

Geometry

Chapter 5

Created by R. D. Routten

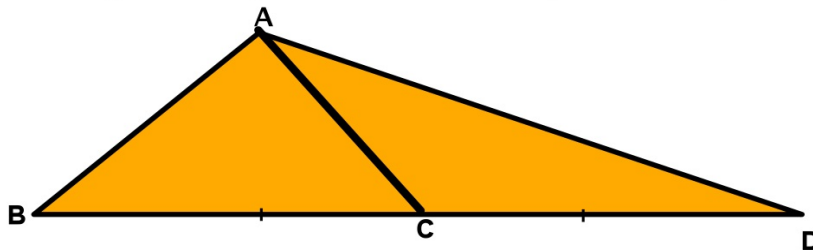
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Hampton, Va.

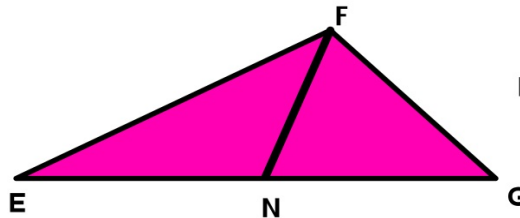
Ch 5.1 Bisectors, Medians, and Altitudes

OBJECTIVE: TSW identify and use perpendicular bisectors, angle bisectors, medians and altitudes in triangles.

Median - a segment that joins a vertex of a triangle to the midpoint of the opposite side.



AC is a median so $BC = CD$
i.e. a median bisects the opposite side



EN = _____

ex. 1) In $\triangle EFG$, FN is a median. Find EN if EG is 15.

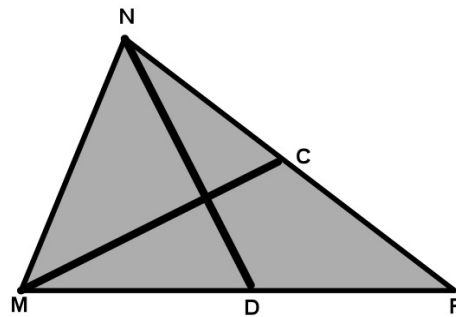
ex. 2) In $\triangle MNP$, MC and ND are medians.

1. Find NC if $NP = 14$

2. Find MP if $DP = 3.5$

$NC =$ _____

$MP =$ _____



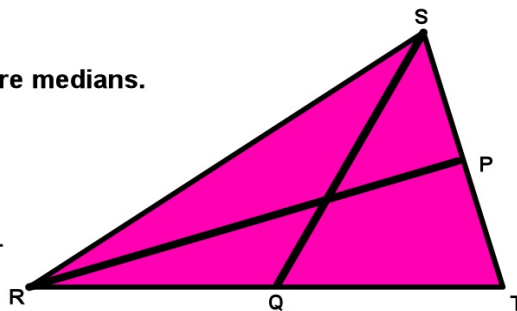
ex. 3) In $\triangle RST$, RP and SQ are medians.

