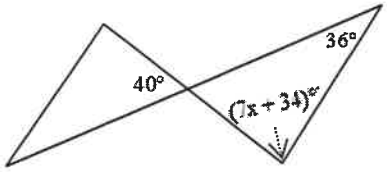
Chapter One

Identify points, lines, planes, segments, rays, collinear points, non-collinear points, coplanar points, angles, and opposite rays
Use the Midpoint and Distance Formulas to find missing coordinate values
Know and apply the Segment Addition and the Angle Addition Postulates
Classify angles as Right, Acute, Obtuse or Straight
Identify and apply properties of adjacent angles, vertical angles, straight angles, right angles and linear pairs of angles
Understand and use complementary and supplementary angles
Understand and use concepts of midpoint, segment bisectors, and angle bisectors to solve problems (radius of a circle)
Know the undefined terms in Geometry (point, line, and plane)

1.) If E is between Y and S, YS = 2x + 6, YE = 4 and ES = x + 10, is E the midpoint of $\overline{YS}$?

2.) Find the value of x.



3.) Estimate the diameter of a circle that is centered at the origin and contains the point (3, 4).

4.) If two angles are supplements and one angle has a measure of $(2x + 4)^\circ$ and the other angle has a measure of $(3x + 6)^\circ$. Find the value of x and the measures of both angles.

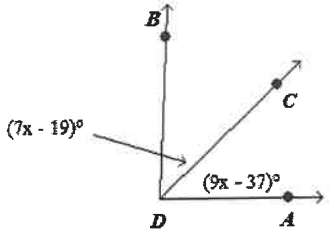
5.) If $\overline{RT} \perp \overline{RV}$ and $m\angle TRV = 3x + 15$. Find x.

6.) A segment has one endpoint at (3, 6) and a midpoint at (0, -10). Find the y - coordinate of the other endpoint.

7.) $\angle CAP$ and $\angle CAT$ form a linear pair. If $m\angle CAP = (3x + 6)^\circ$ and $m\angle CAT = (3x - 6)^\circ$, find the value of x.

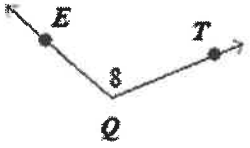
8.) The measure of an angle is nine times the measure of its complement. Find the measure of the larger angle.

9.) In the diagram, $\overrightarrow{DC}$ bisects $\angle BDA$. Find $m\angle ADC$.



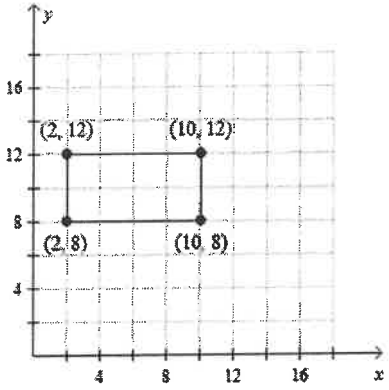
a. 28°
b. 88°
c. 44°
d. 22°

10.) **Which are possible names for the angle?**



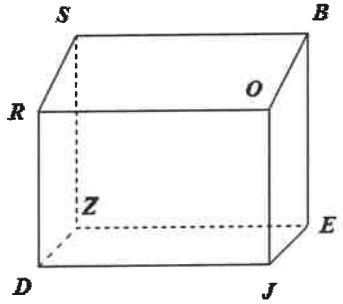
a. $\angle TQE$
b. $\angle 8$
c. $\angle TEQ$
d. $\angle EQT$

11.) A sandbox is being built in a park. The diagram shows the four vertices of the sandbox. Each unit in the coordinate plane represents 1 foot. Find the area of the sandbox.



a. 24 ft^2
b. 32 ft^2
c. 8 ft^2
d. 16 ft^2

12.) Use the diagram below and answer true or false to the following statements.



a.) B, O, and R are collinear points. _____
b.) Z, J, and D are coplanar points. _____
c.) $\overline{SR}$ and $\overline{BE}$ are skew segments. _____
d.) $\overline{JE}$ and $\overline{SR}$ are parallel segments. _____
e.) Plane SOB and plane DEZ intersect. _____

Chapter Two

Use inductive reasoning and logic to make conclusions and conjectures
Provide and/or identify counterexamples
Write conditional statements and identify the hypothesis and conclusion
Identify the converse, inverse, and/or contrapositive of a conditional statement
Determine whether statements are logically equivalent
Use deductive reasoning (Law of Detachment and Law of Syllogism)
Write two – column proofs (algebra, segment, and angle)
Identify and use properties of algebra including but not limited to reflexive prop of =,
symmetric prop of =, and transitive prop of =
Know the difference between a postulate, definition, and theorem

1.) Write the statement "Vertical angles are congruent." as a conditional.

