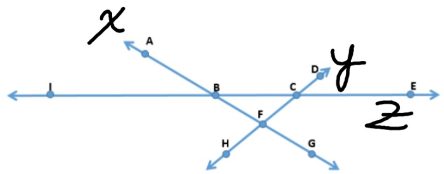
1. Points that are on the same line are also called collinear.
2. A line is a series of points that extends in opposite directions without end.
3. Two lines are skew if they are noncoplanar and do not intersect.
4. A ray is the part of a line consisting of one endpoint and all points in one direction.

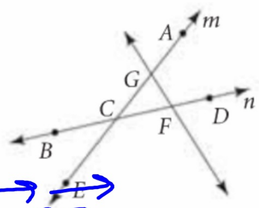
Use the figure at the right to answer questions 5-7.



5. Name line *x* in 3 other ways.
   i) $\overleftrightarrow{AB}$
   ii) $\overleftrightarrow{BA}$
   iii) $\overleftrightarrow{BF}$
6. Line *y* and line *z* intersect at point C.
7. Are the following points collinear? (Yes or No) If yes, name the line on which they lie.

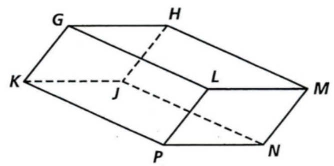
a.) A, B, G yes line x   b.) A, B, C NO

Use the figure at the right to answer questions 8-10. Be sure to use proper symbols!



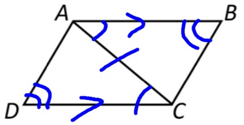
8. Name line *m* two other ways. $\overleftrightarrow{AE}$ $\overleftrightarrow{EA}$
9. Name two line segments. $\overline{CF}$ $\overline{CG}$
10. Name a pair of opposite rays. $\overrightarrow{FB}$ $\overrightarrow{FD}$ $\overrightarrow{CB}$ $\overrightarrow{CD}$

Use the figure at the right to answer questions 11-14.



11. Plane JKPN and Plane GHJK intersect at $\overline{JK}$.
12. Plane HML and Plane PNL intersect at $\overline{LM}$.
13. L, P, K, and G are coplanar.
14. Plane KJH and Plane LMH intersect at $\overline{GH}$.

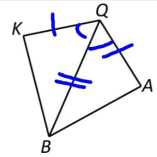
1. Fill in the missing statements and reasons.



Given: $AB \parallel DC$, $\angle B \cong \angle D$
Prove: $BC \cong DA$

Statements	Reasons
1. $AB \parallel DC$	1. Given
2. $\angle BAC \cong \angle DCA$	2. Alt int $\angle$s
3. $\angle B \cong \angle D$	3. Given
4. $AC \cong AC$	4. Refl
5. $\Delta ABC \cong \Delta CDA$	5. AAS Congruence ~~Theorem~~ post
6. $BC \cong DA$	6. CPCTC

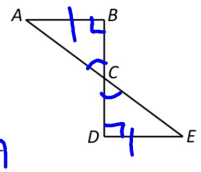
2. Complete the two-column proof.



Given: $QK \cong QA$, QB bisects $\angle KQA$
Prove: $KB \cong AB$

Statements	Reasons
1. $QK \cong QA$	1. Given
2. QB bisects $\angle KQA$	2. Given
3. $\angle KQB \cong \angle AQB$	3. Definition of Bisector
4. $BQ \cong BQ$	4. Reflexive Property of Congruence
5. $\Delta KBQ \cong \Delta ABQ$	5. SAS Congruence Postulate
6. $KB \cong AB$	6. CPCTC

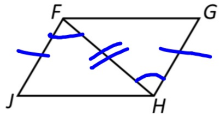
3. Fill in the missing statements and reasons.



Given: $BD \perp AB$, $BD \perp DE$, $AB \cong DE$
Prove: $\angle A \cong \angle E$

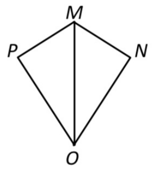
Statements	Reasons
1. $BD \perp AB$ $BD \perp DE$	1. Given
2. $\angle B$ & $\angle D$ are right angles	2. Definition of $\perp$
3. $\angle B \cong \angle D$	3. All rt angles are congruent
4. $\angle BCA \cong \angle ECD$	4. vertical $\angle$s
5. $AB \cong DE$	5. Given
6. $\Delta ABC \cong \Delta EDC$	6. AAS Congruence post
7. $\angle A \cong \angle E$	7. CPCTC

