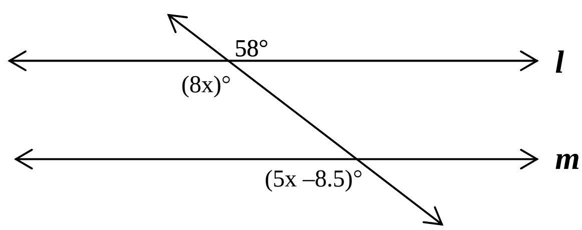
Math 120 Review Questions Chapters 2 and 3

1. State whether the statements are always true (A), sometimes true (S), or never true (N).
   a. Two parallel lines are coplanar.
   b. The measure of an exterior angle of a triangle is greater than the measure of any interior angle.
   c. Two isosceles triangles with congruent bases are congruent.
   d. All diagonals of a regular pentagon are congruent.
   e. If the number of sides of a polygon is doubled, then the sum of the exterior angles is doubled.
   f. If two lines are cut by a transversal, then the alternate interior angles are congruent.
   g. When there is a transversal of two lines, the three lines are coplanar.
   h. An equilateral triangle is a right triangle.
   i. Two lines that have no point in common are parallel.
   j. If the measure of one angle of a triangle is greater than the measure of a second angle, then the side opposite the larger angle is longer than the side opposite the smaller angle.

2. Complete the following table for a regular polygon.

Number of sides	Number of diagonals	Measure of each interior angle	Measure of each exterior angle
6			
	20		
		144°	
			72°

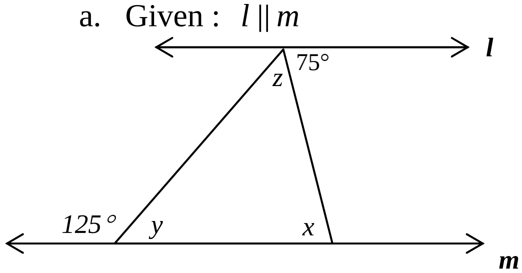
3. Given:



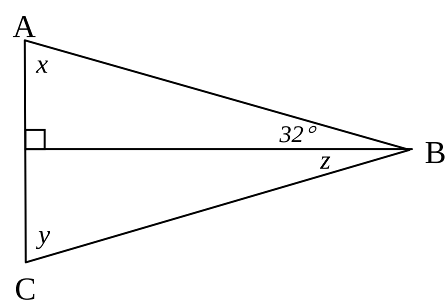
Find x. Are ***l*** and ***m*** parallel? Why or why not?

4. Find x, y, and z.

   a. Given : $l \parallel m$

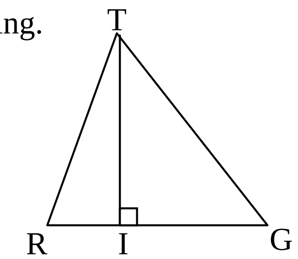


   b. Given: ΔABC with $\overline{AB} \cong \overline{BC}$



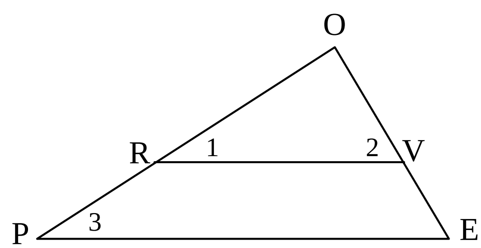
5. Construct using compass and straight edge:
   a. The three medians of a scalene triangle.
   b. The three altitudes of an isosceles triangle.
   c. The three perpendicular bisectors of a right triangle.

6. Prove by using the indirect method of proving.
   a. Given: $\overline{TI} \perp \overline{RG}$, $\overline{TR} \not\cong \overline{TG}$
      Prove: $\overrightarrow{TI}$ does not bisect $\angle RTG$
      (This proves that an altitude of a scalene triangle is not an angle bisector.)

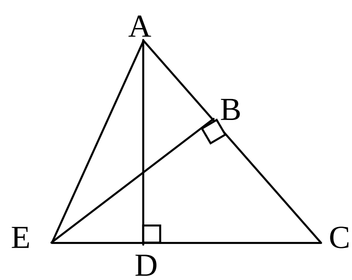


   b. The perpendicular bisector of a line segment is unique.

