5-4: Altitudes & Orthocenters

AGENDA

- Check and review homework 5.3
- Quiz 1 Lessons 5.1-5.3 (15 Minutes)
- Notes & Guided Practice

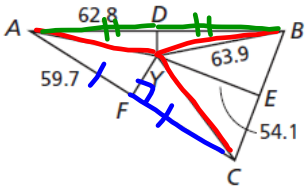
Homework

- 5.4 Worksheet Unit 5 - Day 4 (In packet)
- Proof C
- Keep up with lesson summaries, Comparing Points of Concurrency, construction project
- CR - Due Wed 12/14 unless we drop - then Th

PRACTICE AND PROBLEM SOLVING

5.3 KEY

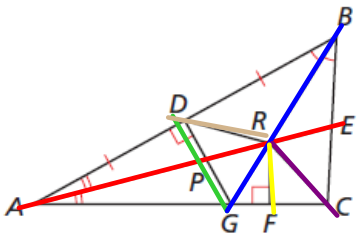
$\overline{DY}$, $\overline{EY}$, and $\overline{FY}$ are the perpendicular bisectors of $\triangle ABC$. Find each length.



12. CF 59.7
13. YC 63.9
14. DB 62.8
15. AY 63.9

Tell whether each segment lies on a perpendicular bisector, an angle bisector, or neither. Justify your answer.

22. $\overline{AE}$
23. $\overline{DG}$
24. $\overline{BG}$
25. $\overline{CR}$
26. $\overline{FR}$ neither
27. $\overline{DR}$ neither



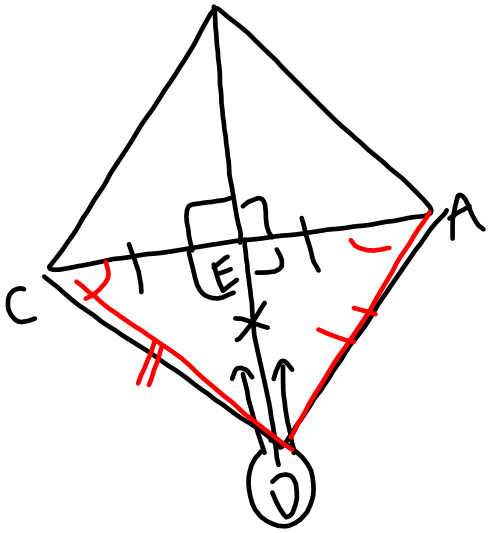
Tell whether each statement is sometimes, always,

22. angle bisector; $m\angle BAE = m\angle EAC$

23. perpendicular bisector; $AD = BD$, $\overline{AD} \perp \overline{DG}$, and $\overline{BD} \perp \overline{DG}$

24. angle bisector; $m\angle ABG = m\angle GBC$

25. Angle bisector; since $\overline{AE}$ and $\overline{BG}$ are $\angle$ bisectors, R is the incenter. $\overline{CR}$ intersects the incenter, so it is an $\angle$ bisector.



S A S

But could extend to use the perpendicular bisector to get the equidistant other sides --> isos & even base angles

Tell whether each statement is sometimes, always, or never true. Support your answer with a sketch.

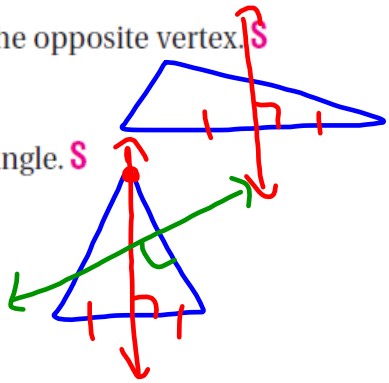
30. A perpendicular bisector of a triangle passes through the opposite vertex. S

