

Math II: 1st Semester Material Pre-Test

Unit 1: Extending the Number System

1. Circle all the subsets that would describe the following number:

0

Complex	Natural
Integers	Rational
Irrational	Real
Whole	Prime

2. Using the Properties of Exponents simplify the following expressions.

A. $3x^{-4}y^4 \cdot 3y^2 \cdot 3yx^5$

$$3 \cdot 3 \cdot 3 x^{-4+5} y^{4+2+1}$$

$$\boxed{27xy^7}$$

3. Rewrite the following radical using rational exponents:

$$\sqrt[3]{15^1} = 15^{1/3}$$

Remember $\frac{\text{power}}{\text{root}}$ for the fraction.

Also MUST be an exponent!

4. Rewrite the following rational exponent expression in radical form:

$$(xy)^{2/5} = \sqrt[5]{(xy)^2}$$

Remember the index, the 5 here, MUST be in the hook!

5. Match the equation with the given situations.

A family is a food vendor at the local fair and sells their cotton candy for \$6 per bag. The family pays \$250 to have their stand and sell n bags. D.
The initial population of bacteria is 250 micrometers. The population will double every 6 hours. C.
Hoopeston Sports Boosters invest \$3000 in hoodies to show support for the football team. They sell the hoodies for \$25 each and sell n of them. B.
The initial population of bacteria is 3000 micrometers. The population will cut in half every 25 hours after the initial dose of medication is taken. A.

A. $y = 3000 \left(\frac{1}{2}\right)^{\frac{1}{25}n}$
B. $y = 25n - 3000$
C. $y = 250(2)^{\frac{1}{6}n}$
D. $y = 6n - 250$

Unit 2A: Quadratic Functions – Representations

6. Find the sum.

$$(7x + 2x^2 - 5x^4) + (3 + x^4 + 9x^2)$$

$$\underbrace{7x + 2x^2 - 5x^4} + \underbrace{+3 + x^4 + 9x^2}$$

$$\boxed{-4x^4 + 11x^2 + 7x + 3}$$

7. Find the difference.

$$(7x + 2x^2 - 5x^4) - (3 + x^4 + 9x^2)$$

$$\underbrace{7x + 2x^2 - 5x^4} - \underbrace{+3 + x^4 + 9x^2}$$

$$\boxed{-6x^4 - 7x^2 + 7x - 3}$$

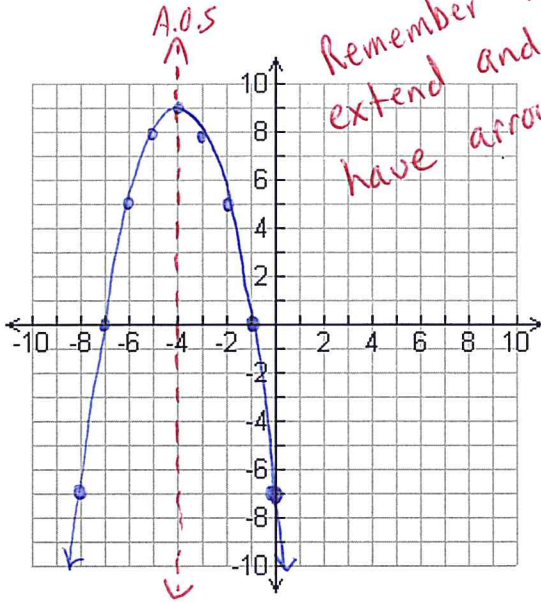
#6 + #7

Combine like terms.

Must be in standard form.

8. Graph the following functions. Identify the Axis of symmetry, the vertex, the x-intercept(s), and the y-intercept:

A. $f(x) = -x^2 - 8x - 7$



$$f(x) = \underbrace{-1}_a x^2 - \underbrace{8}_b x - \underbrace{7}_c$$

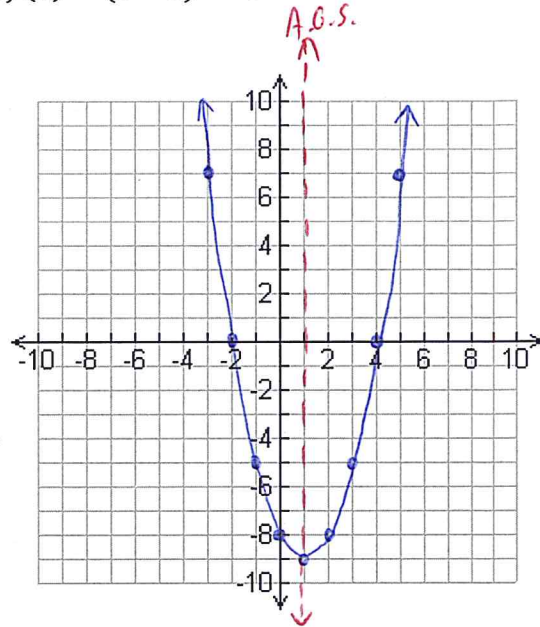
(A) A.O.S.

