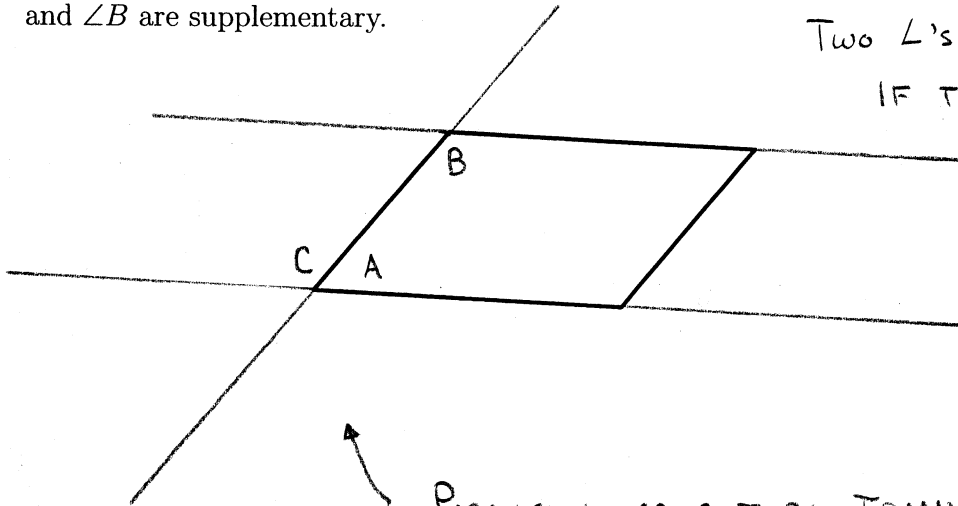


Show all work. Supply explanations when necessary.

1. (3 points) The figure shown below is a parallelogram. Choose any two consecutive interior angles. Label them  $A$  and  $B$ . Then provide a convincing argument that  $\angle A$  and  $\angle B$  are supplementary.



Two  $\angle$ 's are supplementary  
IF THE SUM OF THEIR  
MEASURES IS  $180^\circ$ .

Parallel lines cut by transversal

$\Rightarrow$  ALT INTERIOR ANGLES ARE CONGRUENT

$\angle C$  &  $\angle A$  TOGETHER

$$\Rightarrow m(\angle C) = m(\angle B)$$

$$\text{MAKE A STRAIGHT } \angle \Rightarrow m(\angle C) + m(\angle A) = 180^\circ$$

$$\Rightarrow m(\angle B) + m(\angle A) = 180^\circ$$

2. (3 points) What is the measure of each interior angle of a regular heptagon? What is the measure of each exterior angle?

HEPTAGON HAS 7 SIDES

EXTERIOR  $\angle$  ...

INTERIOR  $\angle$  ...

$$\frac{180^\circ(7-2)}{7} \approx \underline{\underline{128.57}}$$

$$\frac{360^\circ}{7} \approx \underline{\underline{51.43^\circ}}$$

3. (2 points) What is a scalene triangle?

A TRIANGLE WITH NO CONGRUENT  
SIDES

4. (1 point) What is the minimum number of points in a set of noncoplanar points?

3 POINTS ARE ALWAYS COPLANAR

SO YOU NEED AT LEAST

4 POINTS

5. (3 points) In the following figure,  $\overline{AB} \parallel \overline{DC}$ . Find the measure of  $\angle AED$ . Explain your reasoning.

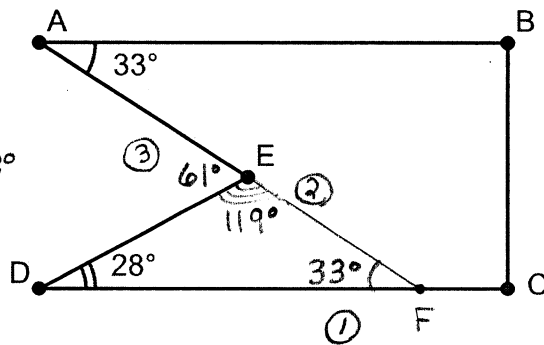
①  $\overleftrightarrow{AE}$  IS A TRANSVERSAL OF THE PARALLEL LINES  $\overleftrightarrow{AB}$  AND  $\overleftrightarrow{DC}$   
 $\Rightarrow$  ALT INT L'S ARE CONGRUENT  $\Rightarrow m(\angle AFD) = 33^\circ$

