ALLEN PARK HIGH SCHOOL

Summer Assessment

Geometry Summer Packet

For Students Entering Geometry

Summer 2015

This summer packet is intended to be completed by the FIRST DAY of school. This packet will be graded and count as the first grade of the marking period. You should be working on the packet for the class you are taking NEXT YEAR. Feel free to email me if you have any questions regarding your packet by emailing me at: tim.brown@apps.k12.mi.us. We encourage you to check your answers and re-work any problems that were incorrect. **We expect you to spend at least 1 hour each week on your summer math packet.** This packet is not designed for one intense 10 hour session the day before school starts, so begin now!

This summer math packet will be worth 50 points and will be the first recorded grade of the marking period. Bring your questions and concerns regarding any problems you may have had difficulty with to your class on the first day of school, September 4th. Start off the year with a great start by completing the packet to the best of your ability.

Show all work for all problems, regardless of their level of difficulty. Answers will be in the form of positive, negative, whole numbers, fractions and decimals. Leave answers in fraction form unless the question contains decimals.

Order of Operations

Remember PEMDAS (**P**lease **E**xcuse **M**y **D**ear **A**unt **S**ally)
You *must* perform the order of operations in a specific order.

P: Parentheses (Grouping symbols: parentheses( ), brackets [ ], braces { }, and fraction bars –).
E: Exponents, such as 3^2.
MD: Multiply OR Divide (compute whatever appears 1st moving from left to right)
AS: Add OR Subtract (compute whatever appears 1st moving from left to right)

Example 1: $5-2+6\div 2\bullet 4+3^2 = 5-2+6\div 2\bullet 4+\underbrace{3^2}_{\text{Exp.}} = 5-2+\underbrace{6\div 2}_{\text{Divide 1st}}\bullet 4+9$

$= 5-2+\underbrace{3\bullet 4}_{\text{Multiply}}+9 \rightarrow = \underbrace{5-2}_{\text{subtract}}+12+9$

$= \underbrace{3+12}_{\text{Add}}+9 \rightarrow = \underbrace{15+9}_{\text{Add}} = \boxed{24}$

Example 2: $\dfrac{-3\pm\sqrt{\underbrace{3^2}_{3\text{x}3}-4(1)(-10)}}{2} = \dfrac{-3\pm\sqrt{9\underbrace{-4(1)(-10)}_{\text{multiply}}}}{2} = \dfrac{-3\pm\sqrt{\underbrace{9+40}_{\text{add}}}}{2} = \dfrac{-3\pm\underbrace{\sqrt{49}}_{\text{evaluate}}}{2} = \dfrac{-3\pm 7}{2}$

split into 2 parts

$= \dfrac{-3+7}{2}$ and $= \dfrac{-3-7}{2}$

$= \dfrac{4}{2}$ and $= \dfrac{-10}{2}$

$= \boxed{2 \text{ and } = -5}$

Find the value of each expression.

1. $10+16\div 4+8$

2. $4\left(3+3^2\right)$

3. $4+2^2-15+4$

4. $\dfrac{14(8-15)}{2}$

5. $7-\left[4+(6\bullet 5)\right]$

6. $\left[21-(9-2)\right]\div 2$

7. $2.5+3^3-8\div 2\bullet 4.1$

8. $3+\left[8\div\left(9+2\left(-4\right)\right)\right]$

9. $4+8-2(4)(8)$

10. $\dfrac{-10\pm\sqrt{10^2-4(2)(12)}}{4}$

11. $12^2+5^2-2(12)(5)$

12. 10^2+8^2

13. $3^2+5^2-2(3)(5)$

14. $\dfrac{-2\pm\sqrt{2^2-4(1)(63)}}{2}$

Simplifying Expressions

Simplifying expressions involves collecting like terms.

$8x$ and $3x$ are like terms $5x$ and $6y$ are *not* like terms

When simplifying expressions you must follow the order of operations.

Example 1: Simplify the expression. $9x+5-2x+7.5=\underbrace{9x-2x+5+7.5}_{\text{Change the order}}=\underbrace{9x-2x}_{\text{like terms}}+\underbrace{5+7.5}_{\text{like terms}}=\boxed{7x+12.5}$

Example 2: Simplify the expression. $-2\left(4x-7\right)-x+4=\underbrace{-2\left(4x-7\right)}_{\text{Distribute the }-2}-x+4=-2\bullet 4x-2\bullet\left(-7\right)-x+4$

$=-8x+14-x+4=\underbrace{-8x-x+14+4}_{\text{change the order}}$

$=\underbrace{-8x-x}_{\text{like terms}}+\underbrace{14+4}_{\text{like terms}}=\boxed{-9x+18}$

Simplify each expression.

