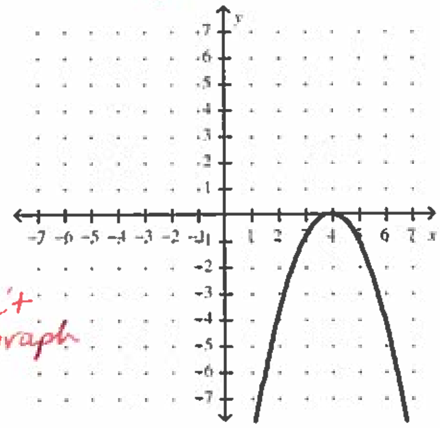
Algebra II Unit 6B Test Review - Quadratics *Name* Key *Date*

1. FOR: $y=-(x-4)^2$



Axis of symmetry is $x = 4$.

The vertex is $(4,0)$.

The roots are: $x = 4$

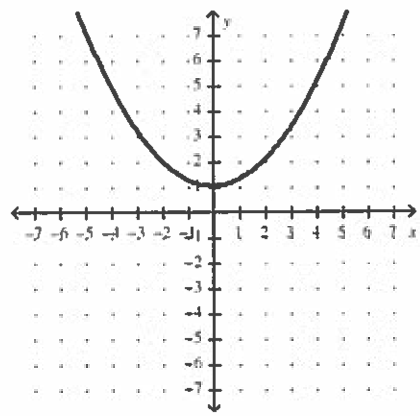
Domain: $(-\infty,\infty)$ Range: $(-\infty, 0]$

Increase: $(-\infty, 4)$ Decrease: $(4, \infty)$

y-intercept: $(0, -16)$ let $x=0$ when you can't see it on the graph

Nature of roots: 1 Real Rat'l Double Root

2. FOR: $y=\frac{1}{4}x^2+1$



Axis of symmetry is $x = 0$ (y-axis).

The vertex is $(0,1)$

The roots are: imaginary $x=\pm 2i$

Domain: $(-\infty,\infty)$ Range: $[1,\infty)$

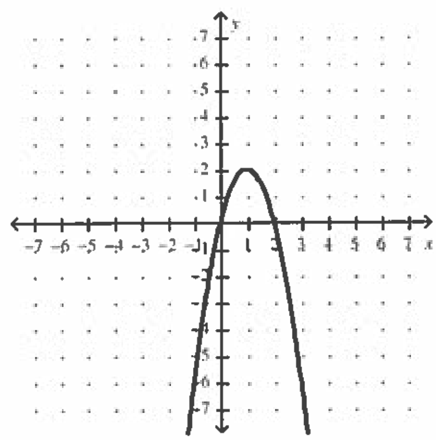
Increase: $(0,\infty)$ Decrease: $(-\infty,0)$

y-intercept: $(0,1)$

Nature of roots: 2 imaginary roots (conjugates)

$$0 = \frac{1}{4}x^2+1$$
$$-1 = \frac{1}{4}x^2$$
$$-4 = x^2$$
$$x = \pm\sqrt{-4}$$
$$x = \pm 2i$$

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



Axis of symmetry is $x = 1$.

The vertex is $(1,2)$.

The roots are: $x=0$ $x=2$

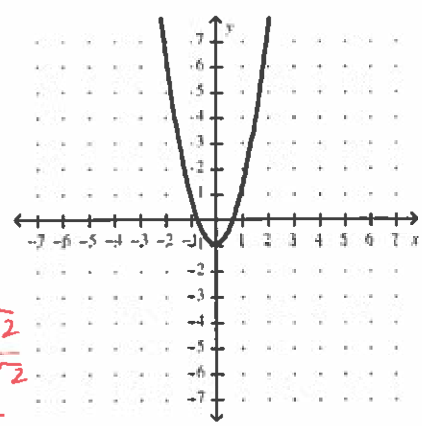
Domain: $(-\infty,\infty)$ Range: $(-\infty, 2]$

Increase: $(-\infty, 1)$ Decrease: $(1,\infty)$

y-intercept: $(0,0)$

Nature of roots: 2 Real Rat'l Roots

4. FOR: $y=2x^2-1$



Axis of symmetry is $x=0$ (y-axis).