2.) Identify the hypothesis and conclusion of the following statement.

Today is Thursday, if tomorrow is Friday.

3.) Write the converse, inverse, and contrapositive of the following. Write their truth value and tell which statements are logically equivalent.

Conditional: If $x = 2$, then $x^2 = 4$.

Converse: _____

Inverse: _____

Contrapositive: _____

4.) Using laws of logic, what conclusion can you make from the following:
All fish can swim. Gertrude is a fish.

5.) Write a proof for the statement. If $3(x + 10) = x + 6$, then $x = -12$.
Given:
Prove:

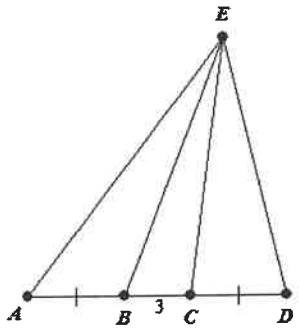
Statements	Reasons

6.) Which of the following are correct about the conditional statement?

"If you live in Chicago, then you live in Illinois."

a. The converse, "If you do not live in Illinois, then you do not live in Chicago.", is true.
b. The contrapositive, "If you do not live in Illinois, then you do not live in Chicago.", is true.
c. The contrapositive, "If you live in Illinois, then you live in Chicago.", is false.
d. The inverse, "If you do not live in Illinois, then you do not live in Chicago.", is true.
e. The inverse, "If you live in Illinois, then you live in Chicago.", is false.
f. The converse, "If you live in Illinois, then you live in Chicago.", is false.

In the diagram, $AB = CD$, $BC = 3$, $AC = -7x - 14$, and $BD = -5x + 6$. Match the numbered equation or reason below with its corresponding letter (a - g) to show that $AB = 53$.

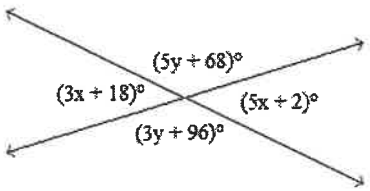


a. $-7x - 14 = -5x + 6$
b. Division Property of Equality
c. Addition Property of Equality
d. Segment Addition Postulate
e. $AB + BC = CD + BC$
f. Substitution Property of Equality
g. $AB + 3 = -7(-10) - 14$

Equation	Reason
1. $AB = CD$, $AC = -7x - 14$, $BD = -5x + 6$, $BC = 3$	1. Given
2.	2. Addition Property of Equality
3. $AB + BC = AC$	3.
4. $CD + BC = BD$	4. Segment Addition Postulate
5. $AC = BD$	5.
6.	6. Substitution Property of Equality
7. $-2x - 14 = 6$	7. Addition Property of Equality
8. $-2x = 20$	8. Addition Property of Equality
9. $x = -10$	9.
10.	10. Substitution Property of Equality
11. $AB + 3 = 56$	11. Simplify
12. $AB = 53$	12. Subtraction Property of Equality

____ 7. Equation 2
____ 8. Reason 3
____ 9. Reason 5
____ 10. Equation 6
____ 11. Reason 9
____ 12. Equation 10

13.) Find the values of x and y.



