Practice Final CPM

Tuesday, June 4, 2019 10:29 AM

Practice Final Exam
2nd Semester

Algebra 1

NAME _____ DATE _____ PERIOD _____

Math Department

Common Core State Standards:

N.RN. 2: Rewrite expressions involving radicals and rational exponents using properties of exponents.
A-SSE 1a: Interpret the structure of expressions
A.SSE.3a: Factor a quadratic expression to reveal the zeros of the function it defines.
A.-APR 3: Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function.
A-CED 2: Create expressions or equations that describe numbers or relationships.
A-CED 3: Systems of Equations and inequalities interpret solutions as viable or nonviable options in a modeling context.
A-REI 1: Understand solving equations as a process of reasoning and explain the reasoning.
A-REI 3: Solve equations and inequalities in one variable.
A.REI 4a: Solve quadratic equations in one variable, by inspection, taking square roots, completing the square, quadratic formula and factoring.
A-REI 4b: Solve by quadratic equations by inspection, taking square roots.
A-REI 6: Solve systems of linear equations exactly and approximately.
A-REI 12: Represent and solve equations and inequalities graphically.
F.IF 4: Interpret functions that arise in applications, relative max and min, symmetry, end behavior in context.
F.IF 6: Calculate and interpret average rate of change of a function.
F.IF 7a: Graph quadratic functions and show intercepts, maxima, and minima.
F.IF 8a: Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph.
F-BF 1a: Build a function that models a relationship between two quantities.
F.LE 6: Apply quadratic equations to physical problems, such as the motion of an object under gravity.

Instructions to Student: You must ***JUSTIFY/EXPLAIN*** all your answers.

1. Use the **substitution** method to solve the linear system.

$y = x - 2$
$3x + y = 10$

$3x + (x-2) = 10$
$3x + x - 2 = 10$
$4x - 2 = 10$
$+2 \quad +2$
$4x = 12$
$x = 3$

$y = 3 - 2$

$(3, 1)$

2. Use the **substitution** method to solve the linear system.

$x + 10y = 13$
$3y = 15$
$\frac{3y}{3} = \frac{15}{3}$
$y = 5$

$x + 10(5) = 13$
$x + 50 = 13$
$-50 \quad -50$
$x = -37$

$(-37, 5)$

3. Solve the following linear system of equations using **any valid method**.

$3p + 2q = -1$
$4p + 2q = -6$ subtract

$-1p = -1 - -6$
$-p = 5$
$p = -5$

$3(-5) + 2q = -1$
$2q = -1 + 15$
$2q = 14$
$q = 7$

(p, q)
$(-5, 7)$

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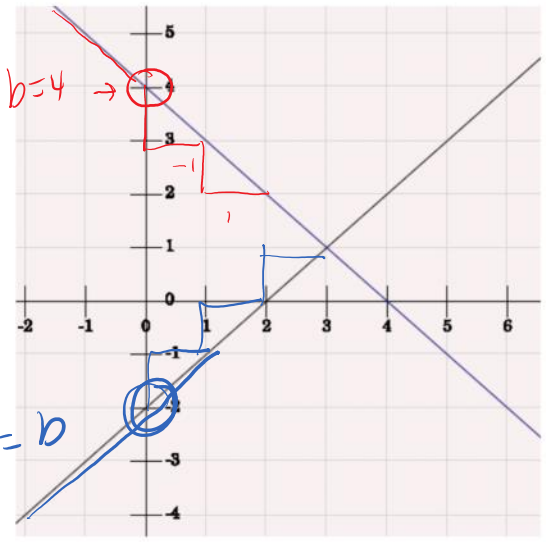
4. Write a linear system of equations for the given graph. Write the equations in standard form Ax + By = C.



$y = -1x + 4$

$+1x \quad +1x$

$1x + y = 4$

$y = 1x - 2$

$-1x \quad -1x$

$-1x + y = -2$

$x - y = 2$

5. Two groups of people went to see Avatar in IMAX 3-D. The first group spent $65.50 on two adult and three children tickets. The other group spent $110.50 on five adult and two children tickets. Write a system of linear equations for this scenario.

Let A = number of Adults
C = number of children

Group A	Group B
$65.50 = 2A + 3C$	$110.50 = 5A + 2C$

6. Solve the linear system in Exercise #5 above using **any valid method** for solving linear systems. Determine the cost of an adult ticket and the cost of children ticket.

$65.50 = 2A + 3C$ $\times -2$ → $-131 = -4A - 6C$

$110.50 = 5A + 2C$ $\times 3$ → $331.5 = 15A + 6C$

$200.5 = 11A$

$A = \$18.23$ Adult ticket.

