Math 3301 Foundations of Geometry
Unit I Practice Test **Name _____**

1. Use inductive reasoning to determine the next 2 elements in the set. Explain your reasoning.

   (a) 5, 9, 13, 17, ___ , ___

   (b) 1, ½, ¼, $^{1}/_{8}$, ___ , ___

2. Determine if the conclusion follows logically from the premises for this deductive argument.

   Premise: If I go camping with my family, then it will rain.
   Premise: It is raining.
   Conclusion: I am camping with my family.

3. If 3 cats kill 3 mice in 3 minutes, how long will it take 100 cats to kill 100 mice?

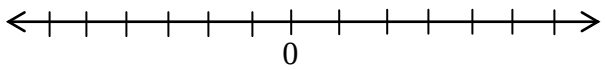
4. There are 5 white socks and 5 black socks in a drawer. How many socks must be removed without looking to be assured of having a pair that match (same color)?

5. True or False.

   (a) Exactly one line can be drawn between two distinct points.

   (b) Any three distinct points determine a unique plane.

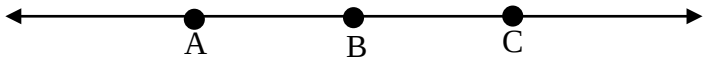
6. Plot the points associated with 3, 1.5, -3, $^{-3}/_{4}$, and $\sqrt{7}$ on a number line.



7. Give the name of the postulate illustrated by the statement:

   If x = 3 and x + 2 = 5, then 3 + 2 = 5.

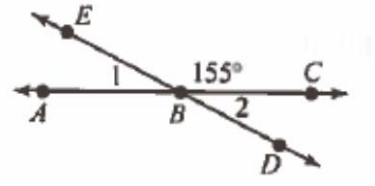
8. Refer to the following line *m*.



(a) Other than *m*, list another way to name the line. _____

(b) Find $\overrightarrow{AB} \cap \overrightarrow{CB}$. _____

9. Use the figure below to answer true or false.



(a) C is on $\overrightarrow{BA}$.

(b) <EBD is a right angle.

(c) <2 and <EBC are supplementary.

(d) $\overrightarrow{BE}$ and $\overrightarrow{EB}$ are the same.

(e) m<1 = 25˚.

(f) How many points on $\overrightarrow{AB}$ are 3 cm from A?

10. Give the converse of the statement:

If you love someone, then you will want the best for that person.

_____

11. Give the negation of the statement: The Beatles were not a British band.

_____

12. Give the inverse of the statement:

If the runner wins the race, then she must be in excellent cardiovascular shape.

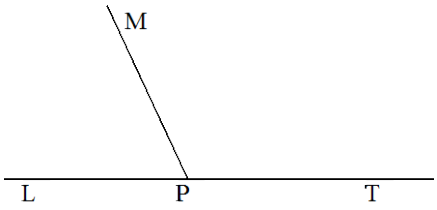
_____

13. Give the contrapositive of the statement: If I drink, then I do not drive.

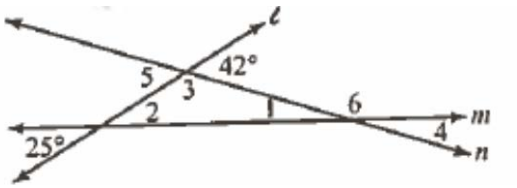
_____

14. What type of angle is <LPM? Circle the best answer.

Acute
Right
Obtuse
Straight



15. Refer to the diagram.

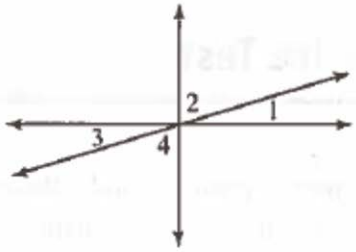


(a) What is the measure of <5? _____ (b) What is the measure of <3? _____

16. Complete the following proof.

Given: ∠1 and ∠2 are complementary
∠1 and ∠3 are vertical angles
∠2 and ∠4 are vertical angles

Prove: ∠3 and ∠4 are complementary



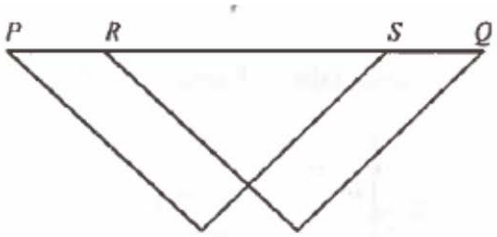
Proof _____

Statements	***Reasons***
1. ∠1 and ∠2 are complementary	1. _____
2. _____	2. Def. of comp. ∠'s
3. _____	3. Given
4. $m\angle 1 = m\angle 3$	4. _____
5. _____	5. Given
6. $m\angle 2 = m\angle 4$	6. _____
7. $m\angle 3 + m\angle 4 = 90°$	7. Substitution law
8. _____	8. Def. of comp. ∠'s