15. $k+2-10k$

16. $8x+3+2x$

17. $-5(1-8a)-6a$

18. $a-5a$

19. $3(7x+9)+10$

20. $-(x+9)-(5x-6)$

21. $10(2n+4)-6(n-1)$

22. $-8.3k+5+3.6k-2.3$

23. $\frac{5}{6}a+\frac{9}{2}\left(\frac{3}{2}a+\frac{19}{6}\right)$

Solving Equations

Remember the general rule: "What you do to one side, you must do to the other." If you add a number to one side of the equation, you must add the same number to the other." This rule holds true for adding, subtracting, multiplying, and dividing numbers or variables to each side of an equation.

Example 1: Solve.

$5x+2=-2x+16$

$\underset{+2x}{5x}+2=\underset{+2x}{-2x}+16$ Add $2x$ to both sides

$7x+\underset{-2}{2}=\underset{-2}{16}$ Subtract 2 from both sides

$7x=14$

$\frac{7x}{7}=\frac{14}{7}$ Divide both sides by 7

$\boxed{x=2}$

Example 2: Solve.

$\frac{3}{2}x-5=1$

$\frac{3}{2}x\underset{+5}{-5}=\underset{+5}{1}$ Add 5 to both sides

$\frac{3}{2}x=6$

$\frac{2}{3}\bullet\frac{3}{2}x=6\bullet\frac{2}{3}$ Multiply both sides by $\frac{2}{3}$ which is the reciprocal of $\frac{3}{2}$

$\boxed{x=4}$

Example 3: Solve.

$\frac{4}{x+1}=\frac{2}{9}$

$\frac{4}{x+1}\times\frac{2}{9}$ Cross Multiply

$\underset{-2}{36}=2x+\underset{-2}{2}$ Subtract 2 ↗

$34=2x$

$\frac{34}{2}=\frac{2x}{2}$ Divide by 2

$\boxed{17=x}$

Solve each equation.

24. $\frac{8}{x}=\frac{9}{6}$

25. $-2=-4-n$

26. $4x=80$

27. $-6=\frac{n}{9}$

28. $4x-5+8=7$

29. $\frac{2}{5}=\frac{10}{x}$

30. $7+x=43$

31. $r-16=-8$

32. $0=6n-6n$

33. $\frac{4y}{5}=\frac{6}{4}$

34. $m-2=6-3m$

35. $-6(1-7x)=-342$

36. $14=-b-b$

37. $\frac{4}{x+2}=\frac{9}{4}$

38. $6-4b=-6b+6(b-3)$

39. $\frac{2}{10}=\frac{2y}{4}$

40. $-8(x-7)=-4(5x+7)$

41. $\frac{x+7}{x-3}=\frac{5}{10}$

42. $-17-4y=-(y-1)$

43. $\dfrac{x-3}{9}=\dfrac{x+1}{7}$

44. $-2(-5y-3)+2(y+5)=-8$

Distance Between Two Points on the Coordinate Plane

<u>Example 1:</u> Find the distance between the pair of points $(5,-2),(-3,7)$.

You must pick one point to be point 1 and the other to be point 2. Point 1 has an *x* and a *y* coordinate. Point 1 will have x_1 and y_1 and point 2 will have x_2 and y_2. For this example $(\underset{x_1}{5},\underset{y_1}{-2}),(\underset{x_2}{-3},\underset{y_2}{7})$. Plug these numbers into the distance formula as follows.

$$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2} = \sqrt{\underbrace{(-3-5)}_{\text{combine}}{}^2+\underbrace{(7-(-2))}_{\text{combine } 7+2}{}^2} = \sqrt{\underbrace{(-8)^2}_{\text{"square"}}+\underbrace{(9)^2}_{\text{"square"}}}$$

$$= \underbrace{\sqrt{64+81}}_{\text{both are always positive - now add}} = \underbrace{\sqrt{145}}_{\text{square root}} = \underbrace{\boxed{12.04}}_{\text{round to 2 decimal places}}$$

The distance between two points can also be interpreted as the length of the segment between the two endpoints.

Find the distance between each pair of points. Distance Formula: $d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

45. $(3,4),(-1,-5)$

46. $(2,8),(8,0)$

47. $(-1,0),(-7,3)$

48. $(-8,4),(1,-7)$

49. $(-1,-4),(3,1)$

50. $(-4,4),(-4,4)$

Midpoint Between Two Points on the Coordinate Plane

Example 1: Find the midpoint of the line segment with the given endpoints $(5,-2),(-3,7)$.

