Algebra 2 Worksheet

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MATH

Exponents and radicals

worksheet

1. Circle each expression that has the same value as $(-3/5)^2$.

$(-1)\left(\frac{3}{5}\right)^2$ $\quad$ $\frac{-9}{25}$ $\quad$ $\frac{3^2}{(-5)^2}$

$\frac{(-3)^2}{5^2}$ $\quad$ $\frac{-3^2}{5^2}$ $\quad$ $\frac{9}{25}$

2. Choose the simplified expression.

$$\frac{x^{\frac{1}{5}}y^{-3}z^0}{x^{\frac{3}{5}}y^2z^{-2}}$$

$\frac{z^2}{x^{\frac{2}{5}}y^5}$ $\quad$ $\frac{z^2}{x^2y^5}$ $\quad$ $\frac{1+z^2}{x^{\frac{2}{5}}y^5}$ $\quad$ $\frac{z^2}{x^{\frac{2}{5}}y^{-1}}$

3. Match each radical with a rational exponent.

$x^{\frac{2}{3}}$	$\sqrt[3]{x}$
$x^{\frac{3}{2}}$	$\sqrt{x^3}$
$x^{\frac{1}{2}}$	$\sqrt[3]{x^2}$
$x^{\frac{1}{3}}$	$\sqrt{x}$

4. Circle the simplified expression.

$$\sqrt{\frac{1}{16}}+\sqrt{\frac{2}{3}}+\sqrt{\frac{1}{6}}$$

$\frac{1}{4}+\sqrt{3}$ $\qquad$ $\frac{3\sqrt{6}}{4}$ $\qquad$ $\frac{1+2\sqrt{3}}{4}$ $\qquad$ $\frac{1+2\sqrt{6}}{4}$

5. Circle the first step at which a mistake is made in simplifying the expression.

$$\frac{1+\sqrt{3}}{1-\sqrt{3}}$$

Step 1: $\frac{(1+\sqrt{3})}{(1-\sqrt{3})}\cdot\frac{(1+\sqrt{3})}{(1+\sqrt{3})}$

Step 2: $\frac{(1+\sqrt{3})^2}{1-\sqrt{3}+\sqrt{3}-3}$

Step 3: $\frac{1+3}{1-3}$

Step 4: -2

Exponents and radicals

KEY POINTS	NOTES
Powers with negative bases	
Powers of fractions	
Zero exponent	
Negative exponents	
Fractional exponents	
Rationalizing the denominator	

Exponents and radicals

KEY POINTS

Rules about radicals

NOTES

Ratios and proportions

worksheet

1. There are 12 cats for every 8 dogs living in a city. If there are a total of $3{,}240$ cats and dogs in the city, how many dogs are there?

$1{,}080$ $1{,}296$ $1{,}944$ $2{,}160$

2. Solve the proportion for the unknown value.

$$\frac{3{,}136}{56} = \frac{224}{x}$$

3. Complete the table.

Fraction	Decimal	Percent
5/8		
	0.75	
		1%

4. A store purchased an item from the manufacturer for $\$42$ and then sold it to a customer for $\$49.98$. What was the percent markup that the store applied to the item?

$0.798\,\%$ $1.9\,\%$ $7.98\,\%$ $19\,\%$

5. Find the amount of interest earned in one year if the annual interest rate is $0.3\,\%$ and the principal balance is $\$2{,}000$.

6. Match each fraction on the left with its reciprocal on the right.

$\frac{1}{2}$	$-\frac{1}{2}$
-2	$-\frac{2}{3}$
$\frac{3}{2}$	2
$-\frac{3}{2}$	$\frac{2}{3}$

7. Circle any complex fractions.

$$\frac{2}{3} \qquad \frac{\frac{2}{3}}{4} \qquad -\frac{5}{\frac{4}{x}} \qquad \frac{\frac{x+2}{5}}{\frac{8}{x-1}}$$

8. True or false? Dividing a number by $4/5$ or multiplying the number by $5/4$ will give the same result.

9. Solve the equation for x.

$$\frac{\frac{x+2}{3}}{7} = \frac{2}{\frac{7}{4}}$$

10. Circle any expressions that are equivalent to the complex fraction.

$$\frac{\frac{2}{x-3}}{\frac{4}{x+5}}$$

$$\frac{2}{x-3}\cdot\frac{4}{x+5} \qquad \frac{2x+10}{4x-12} \qquad \frac{8}{(x-3)(x+5)} \qquad \frac{x+5}{2(x-3)}$$

11. Circle the simplifies version of $\sqrt{-64}$.

-8 $\pm 8i$ $8i$ $8i^2$

12. Match each power of i with its simplified form.

i^{102}	i
i^{73}	$-i$
i^{211}	-1
i^{1000}	1

13. Simplify the expression $5i^3 - 2i^2 + i^4 - i + 8 - \sqrt{-4}$.

14. True or false? The conjugate of $3 + 2i$ is $-3 - 2i$.

15. Circle the simplified expression.

$$\frac{i+1}{i-1}$$

1 0 -1 $-i$

Ratios and proportions

KEY POINTS	NOTES
Ratio	
Proportion	
Percent	
Convert percent to decimal	
Convert decimal to percent	
Convert fraction to percent	
Percent of a number	