The vertex is $(0,-1)$

The roots are: $x=\pm\frac{\sqrt{2}}{2}$

Domain: $(-\infty,\infty)$ Range: $[-1,\infty)$

Increase: $(0,\infty)$ Decrease: $(-\infty,0)$

y-intercept: $(0,-1)$

Nature of roots: 2 Real Irrational Roots

$$2x^2-1=0$$
$$2x^2=1$$
$$x^2=\frac{1}{2}$$
$$x=\pm\frac{\sqrt{1}}{\sqrt{2}}$$
$$x=\pm\frac{1}{\sqrt{2}}\cdot\frac{\sqrt{2}}{\sqrt{2}}$$
$$x=\pm\frac{\sqrt{2}}{2}$$

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Fill in all the following boxes below with the appropriate information.

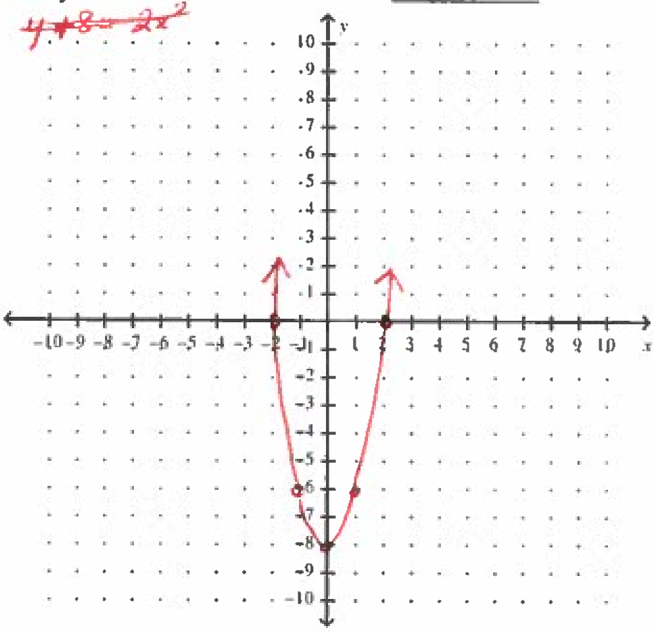
Quadratic Function	***Size*** (normal, narrow, wide)	***Horizontal*** (Right or Left, how many?)	***Vertical*** (Up or Down, how many?)	***Orientation*** (Opens up or down?)	***Vertex*** (Give as a Point)	***Axis Of Symmetry***
5) $y = x^2$	normal	0 (none)	none	up	(0, 0)	x = 0
6) $y = \frac{3}{5}(x-6)^2 - 1$	wide ($\frac{3}{5}$)	right 6	down 1	up	(6, -1)	x = 6
7) $y = 4(x+2)^2 + 8$	narrow (4)	left 2	up 8	up	(-2, 8)	x = -2
8) $y = x^2 + 7$	normal	0 (none)	up 7	up	(0, 7)	x = 0
9) $y = \frac{11}{3}(x-7)^2 + 3$	narrow ~~wide~~ $11/3 > 1$	right 7	up 3	up	(7, 3)	x = 7

(down would mean there's a negative in front)

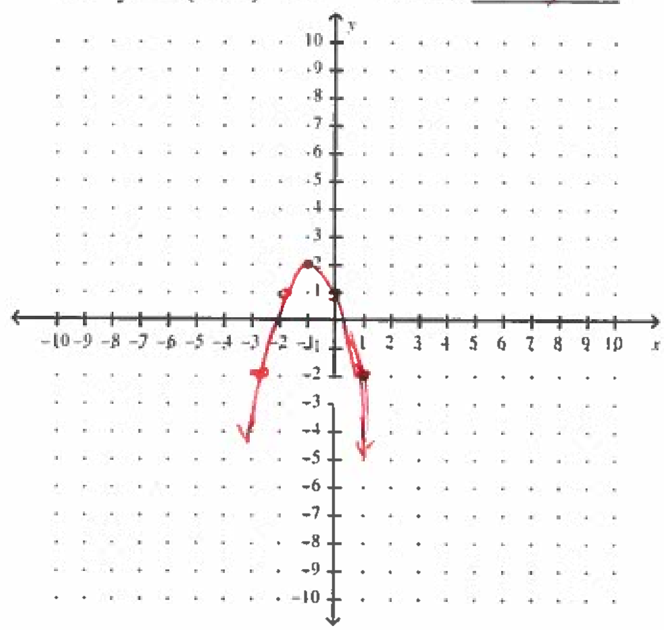
Graph and identify the vertex of the following parabolas.