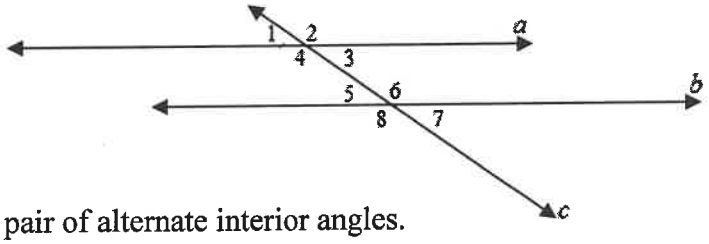
a. $x = 20, y = 2$
b. $x = 8, y = 14$
c. $x = 20, y = 14$
d. $x = 8, y = 2$

Chapter Three

Know and identify parallel, perpendicular, intersecting, and skew lines
Identify transversals and special pairs of angles
Alternate interior, alternate exterior, consecutive interior, consecutive exterior, and corresponding angles
Using parallel lines and transversals find the values of the special pairs of angles
Prove lines are parallel using special pairs of angles
Find slopes and equations of lines in both point-slope and slope-intercept form
Write equations of lines parallel and perpendicular
Write linear equations given real world information
Solve "Crook" problems
The midsegment of a triangle is a segment that connects the midpoints of two sides of a triangle, is parallel to the third side, and half the length of the third side

1.) **True or False:** Two non – coplanar lines that do not intersect are called parallel lines.

Use the diagram and answer the following questions.



2.) Name a pair of alternate interior angles.

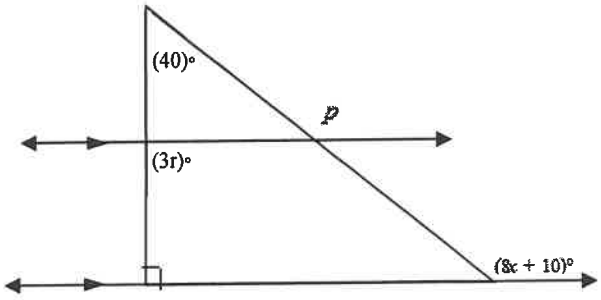
3.) Name a pair of corresponding angles.

4.) Name a transversal.

5.) Write the equation of the line that passes through (5, 4) and (– 3, – 5).

6.) A plumber charges $80 per visit and then charges $60 an hour. Write the equation for the cost of this plumber's visit.

7.) Find the value of r, p, and x.



8.) If A (3, 2) and B (7, 10), find the coordinates of P along the directed line segment AB so that AP to PB is the ratio 3 to 1.

9.) Write an equation of the line passing through the point $(6, -2)$ that is parallel to the line $y = 4x - 11$.

a. $y = -\frac{1}{4}x - 2$

b. $y = -\frac{1}{4}x - 26$

c. $y = 4x - 2$

d. $y = 4x - 26$

10.) Write an equation of the line passing through the point $(9, 3)$ that is perpendicular to the line $y = -\frac{7}{17}x + 11$.

a. $y = \frac{17}{7}x - \frac{132}{7}$

b. $y = -\frac{7}{17}x - \frac{12}{17}$

c. $y = \frac{7}{17}x + 3$

d. $y = -\frac{17}{7}x + 3$

11.) Write an equation of the line through the point $(-3, -8)$ and perpendicular to the line $y = -7$.

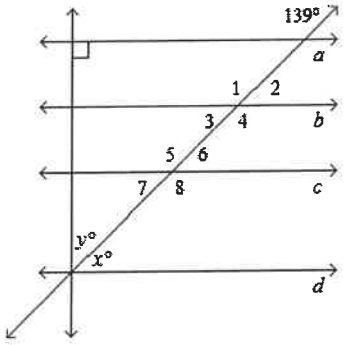
a. $x = -3$

b. $x = -8$

c. $y = \frac{1}{7}$

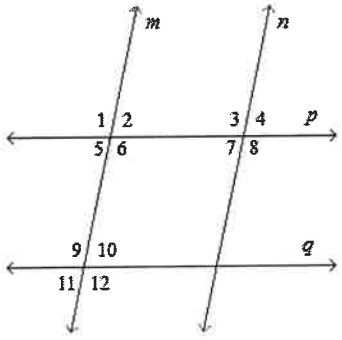
d. $y = -8$

12.) In the diagram, $a \parallel b$, $a \parallel c$, $a \parallel d$, $b \parallel c$, $b \parallel d$, and $c \parallel d$. Which statements about the diagram are true?



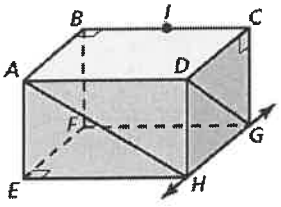
a. The value of x is 41.
b. The value of y is 20.
c. $\angle 2 \cong \angle 3$ by the Vertical Angles Congruence Theorem.
d. $\angle 5 \cong \angle 6$ by the Corresponding Angles Theorem.