Given: $RQ = 7x-1$

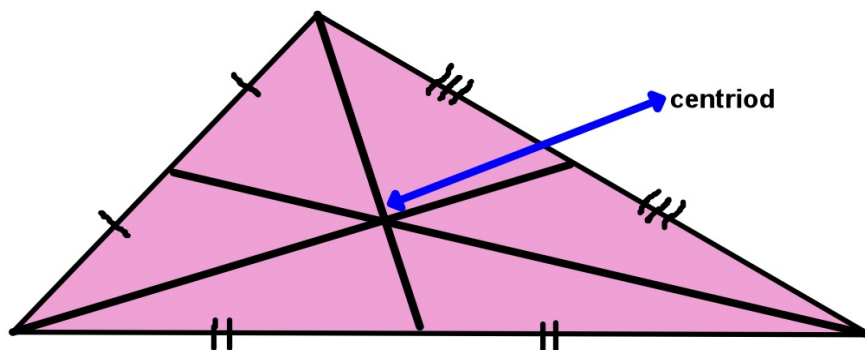
$SP = 5x-4$

$QT = 6x+9$

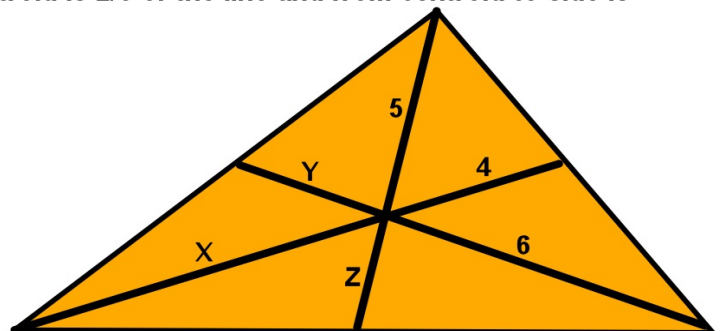
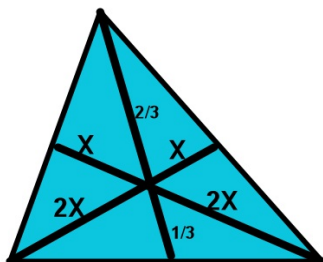
Find PT _____



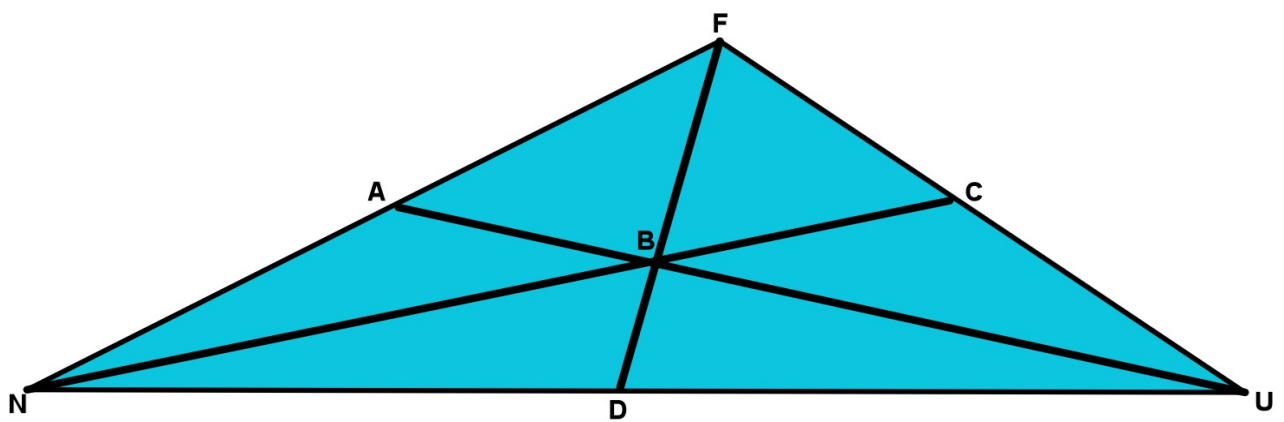
Centroid: the common point where the three medians of a triangle intersect.



Thm: The distance from the vertex to the centroid is twice the length as that from the centroid to the opposite side. i.e. from vertex to centroid is $\frac{2}{3}$ of the line and from centroid to side is $\frac{1}{3}$ of the line.



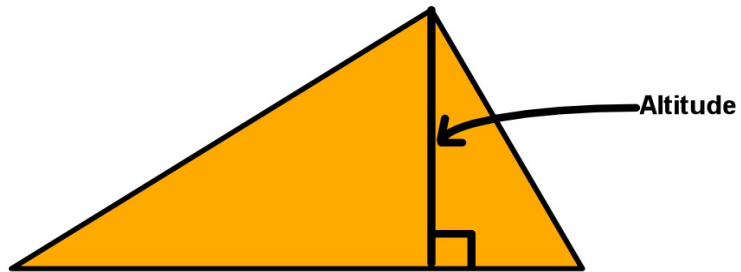
Given triangle FUN find the following lengths of line segments.



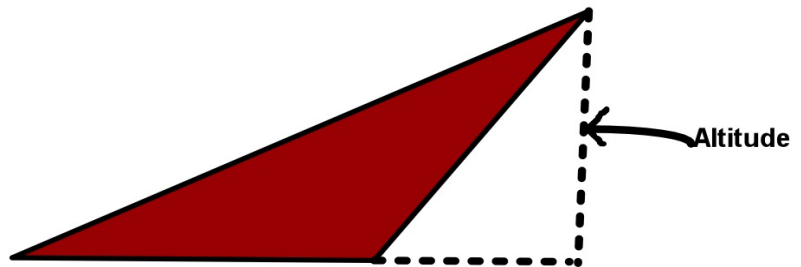
1. If AB is 6 find BU _____
2. If DB is 4 find BF _____
3. If NC is 18 find NB and BC _____, _____
4. If AU is 13 find AB and BU _____, _____

Concurrent: when 3 or more line segments meet at the same point, thus AU, DF, and NC are said to be concurrent lines.

