Algebra 2 H 2024 Summer Packet Name _____

Please bring in a hard copy of this packet on the first day of school.

Calculators: Although students enrolled in any algebra course should have a graphing calculator (a ***TI -84 or 84+***), these problems should be solved without using a calculator.

Complete the packet in PENCIL. Follow the directions in the packet and complete all exercises, neatly SHOWING ALL your work in the packet. Be prepared for an assessment of this material the first week of school after your teacher goes over it with you.

1. Evaluate:

   a) $-2^4 =$ _____ b) $(-2)^4 =$ _____

2. Evaluate **without** a calculator (PEMDAS):

   a) $(17 - 6 \div 2) + (10^2 \cdot 3)$

   b) $8 - 5 \cdot 2^2 - 5(6 - 2)$

   c) $14 \div [3(8 - 2) - 11]$

   d) $\frac{100-15}{9+8}$

   e) $32 \div (-7 + 5)^3$

   f) $\frac{1}{8} - \left(-\frac{12}{7}\right)$

   g) $5 - (-5) + |-9 + 7|$

3. Evaluate the expression for the given values for the variables:

   a) $6h^2 \div 2 + h \ \ when \ \ h = -2$

   b) $x^3 + 4 \quad when \ \ x = -5$

   c) $x^3 + 5y \quad when \ \ x = 4 \ and \ y = -3$

   d) $\frac{y - 7x}{6x+xy} \quad when \ x = -2 \ and \ y = 3$

   e) $x - \frac{8y}{3} \ \ when \ \ x = \frac{1}{2} \ and \ y = -\frac{9}{8}$

4. Simplify:

a) $2y^2 + 3y - 5y^2 + y^5 + y$

b) $3(b + 4) - (7 - b)$

c) $2(x^2 + 3x) - x(x - 4)$

d) $2x - (x^2 + 4) + 4x(x - 7)$

5. Solve for the variables:

a. $-4k + 2(5k - 6) = -3k - 39$

b. $3(x + 4) = 3x + 11$

c. $10 + x = 5\left(\frac{1}{5}x + 2\right)$

d. $-\frac{11}{2} = -2\frac{1}{3} + 3\frac{1}{6}k$

e. $3 - 4(2n - 5) = 71$

6. Solve the system using elimination: $\begin{cases} 3x + 2y = 8 \\ 4x - 3y = -12 \end{cases}$ $x =$ _____ $y =$ _____

7. Solve the system using substitution: $\begin{cases} y = 2x - 8 \\ 2x + 4y = 28 \end{cases}$ $x =$ _____ $y =$ _____

8. Solve the system using any method: $\begin{cases} 6x - 3y = 12 \\ -4x + 2y = -8 \end{cases}$ $x =$ _____ $y =$ _____

9. Define the variables and write the system of equations.

   a) A park charges $\$10$ for adults and $\$5$ for kids. How many adult tickets and kid tickets were sold, if a total of 548 tickets were sold for a total of $\$3750$?

10. Re-writing Formulas. Solve the formula for the indicated variable:

a) w; $P = 2l + 2w$

example: x; $\frac{1}{2}x + y = 6$

$2(\frac{1}{2}x + y) = (6)2$

$x + 2y = 12$

$-2y \quad -2y$

$x = -2y + 1$

b) b; $y = mx + b$

c) h; $V = \frac{1}{3}\pi r^2 h$

d) °C; $°\text{F} = \left(\frac{9}{5}\right)°\text{C} + 32$

Equations of a line:

- Slope-Intercept Form _____
- Point-Slope Form _____
- Standard Form _____

11. Write the equation of a line in **slope-intercept form** that passes through the points $(-1, -2)$ *and* $(2, 7)$. *Hint: Find the slope first.*

12. Write an equation of a line that passes through the point $(1, -5)$ and is **perpendicular** to $y = \frac{1}{8}x + 2$.

