

**Solve. Justify each step with a property of equality.**

- 1)  $2(4x+2) = 4(x+4)$       2)  $\frac{1}{2}x + 4 = 18$       3)  $5x - 2(x-3) = \frac{3}{4}(16-2x)$   
 4)  $x^2 - 11x = -30$       5)  $3x^2 - 12 = 0$       6)  $x^2 + 17x = 0$

7-8: Solve each system of equations by substitution or elimination.

- 7)  $\begin{cases} 12x + 4y = -4 \\ 2x - y = 6 \end{cases}$       8)  $\begin{cases} 4y - 2x = 4 \\ 10x - 5y = 10 \end{cases}$

- 9) Are the lines  $2x + 4y = -10$  and  $y = -\frac{1}{2}x + 5$  parallel, perpendicular, intersecting, or coinciding?  
 10) Are the lines  $6x + 2y = 2$  and  $3x + 9y = 3$  parallel, perpendicular, intersecting, or coinciding?  
 11)  $\overline{FC}$  is a diagonal of square FACE. If the endpoints of the diagonal are  $(-2, 5)$  and  $(4, -6)$ , what is the coordinate of the center of the square?  
 12)  $M$  bisects  $\overline{RS}$ . If  $R$  is at  $(4, -2)$  and  $M$  is at  $(-1, 5)$ , find the coordinates at  $S$ .  
 13. Find  $PQ$  if  $P$  is the point  $(2, -7)$  and  $Q$  is the point  $(-3, -4)$ .  
 14. Find  $AB$  with  $A(-3, 5)$   $B(6, -1)$ .

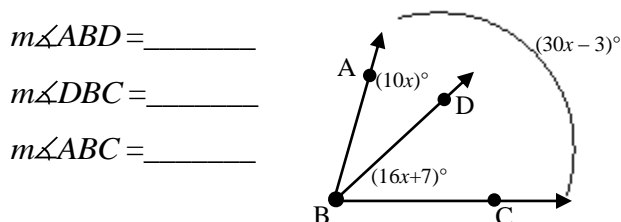
**Let  $S$  be between  $R$  and  $T$ . Solve for  $x$  and then find the unknown segment measurements.**

- |                   |                                 |                                 |                                 |
|-------------------|---------------------------------|---------------------------------|---------------------------------|
|                   | $x = \underline{\hspace{2cm}}$  | $RS = \frac{1}{2}x + 2$         | $x = \underline{\hspace{2cm}}$  |
|                   | $RS = 4x + 3$                   | $RS = \underline{\hspace{2cm}}$ |                                 |
| 1) $ST = 5x - 10$ | $ST = \underline{\hspace{2cm}}$ | 2) $ST = 3x + \frac{3}{2}$      | $RS = \underline{\hspace{2cm}}$ |
|                   | $RT = 6x + 14$                  |                                 | $ST = \underline{\hspace{2cm}}$ |
|                   | $RT = \underline{\hspace{2cm}}$ | $RT = 5x + 2$                   | $RT = \underline{\hspace{2cm}}$ |

If  $B$  is the midpoint of  $\overline{AC}$ , solve for  $x$  then find the measures of the unknown segments.

- |                  |                                 |                   |                                 |
|------------------|---------------------------------|-------------------|---------------------------------|
|                  | $x = \underline{\hspace{2cm}}$  |                   | $x = \underline{\hspace{2cm}}$  |
| 3) $AB = 4x - 4$ | $AB = \underline{\hspace{2cm}}$ | 4) $AB = 4x + 10$ | $AB = \underline{\hspace{2cm}}$ |
| $AC = 7x - 3$    | $AC = \underline{\hspace{2cm}}$ | $BC = 10x + 7$    | $BC = \underline{\hspace{2cm}}$ |

- 5)  $x = \underline{\hspace{2cm}}$       6)  $\overline{IS}$  bisects  $\angle FIH$ .  $m\angle FIS = (7x + 13)^\circ$  ;

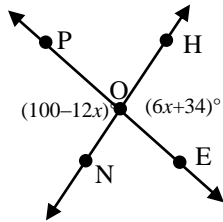


- $m\angle ABD = \underline{\hspace{2cm}}$   
 $m\angle DBC = \underline{\hspace{2cm}}$   
 $m\angle ABC = \underline{\hspace{2cm}}$