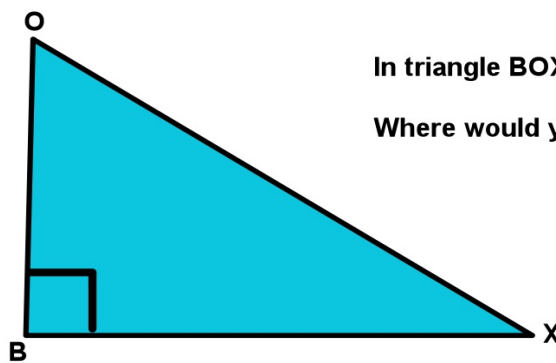
Altitude: A line segment in which one endpoint is at the vertex and the other endpoint is perpendicular to the opposite side.



NOTE: Altitudes may not always lie inside of the triangle.

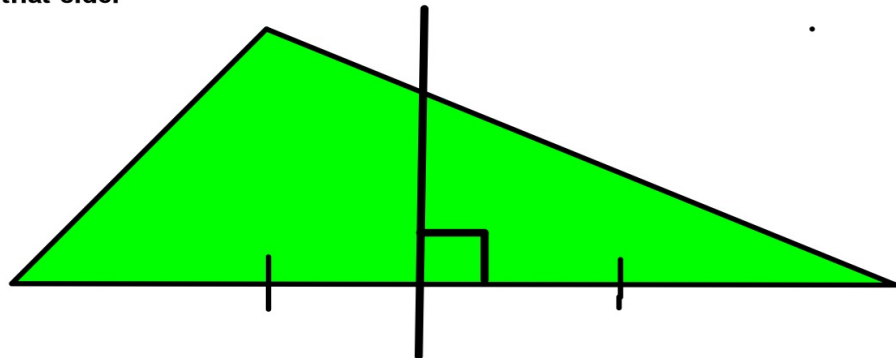


NOTE: In a right triangle the legs of the triangle are the altitudes.



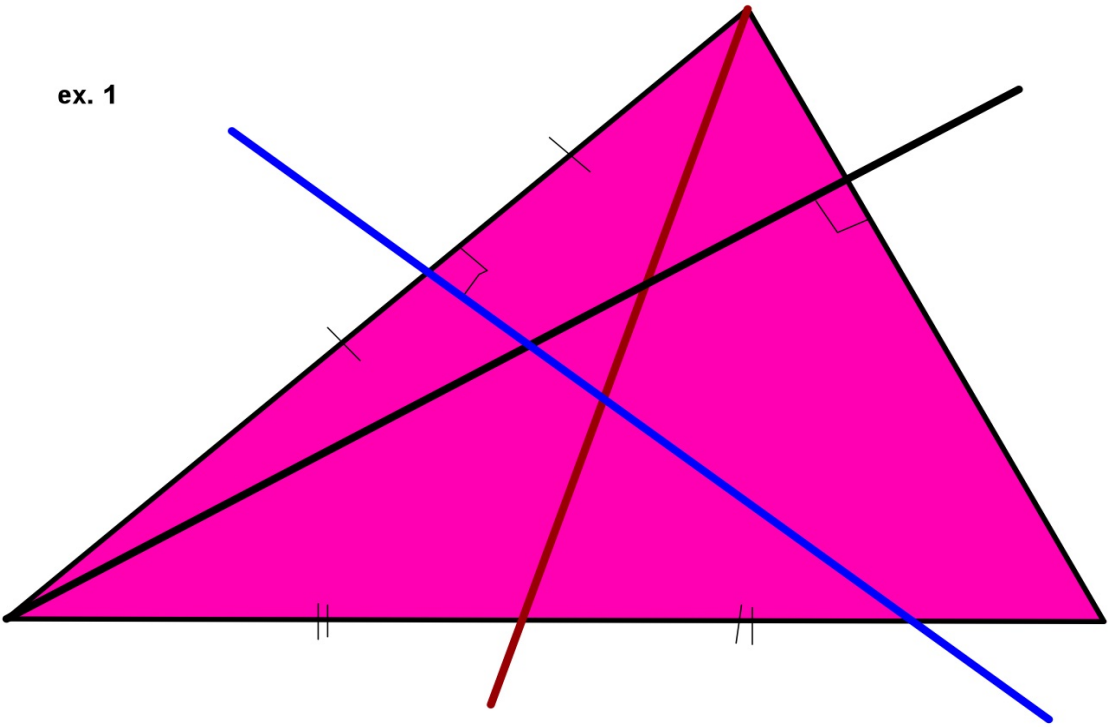
In triangle BOX , OB and BX are altitudes,
Where would you draw the third altitude?

