

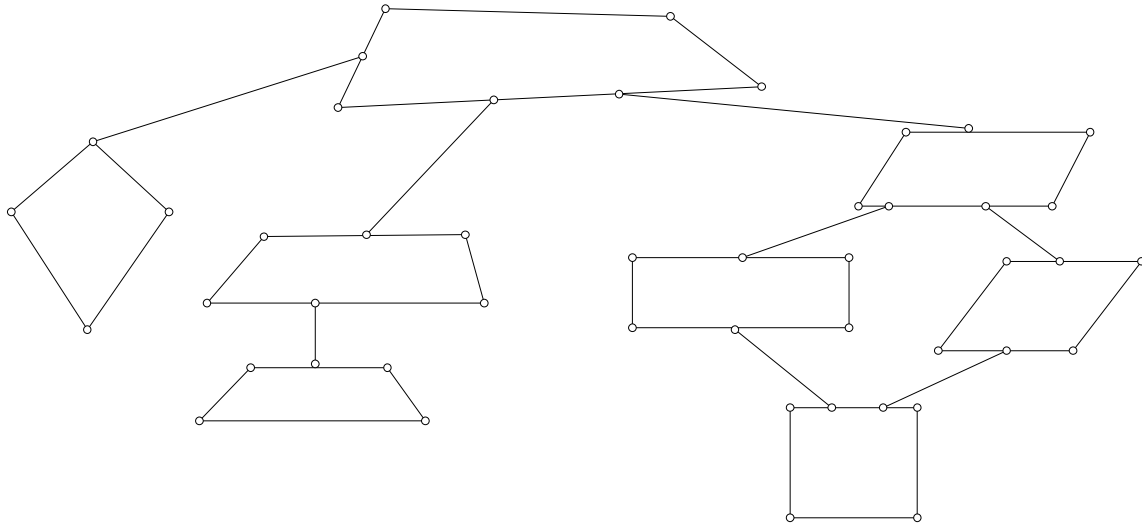
Name: \_\_\_\_\_

Date: \_\_\_\_\_

## MAT 153 Geometry Final Exam

### Sections 1.1 through 9.2

1. (8 points) Fill in each figure with the correct name.

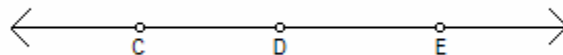


2. (4 points) Find the next two terms in each sequence.

a)  $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \dots$

b) 1, 9, 25, 49, ...

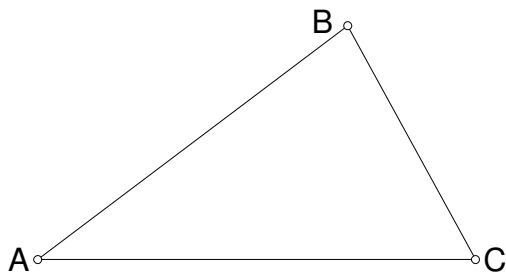
3. (2 points) Name two opposite rays for the given figure.



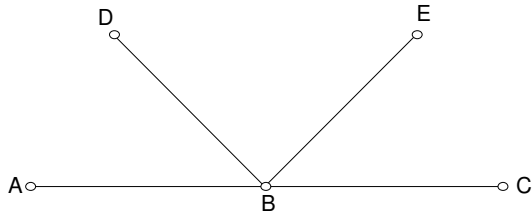
4. (4 points) Draw and label a right angle by using a protractor. Then bisect that angle by using a compass and a straight edge. Do not use a protractor to bisect the angle.

5. (2 points) Two planes intersect in exactly one \_\_\_\_\_.
6. (2 points) Through any three points there is exactly one \_\_\_\_\_.
7. (14 points) Fill in the blanks with always, sometimes, or never.
- a) Two lines that lie in parallel planes are \_\_\_\_\_ parallel.
  - b) Two skew lines are \_\_\_\_\_ coplanar.
  - c)  $\overrightarrow{JK}$  and  $\overrightarrow{JL}$  are \_\_\_\_\_ the same ray.
  - d) Two points are \_\_\_\_\_ collinear.
  - e) Intersecting lines are \_\_\_\_\_ coplanar.
  - f) Rhombuses are \_\_\_\_\_ kites.
  - g) Quadrilaterals are \_\_\_\_\_ trapezoids.

