Summer Review Packet
Liberty High School

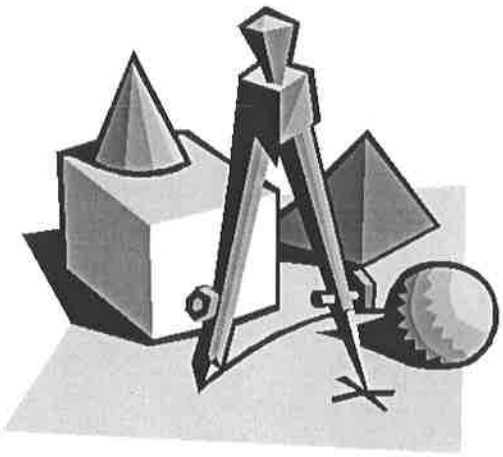
Geometry

The problems in this packet are designed to help you review topics from previous mathematics courses that are important to your success in Geometry. Please try to do each problem and show all work that goes with that answer. Bring this packet with you to your first day of Geometry the first week of school. This will be your first assignment for Geometry.

All work should be completed and ready to turn in the first day of school.

Enjoy your summer! We look forward to seeing you!

Contents:



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Order of Operations

To avoid having different results for the same problem, mathematicians have agreed on an order of operations when simplifying expressions that contain multiple operations.

1. Perform any operation(s) inside grouping symbols. (Parentheses, brackets above or below a fraction bar)
2. Simplify any term with exponents.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

One easy way to remember the order of operations process is to remember the acronym PEMDAS or the old saying, **"Please Excuse My Dear Aunt Sally."**

P - Perform operations in grouping symbols
E - Simplify exponents
MD - Perform multiplication and division in order from left to right
AS - Perform addition and subtraction in order from left to right

Example 1

$2 - 3^2 + (6 + 3 \times 2)$
$2 - 3^2 + (6 + 6)$
$2 - 3^2 + 12$
$2 - 9 + 12$
$-7 + 12$
$= 5$

Example 2

$-7 + 4 + (2^3 - 8 \div -4)$
$-7 + 4 + (8 - 8 \div -4)$
$-7 + 4 + (8 - -2)$
$-7 + 4 + 10$
$-3 + 10$
$= 7$

Order of Operations

Evaluate each expression. Remember your order of operations process (PEMDAS).

1. $6 + 4 - 2 \cdot 3 =$

2. $(-2) \cdot 3 + 5 - 7 =$

3. $15 \div 3 \cdot 5 - 4 =$

4. $29 - 3 \cdot 9 + 4 =$

5. $20 - 7 \cdot 4 =$

6. $4 \cdot 9 - 9 + 7 =$

7. $50 - (17 + 8) =$

8. $(12 - 4) \div 8 =$

9. $12 \cdot 5 + 6 \div 6 =$

10. $18 - 4^2 + 7 =$

11. $3(2 + 7) - 9 \cdot 7 =$

12. $3 + 8 \cdot 2^2 - 4 =$

13. $16 \div 2 \cdot 5 \cdot 3 \div 6 =$

14. $12 \div 3 - 6 \cdot 2 - 8 \div 4 =$

15. $10 \cdot (3 - 6^2) + 8 \div 2 =$

16. $6.9 - 3.2 \cdot (10 \div 5) =$

17. $32 \div [16 \div (8 \div 2)] =$

18. $[10 + (2 \cdot 8)] \div 2 =$

19. $180 \div [2 + (12 \div 3)] =$

20. $\frac{1}{4}(3 \cdot 8) + 2 \cdot (-12) =$

21. $\dfrac{5 + [30 - (8 - 1)^2]}{11 - 2^2} =$

22. $\dfrac{3[10 - (27 \div 9)]}{4 - 7} =$

23. $5(14 - 39 \div 3) + 4 \cdot 1/4 =$

24. $[8 \cdot 2 - (3 + 9)] + [8 - 2 \cdot 3] =$

25. $162 \div [6(7 - 4)^2] \div 3 =$

Operations with Signed Numbers

Adding and Subtracting Signed Numbers

Adding Signed Numbers

Like Signs	Different Signs
Add the numbers & carry the sign	Subtract the numbers & carry the sign of the larger number
(+) + (+) = + (+3) + (+4) = +7	(+) + (–) = ? (+3) + (–2) = +1
(–) + (–) = – (– 2) + (– 3) = (– 5)	(–) + (+) = ? (–5) + (+ 3) = –2

Subtracting Signed Numbers

Don't subtract! Change the problem to **addition** and change the sign of the **second** number. Then use the addition rules.