Perpendicular Bisector: a segment or line that contains the midpoint of a side and is perpendicular to that side.

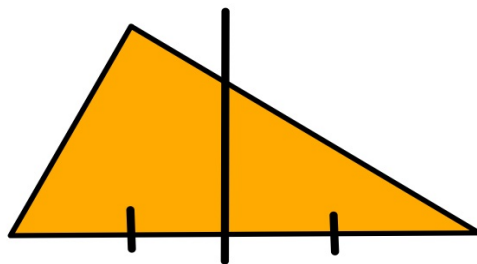


FIVE MINUTE REVIEW
Identify each line segment

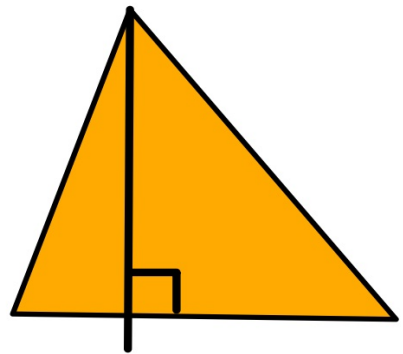
ex. 1



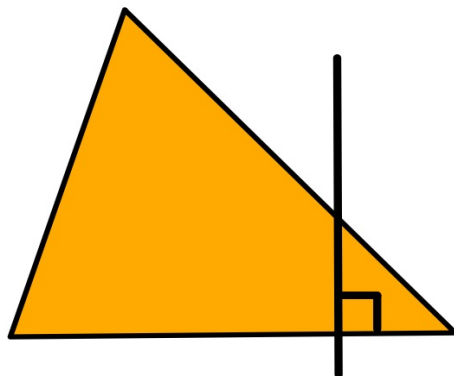
ex. 2



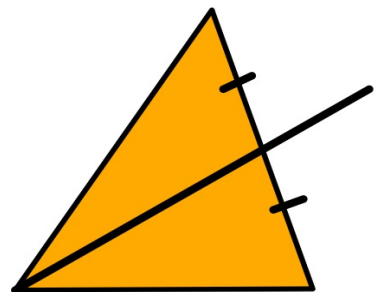
ex.3



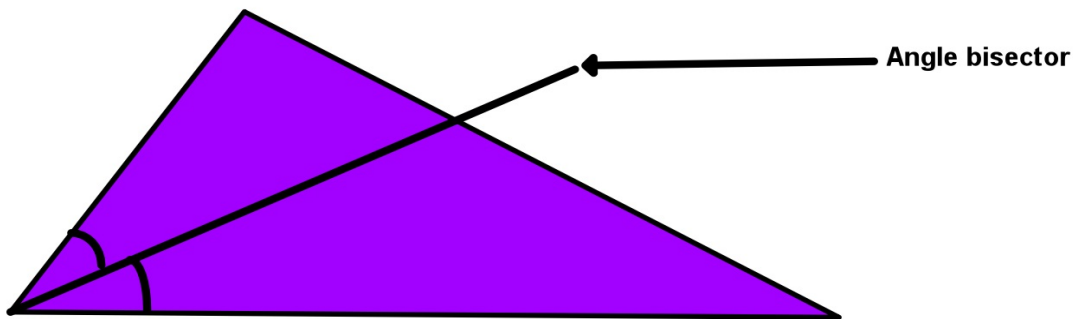
ex. 4



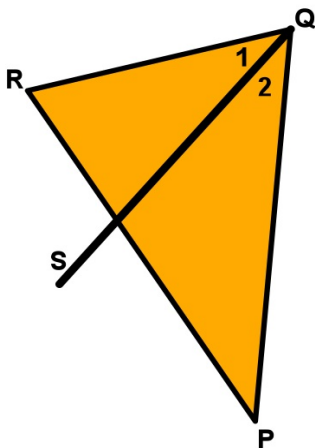
ex 5



Angle Bisector: divides an angle of a triangle into two congruent angles.

