point  $(-4, -1)$ . Show work

8. Write the equation of the parabola in vertex form with a vertex of  $(-2, 5)$  and point  $(-4, -15)$ . Show work

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

$y = a(x+2)^2 + 5$   
 $-15 = a(-4+2)^2 + 5$   
 $-15 = 4a + 5$   
 $-20 = 4a$   
 $-5 = a$   
 $y = -5(x+2)^2 + 5$

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

8  
 $y = -5(x+2)^2 + 5$

9. Suppose you are tossing an apple up to John on a third-story balcony. After  $t$  seconds, the height of the apple in feet is given by  $h = -16t^2 + 38.4t + 0.96$ . John catches the apple just as it reaches its highest point. How long does it take to reach him and at what height above the ground does John catch it? Show work.

9  
A) 1.2 sec  
B) 24 ft

where  $C$  is the total daily cost in dollars and  $n$  is the number of light fixtures produced. How many fixtures should be produced to yield a minimum cost? What is the minimum cost? Show work.

$$x = \frac{-b}{2a} = \frac{10}{2(\frac{1}{2})} = \frac{10}{1} = 20 \quad (20, 700)$$

11. Use the graph of  $y = (x-7)^2 + 2$ . If you translate the parabola to the left 3 units and up 4 units, what is the equation of the new parabola in **Standard form**?

$$\begin{aligned} y &= (x-4)^2 + 6 \\ &= x^2 - 8x + 16 + 6 \\ &= x^2 - 8x + 22 \end{aligned}$$

13. Graph. Label the vertex, y-intercept and axis of symmetry. Find the maximum or minimum.  $y = (x-2)^2 - 3$  Show work. Plot 3 or more distinct points.

$$\begin{aligned} y &= (1-2)^2 - 3 & y &= (-2)^2 - 3 \\ &= 1 - 3 & &= 4 - 3 \\ &= -2 & &= 1 \end{aligned}$$

12. Graph. Label the vertex, y-intercept and axis of symmetry. Find the maximum or minimum.  $y = -3x^2 - 6x + 5$ . Show work. Plot 3 or more distinct points.

$$(1, -4)$$

15. Factor completely  $8x^2 + 24x + 18$

16. Factor completely  $8x^2 - 6x - 27$

$$\begin{array}{r|l} \cancel{-216} & 4x \quad | \quad -9 \\ \cancel{-18} \quad \cancel{12} & 2x \quad | \quad 8x^2 \quad | \quad -18x \\ \cancel{-6} & 3 \quad | \quad 12x \quad | \quad -27 \end{array}$$

17. Factor completely  $9x^2 - 12x + 4$

18. Factor completely  $3x^2 - 3x - 168$

$$\begin{aligned} &3(x^2 - x - 56) \\ &3(x-8)(x+7) \end{aligned}$$

19. Factor completely  $2x^4 - 32$

$$\begin{aligned} &2(x^4 - 16) \\ &2(x^2 + 4)(x^2 - 4) \\ &2(x^2 + 4)(x+2)(x-2) \end{aligned}$$

20. Factor completely  $20x^2 - 11x - 3$

$$\begin{array}{r|l} \cancel{-60} & 4x \quad | \quad -3 \\ \cancel{-15} \quad \cancel{4} & 5x \quad | \quad 20x^2 \quad | \quad -15x \\ \cancel{-11} & 1 \quad | \quad 4x \quad | \quad -3 \end{array}$$

21. Factor completely  $5x^2 + 55x - 80$

22. Factor completely  $7x^2 + 343$

$$7(x^2 + 49)$$

A) 20 fixtures

B) \$700

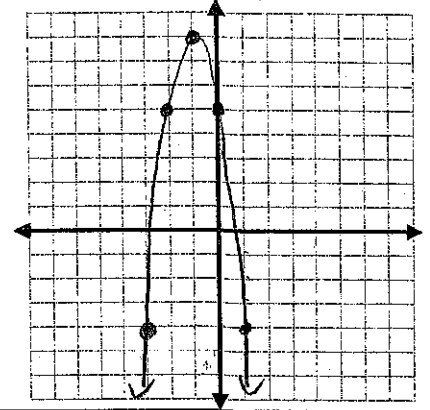
11  $y = x^2 - 8x + 22$

12 Vertex  $(-1, 8)$

y-intercept  $(0, 5)$

Axis of symmetry  $x = -1$

Circle: Max or Min 8

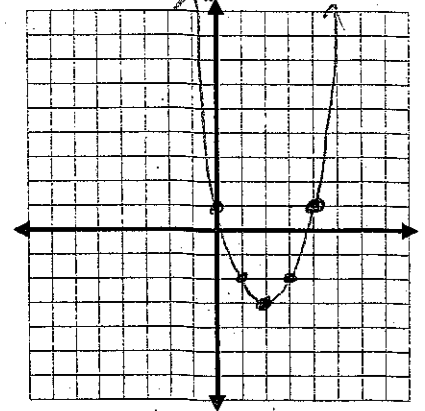


13 Vertex  $(2, -3)$

y-intercept  $(0, 1)$

Axis of symmetry  $x = 2$

Circle: Max or Min -3



14  $2(x-7)(x+7)$  15  $2(x+3)^2$

16  $(2x+3)(4x-9)$  17  $(3x-2)^2$

18  $3(x+7)(x-8)$  19  $2(x^2+4)(x-2)(x+2)$

20  $(5x+1)(4x-3)$  21  $5(x^2+11x-16)$

22  $7(x^2+49)$