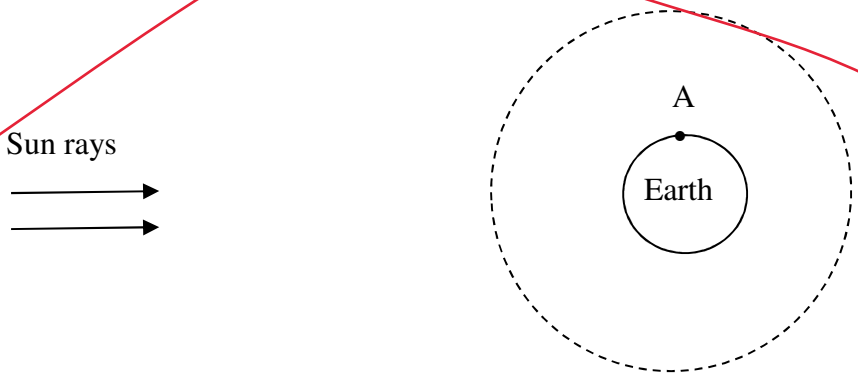
Math 213 Exam 1A Spring 2015 Name_____

1(6). Consider the diagram below of sun and earth. As usual we are looking down on the North Pole.

a. What time of day is it at point A?

b. Sketch in the moon in the place in its orbit where it looks like this:

c. Is the moon waxing or waning when it looks like part b?



2(8). In a certain tiling of regular polygons each vertex is surrounded by one square, one hexagon, and one additional regular polygon. What is the third polygon? Show all work needed to justify your answer.

3(10). Consider the statement **Only seniors apply for graduation.** Circle the letter by the statements that are *equivalent* to this statement.

a. If a student is a senior then they apply for graduation.

b. If a student applies for graduation then they are a senior.

c. All seniors apply for graduation.

d. If a student does not apply for graduation they are not a senior.

e. If a student is not a senior they do not apply for graduation.

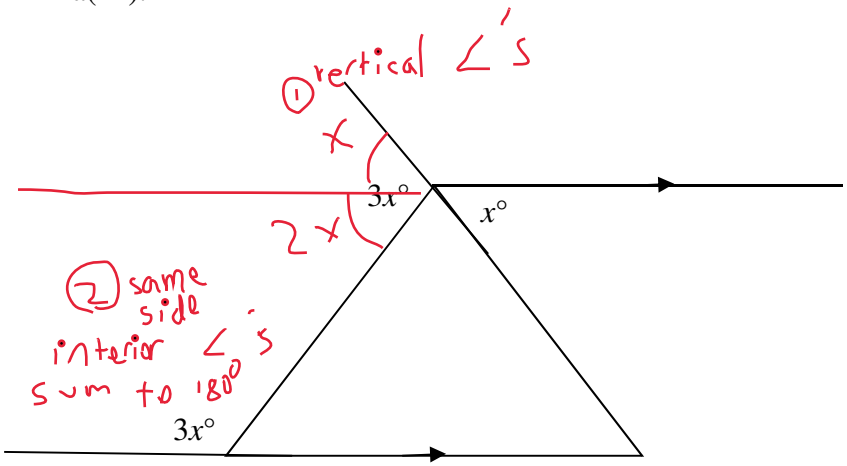
4. For each figure below, determine the value of x. Show all work. Name additional angles as needed.

Indicate clearly in your work when you use one of the following facts:

Facts (not all will be used):

- The angles of a triangle add to 180°
- Corresponding angles are congruent (Parallel postulate)
- Angles that surround a point add to 360°
- Vertical angles are congruent
- Alternate interior angles are congruent
- Angles that form a straight line add to 180° (Straight angle)
- Same-side interior angles add to 180°
- The sum of the exterior angles of a polygon is 360°
- An exterior angle of a triangle is equal to the sum of the opposite interior angles
- The angles of a quadrilateral add to 360°

a(14).



$3x + 2x = 180$

$\Rightarrow 5x = 180$

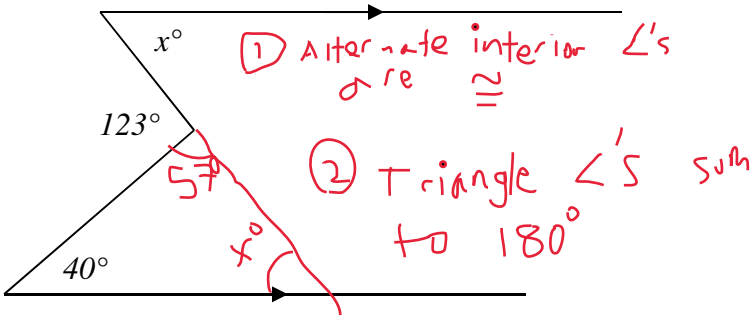
$\Rightarrow \boxed{x = 36}$

b(12). *You will need to add or extend at least one line to solve the following. Be sure to indicate how you define any lines that you add, or clearly indicate what line(s) you are extending.*
As above, show all work, and indicate where in your work you use any of the facts from the box above.

