

Lawrence High School

Math Department



Summer Review

For Students Entering

Advanced Geometry

Please show your work on the following problems. This packet will be collected by your math teacher so don't forget to bring your finished work back with you in August. If you need assistance on a topic check out: <https://www.wolframalpha.com/>,

<https://www.khanacademy.org/>, <http://www.purplemath.com/>, or google the topic.

Fractions:

Perform the indicated operation.

Multiply Fractions.

1. $\frac{1}{2} \times \frac{5}{6}$

2. $\frac{4}{11} \times \frac{3}{2}$

3. $3 \times \frac{3}{6}$

Divide Fractions.

4. $\frac{1}{2} \div \frac{5}{6}$

5. $\frac{4}{11} \div \frac{3}{2}$

6. $3 \div \frac{3}{6}$

Add Fractions.

7. $\frac{8}{9} + \frac{7}{9}$

8. $\frac{3}{4} + \frac{5}{6}$

9. $\frac{3}{7} + 5$

Subtract Fractions.

10. $\frac{8}{11} - \frac{2}{5}$

11. $\frac{2}{12} - \frac{3}{2}$

12. $3 - \frac{1}{7}$

Order of Operations:

Evaluate each expression without using a calculator.

1. $8 \times 17 \div 5 - 2$

2. $14 \div 7 - 2 + (8 + 13)$

3. $3^2 + (20 \div 10 + 3^2)$

4. $(9 - 7) - (16 \div 8)^2$

5. $0.7 + 0.3 \times (3 + 4)^2$

6. $12 + ((13 - 6) + 5^2)$

Evaluate Expressions:

Evaluate the expressions for the given values.

1. $15x + 10y$ when $x = -2$ and $y = -3$

2. $(-2x)^2 - y^3$ when $x = 4$ and $y = 3$

3. $\frac{x + 2y}{4x - y}$ when $x = -3$ and $y = 4$

4. $a + (18 - a) \cdot b$ when $a = 4$ and $b = 1$

Simplify Expressions:

1. $-5a - 14a$

2. $33s - 12s$

3. $12k + 11(3k - 5)$

4. $-5(3b + 4) - 6(3 + 6b)$

5. $4(-3a + 13) + 3(a + 4)$

6. $-11x + 2(9 + 7x)$

7. $-9x - (17 - 7x)$

8. $3a + 7 - 11 - 9a$

9. $(-x + 3) + (-11x^2 - 8x + 12)$

10. $(2b^3 - 5b) - (7b + 3b^2)$

Solve Equations:

Solve the following equations for the variable.

1. $x + 2 = 17 - 4x$

2. $6 + 10n - 4n = n + 1$

3. $\frac{2x}{3} + 4 = 10$

4. $24 = 6(-h - 3)$

5. $12(2k + 11) = 12(2k + 13)$

6. $-(-6t - 3) = 12$

Distance, Midpoint, and Slope:

Given two points (x_1, y_1) and (x_2, y_2) .

Example: Given the points $(3, 9)$ and $(8, -2)$. (It doesn't matter which point is which, but be consistent)

$\text{Distance} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $\sqrt{(8 - 3)^2 + (-2 - 9)^2}$ $\sqrt{(5)^2 + (-11)^2}$ $\sqrt{(25) + (121)}$ $\text{Distance} = \sqrt{(146)}$ $\text{Distance} \approx 12.1$	$\text{Midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$ $\left(\frac{3+8}{2}, \frac{9+(-2)}{2} \right)$ $\text{Midpoint} = \left(\frac{11}{2}, \frac{7}{2} \right)$	$\text{Slope} = \frac{\text{change in } y \text{ (rise)}}{\text{change in } x \text{ (run)}}$ $\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}$ $\frac{-2-9}{8-3}$ $\text{Slope} = \frac{-11}{5}$
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Find the distance, midpoint, and slope given the sets of points below.

Points	Distance	Midpoint	Slope
1. $(2, 6), (10, 12)$			
2. $(5, -8), (5, -1)$			
3. $(-1, 2), (3, 5)$			

Rewrite Equations of Lines:

Slope-Intercept Form: Write the equation in Slope-intercept form by solving for y.

1. $3y = 15x - 12$

2. $x - 5y = 10$

3. $4x - y = 2x + 2$

4. $y + 8 = 8(x + 2)$

5. $-y + 1 = \frac{2}{7}(x - 7)$

Write the Equation of a Line:

Point-Slope form and Slope-intercept form of the equation of a line:

Point-slope form: $y - y_1 = m(x - x_1)$

Slope-intercept form: $y = mx + b$

Example: Write an equation of the line through the point (1, 4) that has a slope of 3.