10. $y = 2x^2 - 8$ Vertex: (0, −8)

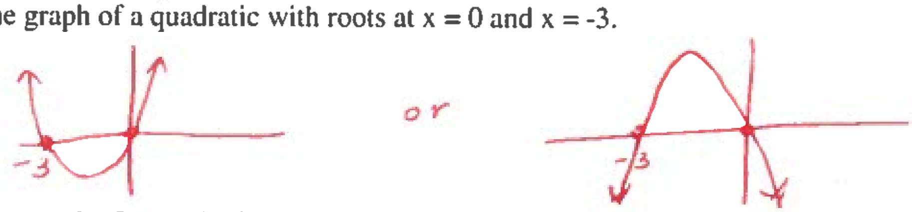
$\cancel{4+8=2x^2}$



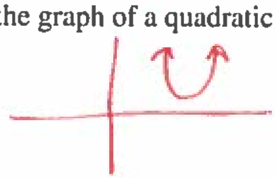
11. $y = -(x+1)^2 + 2$ Vertex: (−1, 2)



12. Sketch the graph of a quadratic with roots at x = 0 and x = -3.

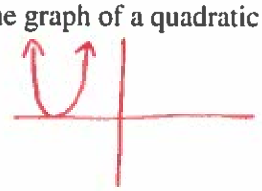


13. Sketch the graph of a quadratic with "nature of roots" that are two imaginary roots.



(any graph that does not touch or cross the x-axis)

14. Sketch the graph of a quadratic that has a discriminant that equals zero.



(any graph that touches & bounces off the x-axis)

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Put the following quadratics into vertex form. Identify the vertex, the axis of symmetry, the roots and sketch the graph. You will have to use one of the four methods that we have learned to find the roots. The four methods that we have learned are solving by graphing, solving by factoring, solving by completing the square and solving by the quadratic formula.

your choice

15. $x^2+4x-5=0$

$x^2+4x=5$

$x^2+4x+4=5+4$

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

$x+2=\pm\sqrt{9}$

$x+2=\pm 3$

$x+2=3$ $x+2=-3$

$x=1$ $x=-5$

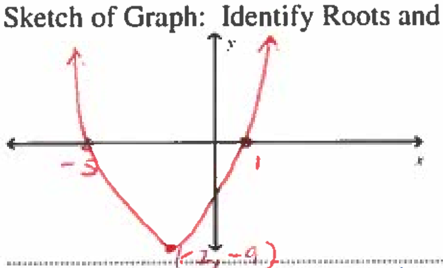
solved by completing the square

Vertex: $(-2,-9)$

Axis of Symmetry: $x=-2$

Roots: $x=1$ $x=-5$

Sketch of Graph: Identify Roots and Vertex.



16. $x^2+8x-9=0$

solve by factoring

$(x+9)(x-1)=0$

$x=-9$ $x=1$

$x^2+8x=9$

$x^2+8x+16=9+16$

$(x+4)^2=25 \rightarrow y=(x+4)^2-25$

$x+4=\pm\sqrt{25}$

$x+4=\pm 5$

$x+4=5$ $x+4=-5$

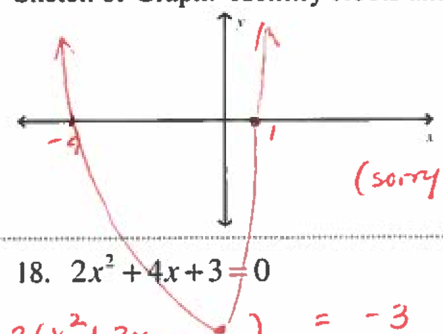
$x=1$ $x=-9$

Vertex: $(-4,-25)$

Axis of Symmetry: $x=-4$

Roots: $x=1,$ $x=-9$

Sketch of Graph: Identify Roots and Vertex.



(sorry - not enough room for good sketch)

17. $x^2+5x+6=0$

$x^2+5x=-6$

$x^2+5x+\frac{25}{4}=-\frac{24}{4}+\frac{25}{4}$

$(x+5/2)^2=\frac{1}{4}$

$x+\frac{5}{2}=\pm\sqrt{1/4}$

$x+\frac{5}{2}=\pm\frac{1}{2}$

$x=\frac{-5}{2}+1/2$ or $x=\frac{-5}{2}-1/2=-3$

Solve by Quad. Formula

$a=1$ $b=5$ $c=6$

$x=\frac{-5\pm\sqrt{25-4(6)}}{2(1)}$

$x=\frac{-5\pm 1}{2}$

$x=-2$ or $x=-3$

$(x+5/2)^2=1/4$

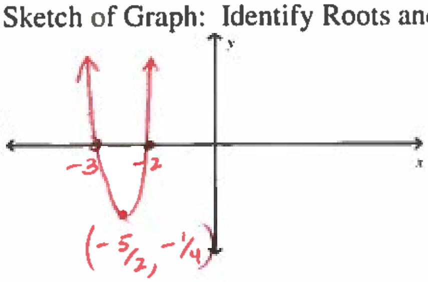
$y=(x+5/2)^2-1/4$

Vertex: $(-5/2,-1/4)$ (-2)

Axis of Symmetry: $x=-5/2$

Roots: $x=-2$ $x=-3$

Sketch of Graph: Identify Roots and Vertex.