4. Complete the two-column proof.



Given: $FJ \cong GH$, $\angle JFH \cong \angle GHF$
Prove: $FG \cong JH$

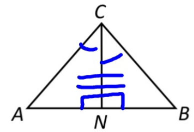
Statements	Reasons
1. $FJ \cong GH$	1. Given
2. $\angle JFH \cong \angle GHF$	2. Given
3. $FH \cong HF$	3. Refl.
4. $\Delta JFH \cong \Delta GHF$	4. SAS Congruence post.
5. $FG \cong JH$	5. CPCTC



5. Fill in the missing statements and reasons.

Given: $MN \cong MP$, $MP \perp PO$, $MN \perp NO$
Prove: $\angle NOM \cong \angle POM$

Statements	Reasons
1. $MP \perp PO$, $MN \perp NO$	1.
2.	2. Definition of Perpendicular
3.	3. Definition of Right Triangle
4.	4. Given
5.	5.
6. Δ ______ $\cong \Delta$ ______	6. ______ Congruence ______
7.	7.



6. Complete the two-column proof.

Given: $CN \perp AB$, CN bisects $\angle ACB$
Prove: ΔABC is an isosceles triangle

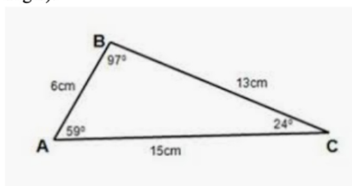
Statements	Reasons
1. $CN \perp AB$	1. Given
2. $\angle ANC$ & $\angle BNC$ are right angles	2. Definition of $\perp$
3. $\angle ANC \cong \angle BNC$	3. All right angles are $\cong$
4. CN bisects $\angle ACB$	4. Given
5. $\angle ACN \cong \angle BCN$	5. Definition of $\angle$ bisector
6. $CN \cong CN$	6. Ref.
7. $\Delta ANC \cong \Delta BNC$	7. ASA Congruence Postulate
8. $AC \cong BC$	8. CPCTC
9. ΔABC is isos. Δ	9. Definition of isos. Triangle

H. Geometry **Topic 10: The Hinge Theorem**

The Hinge Theorem is a theorem about how the sides and angles of a triangle are related.

The Hinge Theorem:
In a triangle, the smallest angle is opposite the smallest side,
the medium angle is opposite the medium side,
and the largest angle is opposite the largest side.

Example 1: In ΔABC below, $\angle C$ is the smallest angle, $\angle A$ is the medium angle, and $\angle B$ is the largest angle. Notice the side lengths. $\overline{AB}$ is the shortest side and it is opposite $\angle C$ (the smallest angle). $\overline{BC}$ is the medium side and it is opposite $\angle A$ (the medium angle). And $\overline{AC}$ is the longest side and it is opposite $\angle B$ (the largest angle).

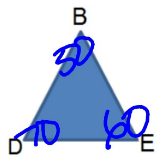


We use the Hinge Theorem to put side lengths and angles in order from smallest to largest, even if we don't know their actual lengths or angle measures. It often helps to draw a triangle if one is not given to you.

Example 2: In ΔDEB, $\angle D = 70°$, $\angle B = 50°$, and $\angle E = 60°$. Put the sides of the triangle in order from shortest to longest.

Solution: Since $\angle B$ is the smallest angle, the side opposite it will be the shortest side.
Since $\angle E$ is the medium angle, the side opposite it will be the medium side.
Since $\angle D$ is the largest angle, the side opposite it will be the largest side.

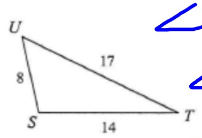
Let's draw and label a triangle to help us see the sides.



The smallest side is DE
The medium side is DB
The largest side is BE

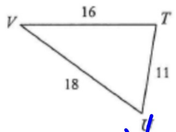
Order the angles in each triangle from smallest to largest.

9)



$\angle T$
$\angle U$
$\angle S$

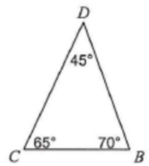
10)



$\angle V$
$\angle U$
$\angle T$

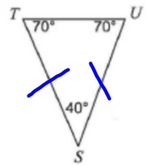
Order the sides of each triangle from shortest to longest.

15)



BC, DB, CD

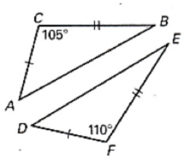
16)



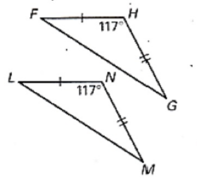
TU
TS US are =

Complete with <, >, or = .

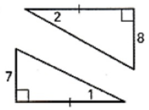
1. $AB < DE$



2. $FG = LM$



3. $m\angle 1$ ____ $m\angle 2$



4. $m\angle 1$ ____ $m\angle 2$