Name: _____

Team: _____

Edmunds Middle School Summer Math Packet Grade 8

*This packet must be fully completed by all Algebra Seminar Students by the first day of school.

Fractions, Decimals and Percents

- Decimal to percent: Move decimal 2 places to the right .52 = 52%
- Percent to decimal: Move decimal 2 places to the left. 12.5% = .125
- Fraction to a decimal: Divide the numerator by the denominator. $\frac{3}{5} = 3 \div 5 = .6$
- Fraction to a percent: Divide the numerator by the denominator, then move the decimal two places to the right OR you can use a proportion:

  Example: $\frac{2}{5} = \frac{x}{100}$ Cross multiply then solve

- Solving a percent problem:
  use the percent proportion $\frac{is}{of} = \frac{\%}{100}$

Circle Answers

Convert to a decimal:

1. 37%
2. 136%
3. 9%
4. 4.2%

Convert to a percent:

5. 0.17
6. 2.47
7. 0.03
8. 0.004

Convert to a fraction:

9. 37%
10. 45%
11. 120%

Convert to a percent:

12. $\frac{4}{5}$
13. $\frac{19}{20}$
14. $\frac{4}{9}$
15. $\frac{5}{8}$

Solve:

16. What is 25% of 40?
17. 9 is what percent of 12?
18. Find 40% of 150.
19. 15 is 60% of what number?

Topic: Rationals

Multiplying Fractions and Mixed Numbers

1) **Change any mixed numbers to improper fractions**
2) *Cross – cancel* ***any*** *numerator with* ***any*** *denominator* by dividing each by a *common factor*
3) Multiply numerator by numerator and denominator by denominator
4) Simplify your answer (make it a mixed number if you can)

Dividing Fractions and Mixed Numbers

1) **Change any mixed numbers to improper fractions**
2) Remember Keep-Change-Flip: keep the first fraction, change the division sign to a multiplication sign, and flip the second fraction
3) Multiply numerator by numerator and denominator by denominator
4) Simplify your answer (make it a mixed number if you can)

Adding and Subtracting Fractions and Mixed Numbers

1) Check to see if the denominators are the same; if not, *find a common denominator*
2) Now add or subtract the fractions – remember, **keep the denominator!**
3) Add or subtract the whole numbers
4) Simplify the fraction
5) Rewrite the sum or difference

Circle Answers

20) $3\frac{2}{3}+5\frac{1}{4}=$

21) $8\frac{4}{5}-3\frac{2}{3}=$

22) $5\frac{2}{11}-2\frac{1}{2}=$

23) $12-4\frac{3}{5}=$

24) $-2\frac{1}{3}-5\frac{3}{4}=$

25) $-5\frac{5}{6}+12\frac{3}{8}=$

26) $3\frac{1}{3}\cdot 7\frac{1}{2}=$

27) $\frac{3\frac{1}{5}}{-\frac{5}{6}}=$

28) $\frac{-6\frac{2}{3}}{-3\frac{3}{4}}=$

Operations with Rational Numbers

Adding & Subtracting Rational Numbers

Determine whether you should add or subtract using integer rules. Then add or subtract.

- Decimals: Line up the decimal points. Then add or subtract and bring the decimal point down. Use integer rules to determine the sign of the answer.

  ex: $-9.8 + 6.24 \longrightarrow$ neg + pos: subtract $\longrightarrow$ $\begin{array}{r} 9.80 \\ -\ 6.24 \\ \hline 3.56 \end{array} \longrightarrow$ answer: -3.56

- Fractions/Mixed Numbers: Find a common denominator and then add or subtract. Borrow or convert an improper fraction answer, if necessary. Use integer rules to determine the sign of the answer.

  ex: $5\frac{3}{4} - \left(-3\frac{7}{8}\right) \longrightarrow 5\frac{3}{4} + 3\frac{7}{8} \longrightarrow$ pos + pos: add $\longrightarrow$ $\begin{array}{r} 5\frac{3}{4} = \frac{6}{8} \\ +\ 3\frac{7}{8} = \frac{7}{8} \\ \hline 8\ \ \frac{13}{8} \end{array} \longrightarrow$ answer: $9\frac{5}{8}$

Multiplying & Dividing Rational Numbers

Determine the sign of the answer using integer rules. Then multiply or divide.