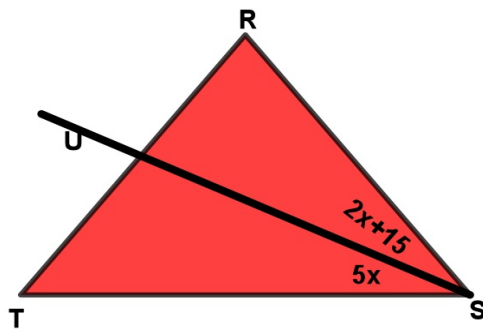


ex. 1)



Given: triangle PQR
QS bisects angle PQR
if angle PQR = 70 degrees
Find measure of angle 2 _____

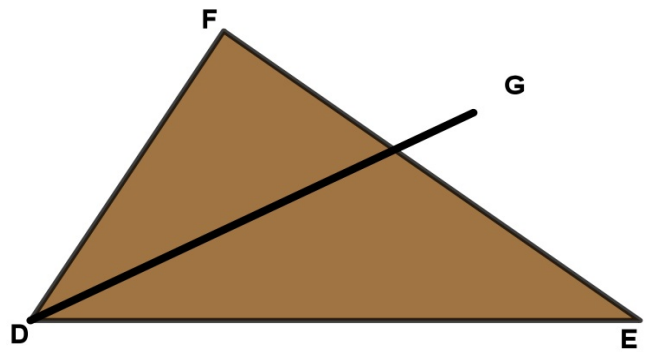
ex. 2



In triangle RST, SU is an angle bisector
Find the measure of angle UST
angle UST = _____

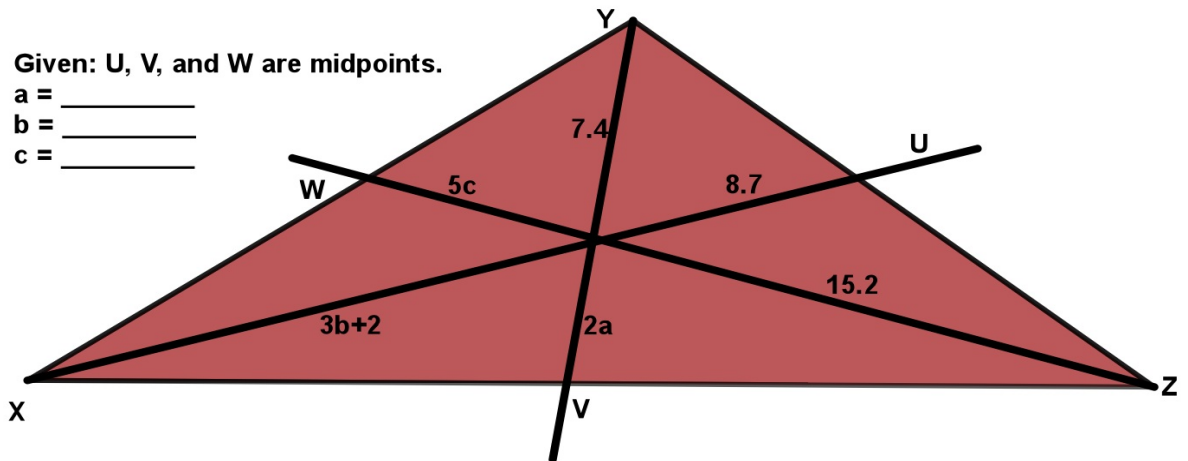
ex. 3

Given: angle F is 80
angle E is 30
DG bisects angle EDF
Find measure of angle DGE _____



ex. 4) Given: U, V, and W are midpoints.

a = _____
b = _____
c = _____



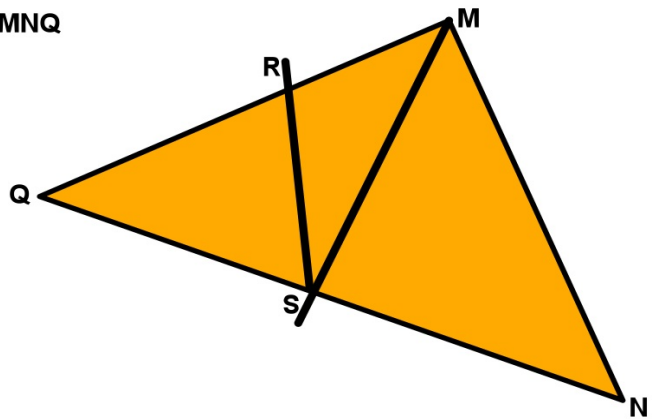
ex. 5) Given: MS is a median of triangle MNQ