$$x = \frac{-b}{2a} = \frac{-(-8)}{2(-1)} = \frac{8}{-2} = -4$$

(B)

x	$f(x) = -x^2 - 8x - 7$	$(x, f(x))$
-8	$f(-8) = -(-8)^2 - 8(-8) - 7$	$(-8, -7)$
-7	$f(-7) = -(-7)^2 - 8(-7) - 7$	$(-7, 0)$ x-int.
-6	$f(-6) = -(-6)^2 - 8(-6) - 7$	$(-6, 5)$
-5	$f(-5) = -(-5)^2 - 8(-5) - 7$	$(-5, 8)$
-4	$f(-4) = -(-4)^2 - 8(-4) - 7$	$(-4, 9)$ vertex
-3	$f(-3) = -(-3)^2 - 8(-3) - 7$	$(-3, 8)$
-2	$f(-2) = -(-2)^2 - 8(-2) - 7$	$(-2, 5)$
-1	$f(-1) = -(-1)^2 - 8(-1) - 7$	$(-1, 0)$ x-int.
0	$f(0) = -(-0)^2 - 8(0) - 7$	$(0, -7)$ y-int.

B. $f(x) = (x - 1)^2 - 9$



$$f(x) = (x - 1)^2 - 9$$

vertex = (opposite, same)

(A) A.O.S.

set material in () = 0 solve.

$$\begin{array}{r} x-1=0 \\ +1 \quad +1 \\ \hline x=1 \end{array}$$

(B)

x	$f(x) = (x-1)^2 - 9$	$(x, f(x))$
-3	$f(-3) = (-3-1)^2 - 9$	$(-3, 7)$
-2	$f(-2) = (-2-1)^2 - 9$	$(-2, 0)$ x-int.
-1	$f(-1) = (-1-1)^2 - 9$	$(-1, -8)$
0	$f(0) = (0-1)^2 - 9$	$(0, -8)$ y-int.
1	$f(1) = (1-1)^2 - 9$	$(1, -9)$ vertex
2	$f(2) = (2-1)^2 - 9$	$(2, -8)$
3	$f(3) = (3-1)^2 - 9$	$(3, -8)$
4	$f(4) = (4-1)^2 - 9$	$(4, 0)$ x-int.
5	$f(5) = (5-1)^2 - 9$	$(5, 7)$

Unit 2B: Quadratic Functions – Modeling

9. Write an equation for each of the following scenarios:

<p>A. Khloe is on top of a bridge overlooking the river and asks if she can throw a rock over the side. She throws the rock <u>upward</u> at <u>32</u> feet per second from a height of <u>450</u> feet</p>	$h(t) = -16t^2 + 32t + 450$
<p>B. Mr. Brewer wants to put a little garden in the back yard for the kids. To keep the animals out of it they want to fence the garden in. At the moment they have a patch of land in mind that is <u>250</u> feet by <u>50</u> feet.</p>	$A(x) = (250 - x)(50 + x)$
<p>C. A construction crew is building another sky scraper in New York and has a guy <u>1500</u> feet <u>above ground</u>. He is chewing a piece of gum that is old and <u>throws it down</u> at <u>16</u> feet per second.</p>	$h(t) = -16t^2 - 16t + 1500$
<p>D. Bryson and Khloe want to create a lemonade stand to help support another little girl that they know who shares the same heart condition as Khloe does. They are <u>currently</u> selling lemonade for <u>\$1</u> a cup and are <u>selling</u> <u>400</u> cups per day. If they increase their sales by <u>increments</u> of <u>\$0.50</u> they think they will only <u>lose</u> <u>20</u> customers per increase since it is for such a good cause.</p>	$C(r) = (1 + 0.5r)(400 - 20r)$ <p style="text-align: center;"># of sales Cost</p>

