SHARYLAND HIGH SCHOOL
SUMMER ALGEBRA I PACKET
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Complete these problems to the best of your ability. Video tutorial links are provided. Test will be week two of semester. These are pre-requisite skills.

ORDER OF OPERATIONS USING INTEGERS

A Review on Operations on Integers

Addition Problems:

negative + negative

$-6 + (-20)$

-26

negative + positive

$6 + (-20)$

-14

$-6 + 20$

14

Subtraction Problems:

Subtraction is the same as adding the opposite. (of the 2nd number)

$18 - 32 \rightarrow 18 + (-32)$

-14

$-25 - 11 \rightarrow -25 + (-11)$

-36

$-4 - (-13) \rightarrow -4 + {}^{+}13$

9

Multiplication & Division Problems:

negative & positive

$-18 \cdot 2$

-36

$-18 \div 2$

-9

negative & negative

$-15 \cdot (-3)$

45

$-15 \div (-3)$

5

Remember PEMDAS

$-7 + (-18 \div 2)^2 \div 3 \cdot 5$

$-7 + (-9)^2 \div 3 \cdot 5$

$-7 + 81 \div 3 \cdot 5$

$-7 + 27 \cdot 5$

$-7 + 135$

128

parentheses

exponents

multiplication/division (left to right)

addition/subtraction (left to right)

Find the value of the expression.

1. $15 - 12 \div 4$

2. $7 + 2 \cdot 4 - 4$

3. $23 - (-17 + 8)$

4. $24 \div (-3) \cdot 2 - 3^2$

5. $-12(20 - 17) - 3 \cdot 6$

6. $3[2 + (12 \div 3)^2]$

7. $\dfrac{-8(2) - 4}{8 \div 4}$

8. $(4 - 10)^2 - [(-10) \div (-5)]$

9. $\dfrac{2 \cdot 4^2 - 8 \div 2}{(5 + 2) \cdot 2}$

10. Let $x = -2$, $y = 4$, and $z = \dfrac{1}{2}$

Evaluate $z(y - 3x) + x$

OPERATIONS ON FRACTIONS & MIXED NUMBERS

Addition & Subtraction Problems:
You must have common denominators before adding or subtracting.
Making them improper fractions first is optional (your choice).

$$9\frac{1}{18}+4\frac{5}{6}$$
$$9\frac{1}{18}+4\frac{5\cdot 3}{6\cdot 3}$$
$$9\frac{1}{18}+4\frac{15}{18}$$
$$13\frac{16}{18}\overset{\div 2}{}$$
$$\boxed{13\frac{8}{9}}$$

$$4\frac{3}{4}-1\frac{5}{6}$$
$$4\frac{3\cdot 3}{4\cdot 3}-1\frac{5\cdot 2}{6\cdot 2}$$
$$4\frac{9}{12}-1\frac{10}{12}$$
$$\boxed{2\frac{11}{12}}$$

side work

$$3\frac{21}{12}$$
$$-\ 1\frac{10}{12}$$
$$2\frac{11}{12}$$

or make them improper fractions

$$4\frac{9}{12}-1\frac{10}{12}$$
$$\frac{57}{12}-\frac{22}{12}$$
$$\frac{35}{12}\text{ or }\boxed{2\frac{11}{12}}$$

Multiplication & Division Problems:
You must make mixed numbers become improper fractions before multiplying or dividing.
There's no need to get common denominators.

$$2\frac{2}{3}\cdot 1\frac{1}{6}$$
or you can reduce any numerator with any denominator before multiplying

$$\frac{8}{3}\cdot\frac{7}{6}$$
$$\frac{56}{18}\overset{\div 2}{}$$
$$\frac{28}{9}\text{ or }\boxed{3\frac{1}{9}}$$

$$\frac{8}{3}\overset{\div 2}{}\cdot\frac{7}{6}\overset{\div 2}{}$$
$$\frac{4}{3}\cdot\frac{7}{3}$$
$$\frac{28}{9}\text{ or }\boxed{3\frac{1}{9}}$$