QS = $3a-14$

SN = $2a+1$

angle MSQ = $7a+1$

1. a = _____
2. Is MS also an altitude of triangle MNQ? _____
3. Why or why not? _____

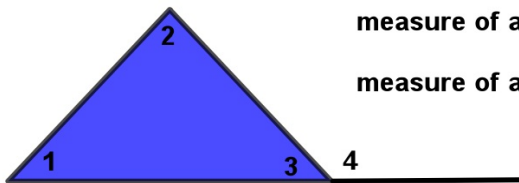




Ch 5.2 INEQUALITIES AND TRIANGLES

OBJECTIVE: TSW recognize and apply properties of inequalities to the measures of angles of a triangle and recognize and apply properties of inequalities to the relationship between angles and sides of triangles.

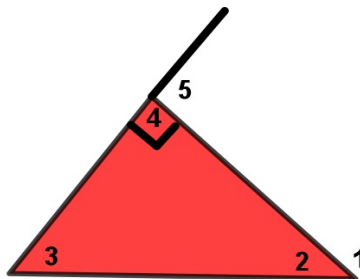
Thm: Exterior Angle Inequality Theorem: If an angle is an exterior angle of a triangle then its measure is greater than the measure of either of its corresponding remote interior angles.



measure of angle 4 is $>$ measure of angle 1

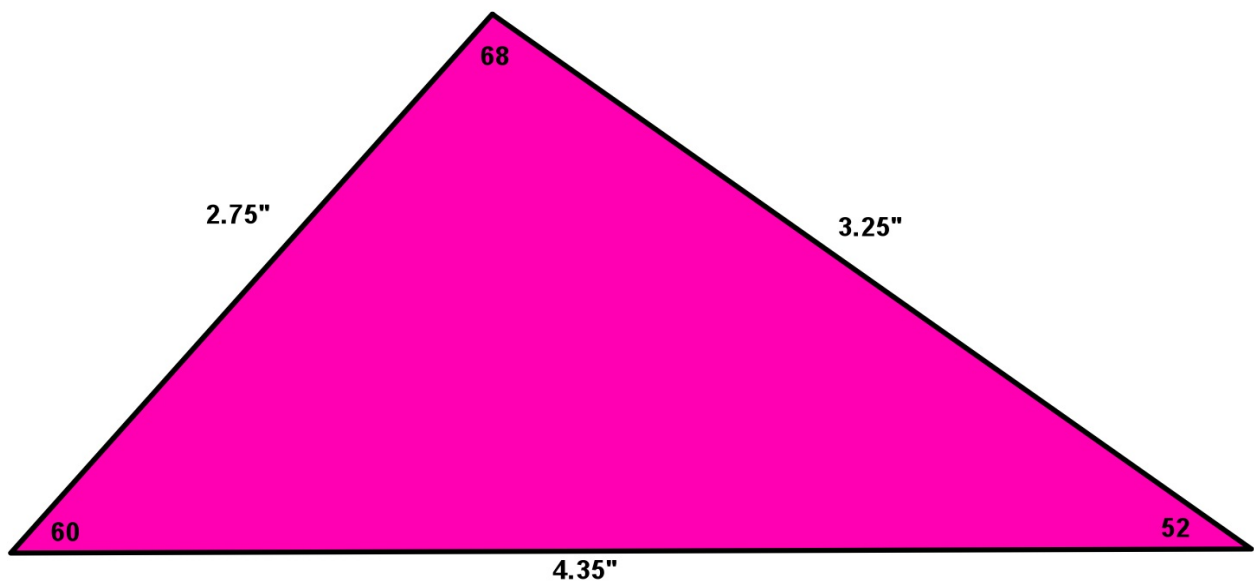
measure of angle 4 is $>$ measure of angle 2

ex. 1) Determine which angle has the greatest measure



ACTIVITY

1. Draw an acute scalene triangle
2. Measure and mark all of the angle measures
3. Measure and mark all of the side lengths

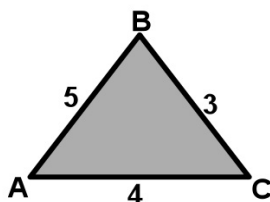


What correlation between side length and angle measure do you notice?