13.) Which statements are enough to conclude that $m \parallel n$?



a. $\angle 6 \cong \angle 3$
b. $\angle 1$ and $\angle 7$ are supplementary.
c. $\angle 1 \cong \angle 9$
d. $\angle 1 \cong \angle 12$

In the diagram, think of each segment in the figure as part of a line.



14.) Name the line(s) through point B that appear skew to $\overleftrightarrow{HG}$.

a. $\overleftrightarrow{BC}$

b. $\overleftrightarrow{BC}$ and $\overleftrightarrow{BA}$

c. $\overleftrightarrow{BF}$

d. $\overleftrightarrow{BC}$ and $\overleftrightarrow{BF}$

15.) Name the plane through point A that appears parallel to EFG.

a. ABC

b. AEF

c. AEH

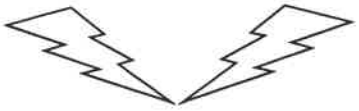
Chapter Four

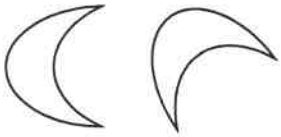
Transformations:

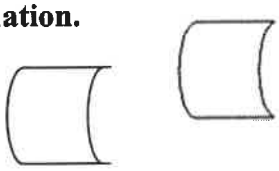
1.) Reflection - flip
2.) Rotation - turn
3.) Translation - slide
4.) Dilation – Enlargement or Reduction
5.)

Isometry – Rigid Transformation – Congruence Transformation
– the preimage and image are the same size and same shape

Name the transformation and then tell if it is an isometric transformation.

1.) 

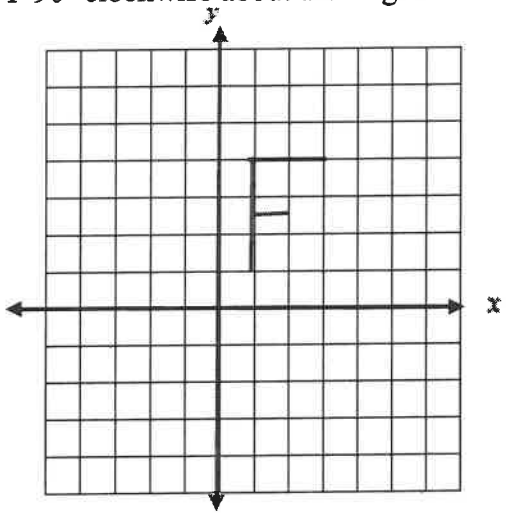
2.) 

3.) 

4.) What are the coordinates of the point (– 2, 3) after it is
   a.) reflected about the y – axis?
   b.) reflected about the x – axis?
   c.) reflected about the line y = x?

5.) Using the mapping: $(x, y) \rightarrow (x + 3, y - 2)$, what are the coordinates of the **preimage** of (5, 4)?

6.) Rotate the letter F 90° clockwise about the origin.

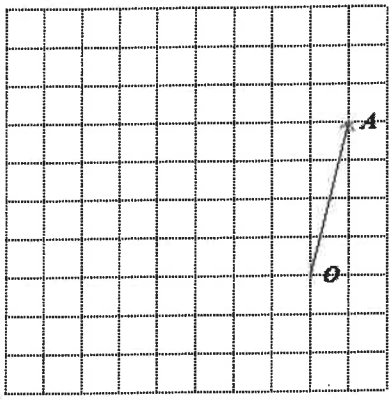


7.) You want to enlarge a poster by a factor of 2 from its current size of 2 feet by 3 feet. What is the size of the enlarged poster?

8.) The logo for a business is moved across a page 6 units right and 6 units down. Next, it is moved 2 units left and 2 units up. Rewrite the composition as a single translation.

