Algebra II
Midterm Study Guide part 2

Name: Key
Date: _____ HR: _____

1. For $f(x) = x^2 - 7x$ evaluate each of the following:

a. $f(-3) = 9 + 21$
$= 30$

b. $Solve: f(x) = 0$

$0 = x^2 - 7x$
$0 = x(x-7)$
$x = 0$ or $x = 7$

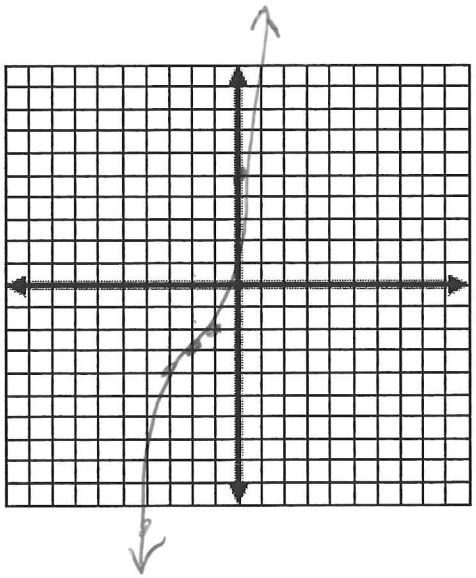
2. Ms. Millerl bought VW Tiguan for $10,000. The value of the car depreciates at a rate of 7% per year. Write an equation to model the amount of money the car is worth after x years.

$y = 10,000(1 - .07)^x$
- or -
$y = 10,000(.93)^x$

3. If $f(x) = (x+5)^2$, what are the solution(s) of $f(x)$? **HINT**: Set $f(x) = 0$ and solve for x

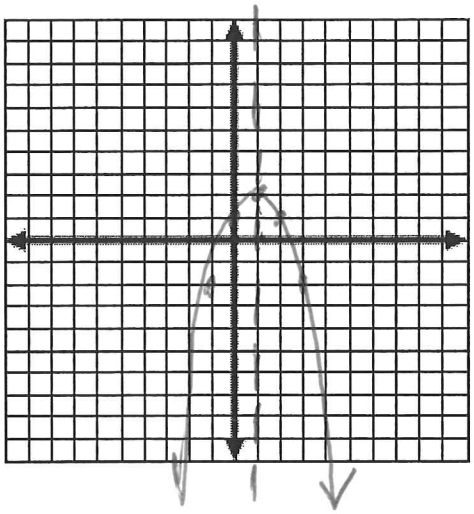
$0 = (x+5)^2$
$0 = x + 5$
$x = -5$

4. Accurately graph each of the following functions. Be sure to plot at least 5 points. **Include all important points and features.**



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

cubic
inf pt @ $(-2, -3)$

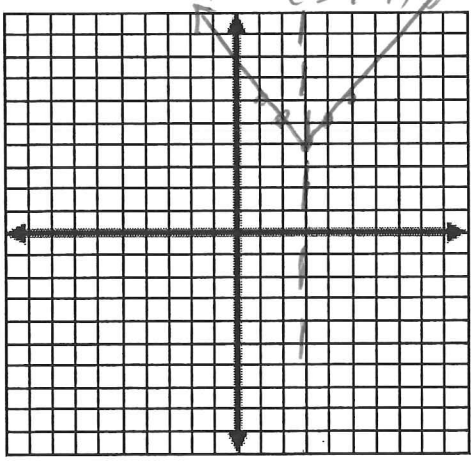


b. $y = -(x-1)^2 + 2$

parabolic graph
vertex @ $(1, 2)$
LOS $x = 1$

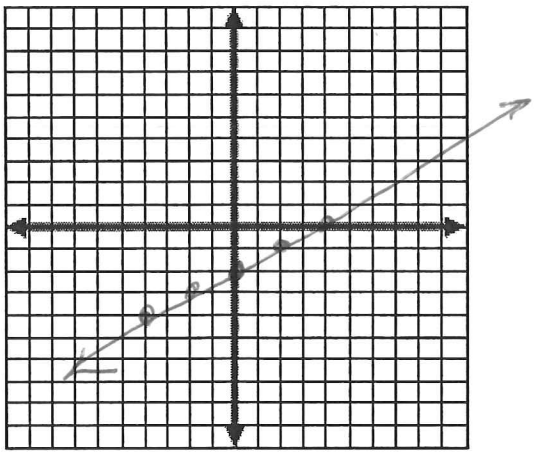
c. $y = |x-3| + 4$

abs. value
vertex @ $(3, 4)$

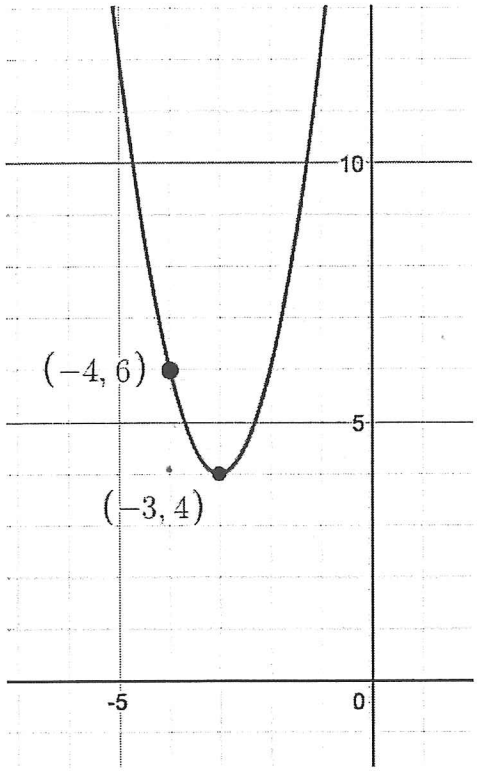


d. $y = 0.5x - 2$

Linear
$m = \frac{1}{2}$
$b = -2$



5. Use the parabola graphed at right to answer the following:



a. What is the vertex? $(-3, 4)$

b. Is there a stretch factor? If so what is it?