- Multiplying Decimals: Ignore the decimal points. Multiply the numbers. Then count the decimal places in the problem to determine the location of the decimal point in the answer.

  ex: $-9.23 \cdot (-1.1) \longrightarrow$ neg · neg = pos $\longrightarrow$ $\begin{array}{r} 9.23 \\ \times\ 1.1 \\ \hline 923 \\ 9230 \\ \hline 10153 \end{array} \longrightarrow$ answer: 10.153

- Dividing Decimals: Move the decimal in the divisor to the end of the number. Move the decimal in the dividend the same number of places and then bring it straight up in quotient.

  ex: $-5.2 \div 0.2 \longrightarrow$ neg ÷ pos = neg $\longrightarrow$ $02.\overline{)\,52.}$ (quotient $26.$) $\longrightarrow$ answer: -26

- Multiplying Fractions: Convert mixed numbers to improper fractions. Then cross-simplify. Multiply the numerators and multiply the denominators. Simplify if necessary.

  ex: $-1\frac{3}{4} \cdot \frac{6}{14} \longrightarrow$ neg · pos = neg $\longrightarrow$ $\frac{\overset{1}{\cancel{7}}}{\underset{2}{\cancel{14}}} \cdot \frac{\cancel{6}^{3}}{\cancel{14}_{2}} = \frac{3}{4} \longrightarrow$ answer: $-\frac{3}{4}$

- Dividing Fractions: Convert mixed numbers to improper fractions. Then flip the second fraction to its reciprocal and multiply the two fractions. Simplify if necessary.

  ex: $-\frac{1}{2} \div \left(-\frac{3}{8}\right) \longrightarrow$ neg ÷ neg = pos $\longrightarrow$ $\frac{1}{\cancel{2}_{1}} \cdot \frac{\cancel{8}^{4}}{3} = \frac{4}{3} \longrightarrow$ answer: $1\frac{1}{3}$

Find the sum, difference, product or quotient. Circle answers.

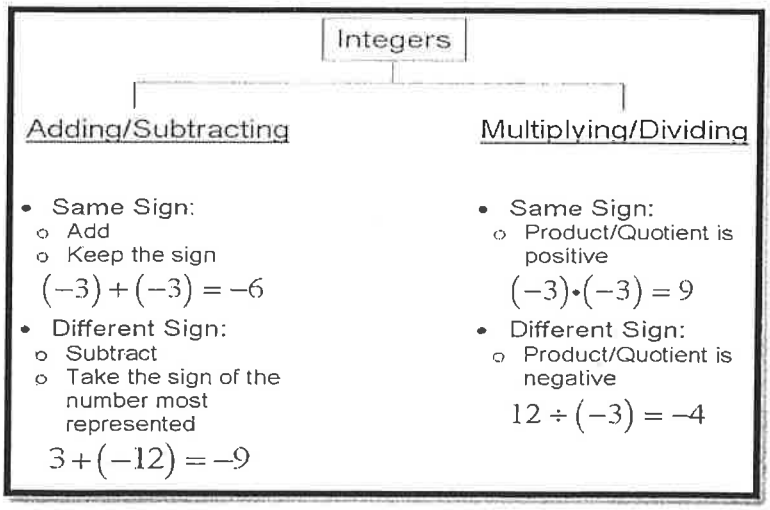
29) $38.61 + 36.841$

30) $1.755 - 1.23$

31) $0.71 \cdot (-9.2)$

32) $13.12 \div 0.1$

Integer Rules and Order of Operations:



Circle answers.