(+9) – (+12) = (+9) + (– 12)	(+4) – (–3) = (+4) + (+3)
(– 5) – (+3) = (– 5) + (– 3)	(–1) – (– 5) = (–1) + (+5)

Simplify. ***Do not use a calculator for this section.***

1. 9 + -4 =
2. -8 + 7 =
3. -14 – 6 =
4. -30 + -9 =
5. 14 – 20 =
6. -2 + 11 =
7. 20 – - 6 =
8. 7 – 10 =
9. -6 – -7 =
10. 5 – 9 =
11. -8 – 7 =
12. 1 – -12 =

Multiplying and Dividing Signed Numbers

If the signs are the same, the answer is *positive*

If the signs are different, the answer is *negative*

Like Signs		Different Signs	
(+)(+) = +	(+3)(+4) = +12	(+)(–) = –	(+2)(–3) = –6
(–)(–) = +	(–5)(–3) = + 15	(–)(+) = –	(–7)(+1) = –7
(+) / (+) = +	(+3) / (+4) = +12	(+) / (–) = –	(+2) / (–3) = –6
(+) / (+) = +	(+3) / (+4) = +12	(–) / (+) = –	(–7) / (+1) = –7

Simplify. ***Do not use a calculator for this section.***

1. (-5)(-3) =

2. $\frac{-6}{2}$ =

3. (2)(4) =

4. $\frac{-12}{-4}$ =

5. (-1)(-5) =

6. $\frac{-16}{8}$ =

7. $\frac{-7}{-1}$ =

8. (3) (-4) =

9. $\frac{8}{-4}$ =

10. (-2)(7) =

11. $\frac{-20}{-1}$ =

12. (2)(-5) =

Rounding Numbers

Step 1: Underline the place value in which you want to round.

Step 2: Look at the number to the right of that place value you want to round.

Step 3: If the number to the right of the place value you want to round is less than 5, keep the number the same and drop all other numbers.

If the number to the right of the place value you want to round is 5 or more, round up and drop the rest of the numbers.

Example: Round the following numbers to the tenths place.

Tenths

1. 23.1246 — 2 is less than 5 so keep the 1 the same — 23.1

2. 64.2685 — 6 is greater than 5 so add one to the 2 — 64.3

3. 83.9721 — 7 is greater than 5 so add one to the 9 — 84

$$\begin{array}{r} {\scriptstyle 1} \\ 83.9721 \\ +\ \ 1 \\ \hline 84.0 \end{array}$$

Round the following numbers to the tenths place.

1. 18.6231 _____
2. 25.0543 _____
3. 3.9215 _____
4. 36.9913 _____
5. 15.9199 _____
6. 0.2658 _____
7. 100.9158 _____
8. 19.9816 _____
9. 17.1083 _____
10. 0. 6701 _____

Evaluating Expressions

Example
Evaluate the following expression when x = 5

Rewrite the expression substituting 5 for the x and simplify.

a. 5x = 5(5)= 25
b. -2x = -2(5) = -10
c. x + 25 = 5 + 25 = 30
d. 5x - 15 = 5(5) – 15 = 25 – 15 = 10
e. 3x + 4 = 3(5) + 4 = 19

Evaluate each expression given that: x = 5 y = -4 z = 6

1. 3x

2. $2x^2$

3. $3x^2 + y$

4. 2 (x + z) – y

5. y + 4

6. 5z – 6

7. xy + z

8. 2x + 3y – z

Evaluate each expression given that: $x = 5$ $y = -4$ $z = 6$

9. $5x - (y + 2z)$

10. $\frac{xy}{2}$

11. $x^2 + y^2 + z^2$

12. $2x(y + z)$

13. $5z + (y - x)$

14. $2x^2 + 3$

15. $4x + 2y - z$

16. $\frac{yz}{2}$

Combining Like Terms

What is a ***term***? The parts of an algebraic expression that are separated by an addition or subtraction sign are called ***terms***.
The expression $4x + 2y - 3$ has 3 terms.