8. (4 points) Copy triangle ABC using one of the methods for proving triangles congruent, by using only a compass and a straight edge. (try ASA or SAS).



9. (3 points)  $\overline{AB} \cong \overline{BC}$ .  $AB = 9$  and  $AC = 5x + 3$ . Find  $x$  and find  $AC$ . What is another name for point  $B$ ?



10. (10 points) Using the following statement, answer each question.

If two angles have a measure of  $90^\circ$ , then the angles are congruent.

a) What is the hypothesis?

b) What is the conclusion?

c) What is the contrapositive?

d) What is the inverse?

e) What is the converse?

11. (2 points) Draw a Venn diagram to illustrate the statement.

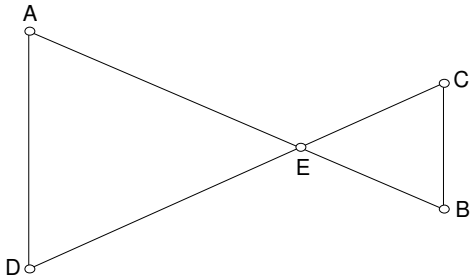
If an angle has a measure of 40 degrees, then it is acute.

12. (2 points) Points A, R, and T are collinear. The coordinate of A is 0.  $AR = 5$  and  $AT = 7$ . What is one possible coordinate of the midpoint of  $\overline{RT}$ .

13. (3 points) Write the two statements that form the biconditional.

Two lines are parallel if and only if they are coplanar and do not intersect.

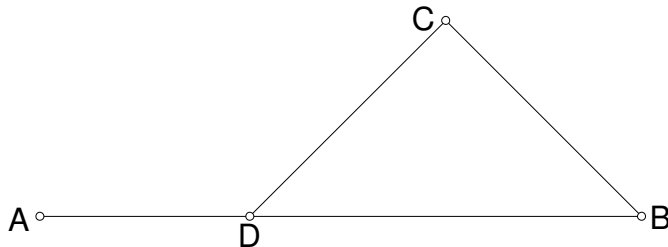
14. (6 points) Find the value of each variable and the measure of each angle.



$$m\angle DEA = y^\circ, m\angle AEC = (x + y + 10)^\circ, m\angle CEB = 2x^\circ$$

15. (3 points) Find the measure of each angle.  $\angle A$  and  $\angle B$  are complementary.  $m\angle A = 3x + 12$ ,  $m\angle B = 2x - 22$ .

16. (3 points) Given that  $m\angle ADC = 135^\circ$  and  $m\angle B = 55^\circ$ , find  $m\angle C$ .



17. (3 points) Find the measure of a single exterior angle of a regular pentagon. Show the work for full credit.

18. (3 points) Find the measure of a single interior angle of a regular hexagon. Show the work for full credit.

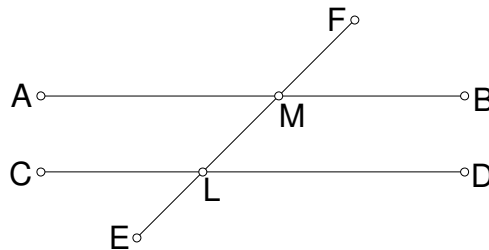
19. (3 points) Find the total measure of all of the interior angles of a regular decagon. Show the work for full credit.

20. (5 points) List all of the reasons that can be used to prove triangles congruent.

21. (3 points) List all of the reasons that can be used to prove triangles similar.

22. (10 points) Name **one** set of angles for each of the categories in the following diagram. **Then state whether each is congruent or supplementary.** It is acceptable to number the angles if desired.

