Name _____ Date _____

CHAPTER 9

Test Study Guide

For use after the chapter "Quadratic Equations and Functions"

1. What is the vertex of the graph of the function $y = -\frac{2}{3}x^2 + 5$?

(x, y)

$a = -\frac{2}{3}$, $b = 0$, $c = 5$

$x = \frac{-b}{2a} = \frac{0}{-\frac{4}{3}} = 0$

$y = -\frac{2}{3}(0)^2 + 5 = 0 + 5 = 5$

(0, 5)

2. What is the axis of symmetry of the function $y = -x^2 + 6x - 8$?

$a = -1$, $b = 6$, $c = -8$

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

$x = \frac{-6}{-2}$

$x = 3$

3. What are the solutions to $107 - 5x^2 = -18$?

$-107 \quad -107$

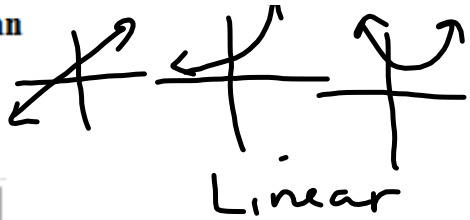
$-5x^2 = -125$

$\frac{-5x^2}{-5} = \frac{-125}{-5}$

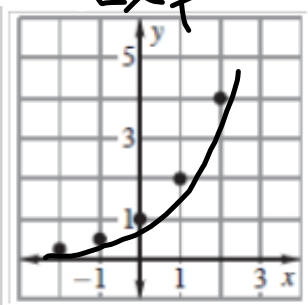
$\sqrt{x^2} = \sqrt{25}$

$x = \pm 5$

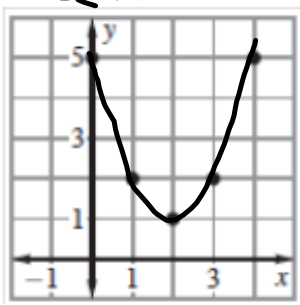
4. **Tell whether the graph represents a *linear function*, an *exponential function*, or a *quadratic function*.**



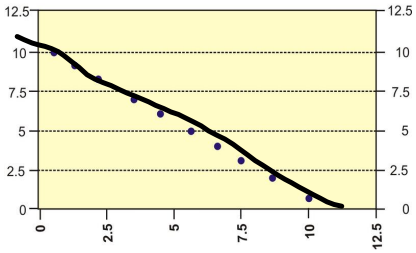
exp



Quad



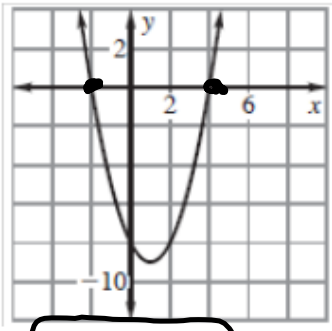
Linear



→ x int → roots → zeros

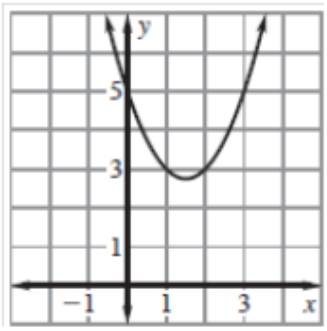
Estimate **the solutions using the graph.**

5.



x = −2
x = 4

6.



no solution

Graph using a table of values. Include at least 3 points in your table.