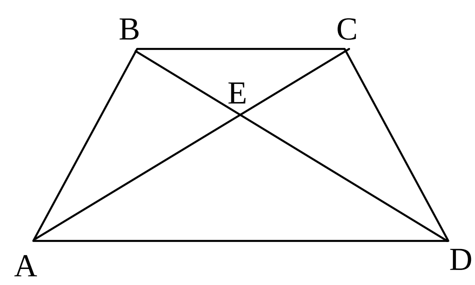
7. Given: $\angle 1$ is complementary to $\angle 2$
   $\angle 2$ is complementary to $\angle 3$
   Prove: $\overline{RV} \parallel \overline{PE}$



8. Given: $\overline{BE}$ is altitude to $\overline{AC}$
   $\overline{AD}$ is altitude to $\overline{CE}$
   $\overline{BC} \cong \overline{CD}$
   Prove: $\overline{BE} \cong \overline{AD}$



9. Given: $\overline{AB} \cong \overline{CD}$, $\angle BAD \cong \angle CDA$
   Prove: ΔAED is isosceles



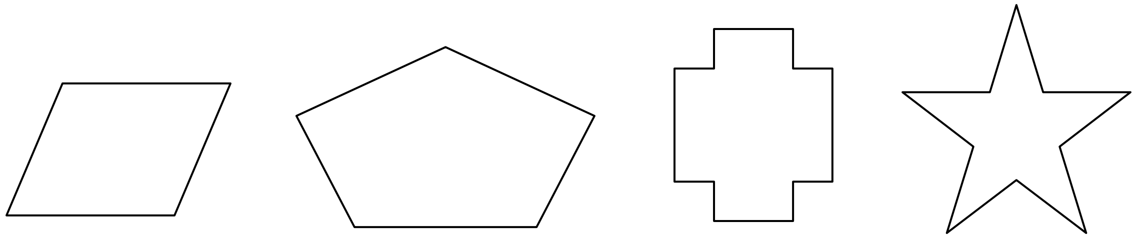
10. Provide a drawing, given, prove and two-column proof for the given statement: "The median to the base of an isosceles triangle is the altitude to the base of the triangle."

11. Given the following letters:

N A M E Z Y O U T H

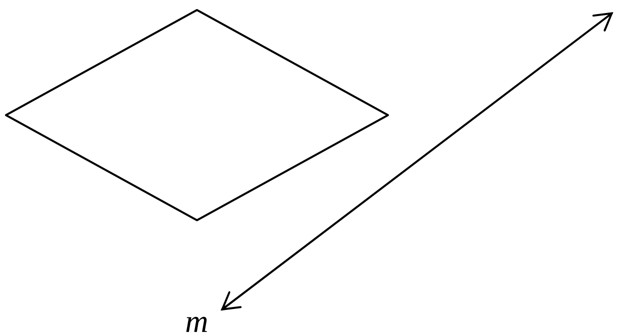
a. Which letters have symmetry with respect to a line?
b. Which letters have symmetry with respect to a point?

12.



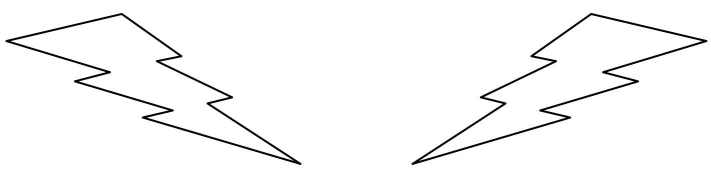
a. Which geometric figures have symmetry with respect to a line?
b. Which geometric figures have symmetry with respect to a point?

13. Complete the figure so that it reflects across line *m*.



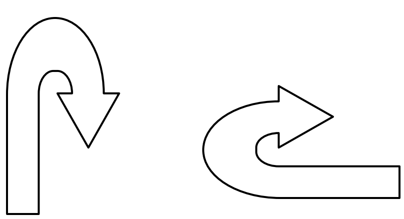
14. Which type of transformation (slide, reflection, rotation) is illustrated?

a.



b.

c.