$65.50 = 2(18.23) + 3C$

$\$9.68 = C$ children tickets

7. Solve the linear system using **linear combination**.

$8x + 5y = 38$

$+ \quad -8x + 2y = 4$ Add

$7y = 42$

$y = 6$

$8x + 5(6) = 38$

$x = 1$

$(1, 6)$

8. Solve the linear system using **linear combination**.

$6y + 8 = -2x$

$-3y = -x + 8$

Rearrange 1st.

$+x \quad +x$

$-3y = -2 + 8$

$-3y = 6$

$y = -2$

$2x + 6y = -8$

$(x - 3y = 8) \times 2 \Rightarrow 2x - 6y = 16$

$4x = 8$

$x = 2$

$(2, -2)$

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9. Solve the linear system using **any valid method**.

$-4j + 2k = 0$

$2j - 3k = 16$

(j, k)

(-4, 8)

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10. You are offered two different jobs. Job A offers an annual salary of $24,000 plus a bonus of 4% of sales. Job B offers an annual salary of $30,000 plus a bonus of 2% of sales. Write a set of functions that represents each job offer?

Let x = Sales amount Let y = Salary amount

Job A

$y = 4\%x + 24{,}000$

$y = .04x + 24{,}000$

Job B

$y = 2\%x + 30{,}000$

$y = .02x + 30{,}000$

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11. Refer to question number 10. How much would you have to sell to earn the same amount in each job?

same

$.04x + 24{,}000 = .02x + 30{,}000$ Equal Values method

$x = \$300{,}000$

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12. The solution to a system of linear equations is a point that makes all the equations in the system true. Graphically, the solution of a system of linear equations is the point of intersection

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13. Given the inequality $y \geq -\frac{4}{5}x - 7$, determine the steps that need to graph the inequality.

$\geq$

Solid line

$y = -\frac{4}{5}x - 7$ Graph the related equation.

C

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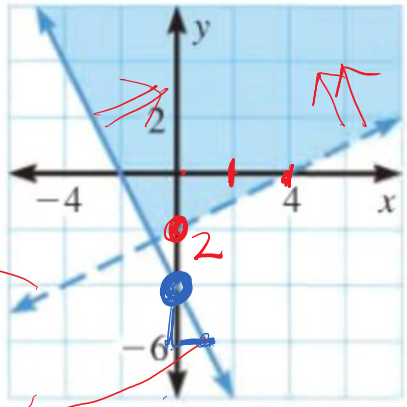
14. Write a system of linear inequalities that defines the shaded region. Write the linear system of inequalities in slope-intercept form $y = mx + b$, remember to use the correct inequality symbol.



$y = mx + b$

$y = \frac{2}{4}x + 2$

$y > \frac{1}{2}x + 2$

$y \geq -2x - 4$

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15. Andrew can work a total of no more than 25 hours per week at his two jobs. He makes $9 an hour tutoring and $7 an hour as a waiter. Andrew needs to earn at least $180 per week to cover his expenses. The system of inequalities that represents this situation, where $\boldsymbol{x}$ = the number of hours tutoring and $\boldsymbol{y}$ = the number of hours as a waiter, is:

$$Hours: x + y \leq 25$$
$$Money: 9x + 7y \geq 180$$

Which of the following is possible way Andrew can divide her hours between the two jobs?

A. 3 hours tutoring and 21 hours as a waiter
B. 5 hours tutoring and 20 hours as a waiter
C. 6 hours tutoring and 21 hours as a waiter
D. 10 hours tutoring and 11 hours as a waiter
E. None of these

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16. Use the property of exponents to simplify the following expression $(9)^{-5} \bullet (9)^{7}$. Write your answer in exponential notation.

Add the exponents

$(9)^{-5+7}$

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17. Use the property of exponents to simplify the following expression $\left(m^{-8}\right)^{5}$.

Power to power mult Exp

$m^{-8 \cdot 5} = m^{-40} = \frac{1}{m^{40}}$

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18. Use the property of exponents to simplify the following expression $\left(\frac{-7}{14}\right)^{4} = \left(\frac{-1}{2}\right)^{4} = \frac{+1}{2^4} = \frac{1}{16}$

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19. Evaluate the expression $\dfrac{(2x^3)^2 \cdot (x^6)^5}{}$

$2^2 x^{3\cdot 2} \cdot x^{6\cdot 5}$

$4x^6 \cdot x^{30} \Rightarrow 4x^{36}$

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20. Find the volume of a cube whose side length is $4y$, using the formula $V = s^3$.