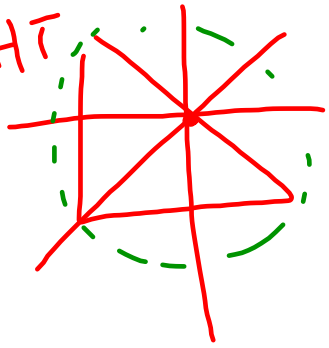
WHEN? ISOS / EQUIL

32. The circumcenter of a scalene triangle is inside the triangle. S

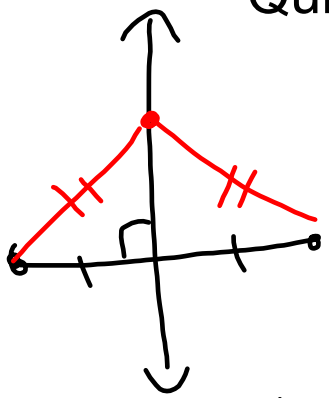
WHEN? IF ⊥ BIS BASE

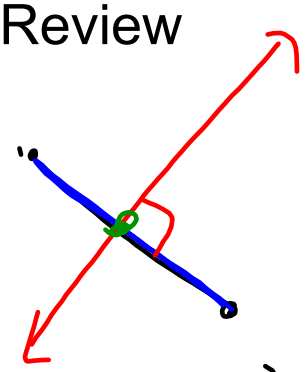
INSIDE - ACUTE
OUTSIDE - OBTUSE
ON - RIGHT





Quiz Review





$\perp$ BIS MIDPOINT

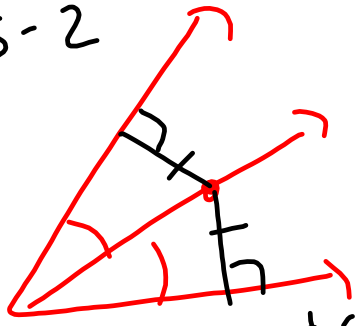
SLOPE $-\frac{3}{4}$

OPP RECIPROCAL $+\frac{4}{3}$

$y - y_1 = m(x - x_1)$

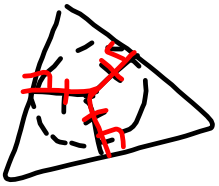
$y = mx + b$

5-2



AAS & CPCTC

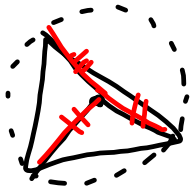
$\angle$BIS $\rightarrow 2 \cong \angle$'s



5-3

BIS $\rightarrow$ RT $\angle$'s

$\rightarrow 2 \cong$ SEGM

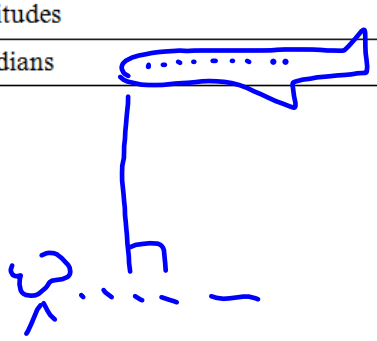


Name: _____ Section: _____ Date: _____

Geometry Unit 5 Day 4 Notes: Altitudes & Orthocenters

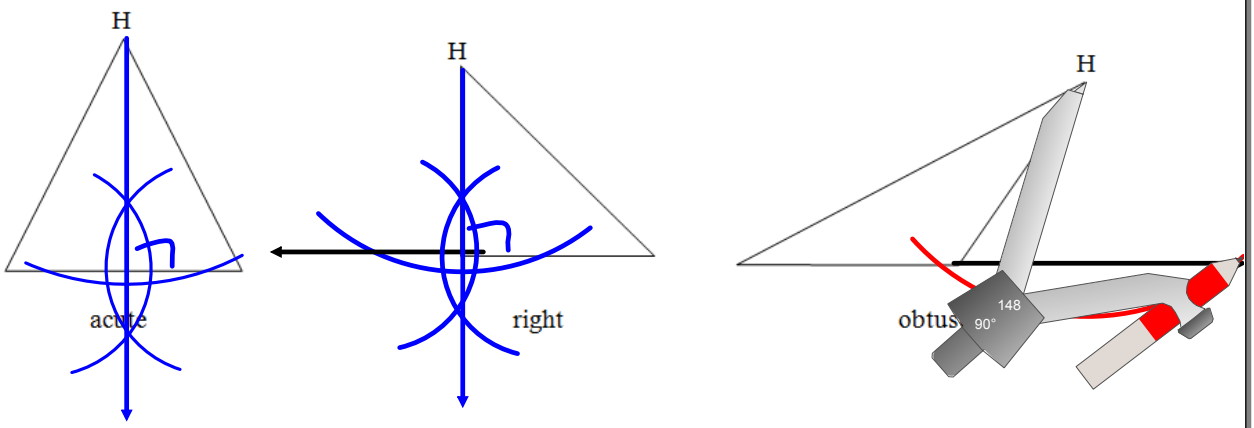
Recall: The 4 special points of concurrency in triangles that we will study are:

Point of Concurrency	Lines that meet to form the point
Incenter	Angle Bisectors (lesson 5-2)
Circumcenter	Perpendicular Bisectors (lesson 5-3)
Orthocenter	Altitudes
Centroid	Medians



ORTHOCENTER

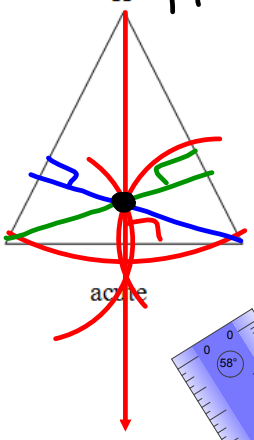
Recall: an altitude of a triangle is the _____ segment from the vertex of a triangle to the line containing the opposite side. Construct the altitude from vertex H in each of the following triangles:



ORTHOCENTER

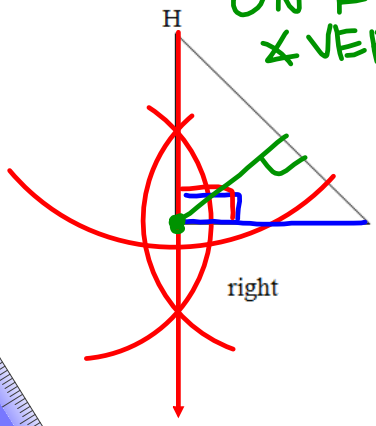
Recall: an altitude of a triangle is the _____ segment from the vertex of a triangle to the line containing the opposite side. Construct the altitude from vertex H in each of the following triangles:

H INSIDE



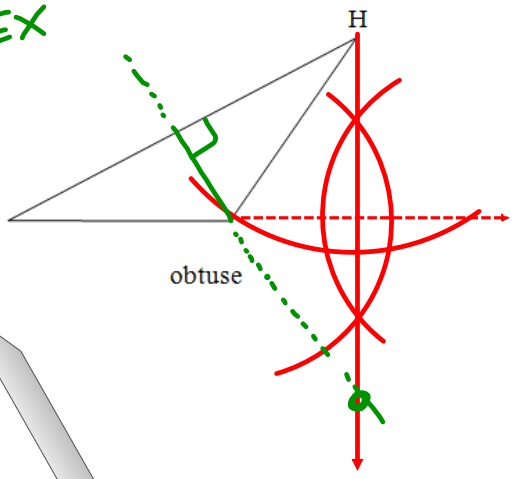
acute

H ON RT & VERTEX

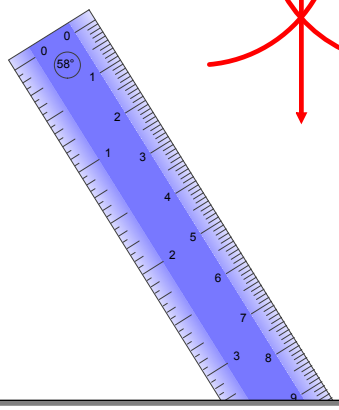


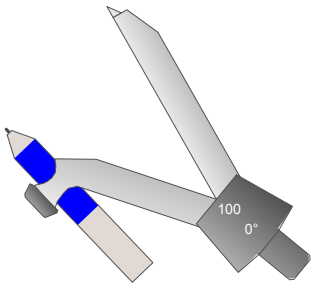
right

OUTSIDE H

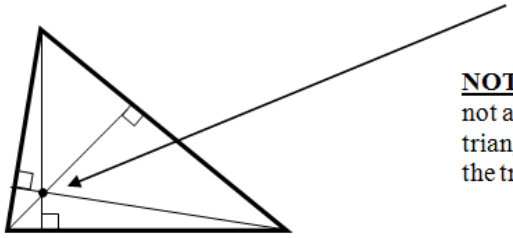


obtuse





Defn: The point of concurrency of the lines containing the altitudes of a triangle is called the ORTHOCENTER of the triangle.



