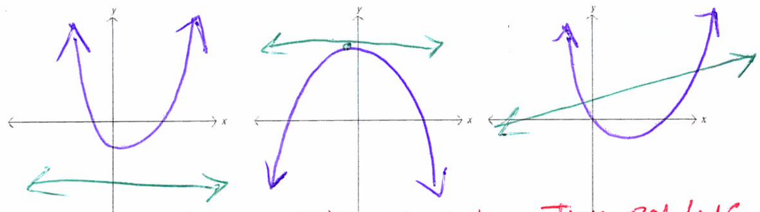
ANSWERS.

Math Pre-Calc 20 - Chapter 8 Review

#1. Draw pictures to show the possible solutions to a linear-quadratic system of equations. (2 marks)



NO SOLUTION ONE SOL'N TWO SOL'NS

#2. Solve the system below by graphing. Verify your solutions. (4 marks)

$y - x^2 + 2x + 4 = 0$

$y - 3x + 8 = 0$

$y = 3x - 8$

$y = x^2 - 2x - 4$ y-int

Complete the squares

$y + 4 = x^2 - 2x + 1$

$+1$

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

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

$(1, -5)$ vertex

verify:

$4 - 4^2 + 2(4) + 4 = 0$

$4 - 16 + 8 + 4$

$-12 + 12 = 0$

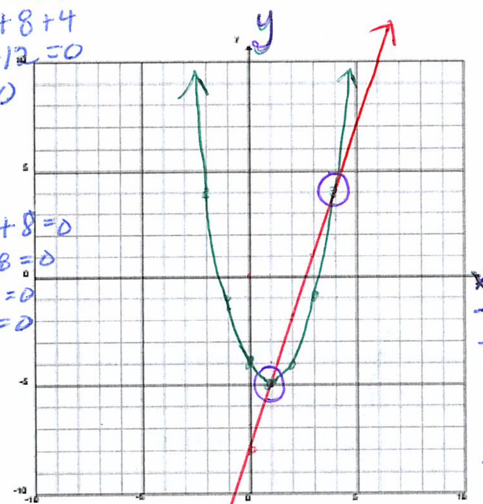
$0 = 0$

$4 - 3(4) + 8 = 0$

$4 - 12 + 8 = 0$

$-8 + 8 = 0$

$0 = 0$



$y = 3x - 8$

SOLUTIONS

$(1, -5)\ (4, 4)$

verify

$-5 - (1)^2 + 2(1) + 4 = 0$

$-5 - 1 + 2 + 4$

$-6 + 6 = 0$

$0 = 0$

$-5 - 3(1) + 8 = 0$

$-8 + 8 = 0$

$0 = 0$

#3. Solve the system below by graphing. Verify your solutions. (4 marks)

