Summer Enrichment Packet

for

Students going into

Geometry S-Path

Sept. 2023

This summer packet is intended to help students retain the mathematical skills and knowledge they have acquired during the school year, preventing the loss of academic progress.

While completion of this packet is not mandatory, we strongly recommend students utilize this packet. Practicing skills reinforces students' understanding of concepts that they may have struggled with during the school year, helping them to start the new year with a stronger foundation. It can also help students prepare for the challenges of the upcoming school year, and promote problem-solving skills, logical reasoning, and critical thinking abilities, which are valuable not just in math, but in many other areas of life.

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You will need a TI-84$^+$ calculator for this class.

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Supply List for Geometry

- TI-84$^+$ calculator
- Pencils/pens
- Colored pencils
- 3 ring binder (can be shared with another class), paper, graph paper
- Protractor
- Quality compass -- Compasses with a wheel between the arms are strongly preferred, as they prevent slippage, which is important for successful constructions.

Show all work! Do **NOT round** any answers. Write the answers as a **fraction** if the **decimal is repeating,** or the **calculator does not show the whole decimal**.

Evaluate each expression. Find the answer and <u>show your work</u>. Remember Order of Operations: Grouping, **E**xponents, **M**ultiplication and **D**ivision, then **A**ddition and **S**ubtraction, all from left to right.

1. $40 - \frac{20 - 3(5)}{5} + 3(2 - 6)^2 =$

2. If a = 6, b = – 2, and c = 8, then $\frac{2(a - c)}{b + 4}$ = _____.

Translate into algebra.

3. Five times a certain number is half a different number.

Simplify. Show all your work. Remember, you need an LCD to add or subtract fractions.

4. $\frac{7}{9}-\frac{4}{5}=$

5. $\frac{6}{5}+2\frac{5}{8}=$

6. $\frac{8}{9}\div\frac{2}{3}$

7. $\left(\frac{-5}{7}\right)\left(\frac{3}{10}\right)=$

Simplify each expression.

8. $7b - 6c - 3c =$

9. $(n^6)(n^4) =$

10. $\frac{c^{50}}{c^{40}} =$

11. $\frac{12a^6}{4a}$

Solve each equation. <u>Show all your work</u> and CHECK!

12. $6x = -3x + 7$

13. $4h = -2(3h + 5)$

14. $18 = -3y$

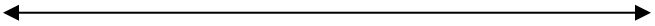
15. $\frac{x}{-5} = 8$

16. $-5(3 - x) = 3x + 1$

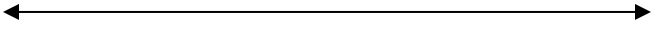
Solve each inequality and graph the solution on a number line. Show all your work.
Remember, if you multiply or divide by a negative number you must switch the direction of the inequality sign.