7. $y = -x^2 + 8x - 3$

x	y
4	13
0	-3
8	-3

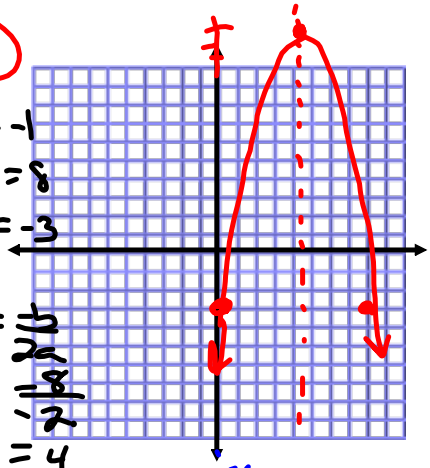
$a=-1$, $b=8$, $c=-3$

$x = \frac{-8}{2(-1)}$, $x = \frac{-8}{-2}$, $x = 4$

$y = -(4)^2 + 8(4) - 3$

$-16 + 32 - 3$

$16 - 3 = 13$



Axis of Symmetry: $x = 4$

Vertex: $(4, 13)$

Opens: down

Minimum or Maximum? 13

Y-Intercept: $(0, -3)$

Domain: $\mathbb{R}$

Range: $y \leq 13$

8. $y = 3(x-1)^2 - 4$

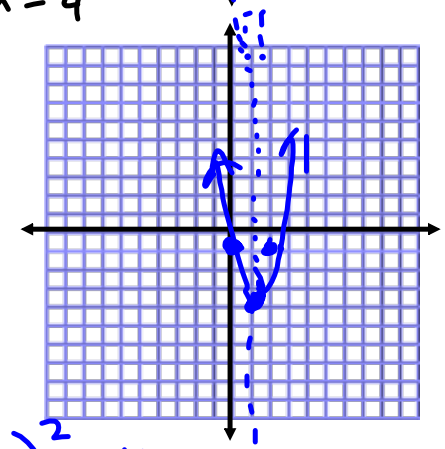
x	y
1	-4
0	-1
2	-1

$y = 3(0-1)^2 - 4$

$3 \cdot 1 - 4$

$3 - 4$

-1



Axis of Symmetry: $x = 1$

Vertex: $(1, -4)$

Opens: up

Minimum or Maximum? -4

Y-Intercept: $(0, -1)$

Domain: $\mathbb{R}$

Range: $y \geq -4$

Use the quadratic formula to solve the equation.
Round to the nearest hundredth if necessary.

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

9. $4p^2 - 8p - 1 = 0$

$a=4$
$b=-8$
$c=-1$

$p = \frac{8 \pm \sqrt{64-4 \cdot 4 \cdot -1}}{8}$ (64+16)

$P = \frac{8 \pm \sqrt{80}}{8}$

$\frac{8+\sqrt{80}}{8} = 2.12$

$\frac{8-\sqrt{80}}{8} = -.12$

10. $4d^2 + 12d + 9 = 0$

$a=4$
$b=12$
$c=9$

$d = \frac{-12 \pm \sqrt{144-4 \cdot 4 \cdot 9}}{8}$ (144-144)

$d = \frac{-12}{8} = -1.5$

11. $s^2 - 2s = 5$

$-5 \quad -5$

$s^2 - 2s - 5 = 0$

$a=1$
$b=-2$
$c=-5$

$s = \frac{2 \pm \sqrt{4-4 \cdot 1 \cdot -5}}{2}$ (4+20)

$s = \frac{2 \pm \sqrt{24}}{2}$

$\frac{2+\sqrt{24}}{2} = 3.45$

$\frac{2-\sqrt{24}}{2} = -1.45$

Without graphing the function, describe how the graph will compare/contrast with $f(x) = x^2$. (Hint* include information about shape, vertex, and the direction it opens)

12. $g(x) = \frac{1}{2}x^2 + 3$

fatter
up 3

13. $h(x) = -x^2 - 2$

open down
down 2

$|a| > 1$ skinnier
$0 < |a| < 1$ fatter
$a > 0$ up
$a < 0$ down
$c = +$ up $-$ down

Solve the quadratic using any method.

Options:
1. *Factoring*
2. *Square Roots*
3. *Quadratic Formula*

14. $2(x-6)^2 = 24$

$\frac{2(x-6)^2}{2} = \frac{24}{2}$

$\sqrt{(x-6)^2} = \sqrt{12}$

$x - 6 = \pm\sqrt{12}$

$+6 \quad +6$

$x = 6 \pm \sqrt{12}$

$6 + \sqrt{12} = 9.46$

$6 - \sqrt{12} = 2.54$

15. $4n^2 - 13 = -20$

$+13 \quad +13$

$\frac{4n^2}{4} = \frac{-7}{4}$ → $\sqrt{n^2} = \sqrt{\frac{-7}{4}}$

$n =$ no solution

$\pm\sqrt{\frac{16}{25}} = \pm\frac{4}{5}$

16. $2y^2 - 7y = 10$

$-10 \quad -10$

$2y^2 - 7y - 10 = 0$

$a = 2$

$b = -7$

$c = -10$

$y = \frac{7 \pm \sqrt{49 - 4 \cdot 2 \cdot -10}}{4}$ (49+80)

$y = \frac{7 \pm \sqrt{129}}{4}$

$\frac{7+\sqrt{129}}{4} = 4.59$

$\frac{7-\sqrt{129}}{4} = -1.09$

17. $9z^2 + 12z + 4 = 0$

$a = 9$

$b = 12$

$c = 4$

$z = \frac{-12 \pm \sqrt{144 - 4 \cdot 9 \cdot 4}}{18}$ (144-144 = 0)

$z = \frac{-12}{18} = \frac{-2}{3}$ or $-.67$

Convert to vertex form by completing the square. Then, name the vertex.