② INTERIOR L'S OF A

TRIANGLE ADD UP TO  $180^\circ$

$$m(\angle DEF) = 180^\circ - 28^\circ - 33^\circ$$

$$m(\angle DEF) = 119^\circ$$



③  $\angle AED$  &

$\angle EDF$  TOGETHER

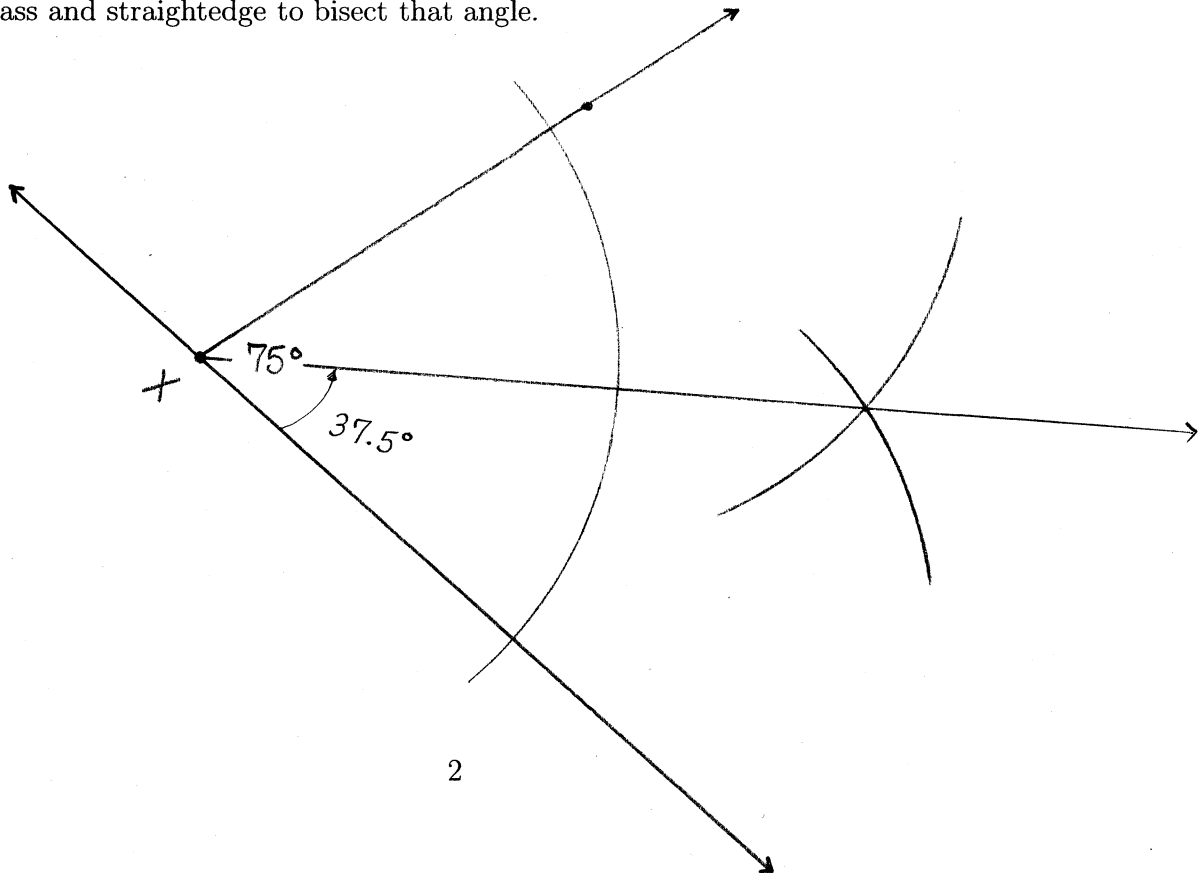
MAKE A STRAIGHT

ANGLE

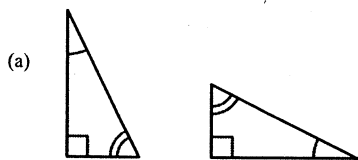
$$m(\angle AED) = 180^\circ - 119^\circ$$

$$m(\angle AED) = 61^\circ$$

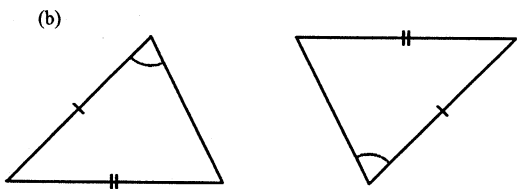
6. (3 points) Use your protractor to draw an angle that measures  $75^\circ$ . Then use only a compass and straightedge to bisect that angle.