17. $x - (-4) > 9$

18. $\frac{x}{-2} < 3$

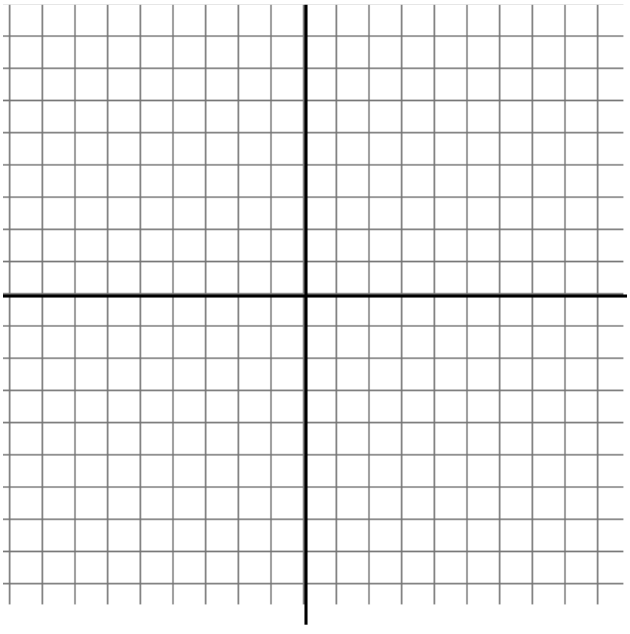


19. $3n + 5 \geq -4$



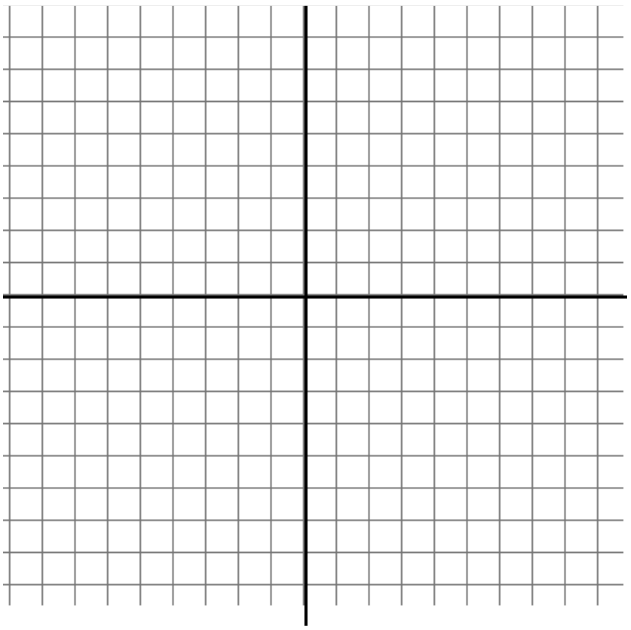
Graph the equation. Use a table or the slope-intercept method, y = mx + b.

20. $y = -2x + 3$ slope: _____ y-intercept: _____



Graph the inequality. Don't forget to shade the solution area and to show your <u>check</u>.

21. $y < 2x - 3$

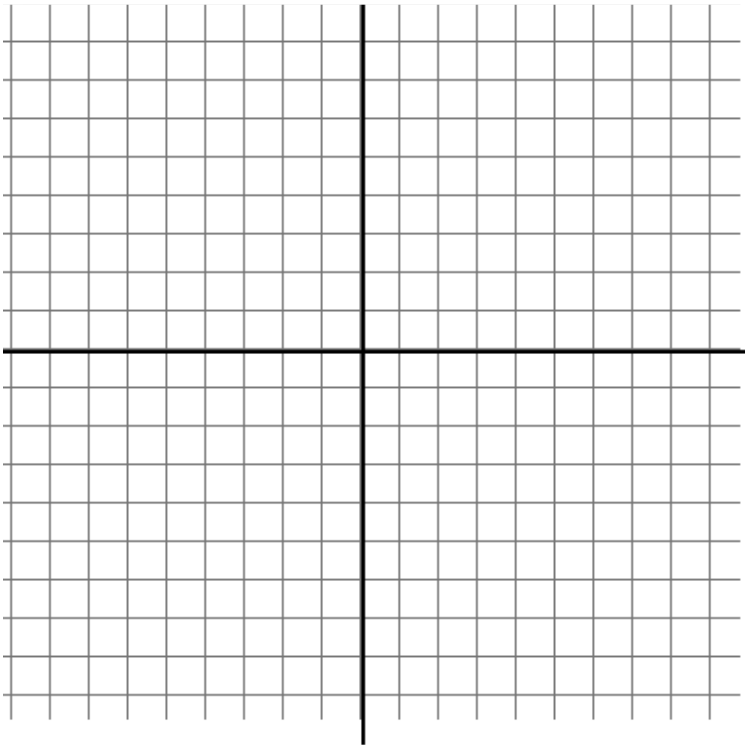


Find the slope of the line containing the points.

22. (–3, 11) and (2, 6)

Find the **x-intercept and y-intercept**. **Graph** the points. Find the **slope** of the line through the points. Write the equation in **slope-intercept** (y = mx + b) form.

23. $6x - 4y = 12$



Simplify the following expressions.

Example: $3(m^2 + n) - 2(3m^2 - 4n) = 3m^2 + 3n - 6m^2 + 8n = -3m^2 + 11n$

24. $(3x^2 + 4x - 5xy) + (-7x^2 + 6x - 5xy)$

25. $(5y^3 - 3y + 4) + (2y^2 + 6y - 4y^3) - (9y^2 - 6 + 2y^3)$

Use the distributive property to expand the product. Follow the example.

EXAMPLE: $(x + 4)(2x - 11) = 2x^2 - 11x + 8x - 44 = 2x^2 - 3x - 44$

26. $(x - 7)(x + 5)$

27. $(y - 8)(y + 8)$

Factor each into the product of two binomials. Follow the example.

