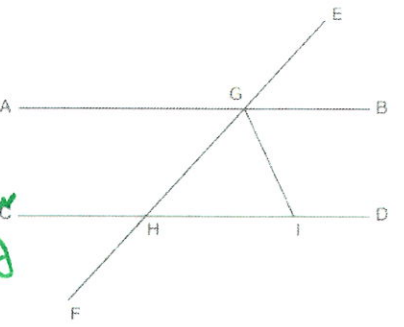
MAT 222, Exam #2, Summer 2017 Name KEY

Instructions: You may use a protractor, compass, ruler and calculator for this exam. You may also use a 3x5 index card, which you will turn in with the exam along with any scrap paper provided by the testing center. It's important to show all work, and explain your reasoning. It is helpful to put a box or circle around your final answer after calculations. Give exact answers unless specifically asked to round.

1. Determine if each statement is True or False. If you mark false, explain why the statement is false, or rewrite the statement as a true one. In the figure, assume lines $\overleftrightarrow{AG}$ and $\overleftrightarrow{DI}$ are parallel. (1 point each)



a. T (F) All isosceles triangles are equilateral triangles. all equilaterals are isosceles

b. (T) F $m\angle IHG + m\angle HGI + m\angle HIG = 180°$.

c. (T) F All right triangles have two acute angles.

d. T (F) If two triangles have the same three angles, then the triangles are congruent. Similar only

e. T (F) The circumcenter is the center of the inscribed circle around a triangle. incenter

f. (T) F The intersection of the medians of a triangle mark at the centroid.

g. (T) F Another name for an indirect proof is proof by contradiction.

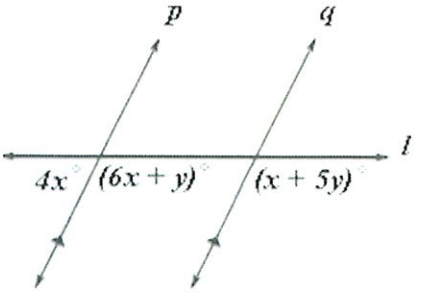
h. (T) F An n-gon is a general term for a polygon with n sides.

i. T (F) The image to the right is a convex polygon. concave

j. T (F) A quadrilateral with a pair of parallel sides is a parallelogram. could be trapezoid

k. T (F) Two skew lines are coplanar. not by definition

2. Find the values of x and y that make the lines p and q parallel. (5 points)



$4x + 6x + y = 180 \Rightarrow 10x + y = 180$

$6x + y = x + 5y \Rightarrow 5x = 4y$

$2(4y) + y = 180$

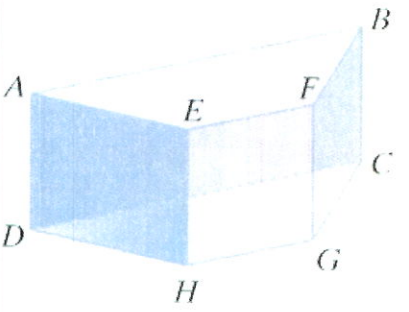
$9y = 180$

$y = 20$

$5x = 80$

$x = 16$

3. Planes AEF and DHG are parallel, and planes ADB and EHG are parallel. Find expressions for two lines that are skew. (3 points)

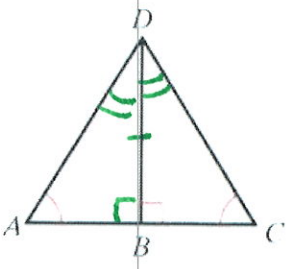


$\overrightarrow{AE}$ skew to $\overrightarrow{HG}$

answers will vary

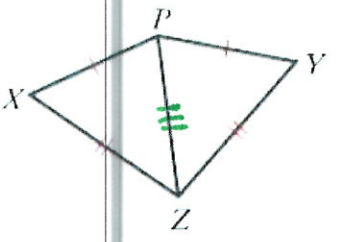
4. For each pair of triangles shown below, determine whether the triangles are congruent. If so, explain the postulate the proves it. If they are not, explain why not. (3 points each)

a.