**Given:**  $\overline{AB} \parallel \overline{CD}$

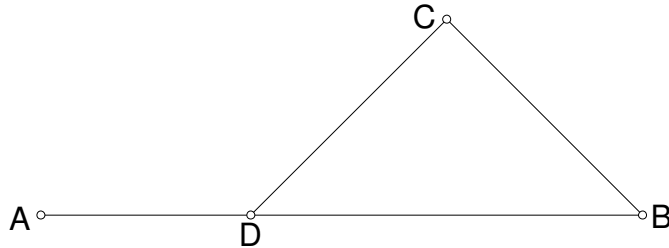


- a) Same-Side Interior Angles:
- b) Alternate Interior Angles:
- c) Vertical Angles:
- d) Corresponding Angles:
- e) Linear Pairs:

23. (10 points) Use the randomly listed statements and reasons to fill in the blanks of the following proof.

**Given:**  $\angle ADC$  is an exterior angle of  $\triangle DCB$

**Prove:**  $m\angle ADC = m\angle C + m\angle B$

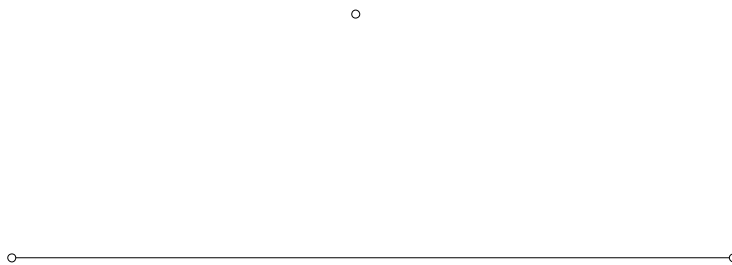


$m\angle ADC = m\angle C + m\angle B$ , Given, Transitive,  $\angle ADC$  is an exterior angle of  $\triangle DCB$ , Angle Addition Postulate,  $m\angle CDB + m\angle C + m\angle B = 180$ , Triangle Angle Sum Theorem,  $m\angle ADC + m\angle CDB = 180$ , Subtraction Property of Equality,  $m\angle ADC + m\angle CDB = m\angle CDB + m\angle C + m\angle B$

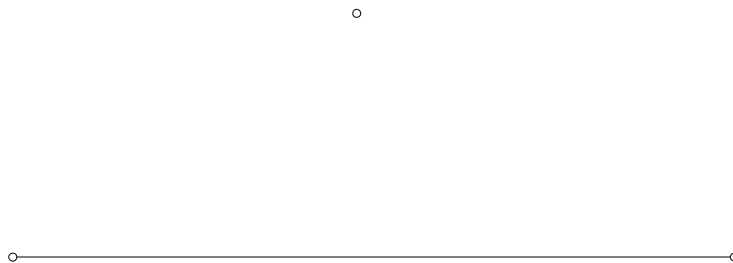
Statements	Reasons
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

24. (3 points) The measures of three angles of a triangle are  $x + 10$ ,  $x - 20$ , and  $x + 25$ . Find  $x$  and determine if the triangle is acute, obtuse or right.

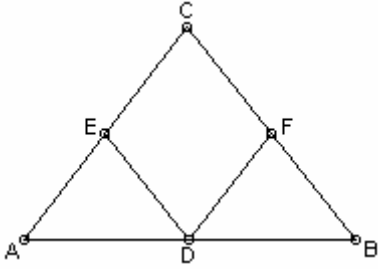
25. (3 points) Construct a perpendicular line through the given point not on the line.



26. (3 points) Construct a line parallel to the given line through the given point.

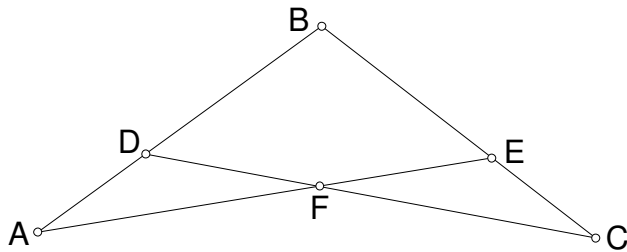


27. (8 points) Complete the following proof.