EXAMPLE: $x^2 + 6x - 7 = (x - 1)(x + 7)$

28. $x^2 - 10x + 24$

29. $x^2 - 81$

30. $x^2 - 8x - 20$

Factor each and solve for x. Follow the example.

EXAMPLE: $x^2 + 5x - 6 = 0$

$(x + 6)(x - 1) = 0$ **Factored and equal to 0**

$(x + 6) = 0$ **OR** $(x - 1) = 0$ **Either factor may equal 0**

$x = -6$ **OR** $x = 1$

31. $x^2 + 6x + 8 = 0$

32. $x^2 - 3x - 4 = 0$

Solve by using the substitution or elimination method. The problems are on next page.

EXAMPLE Substitution: $y = 3x - 4$ and $8x - 2y = 10$

$8x - 2(3x - 4) = 10$ Substitute the value for y

$8x - 6x + 8 = 10$

$2x + 8 = 10$

$2x = 2$

$x = 1$ Finish solving: $y = 3(1) - 4$ so $y = -1$.

Then CHECK! $8(1) - 2(-1) = 10$
$8 + 2 = 10$ yes

EXAMPLE Elimination: $4x + 6y = 12$
$4x - 8y = 5$ Subtract the two equations to get ----
$14y = 7$

$y = ½$

Finish solving for x: $4x + 6(.5) = 12$, so $x = 9/4$.

Then CHECK! $4(9/4) - 8(½) = 5$

$9 - 4 = 5$ yes

33. $2y + x = 5$
$y = 3x - 1$

34. $x = 3 + y$
$x - 7y = 45$

RULES FOR SIMPLIFYING RADICALS (square roots)

$a\sqrt{b} \times c\sqrt{d} = ac\sqrt{bd}$ $\qquad \frac{\sqrt{a}}{\sqrt{b}} = \sqrt{a/b}$ $\qquad \sqrt{a} \times \sqrt{a} = \sqrt{a^2} = |a|$

$a\sqrt{b} + c\sqrt{b} = (a+c)\sqrt{b}$

Remember, proper form for radicals means:

a. No perfect square factor under the radical. For example, $\sqrt{45} = \sqrt{9} \times \sqrt{5} = 3\sqrt{5}$.

b. No fractions/decimals may be left under the radical. For example, $\sqrt{3/4} = \frac{\sqrt{3}}{\sqrt{4}} = \frac{\sqrt{3}}{2}$.

c. No radical may be left in the denominator of a fraction. For example,

$\sqrt{3/7} = \frac{\sqrt{3}}{\sqrt{7}} = \frac{\sqrt{3}}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}} = \frac{\sqrt{21}}{7}$. Another example, $\frac{15\sqrt{75}}{20\sqrt{21}} = \frac{3\sqrt{25}\sqrt{3}}{4\sqrt{7}\sqrt{3}} = \frac{3 \times 5}{4\sqrt{7}} = \frac{3 \times 5 \times \sqrt{7}}{4\sqrt{7}\sqrt{7}} = \frac{15\sqrt{7}}{28}$.

Simplify each. Leave in best radical form. NO DECIMAL EQUIVALENTS.

35. $\sqrt{32}$

36. $\frac{\sqrt{64}}{\sqrt{16}}$

37. $\sqrt{20} - \sqrt{80}$

38. $4\sqrt{5} \times 3\sqrt{10}$

1. A towing service requires a flat fee and an additional fee per mile of towing, up to 20 miles. A 4-mile tow costs $110 and a 9-mile tow costs $122.50.
   a. Write a linear model in slope-intercept form for the price of a tow P(x) for x miles. Give your slope as a decimal in simplest form.

   b. What does the slope represent?

   c. How much is the flat fee? Explain.

2. A tank sprang a leak, where on average it loses 4 liters of water every 10 hours at a constant rate. If the tank currently has 20 liters of water inside of it, answer the following.
   a. Write a linear equation where L is the amount of water in the tank and h and the amount of hours after the leak started.

   b. Using your equation, how many liters of water will be in the tank after five and a half hours?

   c. Using your equation, how long will it take for the tank to have 15 liters inside of the tank.

3. A toy company is testing a toy when thrown into the air by launching it from the top of a building. The toy follows the trajectory modeled by $h(t)= -5t2-3t-4$, where t is the seconds after the toy was launched and h(t) is how many feet the toy is from the ground. Given this, algebraically determine the following.

a. How high was the toy off the ground when it was initially launched?

   b. At what time or times does the toy reach the ground?