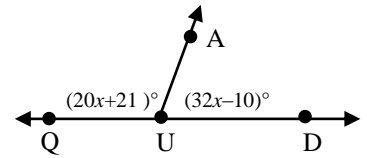
- $m\angle FIH = (19x - 7)^\circ$ .  
 $x = \underline{\hspace{2cm}}$   
 $m\angle SIH = \underline{\hspace{2cm}}$   
 $m\angle FIH = \underline{\hspace{2cm}}$

- 7)  $K$  is in the interior of  $\angle MIL$ .  
 $m\angle MIK = (1-19x)^\circ$  ;  $m\angle KIL = (5x+83)^\circ$  ;  
 $m\angle MIL = (80-15x)^\circ$ .  
 $x = \underline{\hspace{2cm}}$        $m\angle MIK = \underline{\hspace{2cm}}$   
 $m\angle KIL = \underline{\hspace{2cm}}$        $m\angle MIL = \underline{\hspace{2cm}}$
- 9)  $\overline{AH}$  bisects  $\angle MAT$ .  $m\angle MAH = (12x - 13)^\circ$  ;  
 $m\angle HAT = (9x + 2)^\circ$ .  
 $x = \underline{\hspace{2cm}}$   
 $m\angle MAH = \underline{\hspace{2cm}}$        $m\angle MAT = \underline{\hspace{2cm}}$

8)  $x =$  \_\_\_\_\_  
 $m\angle PON =$  \_\_\_\_\_  
 $m\angle POH =$  \_\_\_\_\_



10)  $x =$  \_\_\_\_\_  
 $m\angle QUA =$  \_\_\_\_\_  
 $m\angle DUA =$  \_\_\_\_\_



**Identify the hypothesis and conclusion of the following statements.**

- If you multiply two irrational numbers, then the product is irrational.
- If two points are distinct, then there is on line through them.

**Write the inverse, converse, contrapositive, and the biconditional of the conditional statements.**

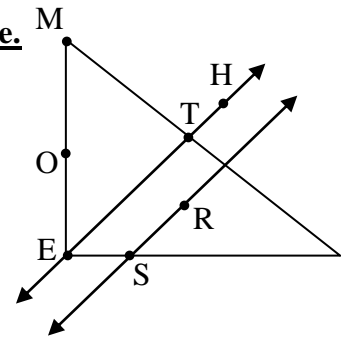
- If  $m\angle 1 = 35^\circ$ , then  $\angle 1$  is acute.
- If a quadrilateral is a rectangle, then it has congruent diagonals.

**Find the truth value for each conditional/biconditional. If it is false, give a counterexample.**

- If two angles are adjacent, then they have a common ray.
- If  $x$  is a whole number, then  $x = 2$
- The sides of a triangle measure 3, 7, and 15 if and only if the perimeter is 25.
- Two angles are complementary if and only if the sum of their measures is  $90^\circ$ .

**Based on the picture alone, determine if each statement is true or false.**

- $\overleftrightarrow{ET} \parallel \overleftrightarrow{SR}$
- $\angle MES$  is a right angle.
- T is between E and H
- M, O, S, and H are coplanar
- $\overline{MO} \cong \overline{OE}$
- $\angle OET \cong \angle TES$



**For each statement, make a conclusion and justify it.**

15) Given:  $\overline{TO} \cong \overline{AN}$

16) Given: E is the midpoint of  $\overline{BD}$

Conclusion: \_\_\_\_\_

Conclusion: \_\_\_\_\_

Why: \_\_\_\_\_

Why: \_\_\_\_\_

17) Given: A bisects  $\overline{CT}$

18) Given:  $\overline{AT}$  bisects  $\angle MAH$

Conclusion: \_\_\_\_\_

Conclusion: \_\_\_\_\_

Why: \_\_\_\_\_

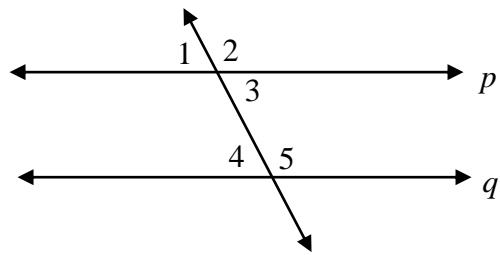
Why: \_\_\_\_\_

- 1) Given:  $p \parallel q$ ;  $m\angle 3 = 9x + 10y$   
 $m\angle 4 = 10x + 22y$ ;  $m\angle 5 = 15x - 2y$