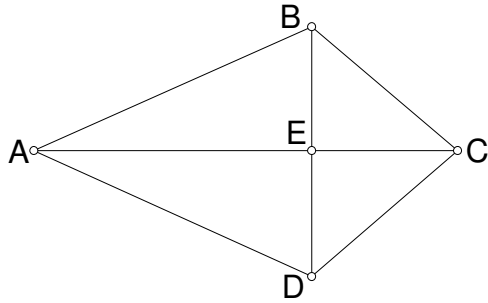
Given:  $\overline{ED} \perp \overline{CA}$  and  $\overline{FD} \perp \overline{CB}$   
 $\overline{EA} \cong \overline{FD}, \overline{ED} \cong \overline{FB}$   
 Prove:  $\triangle AED \cong \triangle DFB$

28. (8 points) Complete the following proof.



Given:  $\overline{AB} \cong \overline{CB}, \angle A \cong \angle C$   
 Prove:  $\overline{AE} \cong \overline{CD}$

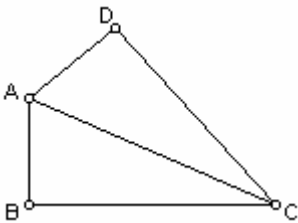
29. (12 points) Complete the following proof.



Given:  $\angle ACB \cong \angle ACD, \angle BAE \cong \angle DAE$

Prove:  $\triangle CEB \cong \triangle CED$

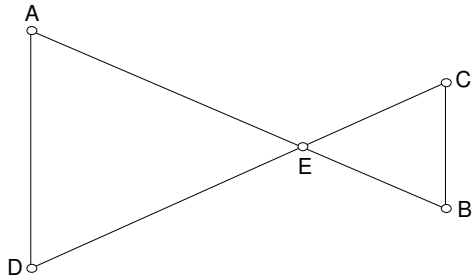
30. (10 points) Complete the following proof.



Given:  $\overline{AB} \perp \overline{BC}; \overline{AD} \perp \overline{DC}; \overline{BA} \cong \overline{DA}$

Prove:  $\triangle CAB \cong \triangle CAD$

31. (6 points) Complete the following proof.