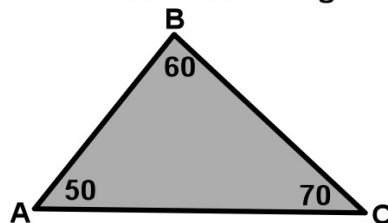
Thm: If one side of a triangle is longer than another side, then the angle opposite the longer side has a greater measure than the angle opposite the smaller side.

Thm: If one angle of a triangle has a greater measure than another angle, then the side opposite the greater angle is larger than the side opposite the lesser angle.

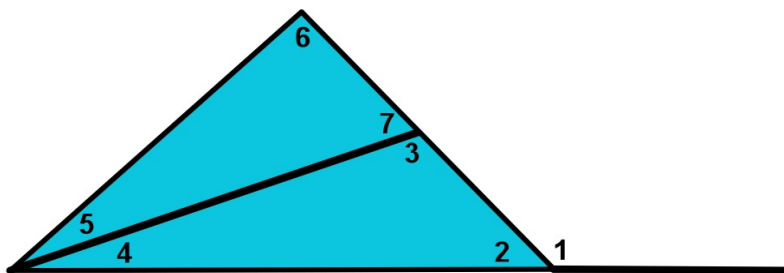
Which angle has the greatest measure?



Which side is the longest?



Use the Exterior Angle Inequality Theorem and list all of the angles whose measure is less than angle 1.



Given: triangle PQR

measure of angle P = $9n+29$

measure of angle Q = $93-5n$

measure of angle R = $10n+2$

Find the measure of each angle and list the sides from shortest to longest.

Given: triangle PQR

measure of angle P = $12n-9$

measure of angle Q = $62-3n$

measure of angle R = $16n+2$

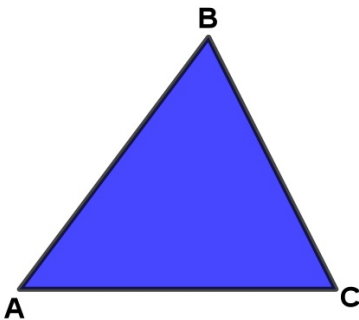
Find the measure of each angle and list the sides from shortest to longest.



Ch 5.4 THE TRIANGLE INEQUALITY

OBJECTIVE: TSW apply the Triangle Inequality Theorem and determine the shortest distance between a point and a line.

Thm: Triangle Inequality Theorem: the sum of the lengths of any two sides of a triangle is greater than the length of the 3rd side.



$$\begin{aligned}AB + BC &> AC \\BC + AC &> AB \\AC + AB &> BC\end{aligned}$$

ex. 1) Determine if the following side lengths could be the sides of a triangle?
Hint: Is the sum of the two smallest lengths greater than the third side?
If so then they could make a triangle.

1. 2, 4, 5
2. 6, 8, 14
3. 6.5, 6.5, 14
4. 6.8, 7.2, 5.1

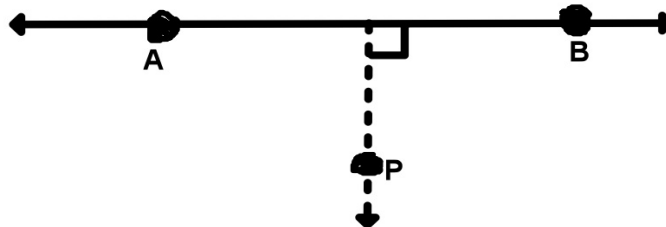
ex. 2) In triangle SUM which of the following could not be a measure of PR if
PQ = 7 and QR = 5
a. 7 b. 9 c. 11 d. 13

Range: the smallest and largest a third side could be given the length of two sides.

For 3 and 10 the range would be $7 < x < 13$

ex. 3) 5 and 7
2 and 6
9 and 14
27 and 12

Thm: The perpendicular segment from a point to a line is the shortest segment from the point to the line. i.e. the shortest distance from P to AB is a perpendicular line



Thm: the perpendicular segment from a point to a plane is the shortest segment from the point to the plane.