What are ***like terms***? Terms with the same variable factors are called ***like terms***.
$2n$ and $3n$ are <u>like terms</u>, but $4x$ and $3y$ are <u>not like terms</u> because their variable factors x and y are different.

To simplify an expression, you must combine the like terms.

Examples: Simplify

1. $5x + 8x$
   $5x + 8x = (5 + 8)x = 13x$

2. $3y - 6y$
   $3y - 6y = (3 - 6)y = -3y$

3. $3x + 4 - 2x + 3$
   $3x - 2x + 4 + 3 = (3 - 2)x + 4 + 3 = x + 7$

4. $2b + 5c + 3b - 6c$
   $2b + 3b + 5c - 6c = (2+3)b + (5 - 6)c = 5b - c$

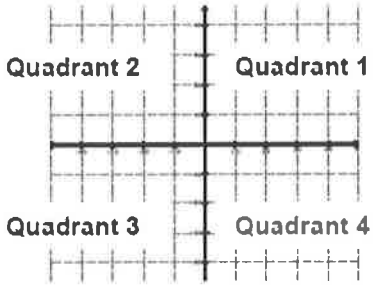
Practice: Simplify each expression

1. $6n + 5n$
2. $25b + 15b$
3. $37z + 4z$
4. $x - 5x$
6. $3n + 1 - 2n + 8$
6. $4f + 5f - 6 + 8$
7. $7t + 9 - 4t + 3$
8. $2k + 4 - 8k - 1$
9. $4r + 3r + 6y - 2y$
10. $8g + 9h - 4g - 5h$
11. $2m + 3n - 4m + 5n$
12. $a + 5b - 2a + 9b$

Graphing

Points in a plane are named using 2 numbers, called a coordinate pair. The first number is called the x-coordinate. The x-coordinate is positive if the point is to the right of the origin and negative if the point is to the left of the origin. The second number is called the y-coordinate. The y-coordinate is positive if the point is above the origin and negative if the point is below the origin.

The x-y plane is divided into 4 quadrants (4 sections) as described below.