17. Complete the following proof.

Given: The figure of overlapping triangles and $PR = SQ$

Prove: $PS = RQ$



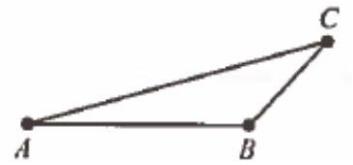
Proof _____

Statements	***Reasons***
1. $PR = SQ$	1. _____
2. $RS = RS$	2. _____
3. $PR + RS = SQ + RS$	3. _____
4. $PS = PR + RS$	4. _____
5. $RQ = SQ + RS$	5. _____
6. $PS = RQ$	6. _____

18. Draw an acute angle, and construct its bisector.

19. Draw a line segment $\overline{AB}$, and construct its perpendicular bisector.

20. Refer to ΔABC below. Assume all angles are unequal, and all sides are unequal.



(a) What are the vertices of ΔABC?

(b) What are the sides of ΔABC?

(c) Classify ΔABC using its sides.

(d) Classify ΔABC using its angles.

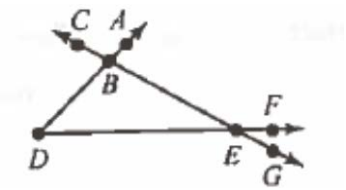
(e) What side is included by <A and <C?

(f) What angle is included by $\overline{AB}$ and $\overline{BC}$?

(g) What side is opposite <A?

(h) What angle is opposite $\overline{AB}$?

21. Refer to the figure below. Answer true or false.



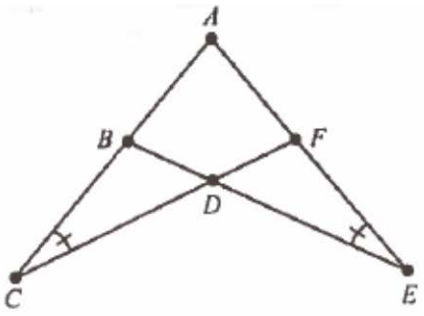
(a) <D is an interior angle of ΔBDE.

(b) <FEG is an exterior angle of ΔBDE.

22. Complete the proof.

Given: $\angle C \cong \angle E$
$\overline{AC} \cong \overline{AE}$

Prove: $\triangle ACF \cong \triangle AEB$



Exercise 18

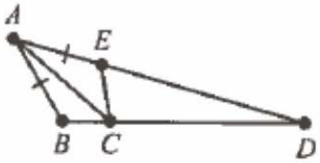
Proof

Statements	*Reasons*
1. $\angle C \cong \angle E$	1. _____
2. _____	2. Given
3. _____	3. Reflexive law
4. _____	4. ASA

23. Complete the proof.

Given: $\overline{AB} \cong \overline{AE}$
$\overline{AC}$ bisects $\angle BAD$

Prove: $\triangle ABC \cong \triangle AEC$



Exercise 19

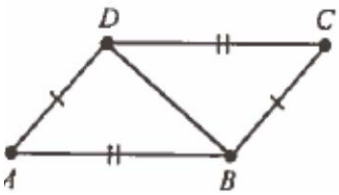
Proof

Statements	*Reasons*
1. $\overline{AB} \cong \overline{AE}$	1. _____
2. _____	2. Given
3. _____	3. Def. of $\angle$ bisector
4. $\overline{AC} \cong \overline{AC}$	4. _____
5. _____	5. SAS

24. Write a two-column or a flowchart proof.

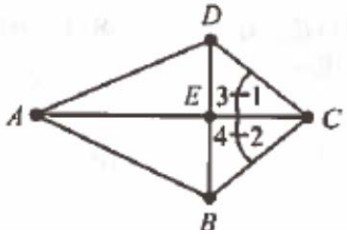
Given: $\overline{AD} \cong \overline{CB}$
$\overline{AB} \cong \overline{CD}$

Prove: $\triangle ADB \cong \triangle CBD$



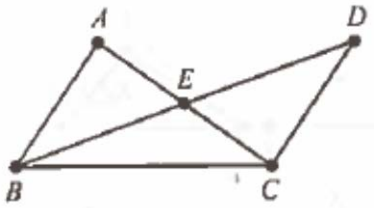
25. Write a two-column or a flowchart proof.

