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## Unit 5 (Quadratics) Test Review Sheet

Directions: Be sure to show all work, communicate your thought process, and justify your reasoning. Remember to check that your answers are complete, correct, and reasonable.
*Also study from the puzzle problems you completed in class! These can be found on the website. You may also want to go back and redo any class work, homework, or quiz problems! ©

1. Which two expressions are equivalent to $8 m^{5}-7 m^{4} n-32 m n^{3}+28 n^{4}$ ?
$8 m\left(m^{4}+4 n^{3}\right)-7 n\left(m^{4}+4 n^{3}\right)$
$\square(8 m-7 n)\left(m^{4}-4 n^{3}\right)$
$\square 8 m\left(m^{4}-4 n^{3}\right)-7 n\left(m^{4}-4 n^{3}\right)$
$\square(8 \mathrm{~m}-7 \mathrm{n})\left(\mathrm{m}^{4}+4 \mathrm{n}^{3}\right)$
$\square 8\left(m^{5}-m^{3} n\right)-7\left(m^{5}-m^{3} n\right)$
$\square(8 m+7 n)\left(m^{4}-4 n^{4}\right)$
$\square 8 \mathrm{~m}\left(\mathrm{~m}^{4}-4 \mathrm{n}^{4}\right)+7 \mathrm{n}\left(\mathrm{m}^{4}-4 \mathrm{n}^{4}\right)$
$\square(1)\left(m^{5}-m^{3} n\right)$
2. Factor the expression $6 r^{2} s-5 r s^{3}-10 s^{4} r^{2}+3 r$ by grouping.
3. Determine one value of $w$ that satisfies the equation:

$$
w^{2}-9 w+12=(w-3)^{2}+w-24
$$

4. Draw arrows to match the equivalent values.
a. $\sqrt{-25}$
b. $5 i^{2}$
C. $5\left(i^{2}\right)^{4}$
d. $5 i^{3}$
i. -5
ii. 5
iii. $5 i$
iv. $-5 i$
5. Select all of the equations that have non-real solutions.
A. $3 c^{2}+6 c-30=0$
B. $3 x^{2}+2 x=x+30$
C. $3 y^{2}+2 y+30=0$
D. $3 d^{2}+2 d=0$
E. $3 v^{2}+3=2 v$
F. $b^{2}+12 b=-40$
6. Consider the functions $h(x)=r x^{2}$ and $g(x)=p x+q . r<0, p>0$, and $q<0$. What are the possible types of solutions to the equation $h(x)=g(x)$ ? Explain.
[Remember, the types are 2 real solutions, 1 real solution, or 2 non-real solutions.]
7. Rewrite each expression in standard form.
a. $\sqrt{-18}$
b. $5 i-4-(9+2 i)+i^{2}$
c. $3 i+2-i(4 i-9)$
d. $(2 i+5)(2 i-5)$
e. $(3 i+8)(7 i-1)$
f. $12 i^{3}-\sqrt{-16}+4 i$
8. Select all of the equations that have only real solutions.
A. $(p-8)^{2}=0$
B. $8 x^{2}+2=5 x$
C. $(n-3)(2 n+9)=-12$
D. $h=\frac{-5 \pm \sqrt{(5)^{2}-4(2)(-10)}}{2(2)}$
E. $z=\frac{6 \pm \sqrt{(-6)^{2}-4(4)(3)}}{2(4)}$
F. $\mathrm{q}=\left(\mathrm{i}^{3}\right)^{2}-1$
9. Consider the functions $f(x)=x^{2}-16 x+42$ and $g(x)=(x-h)^{2}+k$. Determine the values of $h$ and $k$ that will result in $f(x)$ being equivalent to $g(x)$.
10. One zero of a quadratic function is $3-4 \mathrm{i}$. What is the other zero?
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11. Solve each equation.
a. $x^{2}-81=0$
b. $5 x^{2}-4 x=-4 / 5$
c. $x^{2}-11 x=-30$
d. $x^{2}+100=0$
12. Factor to solve each equation.
a. $3 x^{2}-10=-x$
b. $x^{2}=4 x+45$
13. Use the quadratic formula to solve each equation.
a. $7 x^{2}-25=8 x$
b. $2 x^{2}=-3 x-14$
14. Complete the square to solve each equation.
a. $-4 x^{2}+12 x=1$
b. $x^{2}+6 x=-18$
15. Sketch a graph of each parabola.

16. Dara is preparing to present a review lesson on quadratics and graphs of quadratic functions. She decides to use the function $f(x)=9 x^{2}-9 x-4$ for her presentation. Help Dara by completing each of the following activities.

- Rewrite the function in factored form.

Then explain which key features of the graph this shows.

- Rewrite the function by completing the square.

Then explain the key feature of the graph this shows.

- Evaluate $f(0)$. Then explain the key feature of the graph this shows.
- Finally, sketch a graph of the function.

$\qquad$ Date:

17. A certain store manufactures and sells Item W . The financial advisor of the company determined that the function $P=-r^{2}+100 r-200$ models the monthly profit the store can expect to accrue from selling each Item W at any given price r .
a. Determine the maximum profit the store can expect per month, as well as the price they should sell each item for in order to attain as close to this profit as possible.
b. Assume the store sells each Item W for the price you determined in part A, but only generates a profit of $\$ 2000$ that month. Adjust the constant term in the model for the function $P$ so that it more accurately represents the profit generated.
c. Assume the store sells each Item W for $\$ 43$ and accrues a monthly profit of $\$ 1800$. Adjust the constant term in the model for the function $P$ so that it more accurately represents the profit.
18. A ball is kicked from the ground with an initial velocity in feet per second. The height of the ball can be modeled by the function $h=-.2 x^{2}+x+6$, where $x$ is the horizontal distance, in feet, from the point of impact of the kick.
a. Determine the vertex of the graph, and explain what the point represents.
b. If a receiver is 4 feet away from the ball, how high would he/she have to reach to catch the ball, and would he/she have to do so before or after the ball reaches its maximum height.
c. Assuming the ball's path is not interfered at all, how far away from the kicker would you expect the ball to land? Explain.
19. Place a check mark in all appropriate boxes for which the expression evaluates to an imaginary number, and fill in all appropriate boxes for which the expression evaluates to -1 . [Some boxes will be left blank.]
$3 i^{2}$$\left(i^{2}\right)^{3}$
$(1-\sqrt{-4})+i(2+i)$$(1+i)(1-i)$$i^{43}$$:(i-1)(i+1)+1)$
$-\sqrt{-9}$$i^{26}$