$V = (4y)^3$

$V = 64y^3$

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21. Evaluate the expression $\left(\dfrac{12}{-3w^{-8}}\right)^{-3} =$ Reciprocal

$\left(\dfrac{-3w^{-8}}{12}\right)^3 \Rightarrow \left(\dfrac{-1\,w^{-8}}{4}\right)^3 = \left(\dfrac{-1}{4w^8}\right)^3 = \dfrac{-1}{4^3 w^{8\cdot 3}} = \dfrac{-1}{64w^{24}}$

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22. Evaluate the expression $-6\left[(-3x^0a^5b^{-4}\right]^{-6}$

$-6\left[1 \cdot a^5 b^{-4}\right]^{-6}$

$-6\left[\dfrac{a^5}{b^4}\right]^{-6} = -6\left[\dfrac{b^4}{a^5}\right]^6 = -6\left[\dfrac{b^{24}}{a^{30}}\right] \quad \dfrac{-6b^{24}}{a^{30}}$

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23. Rewrite the expression $\left(\dfrac{35x^{-6}y^8}{18x^{-8}y^6}\right)^{-2}$ with positive exponents.

$\left(\dfrac{7x^8}{3x^6y^6}\right)^{-2} \quad \left(\dfrac{7x^2}{3y^6}\right)^{-2} = \left(\dfrac{3y^6}{7x^2}\right)^2 = \dfrac{9y^{12}}{49x^4}$

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24. Light travels at approximately 3.0×10^8 m/sec. How far does light travel in two minutes?

Hint use the distance formula, $d = rt$.

120 secs.

$d = (3.0 \times 10^8)(120\text{sec})$

$= (300000000)(120) = 36000000000$

3.6×10^9

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25. Find the exponential equation that is represented in the given table of values?

Hint: exponential functions are in the form $y = ab^x$

$y = 3\left(\frac{2}{3}\right)^x$

a = y-int

x	-2	-1	0	1	2
y	$\frac{27}{2}$	$\frac{9}{2}$	3	2	$\frac{4}{3}$

$\frac{2}{3}$

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26. Find the missing exponent in the following statement, $\left(\dfrac{y^?}{x^5}\right)^{-5} = \dfrac{x^{25}}{y^{10}}$.

$(y^2)^5 = y^{10}$

$? = 2$

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27. Simplify the expression $\frac{32x^2y}{4x^{-1}y^{-3}} \cdot \left(\frac{16xy^2}{12x^4y^{-1}}\right)^{-2} =$

$8x^3y^4 \cdot \left(\frac{4y^3}{3x^3}\right)^{-2}$ $\quad 8x^3y^4 \cdot \left(\frac{3x^3}{4y^3}\right)^2 \Rightarrow \frac{9x^9}{2y^2}$

28. Solve the following exponential equations $4^{3x+2} = 1024$

$4^{3x+2} = 4^5$ $\quad 3x+2=5$ $\quad x=1$

$4(4)^y = 16$ $\quad 4^{2y} = 4^2$ $\quad 2y=2$ $\quad y=1$

$3^3(3^{3x}) = 9$ $\quad 3^{3+3x} = 3^2$ $\quad 3+3x=2$ $\quad 3x=-1$ $\quad x=\frac{-1}{3}$

29. In 2010 you purchase a new car for \$30,000. The value of the car depreciates by 7% every year. What will the approximate value of the car be in 2014?

Hint: Exponential decay formula is $y = C(1-r)^t$ ← time; initial value; rate

$y = 30{,}000(1-0.07)^{(2014-2010)}$

$y = 30{,}000(.93)^4$

30. What is the exponential equation of the graph?

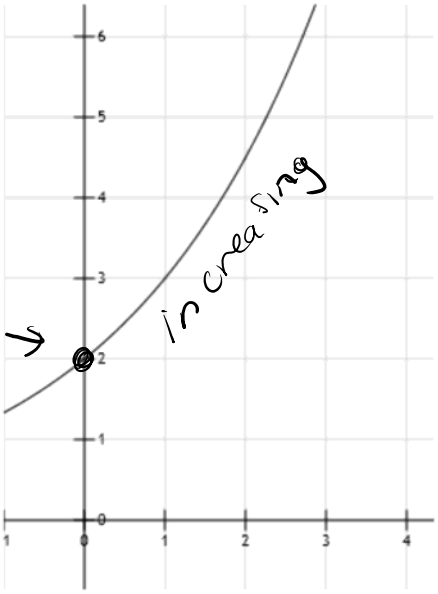
Hint: Exponential Equations are of the form $y = ab^x$

A. $y = 2^x$ ← larger than 1 increasing

B. $y = 2(1.05)^x$

C. $y = 2(1-0.05)^x$ ← going to be smaller than 1 decreasing.

a



31. Find $f(x)-g(x)$, if $f(x) = (-2x^2+3x-7)$ and $g(x) = (2x^2-3x+10)$, then write your answer in standard form.

$(-2x^2+3x-7) - (2x^2-3x+10)$

$(-2x^2+3x-7) - 2x^2 + 3x - 10$

$-4x^2 + 6x - 17$

$-4x^2+6x-17$