Given: $\overline{AC} \perp \overline{BD}$
$\angle 1 \cong \angle 2$
Prove: $\overline{AB} \cong \overline{AD}$



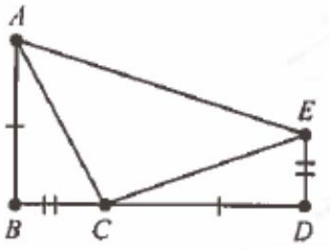
26. Write a two-column or a flowchart proof.

Given: E is the midpoint of $\overline{AC}$
E is the midpoint of $\overline{BD}$
Prove: $\overline{AB} \cong \overline{CD}$



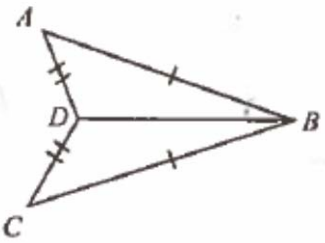
27. Write a two-column or a flowchart proof.

Given: $\overline{AB} \cong \overline{CD}$
$\overline{BC} \cong \overline{DE}$
$\angle CAE \cong \angle CEA$
Prove: $\angle B \cong \angle D$



28. Write a two-column or a flowchart proof.

Given: $\overline{AB} \cong \overline{CB}$
$\overline{AD} \cong \overline{CD}$
Prove: $\overline{BD}$ is bisector of $\angle ABC$



29. True or False.

(a) The orthocenter of a triangle is the point of concurrency where the angle bisectors intersect.

(b) The centroid will always be located inside the triangle.

(c) The altitudes of a triangle will always be in the interior of the triangle.

30. Write a two-column or a flowchart proof.

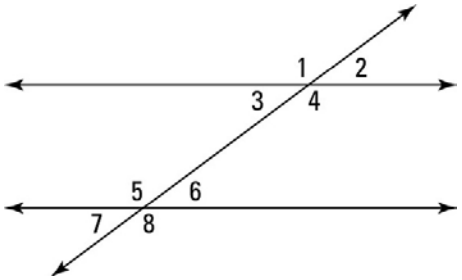
Given: $\overline{WY} \perp \overline{XZ}$
$\triangle WXY$ is isosceles $\triangle$where $\overline{WX} \cong \overline{YX}$
Prove: $\triangle WXZ \cong \triangle YXZ$

31. Draw a segment 4 cm long and an acute angle. Construct a right triangle with the 4 cm segment as the leg included between the right angle and the acute angle.

32. Draw a segment about 2 inches long and an obtuse angle. Construct an isosceles triangle with the two sides as the 2-inch segments and vertex angle as the obtuse angle.

33. If $l \perp m$, $l \perp n$, and m and n are distinct lines, is $m \parallel n$? Explain.

34. Refer to the diagram. If the two lines are parallel, list

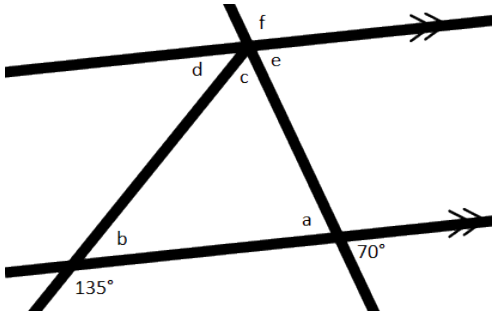


(a) 1 pair of corresponding angles. _____ & _____

(b) 1 pair of nonadjacent angles that are supplementary.

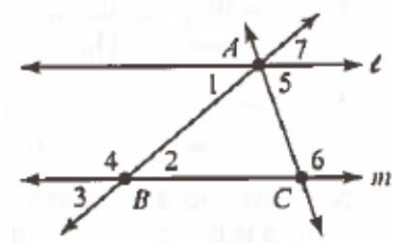
_____ & _____

35. Refer to the diagram below. Assume parallel lines.



(a) m<d = _____ (b) m<f = _____

36. Refer to the figure. Assume $l \parallel m$. Explain your reasoning.



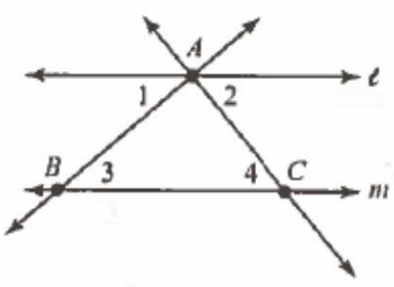
(a) Is <1 ≅ <2? (b) Is <3 ≅ <4?

(c) Give three angles that are congruent to <7.

