

Name: \_\_\_\_\_

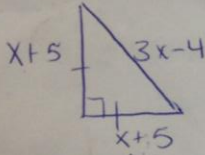
Quadratics Test | 2014

Show all work to receive credit. Any separate work must be stapled to the paper. Express fractional answers in simplest form. Give units for word problems.

- 1) The volume of a box has a height of  $x+1$ , a width of  $x-4$ , and a length of  $x+3$ . Write an expression to represent the volume of the box. Distribute and combine the expression.

$$\begin{aligned} & (x+1)(x-4)(x+3) \\ & (x^2 - 3x - 4)(x+3) \\ & x^3 - 3x^2 - 4x + 3x^2 - 9x - 12 \\ & \mathbf{x^3 - 13x - 12} \end{aligned}$$

- 2) The length of the leg of an isosceles right triangle is represented by  $x+5$ . The length of the hypotenuse of the same triangle is represented by  $3x-4$ . Write an expression to show the perimeter of the triangle.



$$2x+10 + 3x-4$$

$$\mathbf{5x+6}$$

$$(x+5) + (x+5) + (3x-4)$$

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

- 3) Two friends start a furniture business called the Painted Birch. The cost of materials to produce  $x$  pieces of furniture is given by the polynomial  $0.3x^2 - 0.2x + 5$ . The cost of marketing to sell  $x$  pieces of furniture is represented by the polynomial  $0.4x^2 + 0.2x - 2$ . Write and simplify a polynomial expression that represents the total cost of purchasing materials and marketing to sell  $x$  pieces of furniture.

$$\mathbf{0.7x^2 + 3}$$

$$\begin{aligned} & 0.3x^2 - 0.2x + 5 \\ + & 0.4x^2 + 0.2x - 2 \\ \hline & 0.7x^2 + 3 \end{aligned}$$

- 4) The length of a rectangle is  $2x-2$ . The width is  $x+5$ . Solve for  $x$  if the area of the rectangle is 80 square feet.

$$\mathbf{80 = (2x-2)(x+5)}$$

$$y_1 = (2x-2)(x+5)$$

$$y_2 = 80$$

$$\mathbf{x=5}$$

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5) Distribute and combine:  $2(x^3 - 4x^2 + 3x - 2) - 3(3x^3 - 2x + 5)$

$$2x^3 - 8x^2 + 6x - 4 - 9x^3 + 6x - 15$$

$$-7x^3 - 8x^2 + 12x - 19$$

6) Distribute and combine:  $2(x + 5)(3x + 4)$

$$(2x+10)(3x+4)$$

$$6x^2 + 8x + 30x + 40$$

$$6x^2 + 38x + 40$$

7) Find the product:  $(x^2 + 2x - 3)(4x - 1)$

$$4x^3 + 8x^2 - 12x - x^2 - 2x + 3$$

$$4x^3 + 7x^2 - 14x + 3$$

8) Solve for the roots of the quadratic using any method. Leave your answer in radical form if it will not simplify further (in other words, no decimals):

$$6x^2 - 8 = -2x$$

$$6x^2 + 2x - 8 = 0$$

$$\frac{-2 \pm \sqrt{4 - 4(6)(-8)}}{2(6)} = \frac{-2 \pm \sqrt{96}}{12}$$

$$\frac{-2 \pm 4}{12} = 1 \text{ and } -\frac{4}{3}$$

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9) Solve for the roots of the quadratic using any method. Leave your answer in radical form if it will not simplify further (in other words, no decimals):