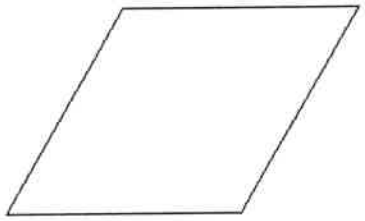
a. $(x, y) \rightarrow (x-4, y+4)$
b. $(x, y) \rightarrow (x+4, y-4)$
c. $(x, y) \rightarrow (x+8, y-8)$
d. $(x, y) \rightarrow (x-8, y+8)$

9.) In the diagram, name the vector and select its component form.



a. $\overrightarrow{AO}, \langle -4,-1 \rangle$
b. $\overrightarrow{OA}, \langle 4,1 \rangle$
c. $\overrightarrow{AO}, \langle -1,-4 \rangle$
d. $\overrightarrow{OA}, \langle 1,4 \rangle$

10.) How many lines of symmetry does the rhombus have?



a. 1
b. 4
c. 2
d. none

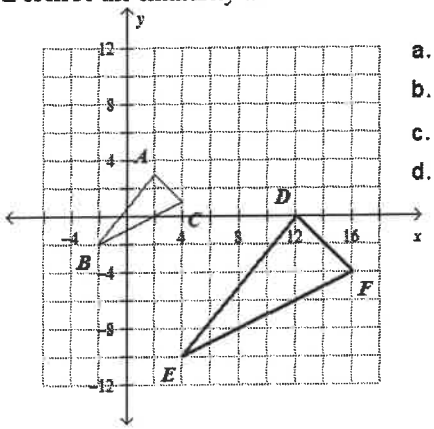
11.) You are rotating a figure 152° from G to G''. Find the measure of the acute angle formed by intersecting lines so that G can be mapped to G'' using two reflections.

a. 107°
b. 76°
c. 62°
d. 38°

12.) The minute hand on a clock rotates in clockwise direction. If the clock was laid on a coordinate plane with its center at the origin and the minute hand currently had an endpoint of $(-4,-6)$, what will the coordinates of the endpoint be in 15 minutes?

a. $(-6,4)$
b. $(6,4)$
c. $(6,-4)$
d. $(4,6)$

13.) Describe the similarity transformation that maps ΔABC to ΔDEF (dilations have a center at the origin).

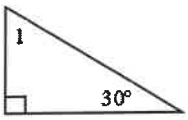


a. dilation with a scale factor of 2 followed by a translation 4 units right and 3 units down
b. dilation with a scale factor of $\frac{1}{2}$ followed by a translation 4 units left and 3 units up
c. translation 4 units right and 3 units down followed by a dilation with a scale factor of 2
d. translation 4 units left and 3 units up followed by a dilation with a scale factor of $\frac{1}{2}$

Chapter Five

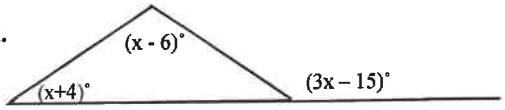
Identify and classify triangles by their angles and sides (Right, Acute, Obtuse, Equiangular, Equilateral, Isosceles, Scalene)
Triangle Sum Theorem (all of the measures of a triangle sum to 180°)
Apply the Exterior Angle Theorem
Prove Triangles congruent by AAS, SAS, ASA, SSS, HL**
Use CPCTC
Understand and use properties of isosceles and equilateral triangles
You must be able to write and fill-in two-column and flow proofs

1.) Classify the following triangle.



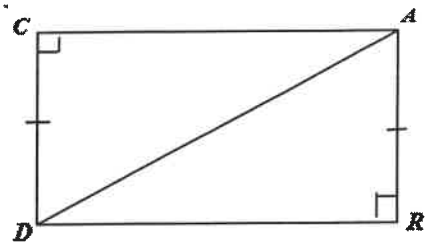
2.) What is the measure of angle 1 in the above triangle?

3.) Find x.

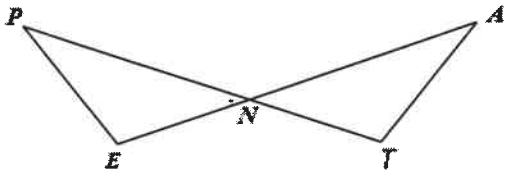


4.) If triangle CAT is an isosceles triangle where angle A is the vertex angle and CA = 2x + 4, AT = 3x – 6, and CT = 5x +10, find CT.

5.) Using the diagram, write a congruence statement. Then, justify your answer.