13. Write an equation of a line that passes through the point $(2, -1)$ and is **parallel** to $y - 2 = -\frac{2}{5}(x + 1)$.

14. Write an equation of the line in **point-slope form** that passes through $(5, 4)$ and has a slope of -3.

15. Solve the absolute value function for the variables:

a) $|12 + 2x| = 6$ $x =$ _____ *or* $x =$ _____

example: $|x + 8| - 5 = 2$

$+5 \quad +5$

$|x + 8| = 7$

$x + 8 = 7$ *or* $x + 8 = -7$

$-8 \quad -8 \qquad -8 \quad -8$

$x = -1$ *or* $x = -15$

b) $|5y - 8| = 1$ $x =$ _____ *or* $x =$ _____

16. Solve and graph the solution set:

An open circle (◯) indicates "less than" or "greater than" while a closed circle (●) indicates "greater than or equal to" or "less than or equal to".

Example: $8r + 6 < 9r$

$-8r \quad -8r$

$6 < r$

$\boxed{r > 6}$

a) $3x + 2 > 11$

b) $x + 3 \leq 5$

c) $-2x - 10 < -12$

17. Solve the inequalities and compound inequalities for the variable:

a. $2(x - 4) > 4x + 6$

b) $21x + 7 < 3x + 16$

c) $2 < 3x - 1 \leq 6$

d) $2 + 3x < -13 \; or \; 4 + 2x > 7$

18. Exponent Rules Review

NOTE: Anything to the zero power equals 1!

Product Rule: When multiplying monomials that have the same base, add the exponents.

$x^m \cdot x^n = x^{m+n}$ Example 1: $x \cdot x^3 \cdot x^4 = x^{1+3+4} = x^8$

Power Rule: When raising monomials to powers, multiply the exponents.

$(x^m)^n = x^{m \cdot n}$ Example 3: $(x^2y^3)^4 = x^{2 \bullet 4} y^{3 \bullet 4} = x^8y^{12}$

Quotient Rule: When dividing monomials that have the same base, subtract the exponents.

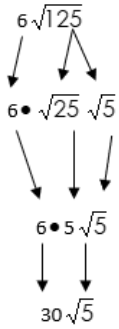
$\frac{x^m}{x^n} = x^{m-n}$ Example 5: $\frac{x^3}{x^{-2}} = x^{3-(-2)} = x^5$

a) $\frac{b \cdot a^2}{a^3 b^2}$ b) $(x^2y^3z)^7$ c) $\frac{m^6}{m^7}$ d) $(6x^4y^6)^3$

e) $\frac{9a^3b^5}{-3ab^8}$ f) $\left(\frac{3m^2n^7}{m}\right)^5$ g) $6x^5 \cdot 3x^5 \cdot x^0$ h) $\frac{x^{-1}}{4x^4}$

19. Simplify each expression (*Hint: look for perfect squares)* **Leave in simplest radical form - NO DECIMALS**:

a. $\sqrt{512}$ b) $-5\sqrt{294}$ c) $6\sqrt{144}$



d) $\sqrt{29} \cdot \sqrt{29}$ e) $\sqrt{8} \cdot \sqrt{6}$ f) $\sqrt{216}$

g) $\sqrt{39}$ h) $\sqrt{25x^2}$ i) $\sqrt{175x^2y^3}$

20. Rationalize the denominator (no radicals in the denominator) **Leave in simplest radical form – NO DECIMALS**:

a) $\frac{2}{\sqrt{3}}$

example: $\frac{2\sqrt{3}}{\sqrt{2}} \rightarrow \frac{2\sqrt{3}}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{6}}{\sqrt{4}} = \frac{2\sqrt{6}}{2} = \boxed{\sqrt{6}}$