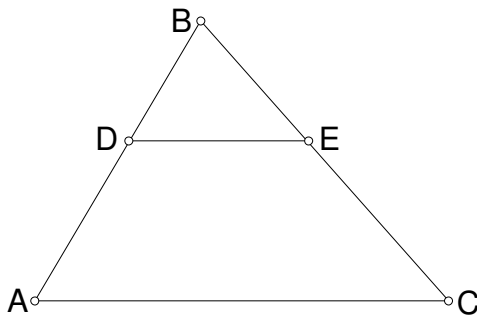


Given:  $\angle AED$  and  $\angle CEB$  are vertical angles

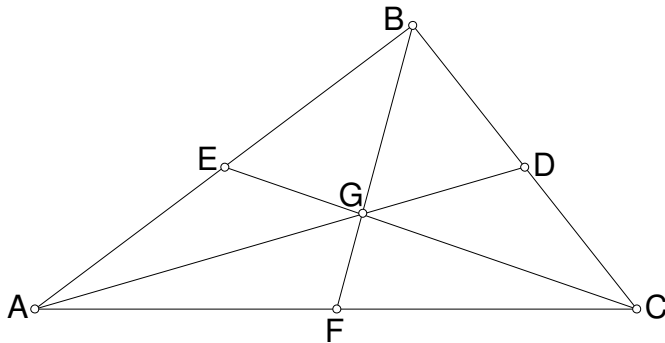
$$\frac{EA}{EC} = \frac{ED}{EB}$$

Prove:  $\triangle DAE \sim \triangle BCE$

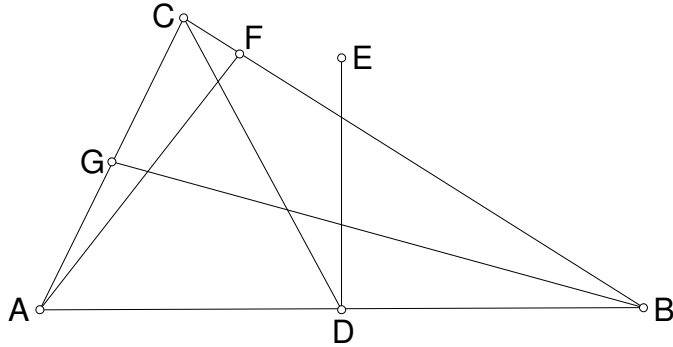
32. (3 points) If  $\overline{DE} \parallel \overline{AC}$ ,  $DA = 15$ ,  $EC = 10$ , and  $BE = 6$ , then find  $BD$ .



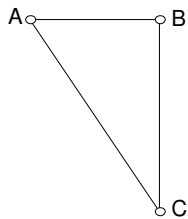
33. (4 points) Given that  $\overline{AD}$ ,  $\overline{CE}$  and  $\overline{BF}$  are medians of triangle ABC,  $BG = 8$ ,  $GD = 3$ ,  $EC = 15$ ,  $BD = 6$ ,  $AC = 10$ , find  $BF$ ,  $AD$ ,  $EG$ , and  $AF$ .



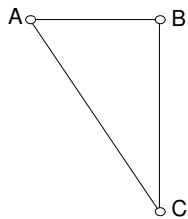
34. (4 points) Given that  $\overline{AD} \cong \overline{BD}$ ,  $\angle ABG \cong \angle CBG$  and  $\angle AFB$  and  $\angle EDB$  are right angles, name an **angle bisector**, a **median**, a **perpendicular bisector**, and an **altitude** in the following diagram.



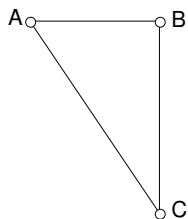
35. (3 points) Angle ABC is a right angle,  $\angle BAC = 60^\circ$ ,  $BC = 12$  What is  $m\angle BCA$ ? What is AB? What is AC?



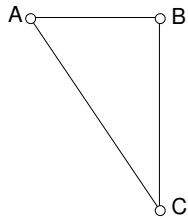
36. (3 points) Angle ABC is a right angle,  $\angle BAC = 45^\circ$ ,  $AB = 5\sqrt{2}$  What is BC? What is AC? What is  $m\angle BCA$ ?



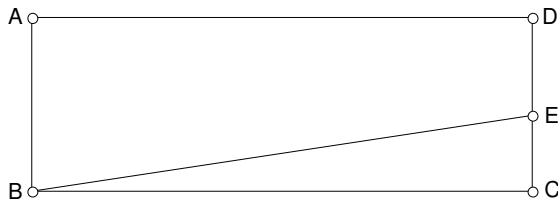
37. (3 points) Angle ABC is a right angle,  $\angle BAC = 40^\circ$ ,  $AB = 4$  What is BC? What is AC? What is  $m\angle BCA$ ?



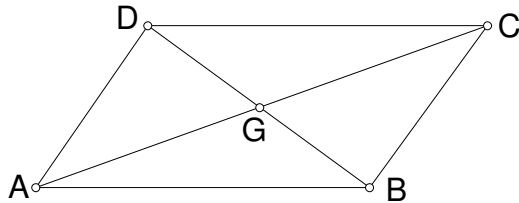
38. (3 points) Angle ABC is a right angle,  $BC = 4$ ,  $AB = 3$  What is  $\angle BAC$ ?  
 What is  $AC$ ? What is  $m\angle BCA$ ?



39. (4 points) ABCD is a rectangle.  $EC = 5$ ;  $DE = 6$ ;  $AD = 10$  What is the area of ABED?



40. (3 points) If ABCD is a parallelogram,  $DG = a$ ,  $GB = b + 2$ ,  $AG = b + 10$ , and  $GC = 2a - 8$ , then find  $a$  and  $b$ . What is  $DB$  and  $AC$ ?



Bonus (2 points possible) If you combine two isosceles triangles into a quadrilateral, what type of quadrilateral is formed? Draw the figure to support your answer.