$y - 3x^2 - 12x = 6$

$y + 4x^2 + 16x = -15$

$y = 3x^2 + 12x + 6$ y-int

$y - 6 = 3(x^2 + 4x + 4)$

$+12$

$y + 6 = 3(x+2)^2$

$y = 3(x+2)^2 - 6$

vertex $(-2, -6)$

$1a = 3$

$3a = 9$

$5a = 15$

Opens Up

verify

$-3 - 3(-1)^2 - 12(-1) = 6$

$-3 - 3 + 12 = 6$

$-6 + 12 = 6$

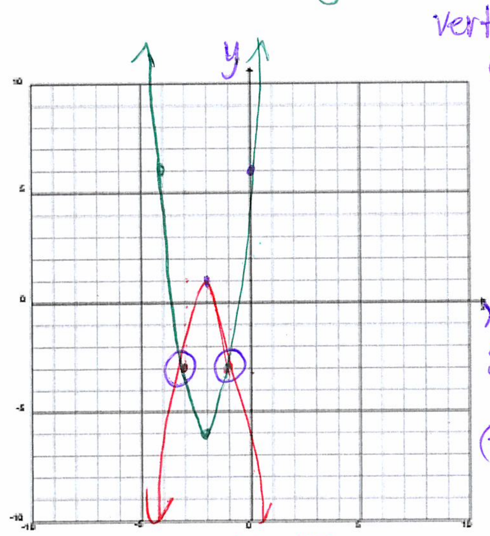
$6 = 6$

$-3 + 4(-1)^2 + 16(-1) = -15$

$-3 + 4 - 16 = -15$

$1 - 16 = -15$

$-15 = -15$



SOLUTIONS

$(-3, -3)\ (-1, -3)$

verify

$-3 - 3(-3)^2 - 12(-3) = 6$

$-3 - 27 + 36 = 6$

$-30 + 36 = 6$

$6 = 6$

$-3 + 4(-3)^2 + 16(-3) = -15$

$-3 + 36 + (-48) = -15$

$33 - 48 = -15$

$-15 = -15$

$y = -4x^2 - 16x - 15$

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

-16

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

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

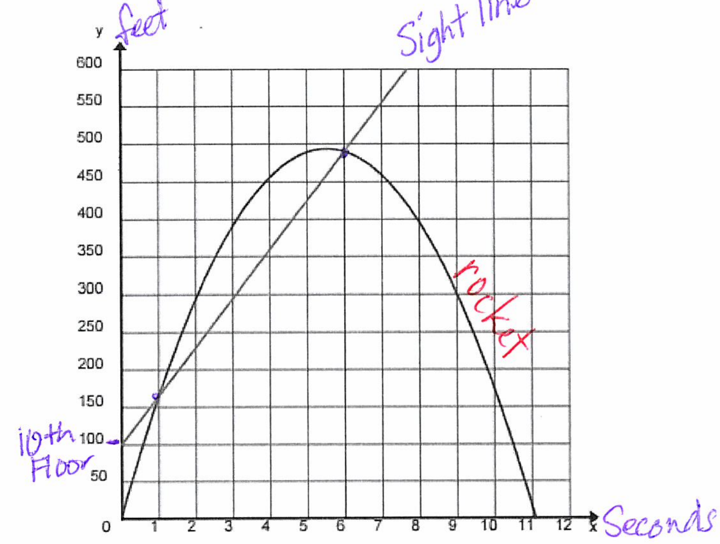
vertex $(-2, 1)$

$1a = -4$

$3a = -12$

Opens down

#4. A model rocket is launched from a field. The height of the rocket, "y", in feet above the ground, after "x" seconds is modeled by the equation $y = -16x^2 + 177x + 4$. From the 10th floor of a nearby building, a boy looks out a window when he hears the rocket fired. The boy's line of sight is given by the equation $y = 65x + 100$. Approximate the points of intersection and interpret these points. (2 marks)



The boy first made eye contact with the rocket at 1 second when it was ~165 ft in the air. He again saw it at 6 seconds when it was on its way down at approx 490 ft.

#5. Solve the system below algebraically. You DO NOT need to verify your solutions. (4 marks)

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

$-6x - y + 15 = 0$

VIA Substitution

$y = -6x + 15$

$4x^2 - (-6x + 15) - 2x + 7 = 0$

$4x^2 + 6x - 15 - 2x + 7 = 0$

$4x^2 + 4x - 8 = 0$

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

$4(x+2)(x-1) = 0$

$x = -2 \quad x = 1$

$-6(-2) - y + 15 = 0 \qquad -6(1) - y + 15 = 0$

$12 + 15 = y \qquad -6 + 15 = y$

$27 = y \qquad 9 = y$

$(-2, 27) \quad (1, 9)$

VIA Elimination

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

$-(0x^2 - 6x + 15 = y)$

$4x^2 + 4x - 8 = 0$

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

$4(x+2)(x-1)$

$x = -2 \quad x = 1$

now all the work is the same!!