$x =$  \_\_\_\_\_

$y =$  \_\_\_\_\_

$m\angle 1 =$  \_\_\_\_\_



**For the following problems, (a) tell what kind of angles are represented; (b) solve for x; and (c) find the measures of the angles. NOTE: Even though all six problems use the same diagram, each one is separate! Angle measures will not be the same from one problem to the next.**

- 2)  $m\angle 10 = 9x + 22$ ;  $m\angle 12 = 12x - 14$

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

- 3)  $m\angle 6 = 14x - 18$ ;  $m\angle 11 = 9x + 17$

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

- 4)  $m\angle 4 = 2x + 46$ ;  $m\angle 5 = -13x + 46$

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

- 5)  $m\angle 2 = 8x - 3$ ;  $m\angle 9 = 3x + 27$

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

- 6)  $m\angle 1 = 10x + 3$ ;  $m\angle 7 = 2x - 3$

a. \_\_\_\_\_

b. \_\_\_\_\_

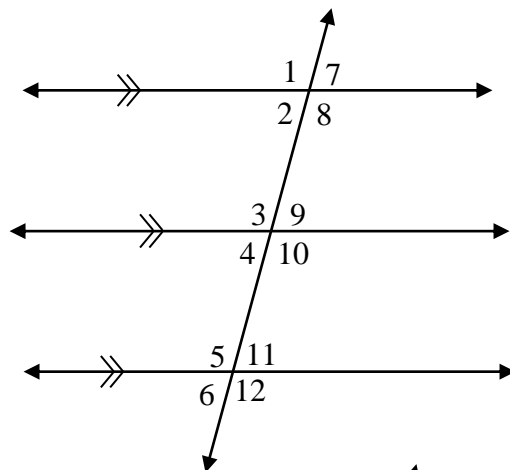
c. \_\_\_\_\_

- 7)  $m\angle 3 = -2x + 110$ ;  $m\angle 12 = 4x + 56$

a. \_\_\_\_\_

b. \_\_\_\_\_

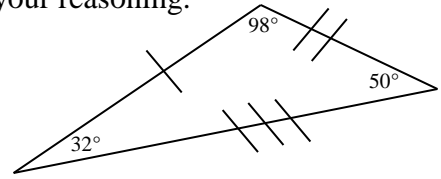
c. \_\_\_\_\_



1) Classify the following triangle by sides AND angles, and explain your reasoning.

By sides: \_\_\_\_\_ Why? \_\_\_\_\_

By angles: \_\_\_\_\_ Why? \_\_\_\_\_



2) The measures of the angles of a triangle are in the ratio of 2:6:10. What are the measures of the angles?

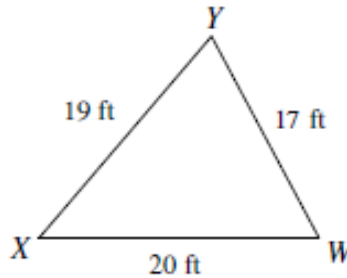
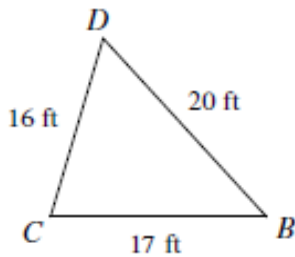
3) Tell if the following measures can be the side lengths of a triangle, and explain how you know.

a. 7, 5, 4    YES / NO    WHY? \_\_\_\_\_

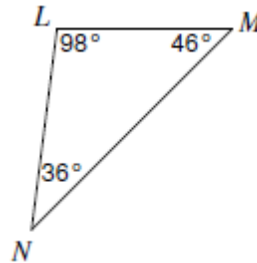
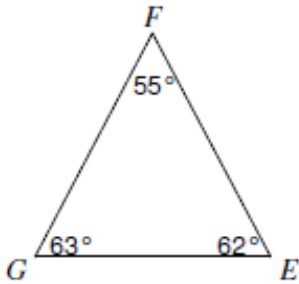
b. 3, 6, 2    YES / NO    WHY? \_\_\_\_\_

c. 2, 15, 16    YES / NO    WHY? \_\_\_\_\_

4) Name the angles of the triangle in order from shortest to longest.



5) Name the sides of the triangle in order from shortest to longest.