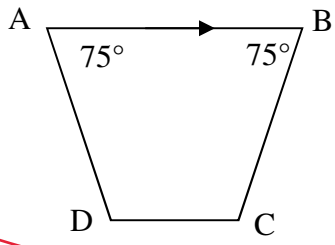
$40 + 57 + x = 180$

$\Rightarrow x + 97 = 180$

$\Rightarrow \boxed{x = 83}$



5(10). A walker begins to follow the path shown at right, beginning at A and walking towards B.

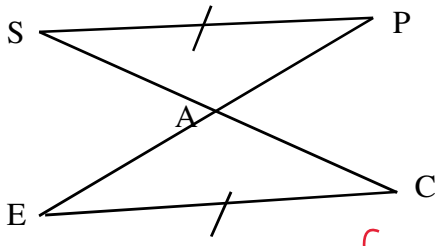


a. At B what angle does the walker turn in order to continue on the path? Sketch in what angle the walker turns, and tell its measure.

b. Suppose the walker continues on the path until he reaches A, but does **not** turn at A to face his original direction; he continues to face in the direction of the path from D to A. How many degrees of turning has the walker experienced altogether? Explain why.

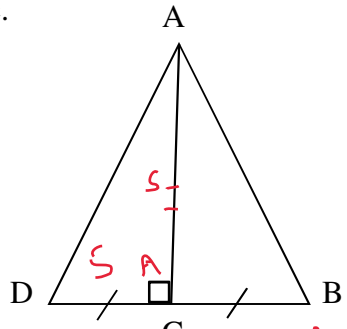
6(16). For each pair of triangles, if the two are congruent give an appropriate congruence statement and the applicable property (e.g., $\Delta ABC \cong \Delta DEF$ by SAS). If it is not possible to prove congruence, state "not enough information." Note: Arrows indicate parallel segments; / indicate congruent segments; □ indicates a right angle. ***Mark any additional congruent parts*** you can deduce from the given information.

a.



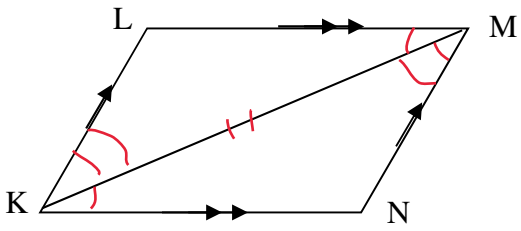
not enough info

c.



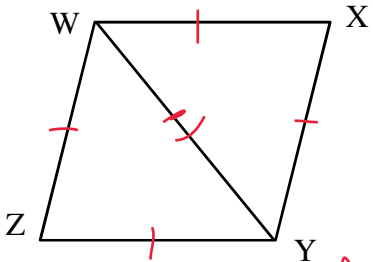
$\Delta DAC \cong \Delta BAC$ by SAS

b.



$\Delta KLN \cong \Delta MNK$ by ASA

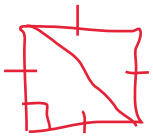
d. Given WXYZ is a rhombus



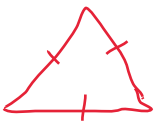
$\Delta WZY \cong \Delta WXY$ by SSS

7(24). For each description, sketch an example of the shape if possible. ***Mark all congruent parts and right angles as appropriate.*** If it is not possible, explain.

a. a triangle that is both right and isosceles



b. a triangle that is both equilateral and isosceles

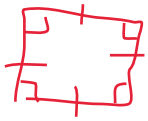


equilateral implies isosceles

c. a triangle that is both regular and right (recall a regular figure has all equal sides and equal angles)

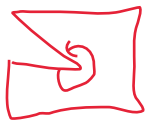
regular triangle implies angles are 60° so can't have a 90° ∠

d. a quadrilateral that is both a rectangle and a rhombus



a square

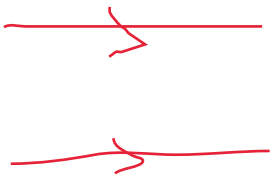
e. a hexagon that is not convex



convex means all ∠'s are less than 180°

f. a trapezoid that has exactly one right angle

impossible, another right angle must appear since same side interior angles sum to 180°



Please copy and sign the following: I pledge on my honor that I have not given or received any unauthorized assistance on this exam. [signed]