Ratios and proportions

KEY POINTS

Percent markup

Percent markdown

Commission

Simple interest

Complex fractions

NOTES

Ratios and proportions

KEY POINTS

Reciprocal

Solving complex fractions

Imaginary number, i

Square of i

Complex number

Complex conjugate

NOTES

Factoring

worksheet

1. Circle the binomial factors of the quadratic $6x^2 + 13x + 6$.

$2x + 3$ $2x + 2$ $3x + 3$ $3x + 2$

2. What should A be to allow us to factor the polynomial $5x^3 + 20x^2 + Ax + 8$ by grouping?

4 -4 2 -2

3. True or false? The binomial $64x^6 - 1$ could be factored both as a difference of cubes or as a difference of squares.

4. Match the binomial in standard form with its factored form.

$x^3 + 1$	$(x - 1)(x^2 + x + 1)$
$x^3 - 1$	$(2x + 3)(4x^2 - 6x + 9)$
$8x^3 - 27$	$(x + 1)(x^2 - x + 1)$
$8x^3 + 27$	$(2x - 3)(4x^2 + 6x + 9)$

5. Which quadratic would have roots $x = -1$ and $x = 6$?

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

Factoring

KEY POINTS

Factoring quadratics when $a \neq -1,1$

Factor by grouping

Difference of two cubes

Sum of two cubes

NOTES

Rational functions

worksheet

1. Circle the remainder after dividing $3x^3 - 2x^2 - 5x + 7$ by $3x + 4$?

$3x + 4$ $\quad$ $\dfrac{11}{3x+4}$ $\quad$ $x^2 - 2x + 1$ $\quad$ $\dfrac{3}{3x+4}$

2. What is the greatest common factor by which all terms can be reduced?

$$\frac{2xy^3 - 4x^2y^5}{8xy^2}$$

3. What is the least common denominator for the sum?

$$\frac{8}{9x^4y} + \frac{8}{6x^2y^3}$$

4. Circle the simplified expression.

$$\frac{4x}{x^2 - 16} \cdot \frac{x^2 - 5x + 4}{2x^2 + 2x - 4}$$

$\dfrac{1}{x+4}$ $\quad$ $\dfrac{2x}{(x+4)(x+2)}$ $\quad$ $\dfrac{1}{2x+4}$ $\quad$ $\dfrac{4x}{(x+4)(x+2)}$

5. Circle all of the values that should be excluded from the domain.

$$\frac{x+4}{x-3} \div \frac{x^2-1}{x}$$

$x \neq 3$ $x \neq -4$ $x \neq 1$ $x \neq -1$

$x \neq 2$ $x \neq -3$ $x \neq 4$ $x \neq 0$

Rational functions

KEY POINTS

Long division of polynomials

Simplifying rational expressions

Adding or subtracting rational expressions

Multiplying rational expressions

Dividing rational expressions

NOTES

Advanced equations

worksheet

1. Label each scenario as direct variation, inverse variation, or neither.

   The number of songs downloaded on your phone, and the amount of memory you have left. _____

   The number of shoes you buy, and the cost of your bill.

   _____

   The number of pets you have, and your grade in English.

   _____

2. Solve the equation for x.

   $0.01x - 0.5x + 0.078 = -1$

   $x = -1.88$ $x = 1.88$ $x = 2.2$ $x = 2.695$

3. Circle the solution(s) of the equation.

   $$\sqrt{x-4} = \frac{1}{5}x$$

   $x = 4$ $x = 5$ $x = 20$ no solution

4. True or false? If $2a + 3b - 5c = 12$, then the values of a, b, and c are

   $$a = \frac{-3b + 5c + 12}{2} \qquad b = \frac{-2a + 5c + 12}{3} \qquad c = \frac{2a + 3b - 12}{5}$$

5. Gwen can bike 30 miles in 2 hours. How far can she travel at this same pace if she bikes for 5.5 hours?

15 miles 52.5 miles 82.5 miles 165 miles

Advanced equations

KEY POINTS	NOTES
Direct variation	
Inverse variation	
Solving decimal equations	
Solving fraction equations	
Extraneous solutions	

Advanced equations

KEY POINTS

Solving multivariable equations

NOTES

Systems of equations

worksheet

1. Solve the system of equations for x_1 using any method.

$$2x_1 - x_2 = 12 \qquad \frac{1}{5}x_1 + \frac{1}{2}x_2 = 0$$

$x_1 = -2$ $\quad$ $x_1 = 0$ $\quad$ $x_1 = 5$ $\quad$ $x_1 = 10$

2. True or false? There can be either 0, 1, or 2 solutions between the graph of a circle and a quadratic.

3. Two even consecutive integers have a sum of 66. Circle the equation that must be true, with n representing the lesser of the two numbers.