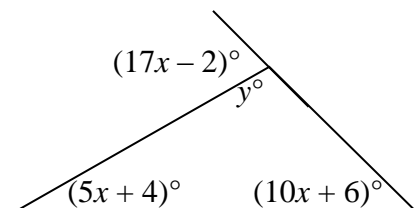
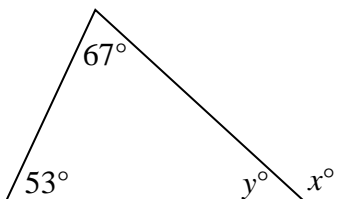
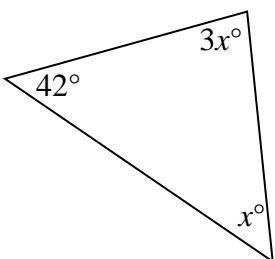


6) A triangle has a perimeter of 135 cm. One side of the triangle measures  $(3x)$  cm. Find the value of  $x$  that makes the triangle equilateral.

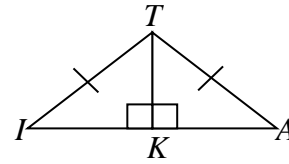
7) Given the isosceles  $\triangle TRY$ , with  $\angle Y$  as the vertex angle,  $m\angle T = 15x + 3$  and  $m\angle R = 8x + 31$ , find:

$x =$  \_\_\_\_\_     $m\angle R =$  \_\_\_\_\_     $m\angle T =$  \_\_\_\_\_     $m\angle Y =$  \_\_\_\_\_

8)  $x =$  \_\_\_\_\_     $3x =$  \_\_\_\_\_     $x =$  \_\_\_\_\_     $y =$  \_\_\_\_\_     $x =$  \_\_\_\_\_     $y =$  \_\_\_\_\_



9) Why is  $\triangle KIT \cong \triangle KAT$ ? \_\_\_\_\_

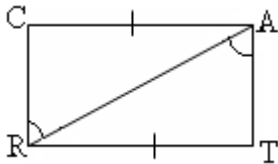


10)

a) Are the triangles congruent? \_\_\_\_\_

b) Why/Why not? \_\_\_\_\_

c) If so, \_\_\_\_\_  $\cong$  \_\_\_\_\_

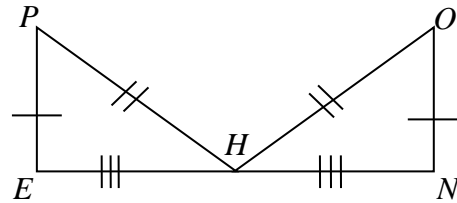


11)

a) Are the triangles congruent? \_\_\_\_\_

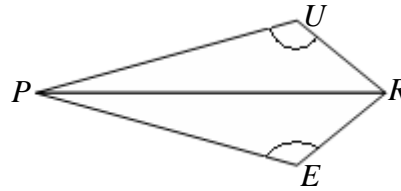
b) Why/Why not? \_\_\_\_\_

c) If so, \_\_\_\_\_  $\cong$  \_\_\_\_\_



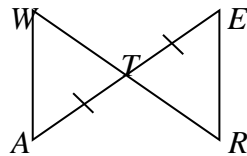
11) What part is missing to use AAS to prove these two triangles congruent?

\_\_\_\_\_  $\cong$  \_\_\_\_\_

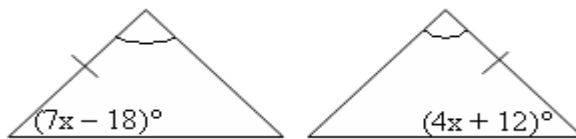


12) What part is missing to use AAS to prove these two triangles congruent?

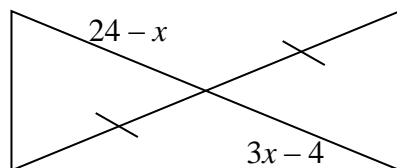
\_\_\_\_\_  $\cong$  \_\_\_\_\_



13) Find the value of  $x$  that makes these two triangles congruent.  $x =$  \_\_\_\_\_

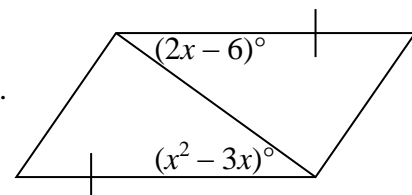


14) Find the value of  $x$  that makes these two triangles congruent.  $x =$  \_\_\_\_\_

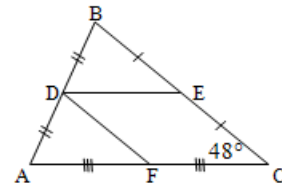


15) Find the value(s) for  $x$  that makes these two triangles congruent.

