Honors Algebra 2
Chapter 2b Review

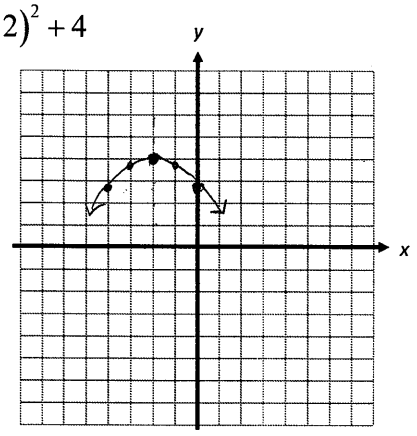
Name: KEY
Block: _____

No Calculator

Graph the function with at least 3 labeled points.

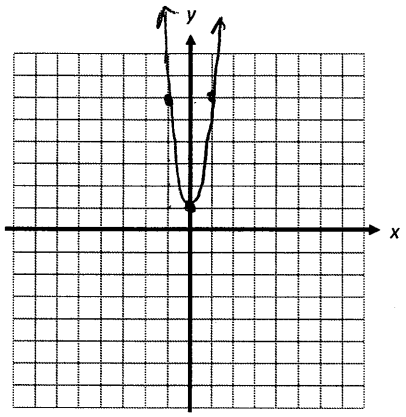
1. $g(x) = -\frac{1}{3}(x+2)^2 + 4$

VERTEX $(-2, 4)$
vertical shrink by a factor of $1/3$
Flipped over x-axis



2. $h(x) = 5x^2 + 1$

Vertex $(0, 1)$
Vertical stretch by 5



Factor each expression.

3. $4x^2 - 20x + 25$ ← PERFECT SQUARE

$(2x)^2 - 20x + (5)^2$
$2(2x)(5)$

$(2x-5)^2$

4. $25x^2 - 36$ ← DIFFERENCE OF SQUARES

$(5x+6)(5x-6)$

4. Solve the equation by factoring. SET $= 0$ Always check for a GCF 1st!

a) $x^2 + 11x = -10$

$x^2 + 11x + 10 = 0$
$(x+1)(x+10) = 0$
$x+1 = 0$ or $x+10 = 0$
$x = -1$ or $x = -10$

b) $3x^2 - 9x = 0$

$3x(x-3) = 0$
$3x = 0$ or $x - 3 = 0$
$x = 0$ or $x = 3$

c) $8x^2 - 10 = 38x$

$8x^2 - 38x - 10 = 0$
$2(4x^2 - 19x - 5) = 0$
$2(4x+1)(x-5) = 0$
$2 \neq 0$ $4x+1 = 0$ $x-5 = 0$
$x = -1/4$ OR $x = 5$

5. For the following function: $f(x) = 2x^2 - 3x + 1$. Find the roots (zeros) for the graph of the quadratic function…

a) by factoring $2x^2 - 3x + 1 = 0$

$(2x-1)(x-1) = 0$
$2x-1=0$ $x-1=0$
$x = 1/2$ or $x = 1$

b) by completing the square

$2x^2 - 3x + 1 = 0$
$2x^2 - 3x = -1$
$2(x^2 - 3/2 x) = -1$

$[\frac{1}{2}(-3/2)]^2 = (-3/4)^2 = 9/16$

$2(x^2 - 3/2 x + \frac{9}{16}) = -1 + 2(9/16)$

$2(x - 3/4)^2 = -1 + \frac{9}{8}$

$2(x - 3/4)^2 = \frac{1}{8}$

multiply both sides by $\frac{1}{2}$

$(x - \frac{3}{4})^2 = \frac{1}{16}$

$x - \frac{3}{4} = \pm\frac{1}{4}$

$x = \frac{3}{4} \pm \frac{1}{4}$

$x = \frac{4}{4}$ or $\frac{2}{4}$

$x = 1$ or $1/2$

c) by using the quadratic formula

$2x^2 - 3x + 1 = 0$

$x = \frac{3 \pm \sqrt{9 - 4(2)(1)}}{2(2)} = \frac{3 \pm \sqrt{9-8}}{4} = \frac{3 \pm \sqrt{1}}{4} = \frac{3 \pm 1}{4}$

$= \frac{3+1}{4}$ or $\frac{3-1}{4}$ $\Rightarrow$ $x = 1$ or $1/2$

6. Write the quadratic function in **standard form** with the given zeros.

a) zeros of -5 and $\frac{3}{7}$.