Step 1 $y - y_1 = m(x - x_1)$

Point-slope Form

Step 2 $y - 4 = 3(x - 1)$

Substitute 3 for the slope (m) and (1, 4) for (x_1, y_1)

Step 3 $y - 4 = 3x - 3$

Distribute the slope (3)

Step 4 $\frac{+4}{+4} \quad \frac{+4}{+4}$

Add 4 to both sides, to get y by itself

Step 5 $y = 3x + 1$

Slope-intercept form

- When given two points, you need to find the slope (using slope formula). Then use either of the two given points for the point-slope formula.

Write an equation of the line in slope-intercept form that contains the given points and slope.

1. $m = 2, (5, 3)$

2. $m = \frac{3}{5}, (-5, 6)$

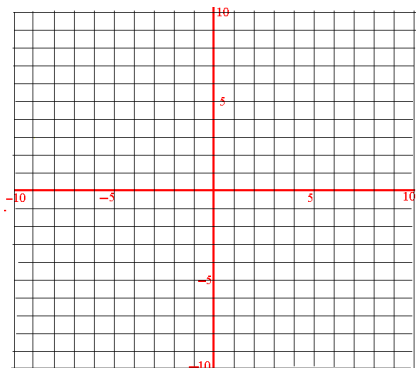
3. $(-4, 7), (-6, -4)$

4. $(8, 10), (-4, 2)$

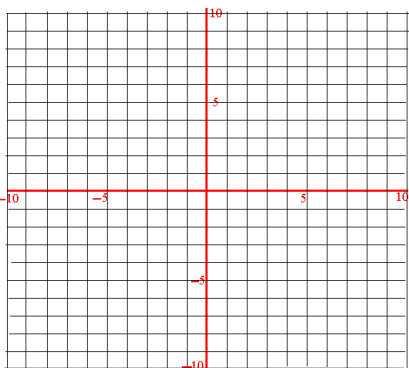
Graph Linear Equations:

Graph the following equations of lines.