ORDER OF OPERATIONS

(P) **Parenthesis**

E^x ***Exponents***

M/D **Multiply or Divide**
*from left to right in the problem

A/S **Add or Subtract**
*from left to right
* *of course*

Find each answer:

33. -12 + -7

34. -25 + 18

35. 2 + -25

36. -28 – (-8)

37. 11 – (-5)

38. -21 – 4

39. -9• -8

40. (2)(-12)

41. -2 • 6 • -5

42. $\frac{-35}{-7}$

43. $\frac{-48}{-4}$

44. $-30 + \frac{-24}{6} - 2$

45. $\frac{16}{4} + 2 \cdot -8$

46. $-3(1-8)+2^3$

47. $\frac{2-3(5+4)}{2^2+1}$

Solving Equations

Solving One-Step Equations

- Cancel out the number on the same side of the equation as the variable by using the inverse operation. (Addition/Subtraction; Multiplication/Division). Be sure to do the same thing to both sides of the equation!

ex: $6x = -18 \rightarrow \frac{6x}{6} = \frac{-18}{6} \rightarrow$ answer: $x = -3$

ex: $y + 23 = -9 \rightarrow y + 23 - 23 = -9 - 23 \rightarrow$ answer: $y = -32$

ex: $\frac{h}{3} = 4 \rightarrow 3 \cdot \frac{h}{3} = 4 \cdot 3 \rightarrow$ answer: $h = 12$

ex: $w - 13 = -5 \rightarrow w - 13 + 13 = -5 + 13 \rightarrow$ answer: $w = 8$

Solving Two-Step Equations

- Undo operations using inverse operations one at a time using the order of operations in reverse. (i.e.: undo addition/subtraction before undoing multiplication/division)

ex: $7x - 4 = -32 \rightarrow 7x - 4 + 4 = -32 + 4 \rightarrow \frac{7x}{7} = \frac{-28}{7} \rightarrow$ answer: $x = -4$

ex: $\frac{j}{5} + 13 = 15 \rightarrow \frac{j}{5} + 13 - 13 = 15 - 13 \rightarrow 5 \cdot \frac{j}{5} = 2 \cdot 5 \rightarrow$ answer: $j = 10$

ex: $\frac{b + 7}{3} = -2 \rightarrow 3 \cdot \frac{b + 7}{3} = -2 \cdot 3 \rightarrow b + 7 - 7 = -6 - 7 \rightarrow$ answer: $b = -13$

Solve the one-step equation. Circle answers.

48. $19 + j = -34$

49. $m - 26 = 13$

50. $\frac{x}{5} = -3$

51 $12f = 216$

52. $g - (-31) = -7$

53. $\frac{h}{9} = 13$

54. $b + (-3) = -9$

55. $-4w = -280$

Solve the two-step equation. Circle answers.

56. $5m - 3 = 27$

57. $7 + \frac{y}{2} = -3$

58. $4 + 3r = -8$

59. $\frac{1}{2}p - 4 = 7$

60. $\frac{k+8}{3} = -2$

61. $\frac{f}{5} - (-13) = 12$

62. $-15 - \frac{g}{3} = -5$

63. $-8 + 4m = 2$

64. $-18 - \frac{3}{4}v = 3$

65. $\frac{-5+n}{4} = -1$

66. $3.5m + 0.75 = -6.25$

67. $2y + 3 = 19$

Translate each sentence to an algebraic equation. Then use mental math to find the solution.

	Equation	Solution
68. One half of a number is -12.	_____	_____
69. 6 more than 7 times a number is 41.	_____	_____
70. 5 less than three times a number is 10.	_____	_____
71. 16 decreased by twice a number is -24.	_____	_____

Topic: Ratio & Proprtion

Dena counted 24 marshmallows in 3 servings of Marsh Morsels. At this rate, how many marshmallows are in 12 servings?

Strategy Write and solve a proportion.

Set up a proportion.

Write ratios for the number of marshmallows to the number of servings.

$$\frac{\text{number of marshmallows in 3 servings}}{\text{3 servings}} = \frac{\text{number of marshmallows in 12 servings}}{\text{12 servings}}$$

Fill in the variable in the proportion.