You must pick one point to be point 1 and the other to be point 2. Point 1 has an *x* and a *y* coordinate. Point 1 will have x_1 and y_1 and point 2 will have x_2 and y_2. For this example $(\underset{x_1}{5},\underset{y_1}{-2}),(\underset{x_2}{-3},\underset{y_2}{7})$. Plug these numbers into the midpoint formula as follows.

$$m.p.=\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)=\left(\frac{\overbrace{5+(-3)}^{\text{combine } 5-3}}{2},\frac{\overbrace{(-2)+7}^{\text{combine } -2+7}}{2}\right)=\left(\underbrace{\frac{2}{2},\frac{5}{2}}_{\text{simplify}}\right)=\boxed{(1,2.5)}$$

The midpoint is the point that is half way between the two given endpoints.

Find the midpoint of the line segment with the given endpoints. Midpoint Formula: $m.p.=\left(\frac{x_2+x_1}{2},\frac{y_2+y_1}{2}\right)$

51. $(-5,-5),(4,5)$

52. $(3,2),(7,9)$

53. $(-3,-4),(-5,10)$

54. $(1,9),(3,5)$

55. $(-4,-9),(-7,-9)$

56. $(4,0),(-6,4)$

Slope of a Line on the Coordinate Plane

The **Slope** of a line represents its steepness. A large slope such as 7 or -6 is a steep line, while a small slope such as ½ or – ¼ are lines with very little steepness (they are almost horizontal lines)

Example 1: Find the slope of the line through the two given points $(-4,6),(2,-3)$.

You must pick one point to be point 1 and the other to be point 2. Point 1 has an *x* and a *y* coordinate. Point 1 will have x_1 and y_1 and point 2 will have x_2 and y_2. For this example $(\underset{x_1}{-4},\underset{y_1}{6}),(\underset{x_2}{2},\underset{y_2}{-3})$. Plug these numbers into the slope formula as follows.

$$m=\left(\frac{y_2-y_1}{x_2-x_1}\right)=\left(\frac{\overbrace{(-3)-6}^{\text{combine } -3-6}}{\underbrace{2-(-4)}_{\text{combine } 2+4}}\right)=\left(\frac{-9}{\underbrace{6}_{\text{simplify}}}\right)=\boxed{\left(-\frac{3}{2}\right)}$$

Find the slope of the line through each pair of points. Slope Formula: $m = \frac{y_2 - y_1}{x_2 - x_1}$

57. $(3,18),(20,-7)$

58. $(6,1),(18,1)$

59. $(4,-16),(-19,-5)$

60. $(-7,6),(-7,9)$

61. $(17,5),(-10,13)$

62. $(-12,-7),(-18,-11)$

Area

Area represents the total number of squares that are required to cover the interior of a flat (plane) figure. Each polygon has its own formula that can be used to calculate the area. Use the formulas below to calculate the area of the given figure.

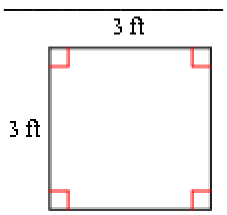
Formulas:

Rectangle/Parallelogram: $A = bh$ Triangle: $A = \frac{1}{2}bh$ Circle: $A = \pi r^2$ Trapezoid: $A = \frac{1}{2}h(b_1 + b_2)$

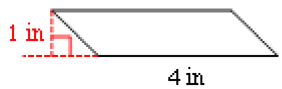
b = base of the figure *h* = the height of the figure *r* = radius of a circle *d* = diameter of a circle π = 3.14

Find the area of each figure. Round to the nearest hundredth when necessary.

63. ________________



64. ________________



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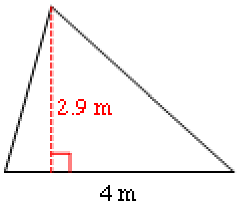

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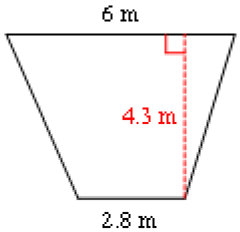
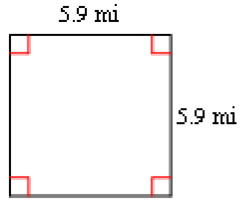
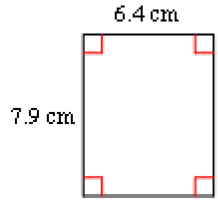


67. ________________



68. ________________



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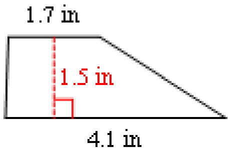