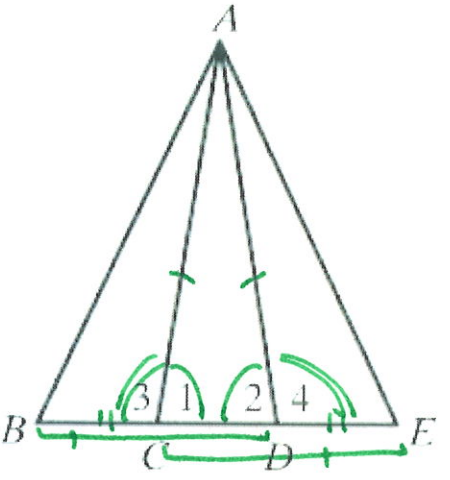
all 3 angles & one side congruent

b.



SSS congruent

5. Given that ΔACD is isosceles, with base $\overline{CD}$, $\angle 1 \cong \angle 2$, and $\overline{BD} \cong \overline{CE}$, prove that $\Delta ABC \cong \Delta AED$. Be sure to state each step, and each theorem or postulate that justifies the step. (7 points)



Given ΔACD isosceles $\Rightarrow$

$\overline{AC} \cong \overline{DA}$ given $\angle 1 \cong \angle 2$

Side opposite congruent angles are congruent in isosceles triangle.

$\overline{BD} \cong \overline{CE}$ given

$BD = BC + CD$
$CE = CD + DE$ } given by diagram

$BC + CD = CD + DE$ transitive prop eq.

$BC = DE$ Subtract prop eq.

$m\angle 1 + m\angle 3 = 180°$
$m\angle 2 + m\angle 4 = 180°$ } def of suppl.

$m\angle 1 + m\angle 3 = m\angle 2 + m\angle 4$ trans. prop eq.

$m\angle 1 + m\angle 2 = m\angle 1 + m\angle 4$ Subst.

$m\angle 2 = m\angle 4$ Subst. prop eq.

$\Delta ABC \cong \Delta ADE$ SAS

6. Using the figure at the right, answer the following questions. (3 points each)

a. Find $m\angle 1$.

$180 = 52 + 55 + m\angle 1$

$m\angle 1 = 73$

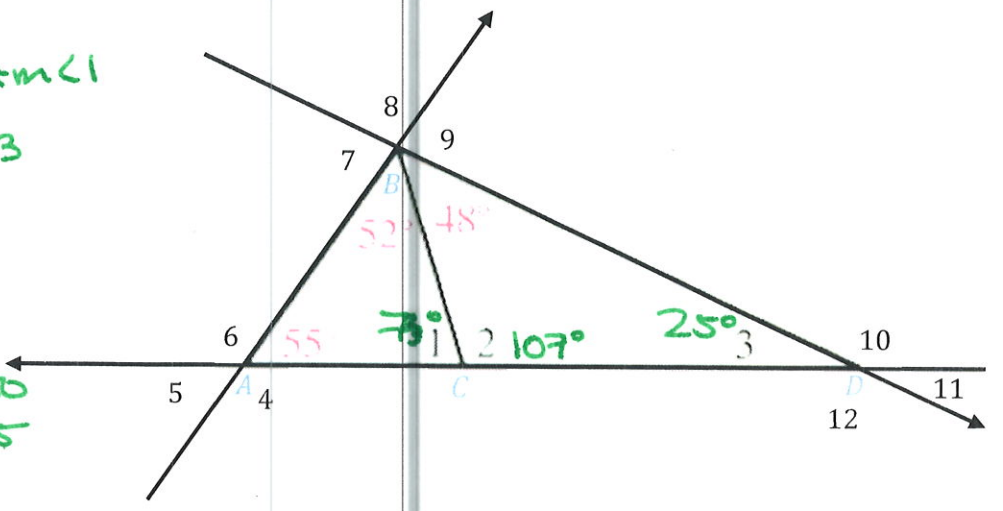
b. Find $m\angle 3$.

$m\angle 1 + m\angle 2 = 180$

$m\angle 2 = 107$

$m\angle 2 + m\angle 3 + 48° = 180$

$m\angle 3 = 25$



c. Consider ΔABD. Which angles are exterior angles? List at least three.