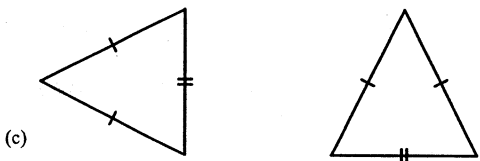
7. (3 points) For each of the following pairs of triangles, determine whether the given conditions are sufficient to show the triangles are congruent. If the triangles are congruent, tell which congruence property can be used to verify this fact.



No, AAA IS NOT A CONGRUENCE PROPERTY.



No, ASS IS NOT A CONGRUENCE PROPERTY.



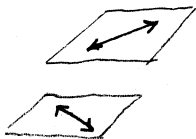
Yes, BY THE SSS CONGRUENCE PROPERTY.

8. (2 points) What is a kite?

A QUADRILATERAL WITH TWO PAIRS OF ADJACENT CONGRUENT SIDES



9. (1 point) Suppose that a line is taken at random from each of two parallel planes. Must the lines be parallel? Explain.



No, PICK A RANDOM LINE ON THE FLOOR AND A RANDOM LINE ON THE CEILING. THEY WON'T BE PARALLEL.

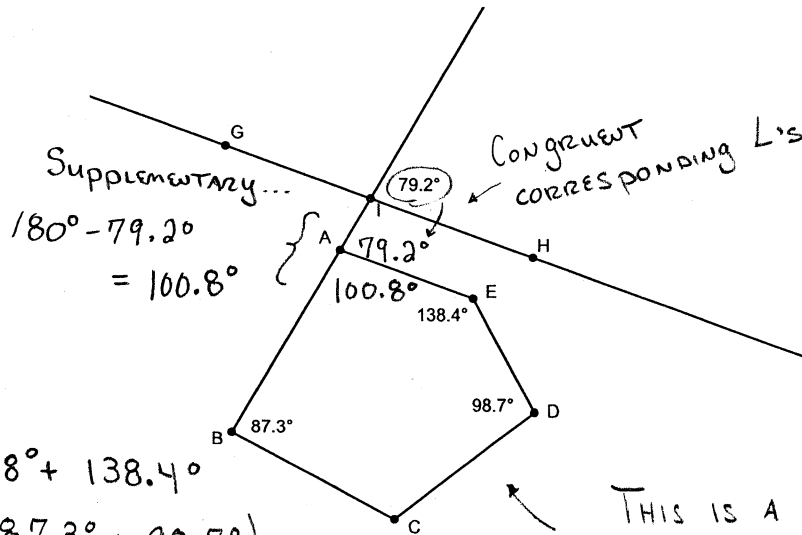
10. (1 point) What is the minimum number of points in a set of noncollinear points?

2 PTS ARE ALWAYS COLLINEAR,

So YOU NEED AT LEAST

3 POINTS

11. (3 points) In the following figure,  $\overline{AE} \parallel \overline{GH}$ . Find the measure of  $\angle BCD$ .



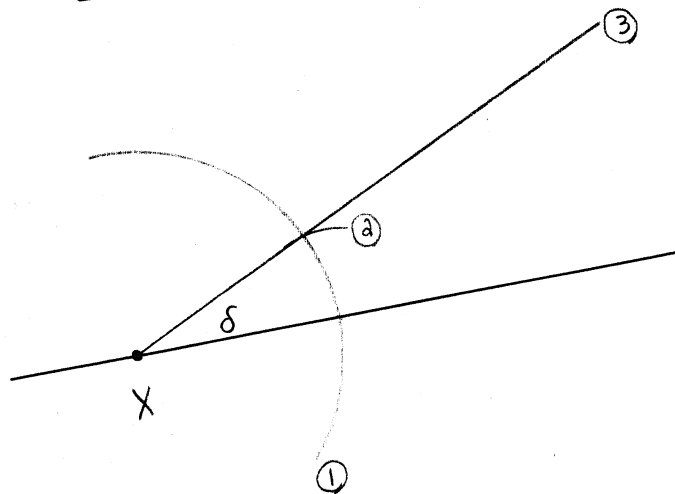
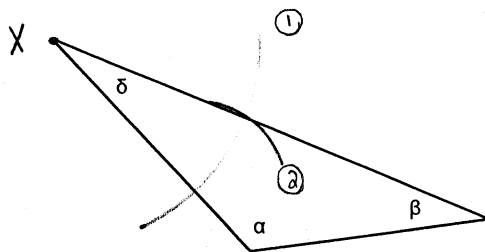
$$540^\circ - (100.8^\circ + 138.4^\circ + 87.3^\circ + 98.7^\circ)$$