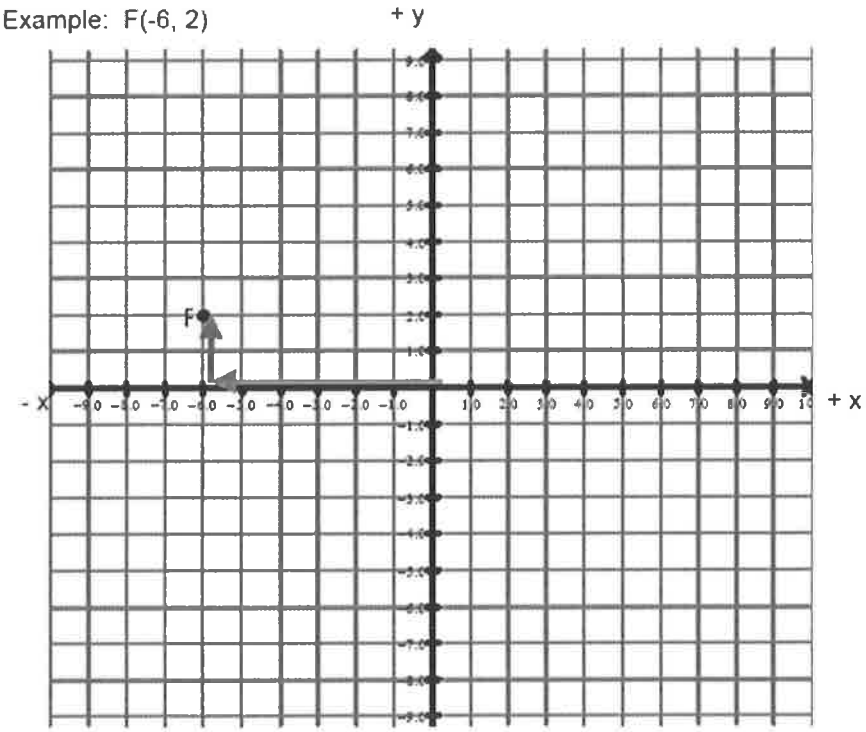


All points in Quadrant 1 has a **positive** x-coordinate and a **positive** y-coordinate (+ x, + y).
All points in Quadrant 2 has a **negative** x-coordinate and a **positive** y-coordinate (- x, + y).
All points in Quadrant 3 has a **negative** x-coordinate and a **negative** y-coordinate (- x, - y).
All points in Quadrant 4 has a **positive** x-coordinate and a **negative** y-coordinate (+ x, - y).

Plot each point on the graph below. Remember, coordinate pairs are labeled (x, y). Label each point on the graph with the letter given.

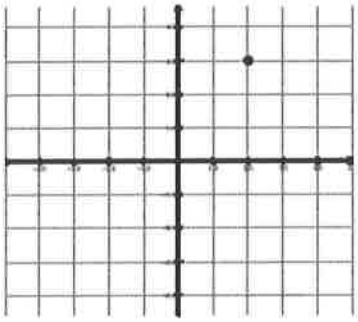
1. A(3, 4) 2. B(4, 0) 3. C(-4, 2) 4. D(-3, -1) 5. E(0, 7)

Example: F(-6, 2)

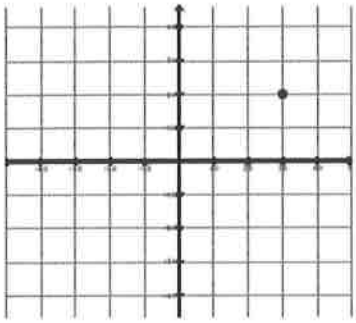


Determine the coordinates for each point below:

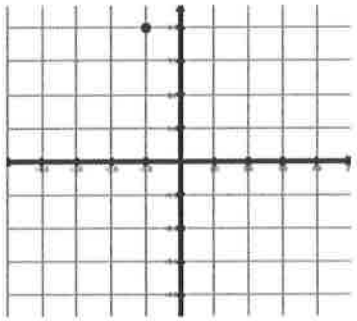
Example. (2 , 3)



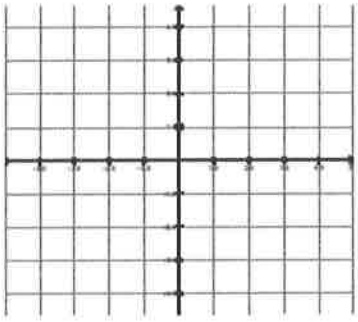
6. (____, ____)



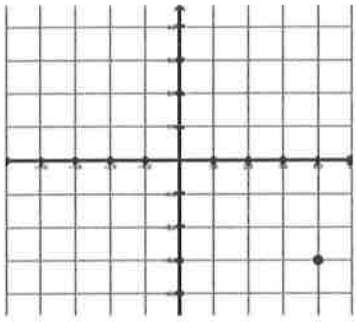
7. (____, ____)



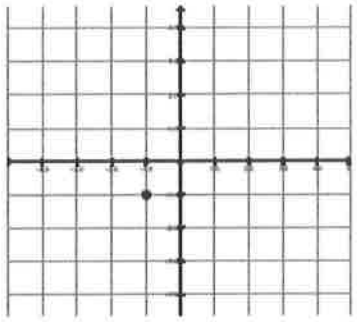
8. (____, ____)