$2n + 2 = 66$ $\quad$ $2n + 1 = 66$ $\quad$ $n + 2 = 66$ $\quad$ $n^2 + 2n = 66$

4. Four years ago, Bethany was 15 years older than Mackenzie, and Mackenzie was 3 years younger than twice Jared's age. Now, Jared is 10 years younger than Mackenzie. How old is Bethany now?

36 $\quad$ 38 $\quad$ 42 $\quad$ 40

5. Solve the system of equations using any method.

$x + y + z = 11$ $\quad -2x + 2y - z = 3$ $\quad 2x - y + 2z = 13$

Systems of equations

KEY POINTS

Variables with subscripts

Uniform motion

Solution to systems of equations

Consecutive integers

Consecutive even integers

Consecutive odd integers

Systems of three equations

NOTES

Graphing

worksheet

1. Circle each line that's perpendicular to $6x - 2y = 4$.

$$y = 6x - 2 \qquad y = -\frac{1}{3}x + 3 \qquad -3y = x - 1 \qquad y = 3x + \frac{1}{2}$$

2. What will be the value of k after converting $y = 2x^2 - 4x + 1$ to vertex form, $y = a(x - h)^2 + k$?

3. What's the distance from the center in Circle A, $(x - 3)^2 + (y + 1)^2 = 4$, to Circle B, $(x + 5)^2 + (y + 3)^2 = 9$?

$$\sqrt{5} \qquad 5 \qquad 2\sqrt{15} \qquad 2\sqrt{17}$$

4. True or false? If a circle has one end of its diameter at $(-5,3)$, and the other end at $(1,3)$, then the equation of the circle would be $(x + 2)^2 + (y - 3)^2 = 9$.

5. Use the function $f(x)$ to calculate each value.

$$f(x) = \begin{cases} -x + 1 & x < -4 \\ 5 & -4 < x \leq 3 \\ -2x + 11 & x > 3 \end{cases}$$

$f(-10) =$ _____

$f(3) =$ _____

$f(4) =$ _____

Graphing

KEY POINTS	NOTES
Parallel lines	
Perpendicular lines	
Standard form of a quadratic	
Axis of symmetry of a quadratic	
Vertex form of a quadratic	
Standard form of a circle	
Distance formula	

Graphing

KEY POINTS

Piecewise function

Story problems and horizontal lines

Story problems and positive slope

Story problems and negative slope

NOTES

Manipulating functions

worksheet

1. For $f(x) = x^2 + 4$ and $g(x) = \sqrt{x} - 1$, match each function to its value.

$(f+g)(1)$	0
$(g-f)(1)$	4
$(g \cdot f)(1)$	5
$(f(g(1)))$	-5

2. Circle the statement that's always true.

$f(g(x)) = g(f(x))$ $\qquad$ $(f \cdot g)(x) = (g \cdot f)(x)$ $\qquad$ $(f-g)(x) = (g-f)(x)$

3. Fill every cell in the table with "Yes" or "No."

	Passes the VLT	Passes the HLT	Is One-to-One
$y^2=x$			
$y=x^3$			
$y=x^2$			

4. Is the inverse of $f(x) = (x-2)^3 + 4$ always $f^{-1}(x) = \sqrt[3]{x+2} - 4$?

5. The vertex of $f(x)$ is at $(3, 2)$ and $f(1) = 6$. Circle all outputs of $f^{-1}(11)$.

-3 $\qquad$ 0 $\qquad$ 3 $\qquad$ 6

Manipulating functions

KEY POINTS

Sum function

Difference function

Product function

Quotient function

Composite function

Domain of a composite function

One-to-one function

Horizontal line test

Inverse function

NOTES

Exponential and logarithmic functions

worksheet

1. If $\log_b a = x$, circle the equation that must be true.

$b^a = x$ $\quad$ $x^a = b$ $\quad$ $b^x = a$ $\quad$ $a^x = b$

2. Match each log expression on the left to its value on the right.

$\log 1{,}000$	0
$\ln e^4$	5
$\log_5 1$	1
$\log_2 32$	3
$\ln e$	4

3. Circle the inverse $f^{-1}(x)$ of the function $f(x) = \log_b(x+4)$.

$f^{-1}(x) = b^x - 4$ $\quad$ $f^{-1}(x) = x^b - 4$ $\quad$ $f^{-1}(x) = b^{x-4}$ $\quad$ $f^{-1}(x) = b^x + 4$

4. If $\log_8 2 + \log_8(4x) = 1$, circle all statements that must be true.

$\log_8(2+4x) = 1$ $\quad$ $x = 1$ $\quad$ $\log_8(8x) = 1$ $\quad$ $\log_8(4x) = \frac{2}{3}$

5. If $\log_a b = 5$ and $\log a = 2$, then circle the value of $\log b$.

0.2 $\quad$ 3 $\quad$ 7 $\quad$ 10

Exponential and logarithmic functions

KEY POINTS

Exponents

Logarithms

Base of a logarithm

Argument of a logarithm

Common logarithm

Natural logarithm

Product rule

Quotient rule

Power rule

NOTES

Exponential and logarithmic functions

KEY POINTS

Change of base

NOTES

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