37. Write a two-column or a flowchart proof.

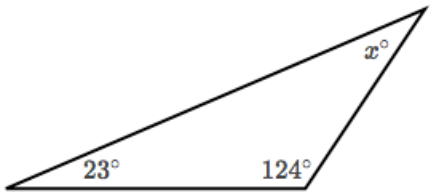
Given: $\ell \parallel m$ and $\angle 1 \cong \angle 2$

Prove: $\triangle ABC$ is isosceles

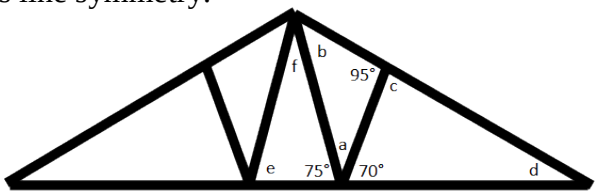


38. Fred claims that he can easily prove that the sum of the measures of the interior angles in any triangle is 180˚. He says that a right triangle is half of a rectangle. Because a rectangle has four right angles, its angles add up to 360˚, so the angles of a right triangle add up to half of 360˚, or 180˚. Next, he claims that he can divide any triangle into two right triangles and use what he proved for right triangles to prove the theorem for any triangle. Is Fred's approach correct? Explain why or why not.

39. Find the missing angle measure. m<x = _____



40. Find the missing angles in the following diagram (resembling a roof truss). Assume that the shape has line symmetry.

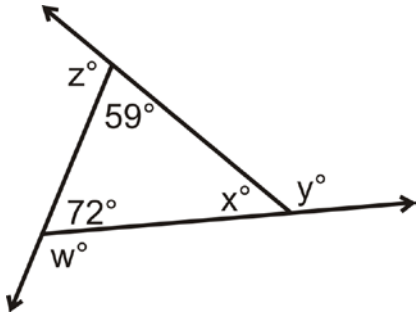


(a) m<b = _____ (b) m<e = _____ (c) m<d = _____

41. True or False.

A right triangle must have two acute angles. _____

42. Determine the missing angles.



(a) m(<y) = _____ (b) m(<z) = _____

43. If ΔABC is a right triangle and $m(<A) = 41^\circ$, what is the measure of the other acute angle.

44. In a certain triangle, the measure of one angle is twice the measure of the smallest angle. Another angle is 6 degrees less than the largest angle. Find the measures of all three angles in the triangle.

45. In general, a polygon with 7 sides is called a(n) _____ .

46. What is the measure of each angle in a regular hexagon?

47. What is the sum of the measures of the exterior angle of a hexagon?

48. Give the number of sides of a regular polygon if the sum of its interior angles is 3600°.

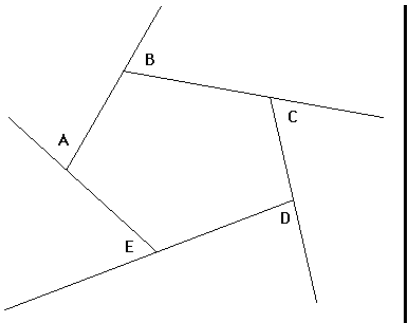
49. In each of the following figures, determine the number of sides of a regular polygon with the stated property. If such a regular polygon does not exist, explain why.

(a) Each exterior angle measures 40°. (b) The sum of all the interior angles is 720°.

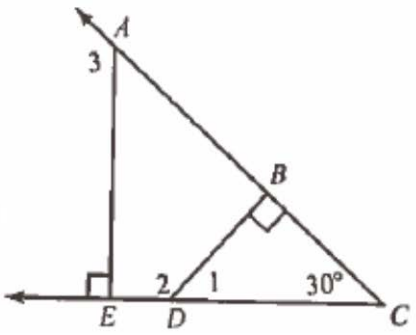
50. For a convex pentagon, find the <u>sum</u> of the measures of the

(a) Interior angles.

(b) Exterior angles, one from each vertex (as shown).

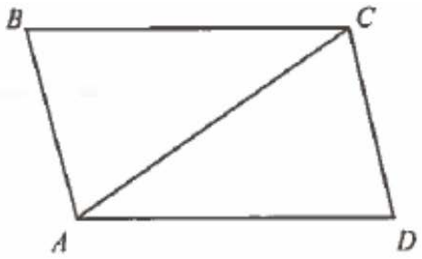


51. *Given:* $\overline{AE} \perp \overline{ED}, \overline{DB} \perp \overline{AC}, m\angle C = 30°$
Find: the measures of the numbered angles.



52. Determine what additional "given" information is missing to prove the triangles congruent using only the theorem stated.

(a) *Given:* $\overline{BC} \parallel \overline{AD}$
Prove: $\triangle ADC \cong \triangle CBA$ by AAS



(b) *Given:* $\overline{AB} \perp \overline{BC}, \overline{CD} \perp \overline{BC}$
Prove: $\triangle ABC \cong \triangle DCB$ by LL