Answer Key:

1. a. A b. S c. S d. A e. N f. S g. A h. N i. S j. A

2. Completed Table:

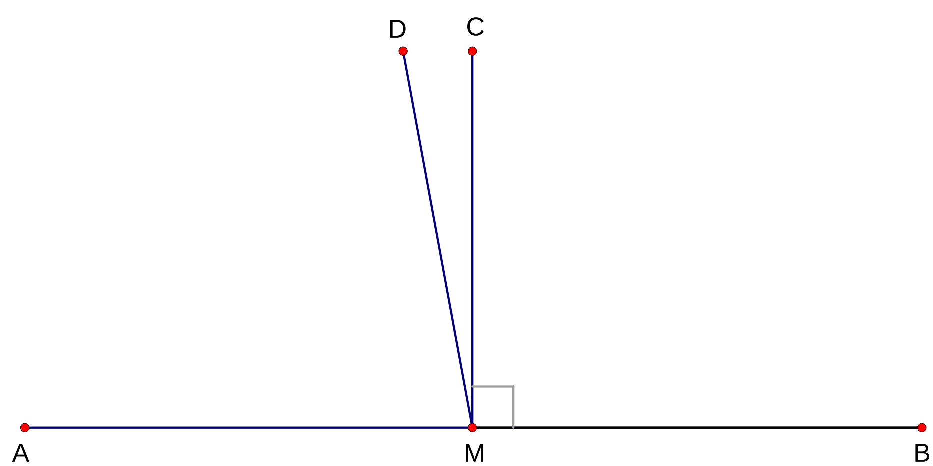
No. of sides	Number of diagonals	Measure of each interior angle	Measure of each exterior angle
(6)	9	120°	60°
8	(20)	135°	45°
10	35	(144°)	36°
5	5	108°	(72°)

3. $x = 7.25$; l and m are not parallel because the corresponding angles are not $\cong$.

4. a. $x = 75^\circ$, $y = 55^\circ$, $z = 50^\circ$
   b. $x = 58^\circ$, $y = 58^\circ$, $z = 32^\circ$

5. Constructions will be discussed in class.

6. a. Proof by indirect method:
   1) Suppose $\overline{TI}$ does bisect $\measuredangle RTG$
   2) Then $\measuredangle RTI \cong \measuredangle GTI$ . . . Definition of angle bisector
      $\overline{TI} \perp \overline{RG}$ . . . Given
      $\measuredangle RIT \cong \measuredangle GIT$ . . . Definition of $\perp$ lines.
      $\overline{TI} \cong \overline{TI}$ . . . Identity
      $\Delta RIT \cong \Delta GIT$ . . . ASA
      $\overline{TR} \cong \overline{TG}$ . . . CPCTC
      This contradicts the given that $\overline{TR}$ is not $\cong$ to $\overline{TG}$.
   3) Supposition must be false. Therefore, $\overline{TI}$ does not bisect $\measuredangle RTG$.



b. Given: $\overline{CM} \perp \overline{AB}$, M midpoint of $\overline{AB}$

Prove: $\overline{CM}$ is the only $\perp$ bisector of $\overline{AB}$

Proof by indirect method:

1) Suppose that $\overline{DM}$ is another $\perp$ bisector of $\overline{AB}$.
2) $\overline{CM} \perp \overline{AB}$, M midpoint of $\overline{AB}$ . . . Given
   $\overline{DM} \perp \overline{AB}$ . . . Definition of $\perp$ bisector
   $\measuredangle BMC$ and $\measuredangle BMD$ are right $\measuredangle s$ . . . $\perp$ lines form right $\measuredangle s$
   $m\measuredangle BMC = 90^\circ$, $m\measuredangle BMD = 90^\circ$ . . . Def of right $\measuredangle s$
   $m\measuredangle BMC + m\measuredangle CMD = m\measuredangle BMD$ . . . Angle Addition Postulate
   $90^\circ + m\measuredangle CMD = 90^\circ$ . . . Substitution
   $m\measuredangle CMD = 0^\circ$ . . . Subtraction Property
   This contradicts the Protractor Postulate.
3) Supposition is false. Therefore $\overline{CM}$ is the only $\perp$ bisector of $\overline{AB}$