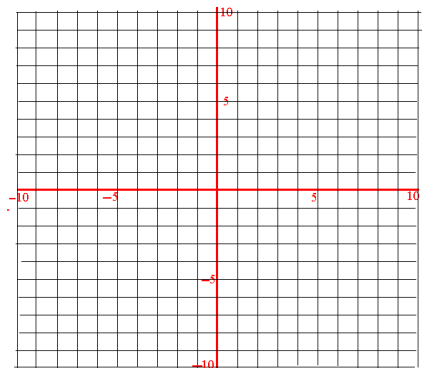
1. $y = -3x + 7$



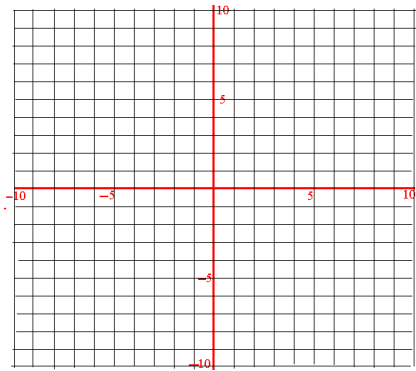
2. $y = x$



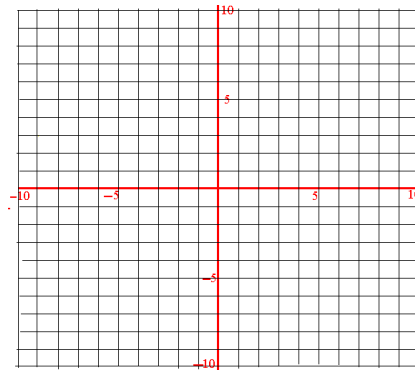
3. $y = -x$



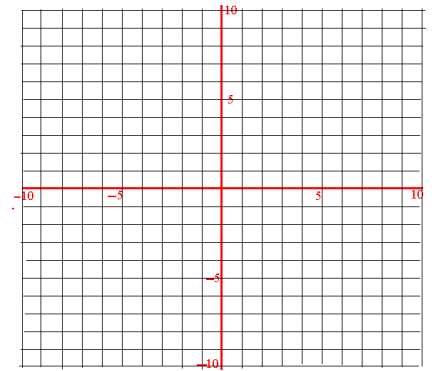
4. $y = -5$



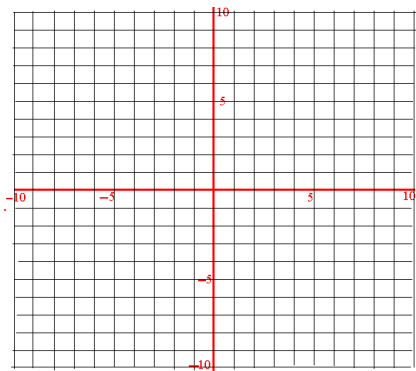
5. $y = \frac{1}{4}x$



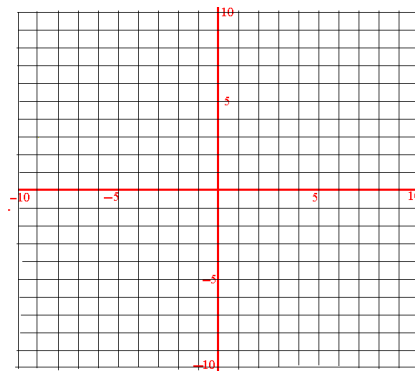
6. $5x + 3y = 6$



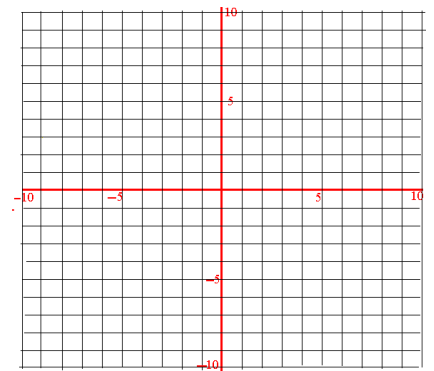
7. $x = 4$



8. $x + y = 4$



9. $2x - 3y = -9$



Solving Systems of Equations using Substitution and Elimination:

Solve the system using substitution.

1. $4x + y = -2$

$y = -x + 4$

2. $2x + 3y = 5$

$x = 5y + 9$

3. $x - 2y = 4$

$3x - 6y = 8$

Solve the system using elimination.

$$\begin{aligned} 4. \quad 8x - 4y &= -32 \\ -3x + 4y &= 12 \end{aligned}$$

$$\begin{aligned} 5. \quad 2x + 3y &= 8 \\ 3x + y &= 5 \end{aligned}$$

$$\begin{aligned} 6. \quad 4x - 3y &= 10 \\ 8x - 6y &= 20 \end{aligned}$$

Properties of Exponents:

Product of Powers	$a^m \cdot a^n = a^{m+n}$	Negative Exponents	$a^{-m} = \frac{1}{a^m}, a \neq 0$
Power of a Power	$(a^m)^n = a^{mn}$	Quotient of Powers	$\frac{a^m}{a^n} = a^{m-n}, a \neq 0$
Power of a Product	$(ab)^m = a^m b^m$	Power of a Quotient	$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}, b \neq 0$

Simplify using positive exponents.

$$1. \quad f^5 \cdot f^2$$

$$2. \quad \left(\frac{a}{b}\right)^8$$

$$3. \quad \frac{p^{15}}{p^9}$$

$$4. \quad t^{-7}$$

$$5. \quad (2c)^2$$

$$6. \quad \frac{9r^2}{3r^7}$$

$$7. \quad a^2 b^{-4}$$

$$8. \quad (2s^3 t^5)^7$$

$$9. \quad (j^2)^{-3}$$

Multiplying Polynomials:

Find the product.

1. $2n(3n^2 - 5n)$

2. $(x + 1)(x + 3)$

3. $(p + 4)(p - 8)$

4. $(x + 9)(x - 9)$

5. $(x - 3)^2$

6. $(m + 12)^2$

Factoring:

Factor by using the GCF.

1. $5x^2 - 35x$

2. $3n^3 - 18n^2 + 15n$

3. $4k^5 + 10k^4$

Factor by using a difference of squares.

4. $x^2 - 36$

5. $9x^2 - 121$

6. $49x^2 - 1$

Factor each trinomial.

7. $x^2 + 9x + 20$

8. $x^2 + 4x - 12$

9. $x^2 - 5x + 6$

Zero Product Property:

Use the Zero Product Property to solve the equations below.

1. $x(x - 4) = 0$

2. $(x + 2)(3x - 2) = 0$

3. $(x - 10)^2 = 0$

Simplifying Radicals:

Write in simplest radical form.