Let n represent the number of marshmallows in 12 servings.

$$\frac{24}{3} = \frac{n}{12}$$

Cross multiply and solve for n.

$$\frac{24}{3} = \frac{n}{12}$$

$24 \cdot 12 \quad 3 \cdot n$ Write the factors of the cross products.

$288 \quad 3n$ Multiply to find the cross products.

$\frac{288}{3} \quad \frac{3n}{3}$ Divide both sides of the equation by the coefficient 3.

$96 = n$ Solve for n.

Solution At this rate, there are 96 marshmallows in 12 servings.

Circle Answers.

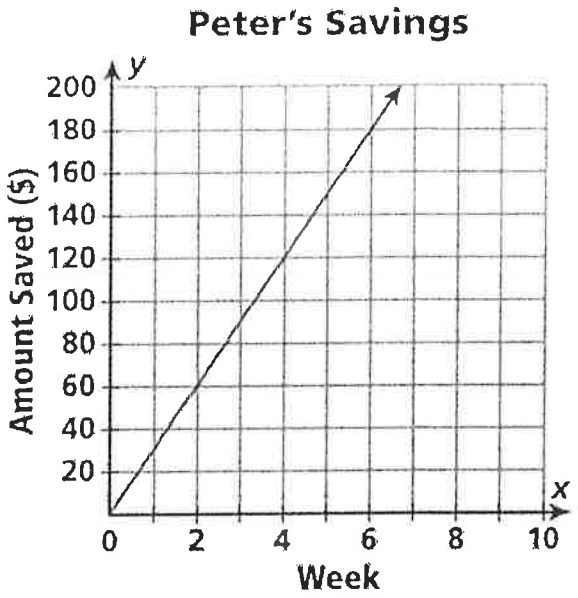
72.) Buck drove 220 miles in 5 hours. What was his average rate of speed?

73.) Horace read 160 pages in 4 hours. How many pages can he read in 6 hours?

74.) Pasha bought 3 pounds of onions for $2.67. Which ratio is proportional to 3 pounds at $2.67?

A. $\frac{\$3.48}{4 pounds}$ B. $\frac{\$3.67}{4 pounds}$ C. $\frac{\$4.45}{5 pounds}$ D. $\frac{\$4.57}{5 pounds}$

75. What is Peter's weekly rate?



76. The equation $y = 6.5x$ relates the number of tickets purchased for the school play and the total cost, in dollars. Use the equation to complete the chart:

Number of tickets, x	1	2	3	4	5	6
Total cost in dollars, y						

77. $\frac{40}{24} = \frac{20}{x}$

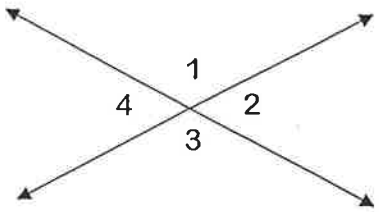
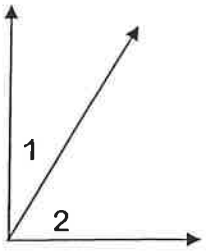
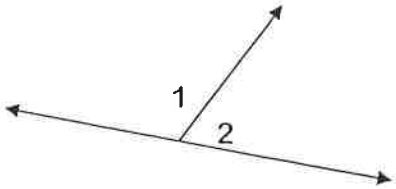
78. $\frac{20}{x} = \frac{11}{16}$

79. $\frac{2}{3} = \frac{9}{x}$

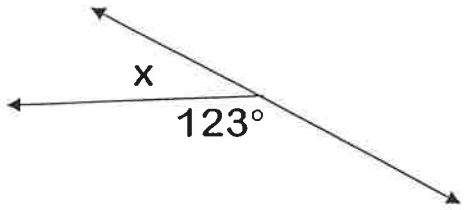
Angle Relationships and Algebra

Notation: $m\angle$ means the "measure of angle ___ "