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

$$-3x^2 - 6x - 1 = 0$$

$$\frac{6 \pm \sqrt{24}}{-6}$$
  
~~$$\frac{6 \pm 2\sqrt{6}}{-6}$$~~

$$\frac{6 \pm \sqrt{36 - 4(-3)(-1)}}{2(-3)}$$

$$\frac{6 \pm \sqrt{24}}{-6}$$

$$\frac{6 \pm 2\sqrt{6}}{-6} = \frac{3 \pm \sqrt{6}}{-3}$$

$$-1 \pm \frac{\sqrt{6}}{3}$$

10) Factor the polynomial completely:  $4x^6 - 64x^2$

$$4x^2(x^4 - 16)$$

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

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

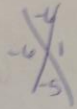
11) Factor the polynomial completely:  $x^2 + 3x - 10$

$$\begin{array}{r} -10 \\ 5 \times -2 \\ 3 \end{array}$$

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

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12) Factor the polynomial completely:  $6x^2 - 10x - 4$

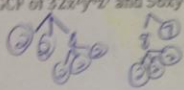


$$2(3x^2 - 5x - 2)$$

$$(3x^2 - 6x)(x - 2)$$
$$3x(x - 2) + 1(x - 2)$$

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

13) Find the GCF of  $32x^3y^4z^2$  and  $56xy^3z^3$



$$8xy^3z^2$$

14) A rocket was launched into the air from an initial height of 6 feet with an initial velocity of 8 feet per second. The height of the rocket in feet,  $h$ , is modeled by the following equation, where  $t$  is the time in seconds after the rocket was launched.  $h(t) = -5t^2 + 8t + 6$

a. How long did it take for the rocket to hit the ground? Round to the nearest tenths place.

$$2.2 \text{ seconds}$$

b. How long does it take for the rocket to reach its maximum height? Round to the nearest tenths place.

$$.8 \text{ seconds}$$

c. What was the maximum height of the rocket? Round to the nearest tenths place.

$$9.2 \text{ feet}$$

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15) A ball is thrown into the air from an initial height of 730 feet with an initial velocity of 135 feet per second. The height of the ball in feet,  $h$ , is modeled by the following equation,  $h(t) = -16t^2 + 135t + 730$ , where  $t$  is the time in seconds after the ball was thrown.

- a. What was the height of the ball 3 seconds after it was thrown?

991 feet

- b. How long did it take the ball to reach its highest point?

4.2 seconds

- c. What was the highest height of the ball?

1014.8 feet



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16) Graph the function  $f(x) = -x^2 - 2x + 8$ . Identify the following, make a table of 5 ordered pairs, and graph.  
 $a = -1$   $b = -2$   $c = 8$

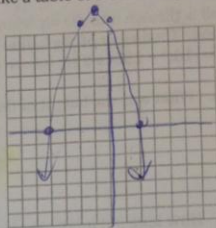
a. Vertex:  
 $(-1, 9)$   $\frac{2}{2(-1)} = -1$   $-1 + 2 + 8$

b. Axis of Symmetry:  
 $x = -1$

c. x-intercept(s):  
 $(-4, 0)$   $(2, 0)$

d. y-intercept:  
 $(0, 8)$

x	y
-4	0
-2	8
-1	9
0	8
2	0



$$\frac{2 \pm \sqrt{4 - 4(-1)(8)}}{2(-1)}$$

$$\frac{2 \pm \sqrt{32}}{-2}$$

$$\frac{2 \pm 6}{-2} = \frac{8}{-2} = -4$$

$$\frac{-4}{-2} = 2$$

17) Graph the function  $f(x) = -(x - 2)^2 + 1$

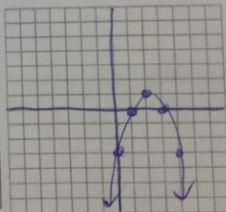
a. Vertex  
 $(2, 1)$

b. Axis of Symmetry  
 $x = 2$

c. x-intercept(s):  
 $(3, 0)$   $(1, 0)$

d. y-intercept:  
 $(0, -3)$

x	y
0	-3
1	0
2	1
3	0
4	-3



$$y = -(0 - 2)^2 + 1$$

$$-4 + 1 = -3$$

$$\pm \sqrt{1} =$$

$$\pm 1 = x - 2$$

$$2 \pm 1 = x$$

$$3 \text{ and } 1 = x$$