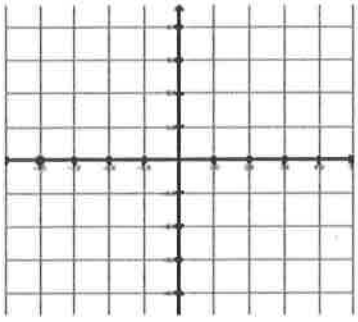
9. (____, ____)



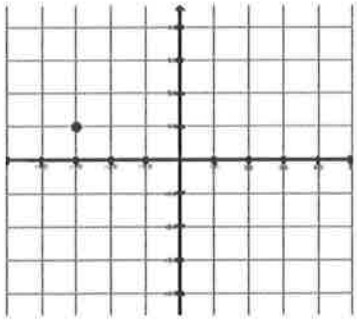
10. (____, ____)



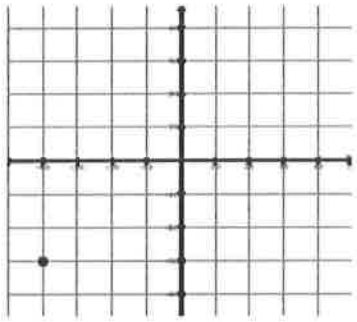
11. (____, ____)



12. (____, ____)



13. (____, ____)



Solving Equations

To solve an equation means to ***find the value*** of the variable. We solve equations by isolating the variable using opposite operations.

Opposite Operations:
Addition (+) & Subtraction (–)
Multiplication (x) & Division (÷)

Example:

Solve.

$3x - 2 = 10$
$+2 \quad +2$ — Isolate 3x by adding 2 to each side.

$\frac{3x}{3} = \frac{12}{3}$ — Simplify / Isolate x by dividing each side by 3.

$x = 4$ — Simplify

Please remember...
to do the same step on each side of the equation.

Always check your work by substitution!

Check your answer.

$3(4) - 2 = 10$ — Substitute the value in for the variable.
$12 - 2 = 10$ — Simplify
$10 = 10$ — Is the equation true? If yes, you solved it correctly!

Try These:

Solve each equation below.

1. $x + 3 = 5$

2. $w - 4 = 10$

3. $c - 5 = -8$

4. $3p = 9$

5. $-7k = 14$

6. $-x = -17$

7. $\frac{h}{3} = 5$

8. $\frac{m}{8} = 7$

9. $\frac{4}{5} d = 12$

10. $\frac{3}{8} j = 6$

11. $2x - 5 = 11$

12. $4n + 1 = 9$

13. $5j - 3 = 12$

14 $2x + 11 = 9$

15. $-3x + 4 = -8$

16. $-6x + 3 = -9$

17. $\frac{f}{3} + 10 = 15$

18. $\frac{a}{7} - 4 = 2$

19. $\frac{b+4}{2} = 5$

20. $\frac{x-6}{5} = -3$

Use substitution to determine whether the solution is correct.

21. $4x - 5 = 7$ $x = 3$

22. $-2x + 5 = 13$ $x = 4$

23. $6 - x = 8$ $x = 2$

24. $1 - x = 9$ $x = -8$

How to simplify radicals (square roots):

Basics:

Perfect Squares

$1^2 = 1$

$2^2 = 4$

$3^2 = 9$

$4^2 = 16$

$5^2 = 25$

$6^2 =$ ____

$7^2 =$ ____

$8^2 =$ ____

$9^2 =$ ____

$10^2 =$ ____

$11^2 =$ ____

$12^2 =$ ____

$13^2 =$ ____

$14^2 =$ ____

$15^2 =$ ____

$16^2 =$ ____

$17^2 =$ ____

$18^2 =$ ____

$19^2 =$ ____

$20^2 =$ ____

$25^2 =$ ____

When a radical is not a perfect square:

Ex) $\sqrt{60}$ → $\sqrt{4}$ $\sqrt{15}$

1st – find a factor that is a perfect square

Note: if this is difficult, then keep factoring until you get doubles of the same number.