$\cong$ means congruent or equal in measure

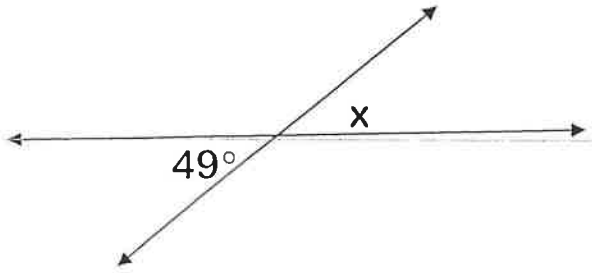
Vertical Angles	Complementary Angles	Supplementary Angles
		
Angles that are opposite each other across two intersecting lines.	Two angles whose sum is 90°.	Two angles whose sum is 180°.
$m\angle 1 \cong m\angle 3$ and $m\angle 2 \cong m\angle 4$	$m\angle 1 + m\angle 2 = 90°$	$m\angle 1 + m\angle 2 = 180°$

State how the angle labeled x is related to the angle with the given measurement. Then find the value of x in each figure.



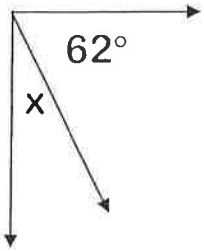
80. relationship: _____

81. x = _____



82. relationship: _____

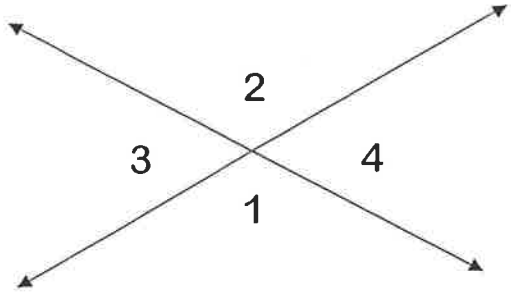
83 x = _____



84. relationship: _____

85. x = _____

Directions: Find the missing angles given that $m \angle 4 = 50°$.

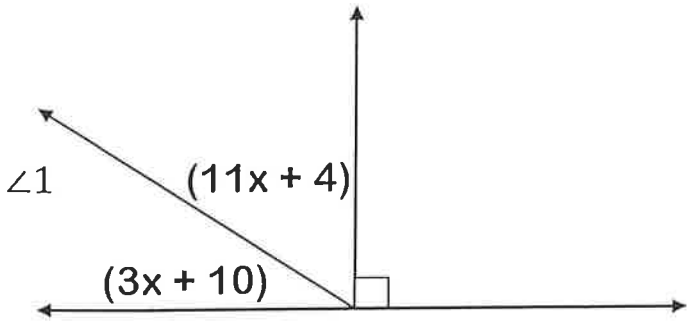


86. $m \angle 1 =$ _____

87. $m \angle 2 =$ _____

88. $m \angle 3 =$ _____

Directions: Use the following figure to answer questions 89-91.



89. relationship of all the angles

_____

90. $x =$ _____

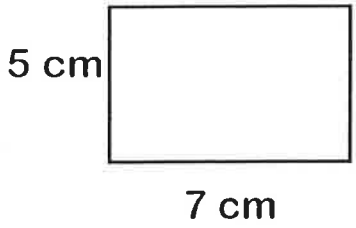
91. $m \angle 1 =$ _____

Geometry

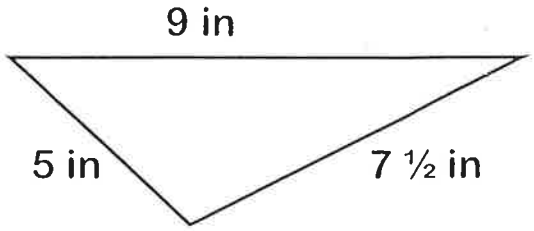
You should know and be able to use the following formulas to find perimeter, area and volume of geometric figures.