$x=-5$ $x+5=0$ $x=3/7$ $7x=3$ $7x-3$ $(x+5)(7x-3)$

$7x^2-3x+35x-15$

$f(x)=7x^2+32x-15$

b) zeros of $-\frac{6}{5}$ and 2

$x=-\frac{6}{5}$ $5x=-6$ $5x+6=0$ $x=2$ $x-2=0$ $(5x+6)(x-2)$

$5x^2-10x+6x-12$

$f(x)=5x^2-4x-12$

7. a) Complete the square to rewrite $y=3x^2-12x+7$ in vertex form. $y-7=3(x^2-4x)$ $\left[\frac{1}{2}(-4)\right]^2$

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

$y+5=3(x-2)^2$

$y=3(x-2)^2-5$

b) Identify the vertex of the function in part (a).

vertex $(2,-5)$

8. Find the zeros (over the complex number system) using the quadratic formula.

means imaginary solutions are ok

a) $f(x)=x^2-14x+39=0$

$x=\frac{14\pm\sqrt{196-4(1)(39)}}{2(1)}=\frac{14\pm\sqrt{196-156}}{2}=\frac{14\pm\sqrt{40}}{2}=\frac{14\pm2\sqrt{10}}{2}=7\pm\sqrt{10}$

b) $f(x)=10x^2+9x+4=0$

$x=\frac{-9\pm\sqrt{81-4(10)(4)}}{2(10)}=\frac{-9\pm\sqrt{81-160}}{20}=\frac{-9\pm\sqrt{-79}}{20}=\frac{-9\pm i\sqrt{79}}{20}$

9. Find the type and number of solutions. Explain how you arrived at your answer in a sentence or two.

USE DISCRIMINANT!

a) $8x^2-5x=-9$

$8x^2-5x+9=0$

$b^2-4ac=25-4(8)(9)=-263<0$

2 COMPLEX SOLUTIONS

b) $3x^2+2x-6=3$

$3x^2+2x-9=0$

$b^2-4ac=4-4(3)(-9)=112>0$

2 REAL SOLUTIONS

10. Simplify. Write the answer in $a+bi$ form.

a) $\sqrt{-36}=6i$

$i\sqrt{36}$

b) $\sqrt{-80}=4i\sqrt{8}$

$i\sqrt{80}$

c) $(3-5i)-(6-i)$

$3-5i-6+i$

$-3-4i$

d) $(-6+4i)+(7-2i)$

$1+2i$

e) $(-6+4i)(7-2i)$

$-42+12i+28i-8i^2$

$-42+40i-8(-1)$

$-34+40i$

f) $\frac{(3-i)(4+2i)}{(4-2i)(4+2i)}=\frac{12+6i-4i-2i^2}{16-4i^2}$

$\frac{12+2i-2(-1)}{16-4(-1)}=\frac{14+2i}{20}$

$=\frac{7}{10}+\frac{1}{10}i$

11. Solve for x (over the complex number system) and simplify the answer(s): → means imaginary solutions are ok

a) $x^2 - 20x + 125 = 0$

QUADRATIC FORMULA

$x = \frac{20 \pm \sqrt{400 - 4(1)(125)}}{2(1)} = \frac{20 \pm \sqrt{-100}}{2} = \frac{20 \pm 10i}{2} = \boxed{10 \pm 5i}$