1. $\sqrt{64}$

2. $\sqrt{20}$

3. $\sqrt{48}$

4. $\sqrt{150}$

5. $\sqrt{800}$

6. $6\sqrt{98}$

7. $(-2\sqrt{15})(5\sqrt{3})$

8. $\frac{2}{\sqrt{3}}$

9. $\sqrt{\frac{9}{16}}$

10. $\sqrt{\frac{32}{8}}$

10. $\frac{\sqrt{72}}{\sqrt{9}}$

11. $\sqrt{4x^2}$

Rounding:

Round each number to the nearest tenth.

1. 8.54

2. 6.29

3. 13.014887

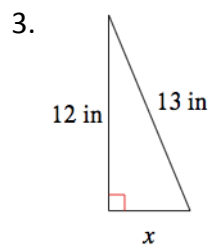
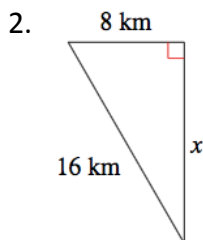
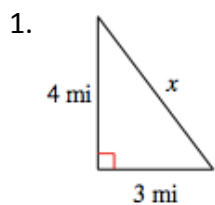
4. 421903.963

5. 0.7

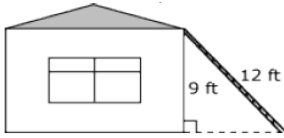
6. 2.13

Pythagorean Theorem:

Find the third side of each right triangle. Round your answer to the nearest tenth, if necessary.



4. A 12-ft. ladder is leaning against a house, as shown below. The top of the ladder touches the house 9-ft. above the ground. Approximately how many feet from the base of the house is the base of the ladder?

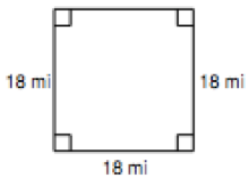


5. Emily is the catcher on the LHS softball team. A member of the other team is trying to steal 2nd (running from 1st base to 2nd base) when the pitcher pitches the ball. How far does Emily have to throw the ball to get the player out at 2nd? (A softball diamond has equal sides of 60-ft., with right angles at each base.)

Circumference, Area, and Perimeter:

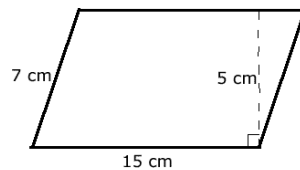
Round your answer to the nearest tenth, if necessary.

- The diameter of a circular rug is 5.6 feet. What is the radius, circumference, and area?
- The diameter of your bicycle wheel is 34 inches. What is its radius? How far will you move in one turn of your wheel? What is the distance covered in 5 turns of the wheel?
- Find the perimeter and area of the following figures. Label your answers.



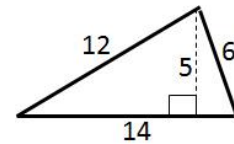
Perimeter: _____

Area: _____



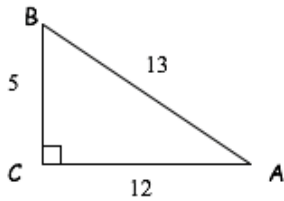
Perimeter: _____

Area: _____



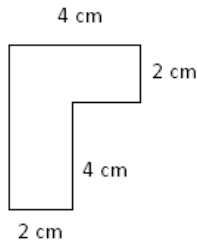
Perimeter: _____

Area: _____



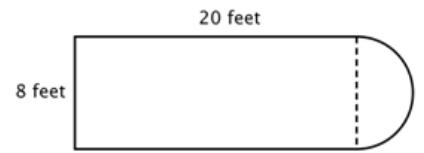
Perimeter: _____

Area: _____



Perimeter: _____

Area: _____



Perimeter: _____

Area: _____

Word Problems:

- The area of a rectangle increased by 7 is the same as 4 less than twice the area of the rectangle. Write and solve an equation to determine the area of the rectangle.
- The perimeter of triangle ABC is 28 inches. Side AB is 6 inches long and side BC is 8 inches long. Find the length of side AC.
- You want to hire a painter to paint your house. Painters Plus charges \$2,220 plus \$45 per hour. Davis & Sons charges \$1,850 plus \$65 per hour. Write and solve an equation to determine the number of hours for which the two costs would be the same.
- An Internet service offers internet access for \$29.95 a month with a \$15.75 initial charge for the hookup. If you spent a total of \$165.50 on Internet access, how many months did you pay for?
- The number of trees planted by the Alpine Nursery in April was 6 more than 3 times the number of trees planted by the nursery in March. If 93 trees were planted in April, write and solve an equation to find how many trees were planted in March.