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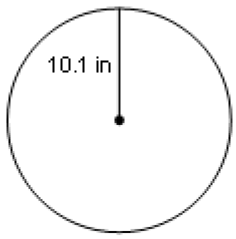

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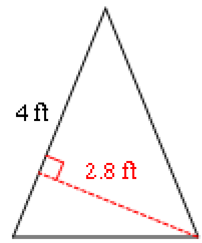

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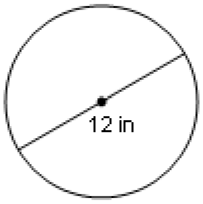
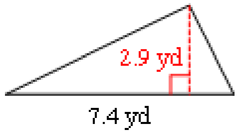
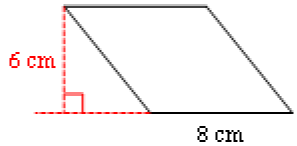


73. ________________



74. ________________



75. Circle with a radius of 11 inches.

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76. Circle with a diameter of 8 km.

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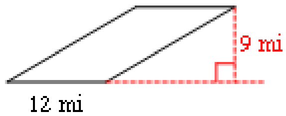
77. ________________



Perimeter and Circumference

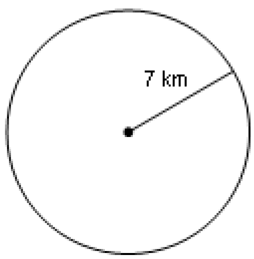
Perimeter represents the distance around a figure. You can simply add up all of the sides of the figure.

Circumference is the distance around a circle. You will use one of the two given formulas below.

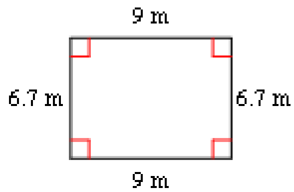
Formulas:
Perimeter = add up all of the sides Circumference: $C = 2\pi r$ or $C = \pi d$ r = radius d = diameter

Find the perimeter or circumference for each figure. Round to the nearest hundredth when necessary.

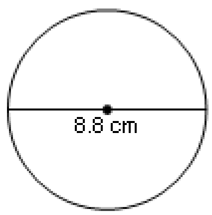
78. ________________



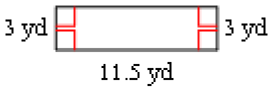
79. ________________



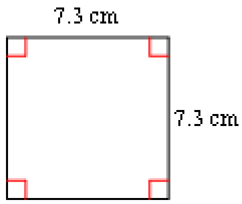
80. ________________



81. ________________



82. ________________



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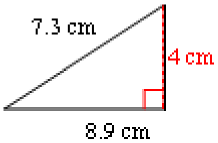

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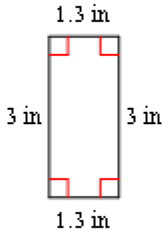
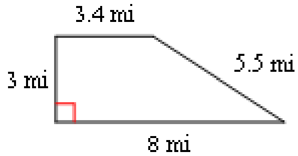
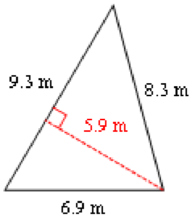


85. ________________



86. ________________

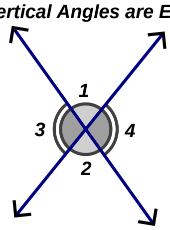


Applying Geometric Terminology

Below you will find multiple definitions that you will see at the beginning of the school year in Geometry. Read each definition and observe all of the information in and around the diagram.

Angle 1 and Angle 2 are VERTICAL ANGLES

Vertical Angles are Equal

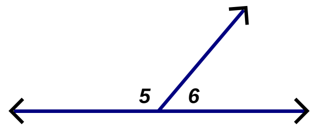


Angle 3 and Angle 4 are VERTICAL ANGLES

Vertical Angles are Equal

Angle 5 and Angle 6 form a LINEAR PAIR

Linear Pairs Add up to 180°.

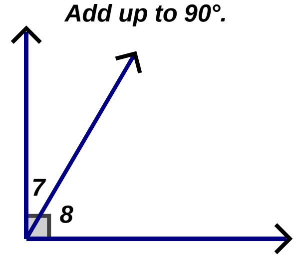


Angle 5 and Angle 6 are also SUPPLEMENTARY ANGLES

Supplementary Angles also Add up to 180°.