Rectangle	$P = 2l + 2w$	$A = lw$	Rectangular Prism
Square	$P = 4s$	$A = s^2$	$V = lwh$
Triangle	$P = s_1 + s_2 + s_3$	$A = \frac{1}{2}bh$	Cube
Circle	$C = \pi d$	$A = \pi r^2$	$V = s^3$

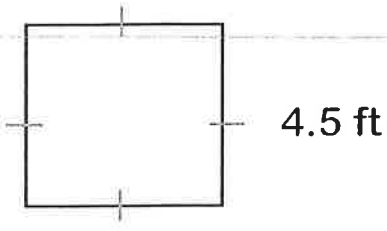
92. Find the perimeter.



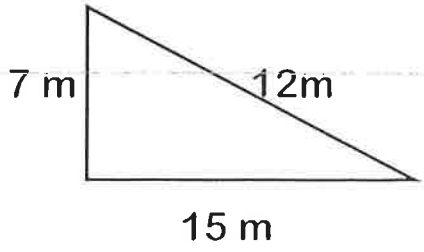
93. Find the perimeter.



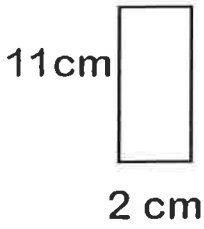
94. Find the perimeter



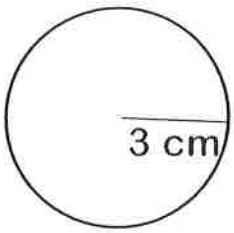
95. Find the area.



96. Find the area.



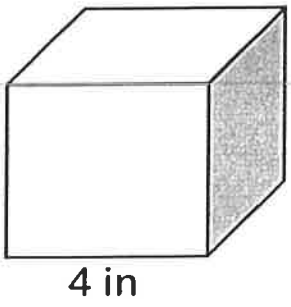
97. Find the area. (use 3.14 for π)



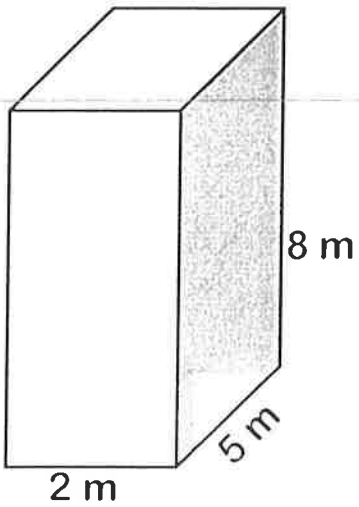
98. Logan County is shaped like a rectangle. It has a length of 80 miles and width of 42 miles. What is the area of the county?

99. A ceramic tile has an area of 81 square inches. How long is one side?

100. Find the volume of the cube.



101. Find the volume of the figure.



· Coordinate Plane

Directions: Identify the location of the follow points.
EX. Point P (10, -6)