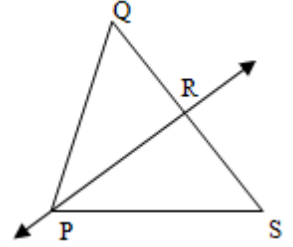
$x =$  \_\_\_\_\_ and \_\_\_\_\_



1) Using  $\triangle ABC$  below, find  $DE$ ,  $AC$ , and  $m\angle DFC$  if  $AF = 12$ .



2) In the figure below,  $\overline{PR}$  is the angle bisector of  $\angle QPS$ . If  $m\angle QPS = x^2 + 5x$  and  $m\angle QPR = 3x + 10$ , solve for  $x$ .

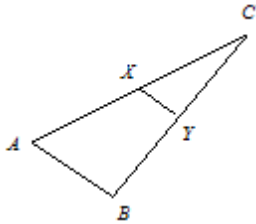


3) Draw a picture showing  $M$ , the incenter of isosceles  $\triangle JKL$ , with  $JK = JL$ . If  $m\angle MKL = 23^\circ$ , what is  $m\angle KJL$ ?

4) If exactly one altitude of a triangle is the same as exactly one perpendicular bisector, what kind of triangle is it? Draw a picture.

5) If you are trying to find a central location that is equidistant to three points, explain when you would use the incenter and when you would use the circumcenter. Where would the three points of interest be located for each?

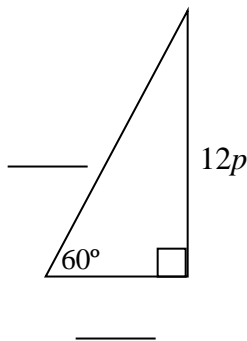
6) Given  $\triangle ABC$  with  $AB = 10$ ,  $BC = 30$ , and  $CA = 34$ , find the length of midsegment  $\overline{XY}$ .



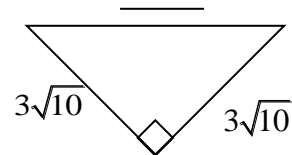
Simplify.

- |                                  |                                 |                                  |                                     |                                 |                                       |
|----------------------------------|---------------------------------|----------------------------------|-------------------------------------|---------------------------------|---------------------------------------|
| 1) $-2\sqrt{45}$                 | 2) $\sqrt{(17)^2}$              | 3) $\sqrt{x^5}$                  | 4) $\frac{\sqrt{5}}{\sqrt{3}}$      | 5) $\frac{\sqrt{6}}{\sqrt{20}}$ | 6) $\frac{28\sqrt{175}}{75\sqrt{98}}$ |
| 7) $-4\sqrt{15} \cdot 3\sqrt{2}$ | 8) $\sqrt{72} \cdot 5\sqrt{10}$ | 9) $\frac{\sqrt{18}}{\sqrt{24}}$ | 10) $\frac{4\sqrt{42}}{7\sqrt{24}}$ |                                 |                                       |

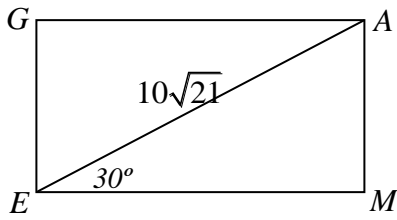
11)



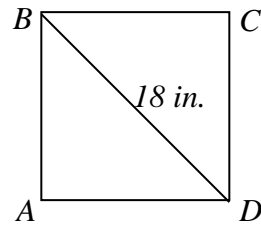
12)



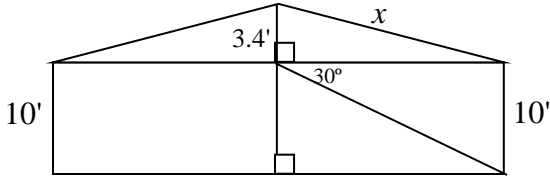
13) Find the perimeter of rectangle GAME.



14) Find the area of square ABCD.



15) Use the blueprint sketch to find  $x$ , the length of the roof. The height of the roof is 3.4 ft. Answer with a decimal; round to the hundredths place.



16) The base of an isosceles triangle has a length of 16cm. and the vertex angle measures  $68^\circ$ . What is the length of each leg? Round to the nearest tenth of a centimeter.