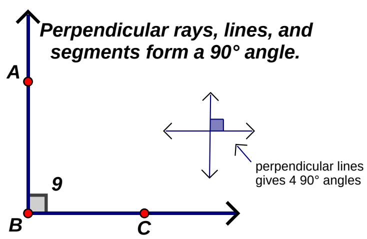
Angle 7 and Angle 8 are COMPLIMENTARY ANGLES

Complimentary Angles Add up to 90°.

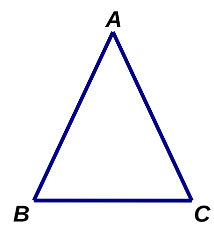


Ray BA and Ray BC are PERPENDICULAR

Perpendicular rays, lines, and segments form a 90° angle.

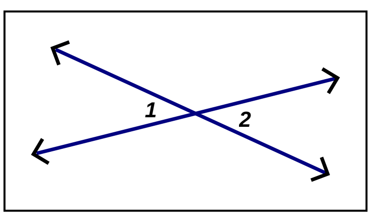


The angles in a triangle always Add up to 180°.

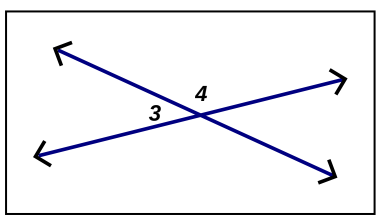


Using the definitions above, identify the type of angle relationships of the numbered angles below.

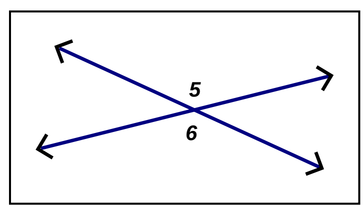
87. ________________



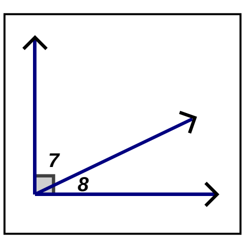
88. ________________



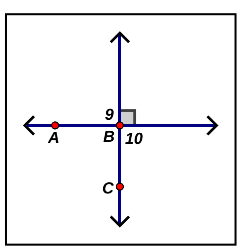
89. ________________



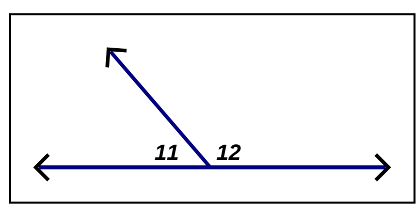
90. ________________



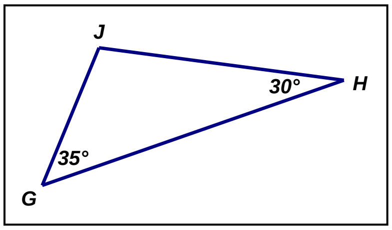
91. ________________



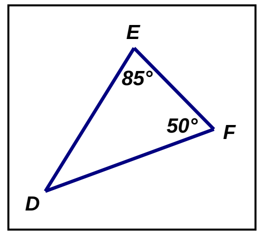
92. ________________



93. Find the measure of angle *J*. ________________

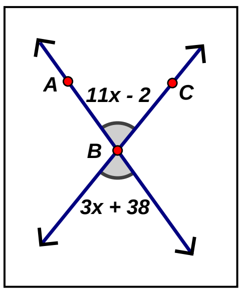


94. Find the measure of angle *D*. ________________

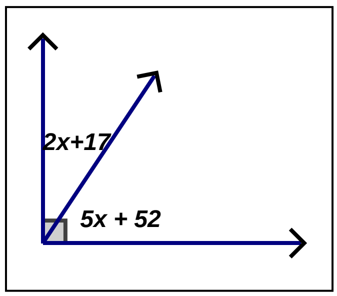


Use the definitions from the previous page to first write an equation for the angle relationship, then find the value of *x*.

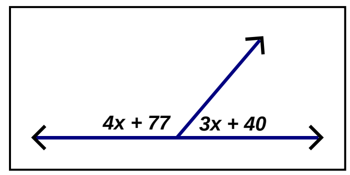
95. ________________



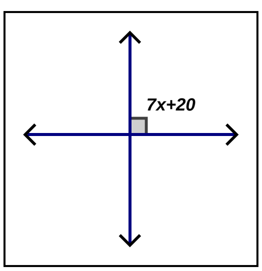
96. ________________



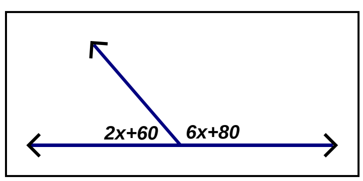
97. ________________



98. ________________



99. ________________



100. ________________