102. Point R _____

103. Point H _____

104. Point X _____

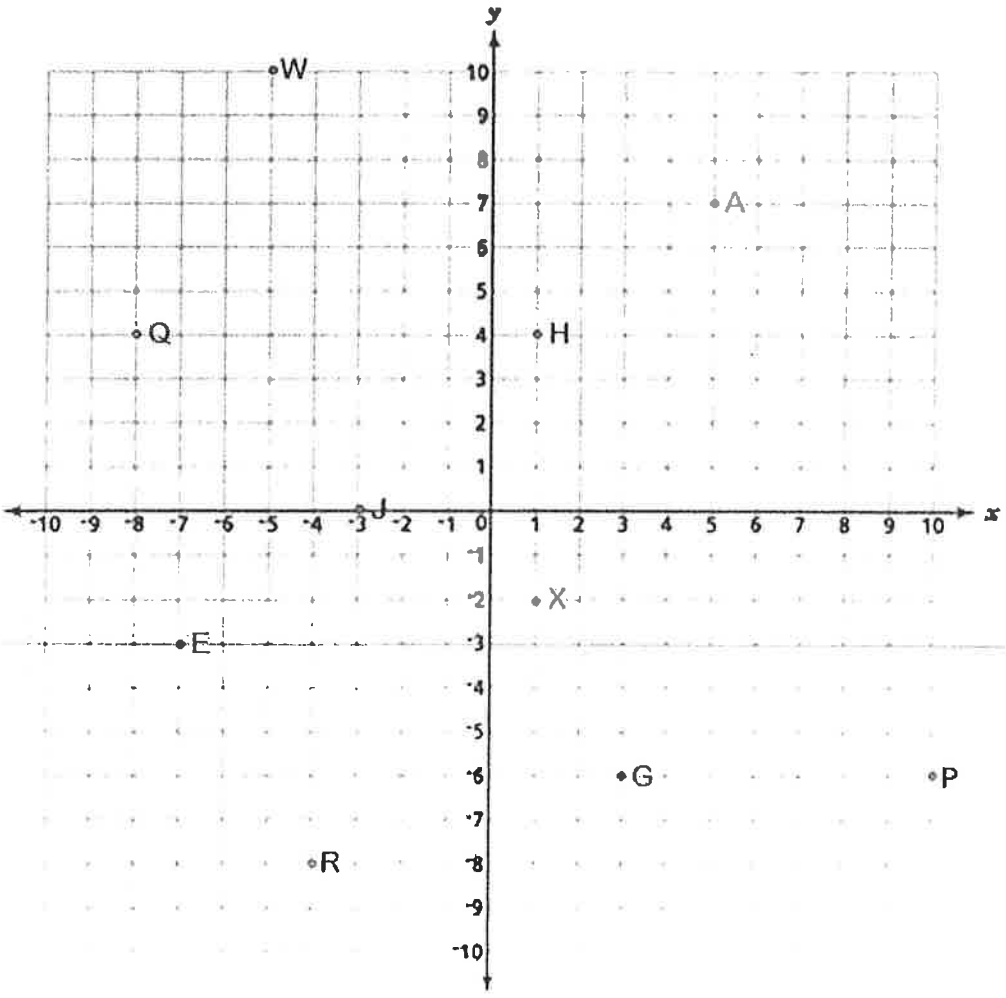
105. Point A _____

106. Point G _____

107. Point E _____

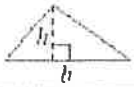
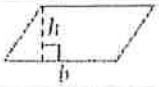
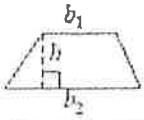
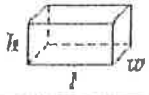
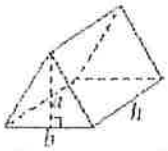
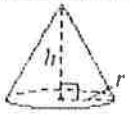
108. Point J _____

109. Point W _____



Grade 7 Mathematics Reference Sheet

FORMULAS

	**Circle**	Area $= \pi r^2$ Circumference $= 2\pi r$
	**Triangle**	Area $= \frac{1}{2}bh$
	**Parallelogram**	Area $= bh$
	**Trapezoid**	Area $= \frac{1}{2}h(b_1 + b_2)$
	**Right Rectangular Prism**	Volume $= lwh$ Volume $= Bh$
	**Right Triangular Prism**	Volume $= \frac{1}{2}abh$ Volume $= Bh$
	**Right Circular Cone**	Volume $= \frac{1}{3}Bh$ Volume $= \frac{1}{3}\pi r^2 h$
	**Right Circular Cylinder**	Surface Area $= 2\pi rh + 2\pi r^2$

CONVERSIONS

1 centimeter = 10 millimeters
1 meter = 100 centimeters = 1,000 millimeters
1 kilometer = 1,000 meters

1 gram = 1,000 milligrams
1 kilogram = 1,000 grams

1 pound = 16 ounces
1 ton = 2,000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts

1 liter = 1,000 milliliters
1 kiloliter = 1,000 liters

1 mile = 5,280 feet
1 mile = 1,760 yards