7. Proof:

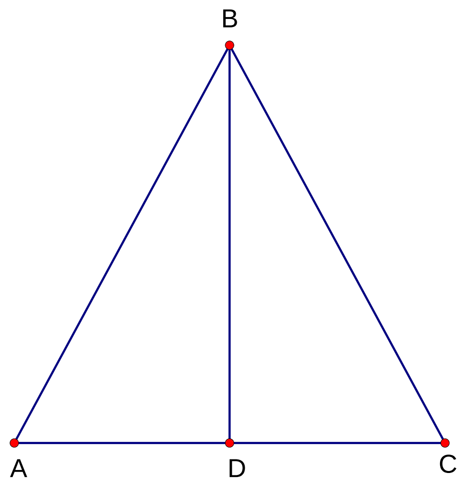
STATEMENTS	REASONS
1. $\measuredangle 1$ complementary to $\measuredangle 2$, $\measuredangle 2$ complementary to $\measuredangle 3$	1. Given
2. $\measuredangle 1 \cong \measuredangle 3$	2. Two $\measuredangle s$ complementary to the same angle are congruent.
3. $\overline{RV} \parallel \overline{PE}$	3. ITLACBAT so that corresponding $\measuredangle s$ are $\cong$, then the lines are parallel.

8. Proof:

STATEMENTS	REASONS
1. $\overline{BE}$ is altitude to $\overline{AC}$, $\overline{AD}$ is altitude to $\overline{CE}$, $\overline{BC} \cong \overline{CD}$	1. Given
2. $\overline{BE} \perp \overline{AC}$, $\overline{AD} \perp \overline{CE}$	2. Definition of altitudes
3. $\measuredangle ADC$ and $\measuredangle EBC$ are right $\measuredangle s$	3. $\perp$ lines form right angles
4. $\measuredangle ADC \cong \measuredangle EBC$	4. All right angles are congruent
5. $\measuredangle C \cong \measuredangle C$	5. Identity
6. $\Delta ADC \cong \Delta EBC$	6. ASA
7. $\overline{BE} \cong \overline{AD}$	7. CPCTC

9. Proof:

STATEMENTS	REASONS
1. $\overline{AB} \cong \overline{CD}$, $\angle BAD \cong \angle CDA$	1. Given
2. $\overline{AD} \cong \overline{AD}$	2. Identity
3. $\Delta BAD \cong \Delta CDA$	3. SAS
4. $\measuredangle BDA \cong \measuredangle CAD$	4. CPCTC
5. $\overline{AE} \cong \overline{DE}$	5. If 2 $\measuredangle s$ of a Δ are $\cong$, then the sides opposite the $\cong \measuredangle s$ are $\cong$
6. ΔAED is isosceles	6. Definition of isosceles triangle



10. Given: $\overline{AB} \cong \overline{CB}$, D midpoint of $\overline{AC}$

Prove: $\overline{BD} \perp \overline{AC}$

Proof:

STATEMENTS	REASONS
1. $\overline{AB} \cong \overline{CB}$, D midpoint of $\overline{AC}$	1. Given
2. $\overline{AD} \cong \overline{DC}$	2. Definition of midpoint
3. $\overline{BD} \cong \overline{BD}$	3. Identity
4. $\Delta ABD \cong \Delta CBD$	4. SSS
5. $\measuredangle ADB \cong \measuredangle CDB$	5. CPCTC
6. $\overline{BD} \perp \overline{AC}$	6. Definition of perpendicular lines.

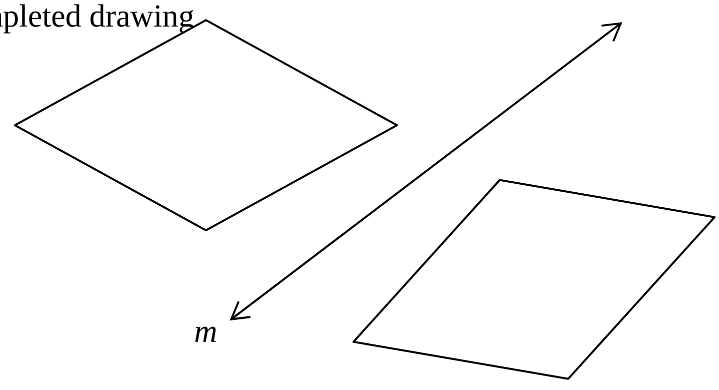
11. a. A M E Y O U T H

b. N Z O H

12. a. pentagon, cross, star

b. parallelogram, cross

13. Completed drawing



14. a. reflection b. slide c. rotation