$$m(\angle BCD) = 114.8^\circ$$

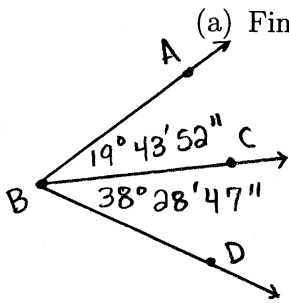
THIS IS A CONVEX PENTAGON.

THE SUM OF THE MEASURES OF INTERIOR ANGLES IS  $180^\circ(5-2) = 540^\circ$

12. (3 points) Use a compass and straightedge to construct an angle whose initial side lies on the line below and whose measure is the same as that of  $\angle \delta$ .



13. (4 points)  $\angle ABC$  and  $\angle CBD$  are adjacent angles. The measure of  $\angle ABC$  is  $19^\circ 43' 52''$ , while the measure of  $\angle CBD$  is  $38^\circ 28' 47''$ .



- (a) Find the measure of  $\angle ABD$ . Write your answer in degrees, minutes, and seconds.

$$\begin{array}{r} 19^\circ 43' 52'' \\ + 38^\circ 28' 47'' \\ \hline 58^\circ 12' 39'' \end{array}$$

$58^\circ 12' 39''$

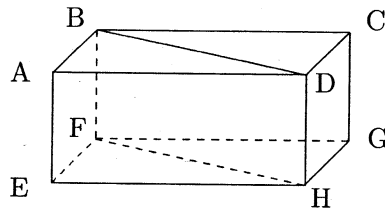
- (b) Convert your answer from part (a) to degrees in decimal form.

$$\frac{12 \text{ min}}{1} \cdot \frac{1^\circ}{60 \text{ min}} = 0.2^\circ$$

$$\frac{39 \text{ sec}}{1} \cdot \frac{1^\circ}{3600 \text{ sec}} = 0.0108\bar{3}$$

$58.2108\bar{3}^\circ$

14. (3 points) Refer to the following three-dimensional figure. Be sure to use correct notation for your answers below.



- (a) Find a pair of skew lines. (If not possible, explain why.)

$$\overleftrightarrow{AB} \text{ AND } \overleftrightarrow{FH}$$

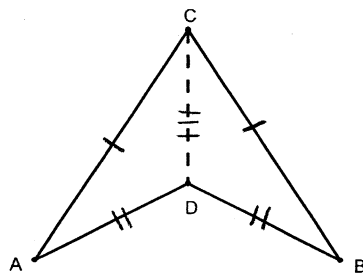
- (b) Find three concurrent lines. (If not possible, explain why.)

$$\overleftrightarrow{AB}, \overleftrightarrow{BD}, \overleftrightarrow{BC} \leftarrow \text{All share point B.}$$

- (c) Find three points that are not coplanar. (If not possible, explain why.)

NOT POSSIBLE. ANY THREE POINTS ARE ALWAYS COPLANAR.

15. (3 points) The figure shown below is a kite. Carefully explain how we can be sure that  $\triangle ACD \cong \triangle BCD$ .

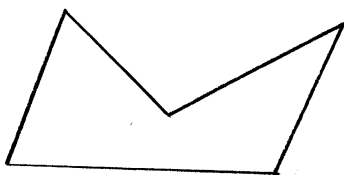


By DEFINITION OF KITE,  
ADJACENT SIDES ARE  
CONGRUENT AS MARKED  
(I AND II).

$\overline{CD} \cong \overline{CD}$  (EVERY SEGMENT  
IS CONGRUENT  
TO ITSELF.)

$\triangle ACD \cong \triangle BCD$   
By SSS

16. (2 points) Sketch a concave pentagon.



17. (3 points) Indicate whether each statement is true or false. If false, change one word to make the statement true.