6.) Given: $\overline{PE} \cong \overline{TA}$
$\angle E \cong \angle T$
Prove: $\angle P \cong \angle A$



Statements	Reasons

7.) In a right triangle, the measure of one acute angle is 2 times the sum of the measure of the other acute angle and 6. Find the measure of each acute angle.

a. 20°, 70°
b. 26°, 64°
c. 34°, 56°
d. 23°, 57°

8.) **Can the triangles be proven congruent with the information given in the diagram? If so, state the theorem you would use.**

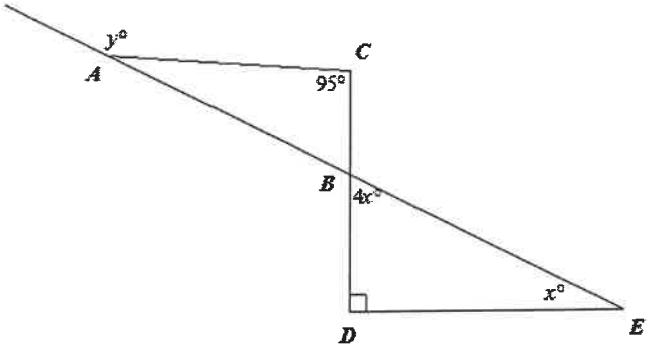
a.)

a. yes; AAS Congruence Theorem
b. yes; ASA Congruence Theorem
c. no

b.)

a. yes; AAS Congruence Theorem
b. yes; ASA Congruence Theorem
c. no

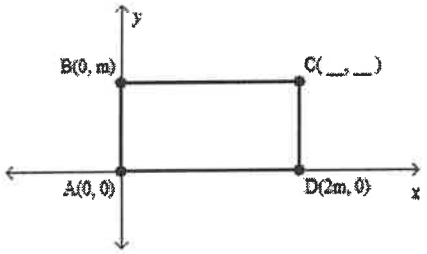
9.) Which statements about the diagram are true?



a. $\triangle BDE$ is obtuse.
b. $\triangle ABC$ is scalene.
c. The value of x is 18.
d. $\triangle ABC$ is obtuse.
e. $\triangle BDE$ is right.
f. The value of y is 113.

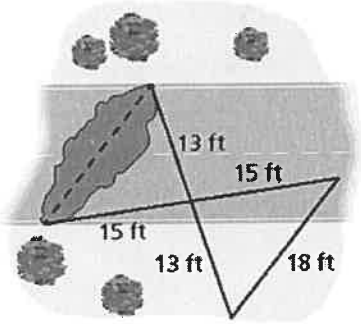
10.) **Find the coordinates of vertex *C* for the figure placed in a coordinate plane.**

a rectangle with width m and length twice its width



a. $C(2m, m)$
b. $C(m, m)$
c. $C(m, 2m)$
d. $C(2m, 2m)$

11.) A road crew uses the triangles shown in the diagram to measure the width of a sink hole across a highway from a safe distance away. How wide is the sink hole?

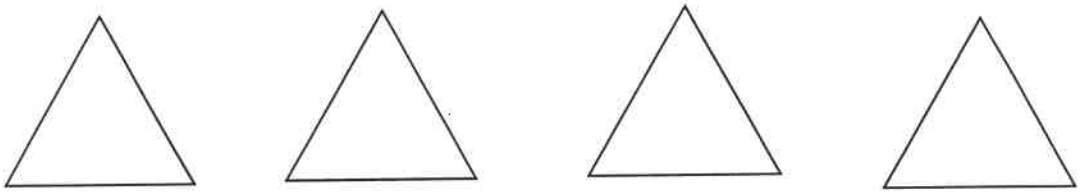


a. 18 ft
b. 13 ft
c. 15 ft
d. cannot be determined

Chapter Six

Identify and use angle bisectors, perpendicular bisectors, medians, and altitudes of triangles
Know the points of concurrency of angle bisectors (incenter), perpendicular bisectors (circumcenter), medians (centroid), and altitudes (orthocenter)
Know the properties of incenters, circumcenters, centroid, and orthocenters
Remember the smallest angle is across from the shortest side of a triangle
Remember that the sum of the lengths of two sides of a triangle must be greater than the length of the third side.
Exterior angle inequality: Measure of the exterior angle > each of the measures of the remote interior angles
The Hinge Theorem and the Converse of the Hinge Theorem (Inequalities in two triangles)
Know and be able to apply the theorems involving segments divided proportionally (Midsegment Theorem)