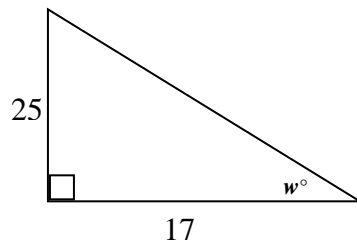
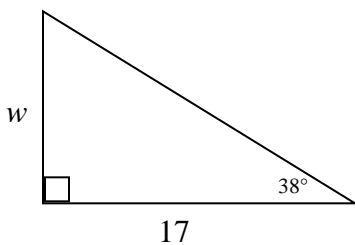
17) A person at the top of a cliff 100 feet tall sees Gilligan's boat. His sighting of the boat is at an angle of depression of  $10^\circ$ . How far is the boat from the base of the cliff?

18) An 80-ft-long freeway entrance ramp has a vertical lift of 22 feet. What is the angle of elevation of the ramp?

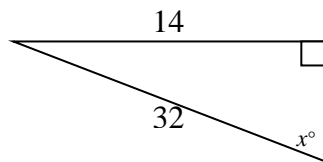
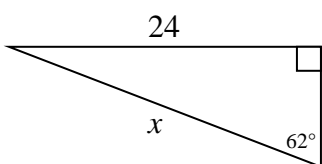
19) A tree casts a shadow of 28 m. The elevation of the sun is  $49^\circ$ . How tall is the tree?

**Solve for the variable(s).**

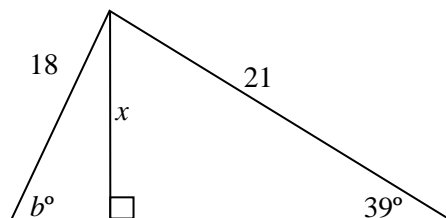
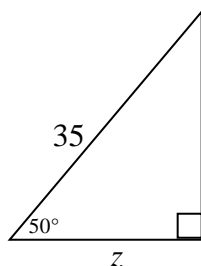
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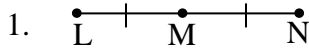
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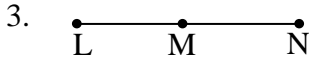
22)



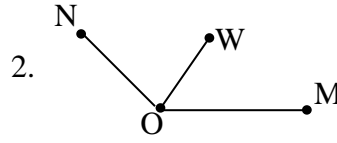
**Algebraic Proofs: Find each variable.**



Given:  $LM = 5y + 6$ ,  $MN = 2y + 21$



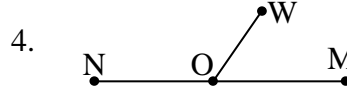
Given:  $LM = 3n$ ,  $MN = 25$ ,  $LN = 9n - 5$



Given:  $m\angle NOW = (3x + 5)^\circ$

$m\angle WOM = (6x - 16)^\circ$

$m\angle NOM = (8x)^\circ$

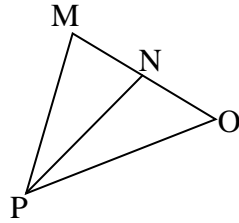


Given:  $m\angle NOW = (4n + 5)^\circ$ ,  $m\angle WOM = (8n - 5)^\circ$

**Geometric Proofs**

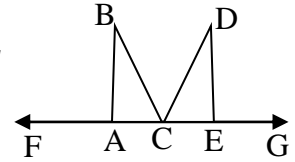
1. Given:  $\overline{PN}$  bisects  $\overline{MO}$   
 $\overline{PN} \perp \overline{MO}$

Prove:  $\triangle MNP \cong \triangle ONP$



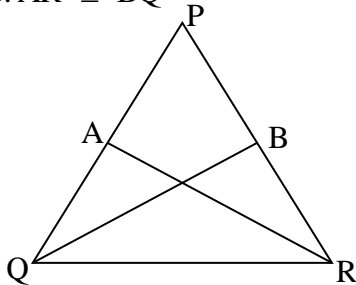
2. Given:  $\angle FAB \cong \angle GED$   
 $\angle ACB \cong \angle DCE$   
 $\overline{AC} \cong \overline{EC}$

Prove:  $\triangle ABC \cong \triangle EDC$



3. Given: Isosceles  $\triangle PQR$  with base  $\overline{QR}$

$\overline{PA} \cong \overline{PB}$   
 Prove:  $\overline{AR} \cong \overline{BQ}$



4. Given: X is the midpoint of  $\overline{AC}$ .

$\angle 1 \cong \angle 2$

Prove: X is the midpoint of  $\overline{BD}$

