Geometry Summer Math Packet

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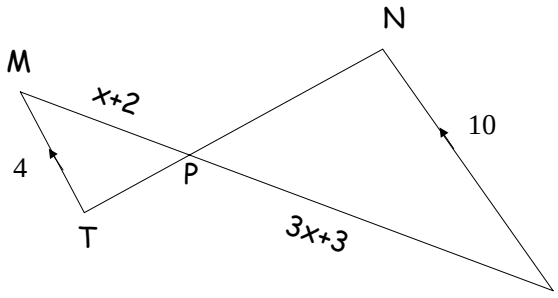
Directions: Complete all ten problems below in the space provided. You must show all work neatly and in an organized fashion along with the correct answer to receive ten points. No scrap.

Problem #1 **(N&O) 10-4a: Accurately solves problems that involve but are not limited to proportional relationships. (F&A) 10-4a: Demonstrates conceptual understanding of equality by: solving problems involving algebraic reasoning about equality. (G&M) 10-5a: Applies concepts of similarity by solving problems within mathematics or across disciplines or contexts.**

In the diagram, $\Delta MPT \sim \Delta RPN$.

Find *x*.



Find *PR*.

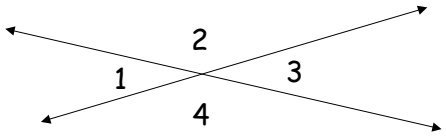
Problem #2 **(G&M) 10-9c: Solves problems on and off the coordinate plane involving perpendicular and parallel lines. (G&M) 10-9d: Solves problems on and off the coordinate plane involving slope. (F&A) 10-3 a,b: Demonstrates conceptual understanding of algebraic expressions by solving problems involving simplifying expressions and translating problem situations into algebraic expressions. (F&A) 10-4a,b: Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality and translating problem situations into equations.**

Write the equation of a line that is perpendicular to the line $4y - x = 8$ and passes through the point (2, −3) in slope-intercept form.

Problem #3 **(G&M) 10-2La: Creates formal proofs involving angles. (F&A) 10-3a,c: Demonstrates conceptual understanding of algebraic expressions by solving problems involving simplifying expressions and translating problem situations into algebraic expressions.**

Write a two-column or paragraph proof using the following information.

Given: $\angle 1$ ***and*** $\angle 3$ ***are vertical angles.***
$m\angle 1 = 3x + 5$, $m\angle 3 = 2x + 8$



Prove: $m\angle 1$ ***= 14***

Problem #4 **(F&A) 10-3a,c Demonstrates conceptual understanding of algebraic expressions by solving problems involving simplifying expressions and translating problem situations into algebraic expressions. (G&M) 10-2Sa: Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems within mathematics or across disciplines or contexts involving angles. (G&M) 10-2Sd: Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems within mathematics or across disciplines or contexts involving polygons.**

The measures of the angles of ΔABC are $5x$, $4x-1$, and $3x+13$.

a. **Draw a figure to illustrate ΔABC. Use a straightedge.**

b. **Find the measure of each angle of ΔABC.**

c. **Prove that ΔABC is an isosceles triangle. You may explain your answer in paragraph form.**

Problem #5 **(G&M) 10-2Sa: Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems within mathematics or across disciplines or contexts involving angles. (G&M) 10-6a: Solves problems within mathematics or across disciplines or contexts involving perimeter.**

The coordinates of the vertices of a triangle are $A(-2,-1)$, $B(2,5)$, **and** $C(4,3)$.

a. **Find the perimeter of** ΔABC. **You may use the Distance Formula or the Pythagorean Theorem. Draw triangle** ABC **if necessary.**

b. **Suppose each coordinate is multiplied by 2. What is the perimeter of this triangle? Explain.**

Problem #6 **(G&M) 10-7c: Solves problems involving geometric measurement by making decisions concerning an appropriate degree of accuracy in problem situations involving measurement in other GSEs.**

Find the precision for a bolt with a measurement of $3\frac{1}{4}$ inches. Explain what this precision means.

Problem #7 **(G&M) 10-9 a: Solves problems on and off the coordinate plane involving distance. (G&M) 10-10c: Demonstrates conceptual understanding of spatial reasoning and visualization by solving related problems.**

The vertices of $\triangle ABC$ **are** $A(-3,1)$, $B(0,-2)$, **and** $C(3,4)$.

a. **Use the Distance Formula to find the length of each side to the nearest tenth.**

b. **What type of triangle is** $\triangle ABC$**? Explain how you know.**

c. **Prove** $< A =< B$. **You may explain your answer in paragraph form.**

Problem #8 **(F&A) 10-4a: Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality. (G&M) 10-2L: Creates formal proofs.**

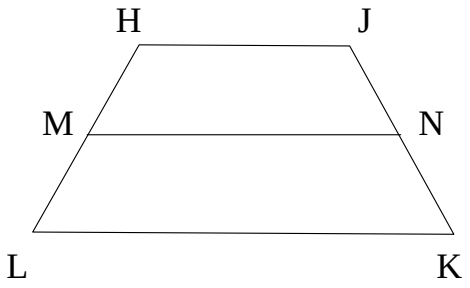
Engineers consider the expansion and contraction of materials used in construction. The coefficient of linear expansion, *k*, is dependent on the change in length and the change in temperature and is found by the formula, $k = \frac{\Delta l}{l(T - t)}$**. Solve this formula for T and justify each step in a two-column proof using the properties we learned about in class.**

Problem #9 **(F&A) 10-4a: Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality. (F&A) 10-4b: Demonstrates conceptual understanding of equality by translating problem situations into equations. (G&M) 10-2Sd: Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems within mathematics or across disciplines or contexts involving polygons.**

A quadrilateral has angles with measures of $(2x+15)^\circ$, $(3x-20)^\circ$, $(x+15)^\circ$, **and** x°. **Find the measure of each interior angle.**

Problem #10 **(F&A) 10-4a: Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality. (F&A) 10-4b: Demonstrates conceptual understanding of equality by translating problem situations into equations. (G&M) 10-2Sd: Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems within mathematics or across disciplines or contexts involving polygons.**

$\overline{MN}$ **is the median of trapezoid *HJKL*. Find each indicated value.**



a. Find *HJ* if MN = $5x + 6$**, *HJ* =** $3x + 6$ **and *LK* =** $8x$**.**

b. Find $m < JKL$ **if *HJKL* is isosceles and** $m < HLK$ **= 62.**