#6. Solve the system below algebraically. You DO NOT need to verify your solutions. (4 marks)

$2x^2 - y + 16x + 29 = 0$
$-2x^2 - 16x - y = 35$

VIA elimination

$2x^2 + 16x + 29 = y$
$-(-2x^2 - 16x - 35 = y)$
$4x^2 + 32x + 64 = 0$
$4(x^2 + 8x + 16) = 0$
$4(x+4)(x+4) = 0$
$x = -4$
$2(-4)^2 - y + 16(-4) + 29 = 0$
$2(16) - y - 64 + 29 = 0$
$32 - 64 + 29 = y$
$-3 = y$
$(-4, -3)$ SOLUTION

$y = 2x^2 + 16x + 29$

VIA SUBSTITUTION

$-2x^2 - 16x - (2x^2 + 16x + 29) = 35$
$-2x^2 - 16x - 2x^2 - 16x - 29 - 35 = 0$
$-4x^2 - 32x - 64 = 0$
$-4(x^2 + 8x + 16) = 0$
$-4(x+4)(x+4) = 0$
$x = -4$

Same!

#7. Solve the system below algebraically. Round your answers to 2 decimal places. You DO NOT need to verify your solutions. (4 marks) Hint: You will need to use the quadratic formula!

because we can't FACTOR it.

$3x^2 - y - 4x = -3$
$-2x^2 + 2x - y + 8 = 0$

VIA substitution

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

$-2x^2 + 2x - (3x^2 - 4x + 3) + 8 = 0$
$-2x^2 + 2x - 3x^2 + 4x - 3 + 8 = 0$
$-5x^2 + 6x + 5 = 0$

$a = -5$
$b = 6$
$c = 5$

$\dfrac{-6 \pm \sqrt{36 - 4(-5)(5)}}{2(-5)}$

$\dfrac{-6 \pm \sqrt{136}}{-10}$

$\dfrac{-6 \pm 11.66}{-10}$

$\dfrac{-6 + 11.66}{-10} = -.566$

$\dfrac{-6 - 11.66}{-10} = 1.766$

$3(-.566)^2 - y - 4(-.566) = -3$
$3(.320356) - y + 2.264 = -3$
$.96 + 3 + 2.264 = y$
$6.23 = y$

$3(1.766)^2 - y - 4(1.766) = -3$
$5.23 = y$

$\{(-.566, 6.23)$ & $(1.766, 5.23\}$

#8. Determine two whole numbers such that the first number increased by triple the second number is 24. If the first number is squared and decreased by five times itself, the result is 13 less than the second number. (5 marks)

Let x = 1st #
y = 2nd #

Isolate for x

$x + 3y = 24$ $\quad x = 24 - 3y$
$x^2 - 5x = y - 13$
$(24 - 3y)^2 - 5(24 - 3y) = y - 13$
$(24 - 3y)(24 - 3y) - 120 + 15y = y - 13$
$576 - 72y - 72y + 9y^2 - 120 + 15y - y + 13 = 0$
$9y^2 - 130y + 469 = 0$

$a = 9$
$b = -130$
$c = 469$

$\dfrac{130 \pm \sqrt{(-130)^2 - 4(9)(469)}}{2(9)}$

$\dfrac{130 \pm \sqrt{16}}{18}$

$\dfrac{130 + 4}{18} = 7.\overline{4}$

$\dfrac{130 - 4}{18} = 7$

$x + 3(7) = 24$
$x + 21 = 24$
$x = 3$

$(3, 7)$ The #'s are 3 and 7.

#9. Two players are throwing basketballs back and forth. Standing about 9m apart and facing each other, each player throws a ball at the same time. In one exchange, the path of one basketball is represented by the equation $y = -x^2 + 12x - 28$. The path of the other ball is modeled by the equation $y = -x^2 + 4x + 2$. In each equation, "x" is the horizontal distance a ball travels, in metres, and "y" is the vertical distance travelled, also in metres. Determine the point(s) of intersection (rounded to 2 decimal places) algebraically and interpret the solution. (4 marks)

$y = -x^2 + 12x - 28$
$-(y = -x^2 + 4x + 2)$
$0 = 8x - 30$

$8x - 30 = 0$
$\dfrac{8x}{8} = \dfrac{30}{8}$
$x = 3.75$

$y = -(3.75)^2 + 12(3.75) - 28$
$y = -14.0625 + 45 - 28$
$y = 2.9375$
$y = 2.94$

If the balls were thrown on the same plane, the would hit each other at a horizontal distance of 3.75m and a vertical distance of 2.94 m