b) $\sqrt{\frac{3}{4}}$

c) $\frac{\sqrt{3}}{6\sqrt{7}}$

d) $\frac{\sqrt{5}}{\sqrt{2}}$

e) $\frac{3\sqrt{30}}{5\sqrt{6}}$

f) $\frac{\sqrt{2}}{\sqrt{12}}$

h) $\frac{5}{\sqrt{7}}$

21. Factor the equations. (*Hint: Do they have a common factor that can be factored out first – GCF)*

a) $x^2 - 4x - 5$

b) $9y^2 - 16$

example: $6n^2 - 18n + 12$

$\div 6 \quad \div 6 \quad \div 6$

$6\ (n^2 - 3n + 2)$

$6\ (n - 2)(n - 1)$

What two factors multiply to +2 and add to -3 → -2 & -1

GCF = 6 so divide out 6 from each term in the expression

c) $30p^2 + 25p - 20$

d) $x^2 - 14x + 49$

e) $8x^3 - 64x$

22. Solve each equation by factoring.

a) $x^2 + 2x - 8 = 0$ b) $x^2 - 4 = 0$ c) $2x^2 + 13x = -15$

23. Solve the quadratic function by the **square root method**. Leave your answer in **simplified radical form** if applicable.

a. $x^2 - 64 = 0$ b) $-4x^2 + 84 = 4$ c) $7x^2 = -21$

d) $9(m-3)^2 + 8 = 449$ e) $(6t+2)^2 + 4 = 28$

24. Write an algebraic model representing the problem. Then solve.

a) The length of a rectangle is twice that of the width. The perimeter of the rectangle is 24 cm. What is the width of the rectangle?

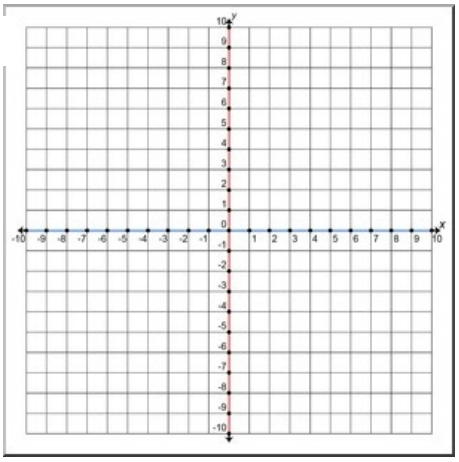
model _____

25. Graphing Linear Equations:

a) Graph $2x + 3y = 6$ using the x and y *intercepts*

$x =$ _____ $y =$ _____

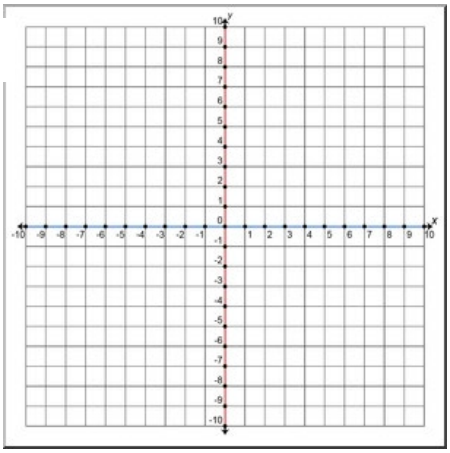
a



b & c

b) Graph $x - 3 = 0$ in red and state the slope: _____

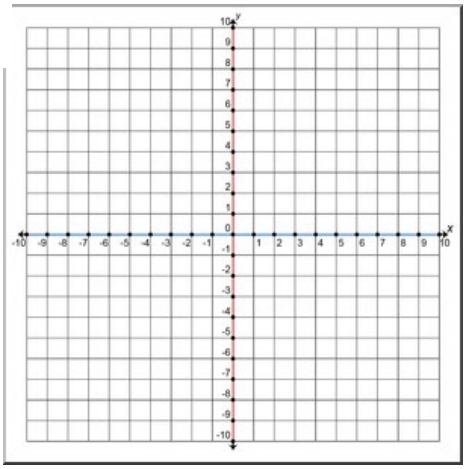
c) Graph $y + 4 = 0$ in blue and state the slope: _____



d

d) Graph $3x - \frac{1}{2}y = 2$ using slope-intercept form.