Division = Multiplying by the Reciprocal (of the 2nd number)

$$\frac{4}{7}\div 1\frac{2}{9}$$
$$\frac{4}{7}\div\frac{11}{9}$$
$$\frac{4}{7}\cdot\frac{\mathbf{9}}{\mathbf{11}}$$
$$\boxed{\frac{36}{77}}$$

$$15\div 2\frac{1}{2}$$
$$\frac{15}{1}\div\frac{5}{2}$$
$$\frac{15}{1}\cdot\frac{\mathbf{2}}{\mathbf{5}}$$
$$\frac{15}{1}\overset{\div 5}{}\cdot\frac{2}{5}\overset{\div 5}{}$$
$$\frac{3}{1}\cdot\frac{2}{1}$$
$$\frac{6}{1}\text{ or }\textcircled{6}$$

Find the value of each expression. Final answers must be in simplest form ***(including improper fractions to mixed numbers).***

1. $\frac{2}{3}+\frac{9}{3}$

2. $\frac{1}{4}+\frac{1}{5}$

3. $\frac{13}{20} - \frac{2}{5}$

4. $\frac{5}{6} - 3\frac{1}{2}$

5. $3\frac{3}{4} + 2\frac{1}{6}$

6. $\frac{7}{2} \cdot \frac{3}{2}$

7. $2\frac{1}{4} \cdot \frac{1}{18}$

8. $\frac{3}{2} \div \frac{1}{8}$

9. $\frac{3}{7} \div \frac{1}{5}$

10. $\frac{2}{3} \div 1\frac{1}{3}$

VERBAL EXPRESSIONS

ADDITION	SUBTRACTION	MULTIPLICATION	DIVISION	EXPONENTS
Plus	Minus	Multiplied by	Divided by	Square of *(2nd power)*
Increased by	Decreased by	Times	Quotient of	Cube of *(3rd power)*
More than	Fewer than	Product	Into	Power of
Sum of	Less	Twice, One-half, etc.		
	Less than	Of *(usually with fractions)*		
	Difference of			

Write an algebraic expression for each verbal expression.

- The sum of two-fifths a number and eight: $\frac{2}{5}n+8$
- Seven more than twice the difference a number and five: $7+2(n-5)$ *or* $2(n-5)+7$

1. The sum of 9 and a number

2. The difference of a number cubed and twelve

3. A number decreased by 8

4. Three less than 5 times a number

5. One-third the square of b

6. The product of four and x increased by y

7. The quotient of a number and negative 5

8. A number to the power of five less seven

9. Twice the sum of 15 and a number

10. The quotient of three and the sum of a number and 11

SOLVING EQUATIONS USING INVERSE OPERATIONS

Examples on Solving Equations Using Inverse Operations:

1.) $x + 72 = 14$

$$\begin{array}{r} -72 \quad -72 \\ \hline \boxed{x = -58} \end{array}$$

$$\begin{array}{r} \overset{6}{\cancel{7}}\overset{12}{\cancel{2}} \\ -14 \\ \hline 58 \end{array}$$

2.) $-39 = r - 50$

$$\begin{array}{r} +50 \quad +50 \\ \hline \boxed{11 = r} \end{array}$$

3.) $-8w = -168$

$$\begin{array}{r} \div(-8) \quad \div(-8) \\ \hline \boxed{w = 21} \end{array}$$

4.) $\dfrac{h}{15} = -5$

$$\begin{array}{r} \cdot 15 \quad \cdot 15 \\ \hline \boxed{h = -75} \end{array}$$

5.) $-21h + 9 = -75$

$$\begin{array}{r} -9 \quad -9 \\ \hline -21h = -84 \\ \div(-21) \quad \div(-21) \\ \hline \boxed{h = 4} \end{array}$$

think:
$-75 + (-9)$

6.) $-34 + \dfrac{n}{-3} = 2$

$$\begin{array}{r} +34 \quad +34 \\ \hline \dfrac{n}{-3} = 36 \\ \cdot(-3) \quad \cdot(-3) \\ \hline \boxed{n = -108} \end{array}$$

S
A
D
M
E
P

When using inverse operations, go in the "inverse order" of PEMDAS. (SADMEP)

Solve each equation using inverse operations. Final answers must be in simplest form (including improper fractions to mixed numbers). No decimals.