COMPLETE THE SQUARE

$x^2 - 20x = -125$

$\left[\frac{1}{2}(-20)\right]^2 = (-10)^2 = 100$

$x^2 - 20x + 100 = -125 + 100$

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

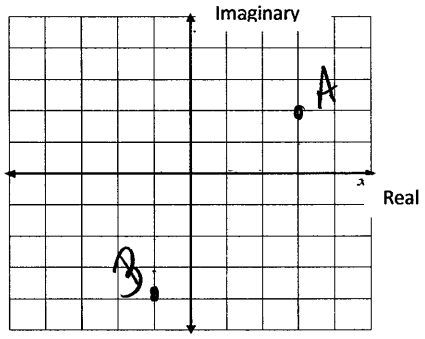
$x - 10 = \pm 5i$

$\boxed{x = 10 \pm 5i}$

12. Plot the pair of numbers in the complex plane.
$3 + 2i,\ -1 - 4i$

A $(3+2i)$

B $(-1-4i)$



13. Find $|3+7i| = \sqrt{(3)^2 + (7)^2} = \sqrt{9+49}$

$= \boxed{\sqrt{58}}$

14. Solve (over the complex number system) and simplify your answer: → means imaginary solutions are ok

a) $\frac{1}{3}(x+7)^2 = 5$

$(x+7)^2 = 15$

$x + 7 = \pm\sqrt{15}$

$\boxed{x = -7 \pm \sqrt{15}}$

b) $2(x+9)^2 = -8$

$(x+9)^2 = -4$

$x + 9 = \pm 2i$

$\boxed{x = -9 \pm 2i}$

15. Solve the inequality using algebra and a sketch: $3x^2 + 4x - 3 \le 1$

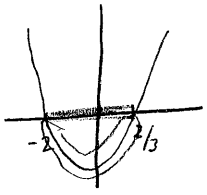
$3x^2 + 4x - 4 \le 0$

$(3x - 2)(x + 2) \le 0$

Zeros are at $x = 2/3$ and $x = -2$

Want parabola below x-axis

$-2 \le x \le 2/3$



16. Graph the inequality

a) $y \ge x^2 + 2x + 5$

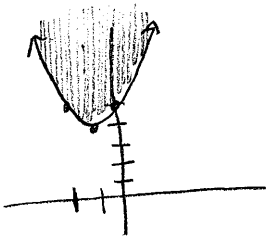
Vertex: $(-1, 4)$

$x = \frac{-b}{2a} = \frac{-2}{2(1)} = -1$

$y(-1) = (-1)^2 + 2(-1) + 5$

$y(-1) = 1 - 2 + 5 = 4$

y-int = 5



b) $y > -2x^2 + 8x - 14$

vertex $(2, -6)$ y-int $= -14$

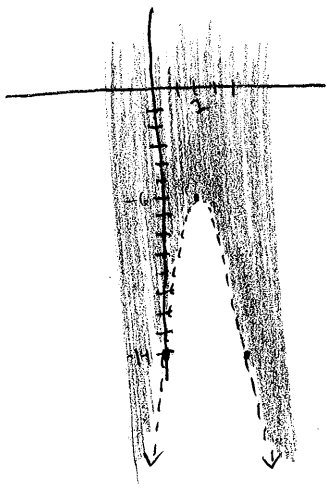
$x = \frac{-b}{2a} = \frac{-8}{2(-2)} = 2$

$y(2) = -2(2)^2 + 8(2) - 14$

$y(2) = -2(4) + 8(2) - 14$

$y(2) = -8 + 16 - 14$

$y(2) = -6$



Calculator Allowed

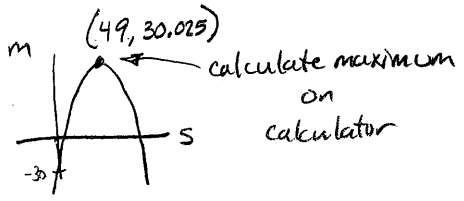
17. The highway mileage m in miles per gallon for a compact car is approximated by $m(s) = -0.025s^2 + 2.45s - 30$, where s is the speed in miles per hour

a) What is the maximum mileage for this compact car to the nearest tenth of a mile per gallon?

30.025 miles per gallon

b) What speed results in this mileage?

When you go 49 mi/hr



18. A football is kicked from ground level with an initial vertical velocity of 48ft/s. The formula for projectile motion is $h(t) = -16t^2 + v_0t + h_0$.

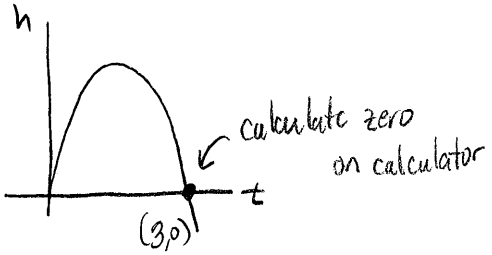
$h_0 = 0$ $\quad$ $v_0 = 48$

a) Model the height of the ball as a function of the time after it is hit.

$h(t) = -16t^2 + 48t$

b) How long is the ball in the air?

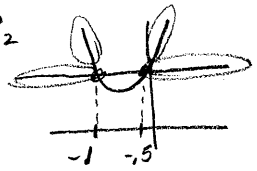
3 seconds



19. Solve the inequality using any method: $2x^2 + 3x + 6 > 5$

Graph $Y_1 = 2x^2+3x+6$ & $Y_2 = 5$ } want $y_1 > y_2$ (y_1 above y_2)

$x < -1$ or $x > -.5$



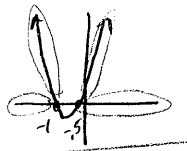
OR

$2x^2 + 3x + 1 > 0$

y_1

want $y_1 > 0$

Above x-axis



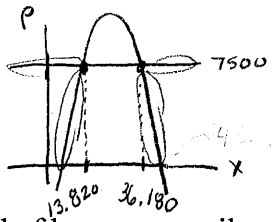
$x < -1$ or $x > -.5$

20. A business offers educational tours to Patagonia, a region of South America that includes parts of Chile and Argentina. The profit P for x number of persons is modeled by the equation $P(x) = -25x^2 + 1250x - 5000$. The trip will be rescheduled if the profit is less than $7500. How many people must have signed up if the trip is rescheduled? Write your answer as an inequality.

Looking for when $-25x^2 + 1250x - 5000 < 7500$

want y_1 < y_2

y_1 below y_2



ACCEPTABLE

$x < 13.820$ or $x > 36.180$

BUT we can't have $x < 0$ & parts of people is kinda gross :(

$0 \le x \le 13$ or $x \ge 37$ ☺

BETTER

21. Claire is participating in a running club and keeps record of how many miles she runs. The data below shows the distances that Claire has run after so many days. Find the quadratic model for the number of miles ran in the amount of days given. Use the model to estimate the number of miles that Claire ran in 25 days.

$x = 25$

Claire's Running Record

L1 Days	L2 Miles
10	12.3
20	34.4
30	66.5
40	108.6
50	160.7

} QUADREG

$y = .05x^2 + .71x + .2$

SHOW THIS FOR CREDIT!

$y = .05(25)^2 + .71(25) + .2 = 49.2$ miles