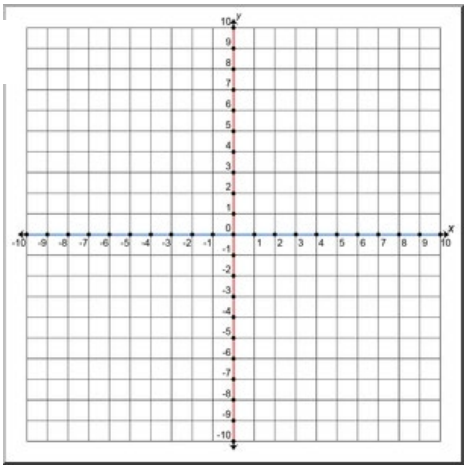
Slope = _____ y-intercept = _____



e) Graph $6x + 24 = -12y$ using any method.

Slope = _____ y-intercept = _____-

e



26. Application Problems.

a) A rectangular garden has a length of $x + 8$ units and a width of $x - 4$ units. Draw a diagram and label the dimensions. Find the **expression** for the area.

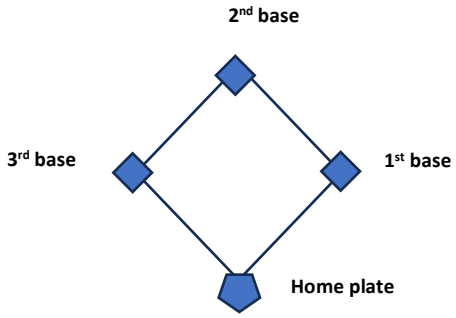
b) The area of a rectangular frame is $216\ cm^2$. The frame is $6\ cm$ longer than it is wide. Find the dimensions of the frame.

c) The length of a rectangular garden is two feet less than 3 times the width. If the area is $65\ ft^2$, find the dimensions of the garden.

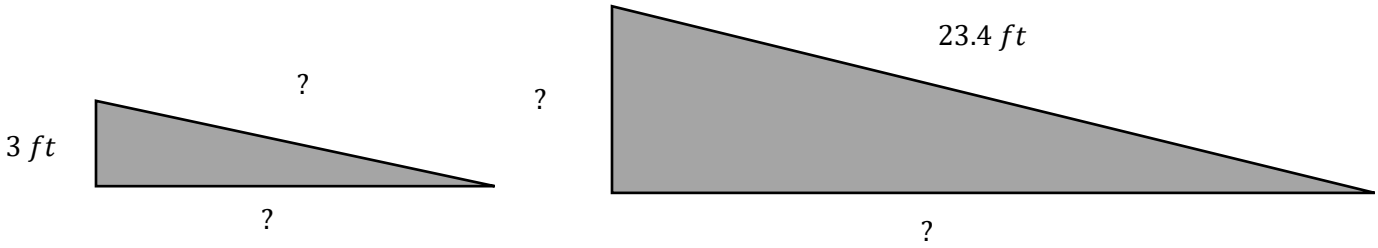
d) Jack uses propane to heat his house. Over a 30-day period, the amount of propane in his tank decreases from $400\ gallons$ to $214\ gallons$. What is the average rate of change in the amount of propane?

27. Right Triangle Word Problems. Solve for the variables.

a. A baseball diamond has four right angles and four equal sides. Each side is $90\ feet$. What is the shortest distance between home plate and second base? Round your answer to the nearest tenth.



b. For entrances to be accessible to all, ramps are being put in place in two different buildings. One will be smaller than the other, however, both ramps must be proportional in a $3:1$ ratio. Two measurements are provided below. What are the measurements of the other sides?



c. Lorena and Karla are creating an art project in the shape of a right triangle. They have a $92\ cm$ long piece of wood, which is to be used for the hypotenuse. The two legs of the triangular support are of **equal length**.

Approximately how many more centimeters of wood do they need to complete the support.

Looking forward to a great year!