1. $x - 6 = -23$

2. $x - (-8) = 22$

3. $-4x = 14$

4. $\dfrac{x}{7} = -8$

5. $\dfrac{2}{3}x = 10$

6. $17 = -5 + x$

7. $4x + 11 = 27$

8. $-2 - 9x = 34$

9. $13 - x = -8$

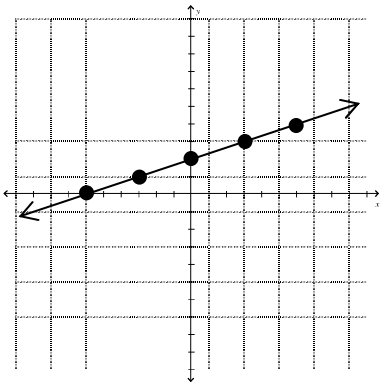
10. $\dfrac{3}{5}x + 2 = 7$

GRAPHING POINTS ON A COORDINATE PLANE

For each equation, use the given x-coordinates to complete the table. Then, graph the line.

Example: $y = \frac{1}{3}x + 2$

x	*y*
-6	**0**
-3	**1**
0	**2**
3	**3**
6	**4**



sample work:

$y = \frac{1}{3}x + 2$ $\quad$ $y = \frac{1}{3}x + 2$ $\quad$ $y = \frac{1}{3}x + 2$

$y = \frac{1}{3} \cdot 0 + 2$ $\quad$ $y = \frac{1}{3}(-6) + 2$ $\quad$ $y = \frac{1}{3} \cdot 3 + 2$

$y = 0 + 2$ $\quad$ $y = -2 + 2$ $\quad$ $y = 1 + 2$

$y = 2$ $\quad$ $y = 0$ $\quad$ $y = 3$

For each equation, use the given x-coordinates to complete the table. Show your work in the spaces provided. Then, graph the ordered pairs and line on the coordinate plane provided on the <u>answer page</u>.

1. $y = 3x - 1$

x	*y*
-2	
-1	
0	
1	
2	

2. $y = -x + 2$

x	*y*
-6	
-5	
-1	
4	
7	

3. $y = -2x - 7$

x	*y*
-7	
-5	
-2	
0	
1	

4. $y = \frac{1}{2}x + 3$

x	*y*
-4	
-2	
0	
2	
4	

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

x	*y*
-6	
-3	
0	
3	
6	

SLOPE-INTERCEPT FORM

$y = mx + b$

IDENTIFY THE SLOPE AND Y-INTERCEPT

1) $y = -\frac{2}{3}x + 1$

2) $y = -\frac{1}{2}x - 5$

3) $y = 3x - 2$

4) $y = -\frac{1}{3}x - 1$

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

6) $y = 2x + 1$

7) $y = 3x + 1$

8) $y = x + 2$

SLOPE-INTERCEPT FORM

SOLVE FOR "Y"

13) $9 = 3y - 9x$

14) $-12 = -3x - 3y$

15) $-1 = y$

16) $0 = -3 + y + \frac{1}{2}x$

17) $6x + 25 + 5y = 0$

18) $-x = -1 - \frac{1}{5}y$

19) $15x = 9y$

20) $3y = -9 - 2x$

SOLVING EQUATIONS

SOLVE EACH EQUATION

Solve each equation.