Orthocenter

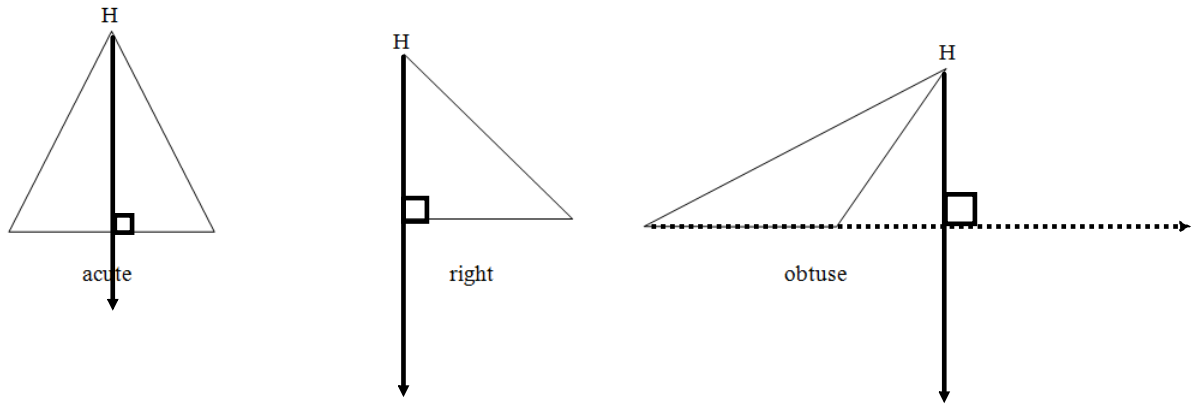
NOTE: The orthocenter of a triangle is not always in the interior of the triangle, sometimes it lays on or outside the triangle.

Go back to the three triangles above and sketch the other two altitudes for each triangle using your universal angle maker. Where does the orthocenter fall?

Acute INSIDE Right ON Obtuse OUTSIDE

Go back to the three triangles above and sketch the other two altitudes for each triangle using your universal angle maker. Where does the orthocenter fall?

Acute _____ Right _____ Obtuse _____

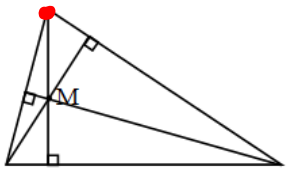


Recognizing Points of Concurrency & Regents Question

Is M a circumcenter or an orthocenter? Explain.

M = ORTHOCENTER

⊥ FROM VERTICES → ALTITUDES



NOT ⊥ BIS SIDES

In which triangle do the three altitudes intersect outside the triangle?

1) a right triangle
2) an acute triangle
3) an obtuse triangle
4) an equilateral triangle

Using Altitudes in Proofs

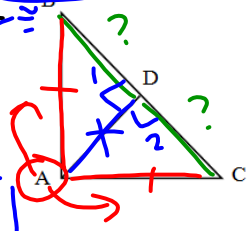
Given: $\overline{AD}$ is an altitude of ΔABC
$\overline{AB} \cong \overline{AC}$

Prove: $\overline{BD} \cong \overline{CD}$

RT ∠'S → ≅ ∠'S

① ⊥ → △ ≅ △ BY RHL ≅ RHL → RT △'S

② CPCTC



R: $\overline{AD}$ ALT △ABC → GIVEN

H: $\overline{AB} \cong \overline{AC}$ GIVEN

L: $\overline{AD} \cong \overline{AD}$ REFLEXIVE

$\overline{AD} \perp \overline{BC}$ ALTITUDE ⊥ BASE DEFN OF ALTITUDE

$\angle 1$ & $\angle 2$ RT ∠'S ⊥ → RT ∠'S

△ABD & △ACD RIGHT △'S RT ∠ → RT △ DEFN OF RT △

△ABD ≅ △ACD BY RHL ≅ RHL

② $\overline{BD} \cong \overline{CD}$ BY CPCTC

Do #3 on the back of the construction project rubric - construct the altitude