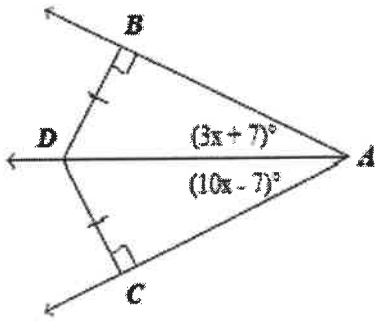
1.) Draw an angle bisector, altitude, perpendicular bisector, and median and list its properties.



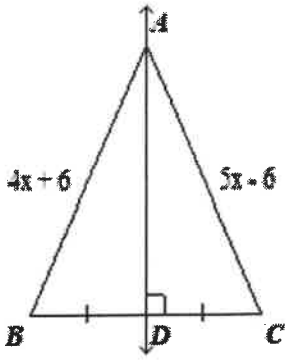
2.) In triangle ABC, AB = 4, BC = 10 and AC = 13. List the angles from smallest to largest.

3.) If two sides of a triangle have lengths 3 and 6, what are the possible values of the third side?

4.) Find $m\angle CAD$.



5.) Find AB.



6.) Find the coordinates of the circumcenter of $\triangle ABC$ with vertices $A(-4,0)$, $B(8,3)$, and $C(4,3)$.

a. $(6,-14.5)$
b. $(0,1.5)$
c. $(2,1.5)$
d. $(6,1.1)$

7.) Write an equation of the perpendicular bisector of the segment with endpoints $G(-2,0)$ and $H(8,-6)$.

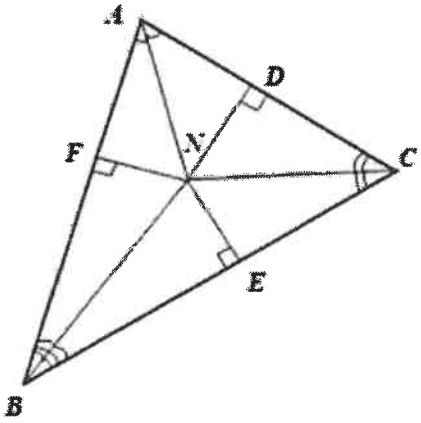
a. $y=\frac{5}{3}x+\frac{34}{3}$

b. $y=\frac{5}{3}x-8$

c. $y=-\frac{5}{3}x-\frac{16}{3}$

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

8.) In $\triangle ABC$, N is the incenter, $ND=4x+5$, and $NF=7x-10$. Find NE.



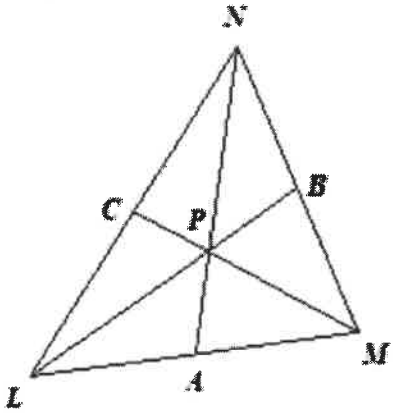
a. $NE=15$

b. $NE=50$

c. $NE=5$

d. $NE=25$

9.) In $\triangle LMN$, point P is the centroid, and $AN=18$. Find AP and NP.



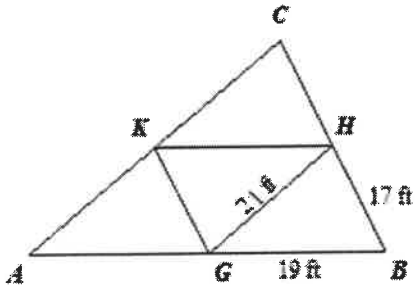
a. $AP=6, NP.=12$

b. $AP=9, NP.=9$

c. $AP=4.5, NP.=13.5$

d. $AP=3, NP.=15$

10.) You install fencing around your large triangular garden. Then, you divide it into four small triangular gardens by connecting the midpoints of each side of the triangle with fencing. How many feet of fencing do you need?



a. 228 ft

b. 177 ft

c. 171 ft

d. 114 ft