18. $2x^2+4x+3=0$

$2(x^2+2x\quad)=-3$

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

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

~~$(x+1)^2=-1/2$~~

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

solve by Quad Formula

$a=2$ $b=4$ $c=3$

$x=\frac{-4\pm\sqrt{16-4(2)(3)}}{2(2)}$

$x=\frac{-4\pm\sqrt{-8}}{4}=\frac{-4\pm 2i\sqrt{2}}{4}$

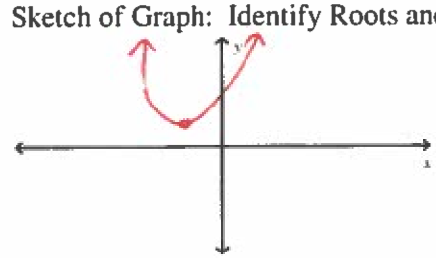
$x=\frac{\cancel{2}(-2+i\sqrt{2})}{\cancel{2}\cdot 2}$

Vertex: $(-1,1)$

Axis of Symmetry: $x=-1$

Roots: $\frac{-2\pm i\sqrt{2}}{2}$

Sketch of Graph: Identify Roots and Vertex.



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Change to quadratic form (expand ,FOIL & simplify): $y = ax^2 + bx + c$ *Honors Challenge

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

$y = (x-4)(x-4) + 7$

$y = x^2 - 4x - 4x + 16 + 7$

$y = x^2 - 8x + 23$

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

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

$y = 4x^2 + 8x + 4 - 6$

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

21*) $y = -\frac{1}{2}(4x-3)^2 + \frac{9}{2}$

$y = -\frac{1}{2}(4x-3)(4x-3) + \frac{9}{2}$

$y = -\frac{1}{2}(16x^2 - 24x + 9) + \frac{9}{2}$

$y = -8x^2 + 12x$

Write an equation for a parabola that is:

22) Very narrow, left 7, up 3, opens up. Use excellent form.

$y = 5(x+7)^2 + 3$ (may change 5 to any # > 1)

23) Normal size, right 4, down 2, and upside down.

$y = -(x-4)^2 - 2$

24) Wider than normal, centered on the *y-axis*, down 5, opens up.

$y = \frac{1}{2}x^2 - 5$ (½ may be any fraction < 1)

25) How many solutions does every quadratic equation have?

2

26) When looking at the graph of any function, you can tell how many real solutions it has by how many times it crosses the x-axis.

27) True or False: A quadratic equation could have two real solutions or two imaginary solutions, but it cannot have one real solution and one imaginary solution. True (imaginary roots come in pairs - always conjugates)

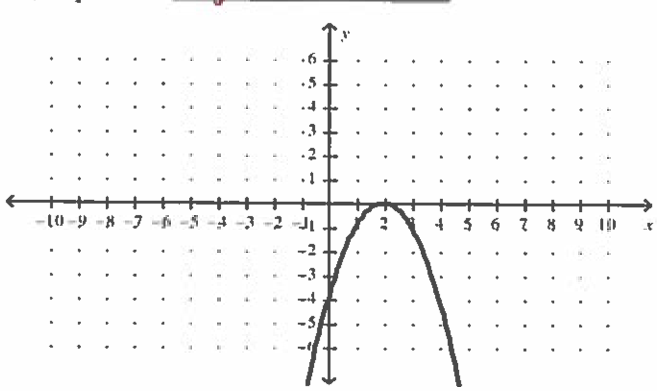
28) If a quadratic equation has exactly one double real rational zero, the graph of the corresponding quadratic function looks like: (touches + bounces off x-axis)

29) What is the parent function, which determines size, for $y = -\frac{2}{3}(x-5)^2 + 17$?

$y = \frac{2}{3}x^2$

Identify the equations (in vertex form) of the graphs below:

30) Equation: $y = -(x-2)^2$



31) Equation: $y = 2x^2 - 5$