21) $1 - 7n - 7n = 1$

22) $2v - 6 - 1 = -23$

23) $-16 = -r - r$

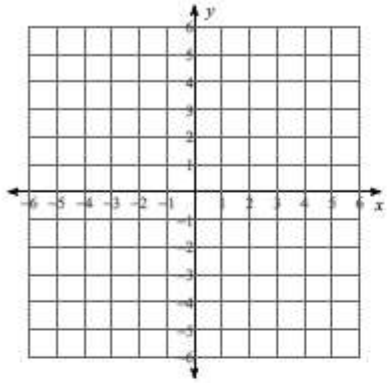
24) $-22 = 8 + 5x - 5$

25) $-6x - x = -21$

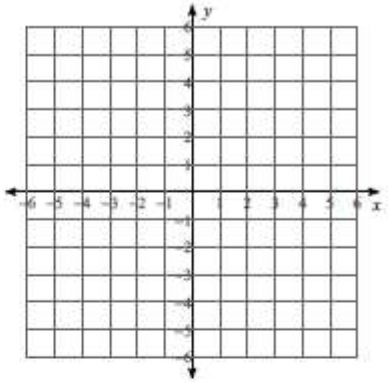
GRAPHING

SKETCH THE GRAPH

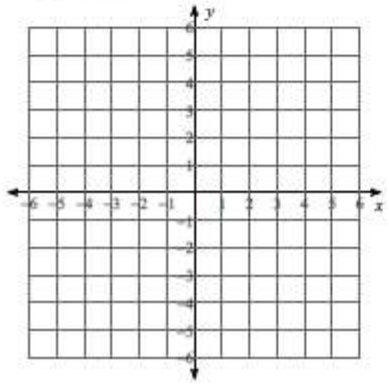
32) $y = -\frac{7}{2}x - 5$



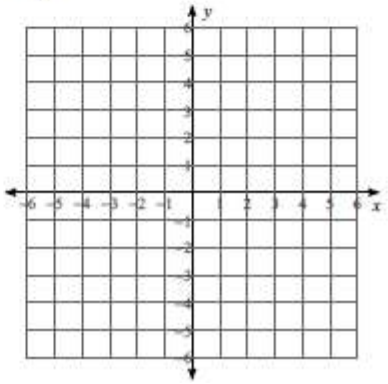
33) $y = \frac{3}{5}x + 3$



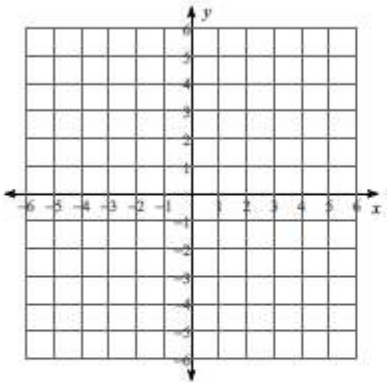
34) $y = x - 2$



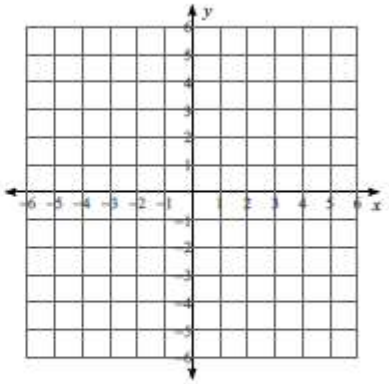
35) $y = -7x - 3$



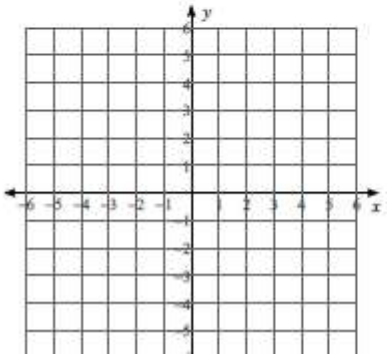
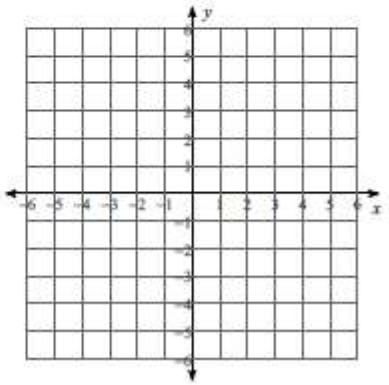
36) $y = -x - 2$



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



38) $y = \frac{5}{2}x - 4$



39) $y = 2x - 4$