10. For each of the following functions state if the vertex would be a maximum or a minimum:

<p>A. $A(x) = 2x^2 + 20x - 150$ Since $a = 2$ is a positive, the graph shoots up. Making the vertex a Minimum.</p>	<p>B. $C(r) = -r^2 - 22r - 40$ Since $a = -1$ is a negative, the graph shoots down. Making the vertex a Maximum.</p>
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Unit 2C: Quadratic Functions – Working with Equations

11. Simplify the following square roots.

<p>A.</p> $\begin{aligned} & \sqrt{704} \\ &= \sqrt{64 \cdot 11} \\ &= \sqrt{64} \cdot \sqrt{11} \\ &= \boxed{8\sqrt{11}} \end{aligned}$	<p>B.</p> $\begin{aligned} & \sqrt{-468} \\ &= \sqrt{36 \cdot -1 \cdot 13} \\ &= \sqrt{36} \cdot \sqrt{-1} \cdot \sqrt{13} \\ &= \boxed{6i\sqrt{13}} \end{aligned}$
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12. Perform the indicated operation on the Complex Numbers:

Remember standard form a+bi

<p>A.</p> $\begin{aligned} & (8 - 6i) + (4 - 3i) \\ & \underline{8 - 6i} + \underline{4 - 3i} \\ & \boxed{12 - 9i} \end{aligned}$	<p>B.</p> $\begin{aligned} & (-2 + 7i) - (6 - 3i) \\ & \underline{-2 + 7i} - \underline{6 - 3i} \\ & \boxed{-8 + 10i} \end{aligned}$
<p>C.</p> $\begin{aligned} & (2 + 7i)(2 - 4i) \\ & 2(2 - 4i) + 7i(2 - 4i) \\ & 4 - 8i + 14i - 28i^2 \\ & 4 + 6i - 28(-1) \\ & 4 + 6i + 28 \\ & \boxed{32 + 6i} \end{aligned}$	<p>D.</p> $\begin{aligned} & \frac{(3 + 5i)(-6 + 7i)}{(-6 - 7i)(-6 + 7i)} \\ & \begin{array}{l} \text{Top} \\ 3(-6 + 7i) + 5i(-6 + 7i) \\ -18 + 21i - 30i + 35i^2 \\ -18 - 9i + 35(-1) \\ -18 - 9i - 35 \\ -53 - 9i \end{array} \\ & \begin{array}{l} \text{Bottom} \\ -6(-6 + 7i) - 7i(-6 + 7i) \\ 36 - 42i + 42i - 49i^2 \\ 36 - 49(-1) \\ 36 + 49 \\ 85 \end{array} \\ & \text{Answer} \\ & \frac{-53 - 9i}{85} = \frac{-53}{85} - \frac{9}{85}i \end{aligned}$

13. Solve the following Quadratic equations using any method of your choosing.

Recommend Factoring or Quadratic Formula

<p>A.</p> $\begin{aligned} & 10x = -24 + x^2 \\ & \underline{-10x} \quad \underline{-10x} \\ & 0 = x^2 - 10x - 24 \\ & \begin{array}{r} 24 \\ 1 \ 24 \\ \hline 2 \ 12 \\ 3 \ 8 \\ \hline 4 \ 6 \end{array} \\ & 0 = (x^2 - 12x) + (2x - 24) \\ & 0 = x(x - 12) + 2(x - 12) \\ & 0 = (x + 2)(x - 12) \\ & \text{So } \begin{array}{l} x + 2 = 0 \\ \underline{-2} \quad \underline{-2} \\ \hline x = -2 \end{array} \quad \begin{array}{l} x - 12 = 0 \\ \underline{+12} \quad \underline{+12} \\ \hline x = 12 \end{array} \end{aligned}$	<p>B.</p> $\begin{aligned} & 40x + 25 = -16x^2 \\ & \underline{+16x^2} \quad \underline{+16x^2} \\ & 16x^2 + 40x + 25 = 0 \\ & a = 16 \\ & b = 40 \\ & c = 25 \\ & x = \frac{-40 \pm \sqrt{(40)^2 - 4(16)(25)}}{2(16)} \\ & = \frac{-40 \pm \sqrt{0}}{32} \\ & = \frac{-40 \pm 0}{32} = \frac{-40}{32} = \boxed{\frac{-5}{4}} \end{aligned}$
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