- (a) Three collinear points uniquely determine a plane.

FALSE, CHANGE "COLLINEAR" TO "NON COLLINEAR"

- (b) If three lines share a single point, then the lines must be coplanar.

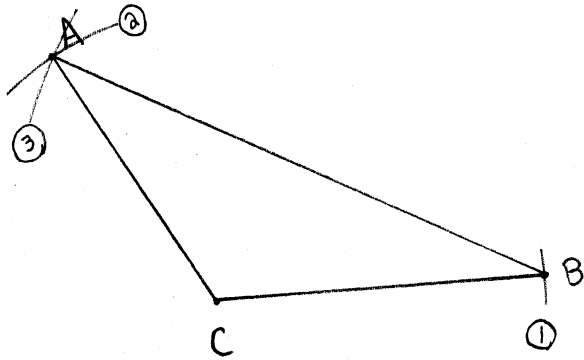
FALSE, CHANGE "COPLANAR" TO "CONCURRENT"

- (c) Two parallel lines uniquely determine a plane.

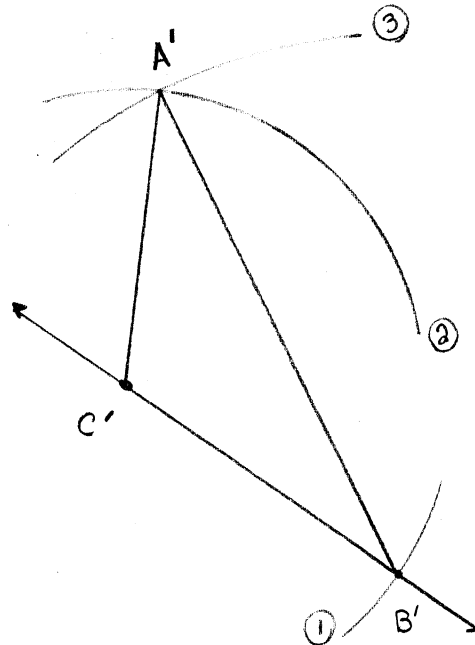
TRUE

18. (4 points) Use a straightedge to draw an obtuse triangle. Then use only a compass and straightedge to construct a congruent triangle.

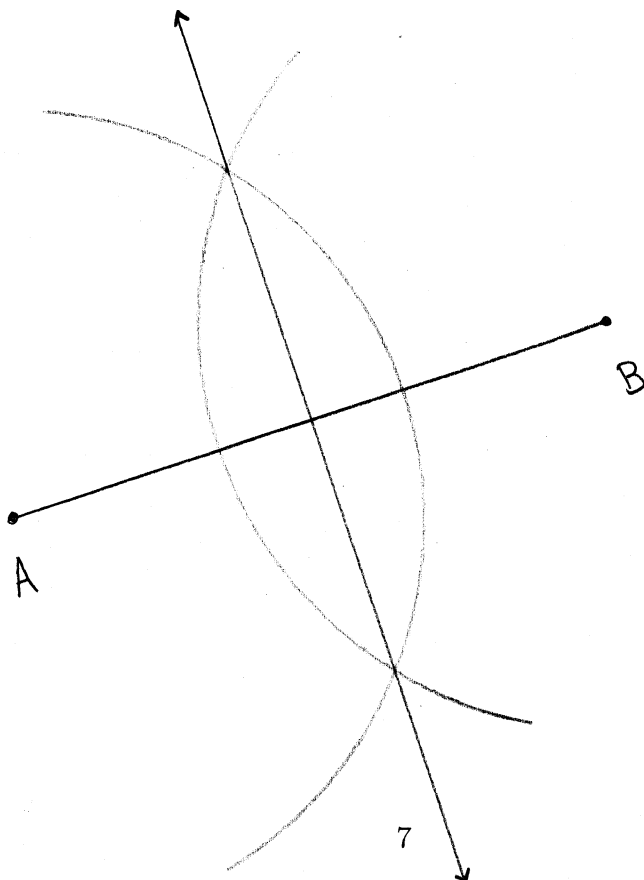
SSS CONSTRUCTION



$\triangle ABC$   
 $\cong \triangle A'B'C'$



19. (3 points) Draw a line segment. Then use only a compass and straightedge to bisect the segment.



SAME SIZE  
 CIRCLES FROM  
 BOTH ENDPONITS.