$a = 2$

c. Write the equation of the parabola in vertex form

$y = a(x-h)^2 + k$

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

d. Fully expand your equation from part c to write the equation in standard form: $y = ax^2 + bx + c$

$y = 2(x+3)(x+3) + 4$

$y = 2(x^2+6x+9) + 4$

$y = 2x^2 + 12x + 22$

6. Rewrite the following equations in vertex form by completing the square.

a. $y = x^2 + 6x - 3$

$y = (x+3)^2 - 12$

b. $y = x^2 - 14x + 30$

$y = (x-7)^2 - 19$

7. Find the quotient and simplify completely. State any excluded values for x.

$$\frac{5x-15}{3x^2+10x-8} \div \frac{x^2+x-12}{3x^2-8x+4}$$

1st) Factor everything
2nd) ÷ = multiplication (invert 2nd fraction)

$$\frac{5(x-3)}{(3x-2)(x+4)} \cdot \frac{(3x-2)(x-2)}{(x+4)(x-3)}$$

3rd) Simplify (makes 1's)

$$\boxed{\frac{5(x-2)}{(x+4)^2}}$$

8. Erik says $(a+b)^2 = a^2 + b^2$, but Henry thinks $(a+b)^2 = a^2 + ab + b^2$. Who is correct? Explain completely.

Neither!

$$(a+b)^2 = (a+b)(a+b)$$
$$= a^2 + ab + ab + b^2$$
$$= a^2 + 2ab + b^2$$

9. Simplify each of the following completely.

a. $\left(\frac{a^3}{b^{-2}}\right)^4$

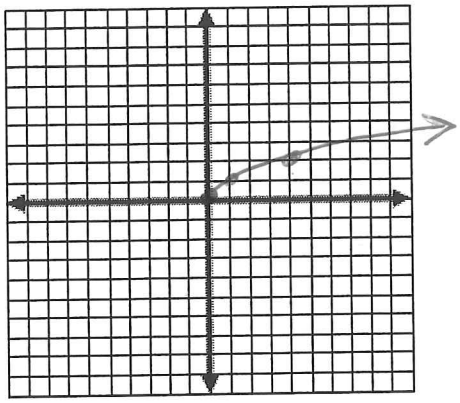
$$= \frac{a^{12}}{b^{-8}}$$
$$= a^{12}b^8$$

b. $(x^2y^3)^3$

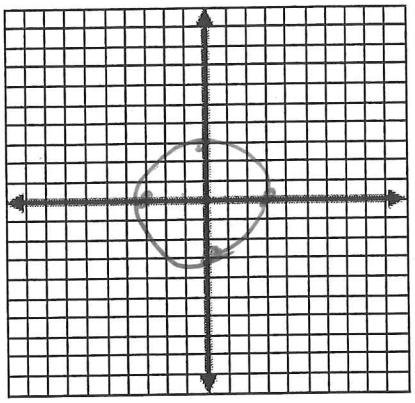
$$= x^6y^9$$

10.

Draw an example of a function below:



Draw an example of a non-function below:



What must be true for the graph of an equation to be considered a function?

for every 1 input there is 1 & only 1 output

11. Write the equation of a rational function that has been shifted 4 units left and 5 unit down.

$$y = a\left(\frac{1}{x-h}\right)+k$$

$$y = \frac{1}{x+4} - 5$$

12. Write the equation of an absolute value function that has been shifted 3 units left, 4 units up, and has been vertically compressed by a factor of $\frac{2}{3}$

$$y = a|x-h|+k$$

$$y = \frac{2}{3}|x+3|+4$$

13. Write the equation of a circle with center at (9, -2) and radius of 3.

$(x-h)^2+(y-k)^2=r^2$

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

14. Write the equation of a parabola that opens downward, been vertically stretched by a factor 6, and shifted 17 units down.

$y=a(x-h)^2+k$

$y=-6(x)^2+17$

15. Factor the following expressions **completely**. Do not solve for x.

a. x^2-25

$(x-5)(x+5)$

b. $16x^2-100$

$(4x-10)(4x+10)$

c. $10x-25$

$5(2x-5)$

16. Solve $4x^2+5x-6=0$. What is the sum of your solutions?

	x	2
$4x$	$4x^2$	$8x$
-3	$-3x$	-6

$(x+2)(4x-3)=0$

$x=-2,\ x=3/4$

Sum of Solns

$-2+3/4 \rightarrow -\frac{8}{4}+\frac{3}{4}=\boxed{-\frac{5}{4}}$