Ex) $\sqrt{60}$ → $\sqrt{6}$ $\sqrt{10}$ → $\sqrt{2}$ $\sqrt{3}$ $\sqrt{2}$ $\sqrt{5}$

2nd – simplify all radicals that are perfect squares and keep as coefficients in front of the radicals that cannot be simplified any further.

Therefore, when you recombine you'd have $\sqrt{4} \bullet \sqrt{15}$, or $2\sqrt{15}$

Radicals in the denominator:

When you have radicals in the denominator: $\frac{6}{\sqrt{2}}$ or $\frac{\sqrt{10}}{\sqrt{3}}$ or $\sqrt{\frac{4}{7}} = \frac{\sqrt{4}}{\sqrt{7}}$

Remove the radical from the denominator by multiplying numerator and denominator by that radical:

Ex) $\frac{6}{\sqrt{2}} \bullet \frac{\sqrt{2}}{\sqrt{2}} = \frac{6\sqrt{2}}{2} = 3\sqrt{2}$

Adding/Subtracting:

Radicals can only be added/subtracted if, when each term is simplified, their radicals are the same:

Ex) $6\sqrt{2} + 2\sqrt{8} - \sqrt{18}$ → $\sqrt{4}\sqrt{2}$ $\sqrt{9}\sqrt{2}$ 1st simplify all radicals

$= 6\sqrt{2} + 2 \bullet 2\sqrt{2} - 3\sqrt{2}$

$= 6\sqrt{2} + 4\sqrt{2} - 3\sqrt{2}$ 2nd combine all terms with like radicals

$= 7\sqrt{2}$

1. $\sqrt{256}$

2. $\sqrt{50}$

3. $\sqrt{48}$

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

5. $\sqrt{\frac{5}{8}}$

6. $5\sqrt{2}+3\sqrt{2}$

7. $\frac{\sqrt{48}}{\sqrt{12}}$

8. $\frac{15}{\sqrt{3}}$

9. $\frac{10\sqrt{6}}{\sqrt{2}}$

10. $2\sqrt{98}$

11. $4\sqrt{3}-\sqrt{3}$

12. $\sqrt{27}+\sqrt{75}$

13. $8\sqrt{5}+9\sqrt{7}$

14. $\sqrt{\frac{25}{400}}$

15. $\sqrt{24}-2\sqrt{6}$

16. $9\sqrt{10}+2\sqrt{10}-11\sqrt{10}$

17. $3\sqrt{3}\bullet\sqrt{2}$

18. $6\sqrt{2}\bullet 3\sqrt{7}$

19. $\frac{8\sqrt{45}}{16\sqrt{20}}$

20. $4\sqrt{3}+\sqrt{12}-\sqrt{27}$

MULTIPLY:

1. $(\sqrt{3})(\sqrt{3})$

2. $(2\sqrt{5})^2$

3. $(3\sqrt{6})(2\sqrt{3})$

4. $(7\sqrt{3})^2$

5. $4\sqrt{3}\bullet 2\sqrt{5}\bullet 3\sqrt{3}$

Solving Proportions

A *proportion* is an equation that states that two ratios are equal.

Cross product property: $if \frac{a}{b} = \frac{c}{d}, then\ ad = bc.$

Example 1

Solve the proportion $\frac{4}{7} = \frac{x-2}{2}$

Solution

$\frac{4}{8} = \frac{x-2}{2}$	*Write the original proportion*
$8(x-2) = (4)(2)$	*Use cross product property*
$8x - 16 = 8$	*Use distributive property and simplify*
$8x = 24$	*Isolate variable term*
$x = 3$	

Exercise:

Solve the proportion

29. $\frac{4}{y} = \frac{3}{7}$

30. $\frac{4}{x} = \frac{x}{16}$

31. $\frac{4}{7} = \frac{2x}{5}$

32. $\frac{5}{3c} = \frac{2}{3}$

33. $\frac{4}{2x} = \frac{7}{3}$

34. $\frac{x+5}{6} = \frac{x-2}{4}$

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

36. $\frac{5}{2y} = \frac{7}{y-3}$