18. $y = x^2 - 18x + 4$

$y = x^2 - 18x + 81 + 4 - 81$

$y = (x - 9)^2 - 77$

$V = (9, -77)$

19. $y = -2x^2 + 20x - 8$

$-2x^2 + 20x + -50 - 8 - -50$

$-8 + 50$

$-2(x^2 - 10x + 25)$

$y = -2(x - 5)^2 + 42$

$V = (5, 42)$

AIR STYLE PROBLEMS

A) Determine all zeros for the function $f(x) = (x^2 + 2x - 8)(x - 6)$. $=0$

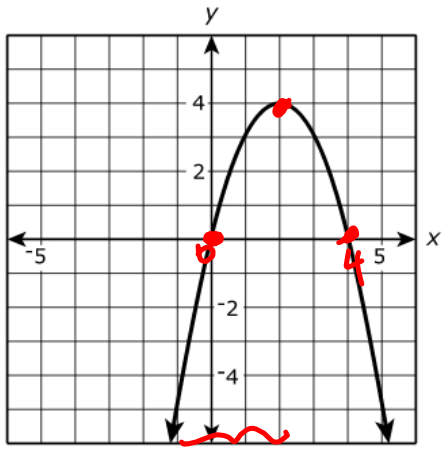
Drag and drop **all** zeros of the function into the box.

$(x+4)(x-2)(x-6)=0$

-48	-8	-6	-4	-2	0	2	4	6
8	48							

$x=-4, 2, 6$

B) The function $f(x) = 4x - x^2$ is graphed as shown.



Sol = $x=0, 4$

Vertex = $(2, 4)$

positive $0<x<4$

negative $x<0$ and $x>4$

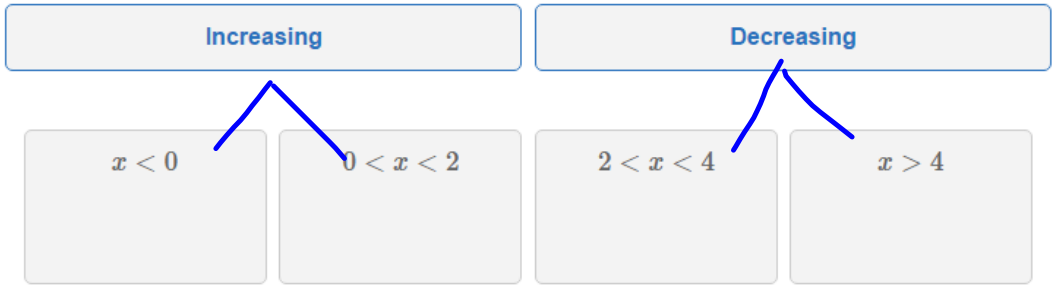
incr / $x<2$

decr \ $x>2$

See other side for questions. →

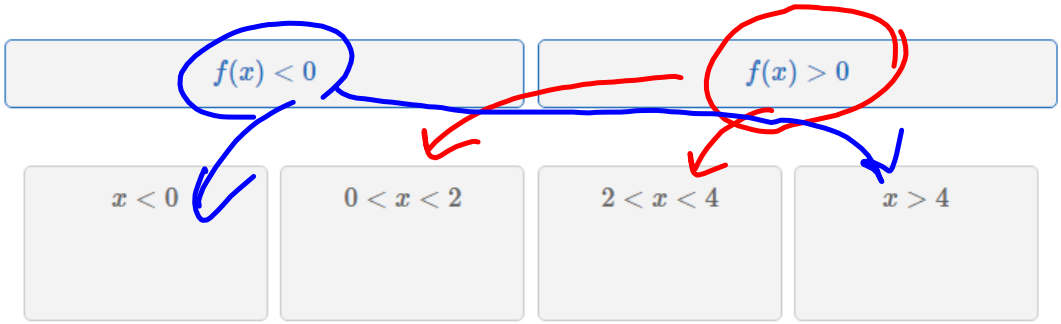
Part A

Drag the correct word to the box with each given interval to indicate whether the function is increasing or decreasing on that interval.



Part B

Drag the appropriate value, $f(x) < 0$ or $f(x) > 0$, to the box with each given interval.



C) A ball was thrown upward into the air. The height, in feet, of the ball above the ground t seconds after being thrown can be determined by the expression $-16t^2 + 40t + 3$. What is the meaning of the 3 in the expression?

A. The ball took 3 seconds to reach its maximum height.

B. The ball took 3 seconds to reach the ground.

C. The ball was thrown from a height of 3 feet.

D. The ball reached a maximum height of 3 feet.

$c = 3$

$h(t) = -16t^2 + vt + s$

$\therefore$ initial height