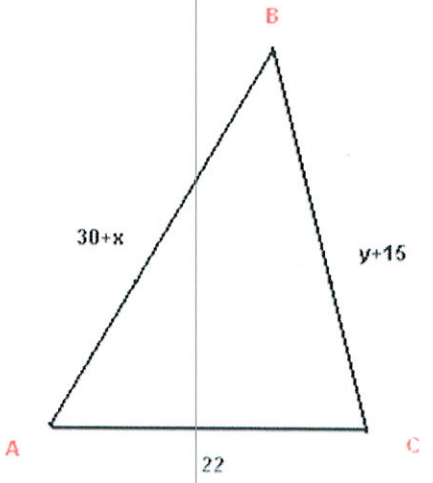
$\angle 6$, $\angle 4$ $\angle 10$, $\angle 12$

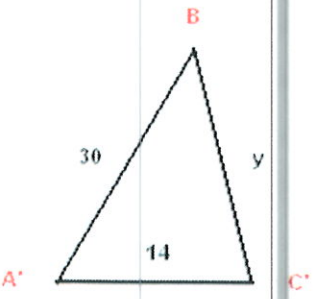
$\angle 7$, $\angle 9$ answers will vary

d. Is ΔBCD similar to ΔABD? Why or why not.

no $\angle ABD$ is 100° which is not congruent to $\angle 2$ (48° not congruent to 55°)

7. Use the diagram below to find the values of x and y that will make the two triangles similar. (6 points)





$\frac{y+15}{y} = \frac{22}{14}$

$14(y+15) = 22y$

$14y + 210 = 22y$

$210 = 8y$

$y = \frac{105}{4} = 26.25$

$\frac{30+x}{30} = \frac{22}{14}$

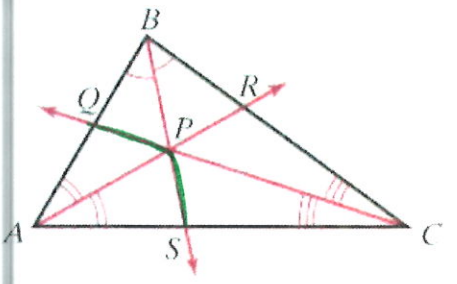
$14(30+x) = 30(22)$

$420 + 14x = 660$

$14x = 240$

$x = \frac{120}{7}$

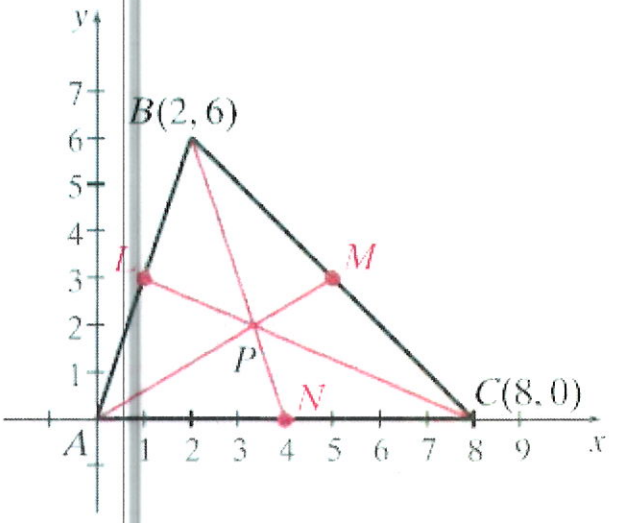
8. Use the diagram to the right to explain why we are unable to claim that $PQ = PS$. State any theorems you use. (6 points)



angle bisectors do not imply anything about where sides are divided so we can't say $AQ = AS$ which would imply congruence by SAS.

answers may vary

9. The ΔABC is shown on the coordinate plane. Use the diagram to find the following. (3 points each)



a. The coordinates of point M (midpoint of $\overline{BC}$).

$\left(\left(\frac{2+8}{2}\right), \left(\frac{6+0}{2}\right)\right) = (5, 3)$

b. The coordinates of point L (the midpoint of $\overline{AB}$).

$\left(\left(\frac{0+2}{2}\right), \left(\frac{6+0}{2}\right)\right) = (1, 3)$

c. The equation of the line $\overleftrightarrow{LC}$.

$m = \frac{3-0}{1-8} = \frac{3}{-7}$ $\quad y - 3 = -\frac{3}{7}(x - 1)$ $\quad y = -\frac{3}{7}x + \frac{24}{7}$

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

d. The equation of the line $\overleftrightarrow{MA}$.

$m = \frac{3}{5}$ $\quad y = \frac{3}{5}x$

e. The point of intersection P.

$\left(-\frac{3}{7}x + \frac{24}{7} = \frac{3}{5}x\right) 35$

$-15x + 120 = 21x$

$120 = 36x$

$x = \frac{10}{3}$

$y = \frac{3}{5}\left(\frac{10}{3}\right) = 2$

$\left(\frac{10}{3}, 2\right)$