2.5

Proofs About Angle Pairs and Segments (Day 1)

Name _____ Date _____

Properties of Algebra

Directions: Use A–K to name the property demonstrated by the exercises.

A. Associative Property
B. Commutative Property
C. Distributive Property
D. Reflexive Property
E. Symmetric Property
F. Transitive Property
G. Substitution Property
H. Addition Property of Equality
I. Subtraction Property of Equality
J. Multiplication Property of Equality
K. Division Property of Equality

1. $6x^2 + x = x(6x + 1)$

_____

2. $(m\angle 1 + m\angle 2) + m\angle 3 = m\angle 1 + (m\angle 2 + m\angle 3)$

_____

3. $(m\angle 1 + m\angle 2) + m\angle 3 = (m\angle 2 + m\angle 1) + m\angle 3$

_____

4. If $AB + BC = AC$, then $BC + AB = AC$

_____

5. $2(AB)(MN) = (AB)(2)(MN)$

_____

6. If $m\angle A = m\angle B$ and $m\angle B = 35°$, then $m\angle A = 35°$

_____

7. If $AB + BC = AC$, then $AC = AB + BC$

_____

8. If $m\angle P - m\angle T = 75°$ and $m\angle P = 115°$, then $115° - m\angle T = 75°$

_____

9. $BD = BD$

_____

10. If $PQ + QR = MN$ and $MN = ST + UV$, then $PQ + QR = ST + UV$

_____

11. If $AB + BC = AC$ and $BC = 15$ cm, then $AB + 15 = AC$

_____

12. $m\angle ABC = m\angle ABC$

_____

13. $AB + BC = PQ$, therefore $AB = PQ - BC$

_____

14. $m\angle A = m\angle B$, therefore $m\angle A + 90° = m\angle B + 90°$

_____

15. $2(PQ) = 16$ m, therefore $PQ = 8$ m

_____

16. $m\angle P = \frac{1}{2}m\angle Q$, therefore $2m\angle P = m\angle Q$

_____

17. If $m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 = 360°$, and $m\angle 2 + m\angle 3 = 180°$, then $m\angle 1 + m\angle 4 = 180°$

_____

18. If $m\angle P - 86° = 150°$, then $m\angle P = 236°$.

_____

Inductive Reasoning

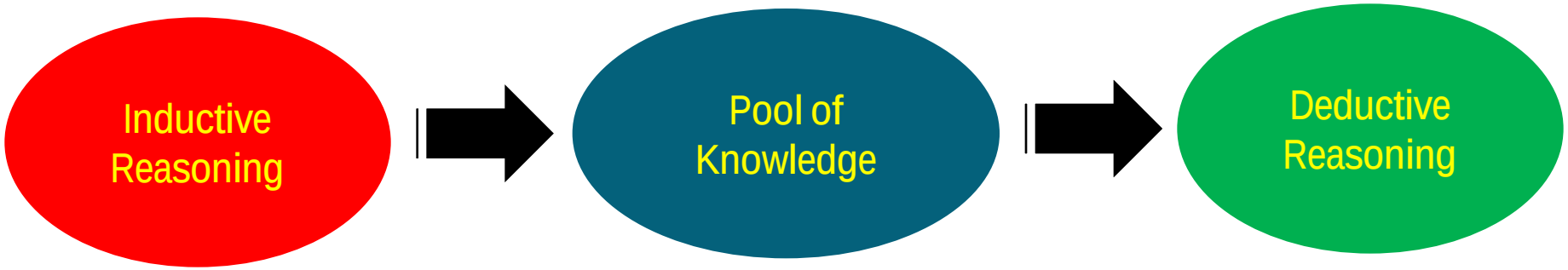
1) Observe

2) Find a pattern

3) Make a conjecture

Deductive Reasoning

When you make a conclusion from things that you previously know and accept as true.

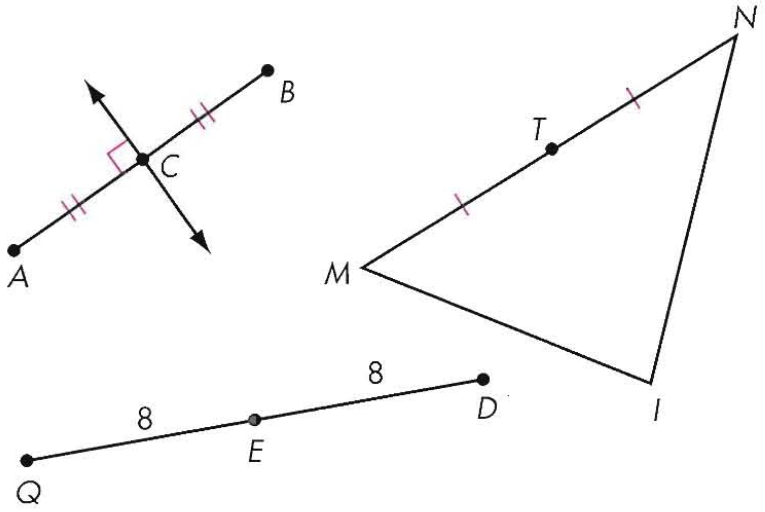

Inductive Reasoning
Pool of Knowledge
Deductive Reasoning

Have we done inductive reasoning already?

-Observe
-Find a Pattern
-Make a Conjecture

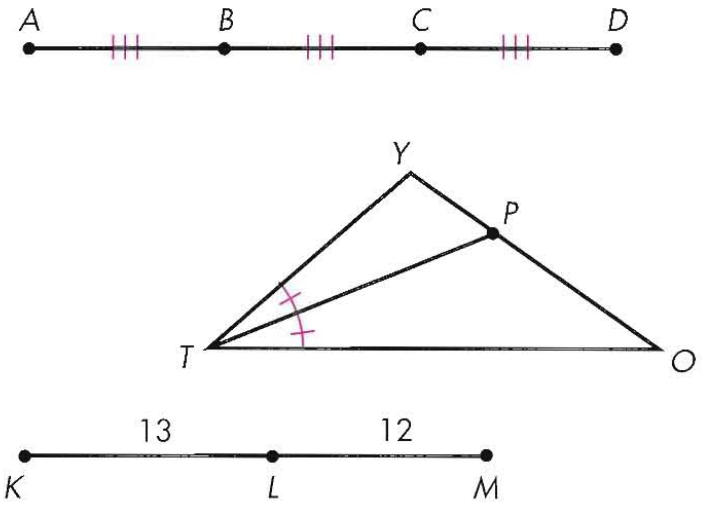
4. Define *midpoint of a segment.*

Midpoints of segments



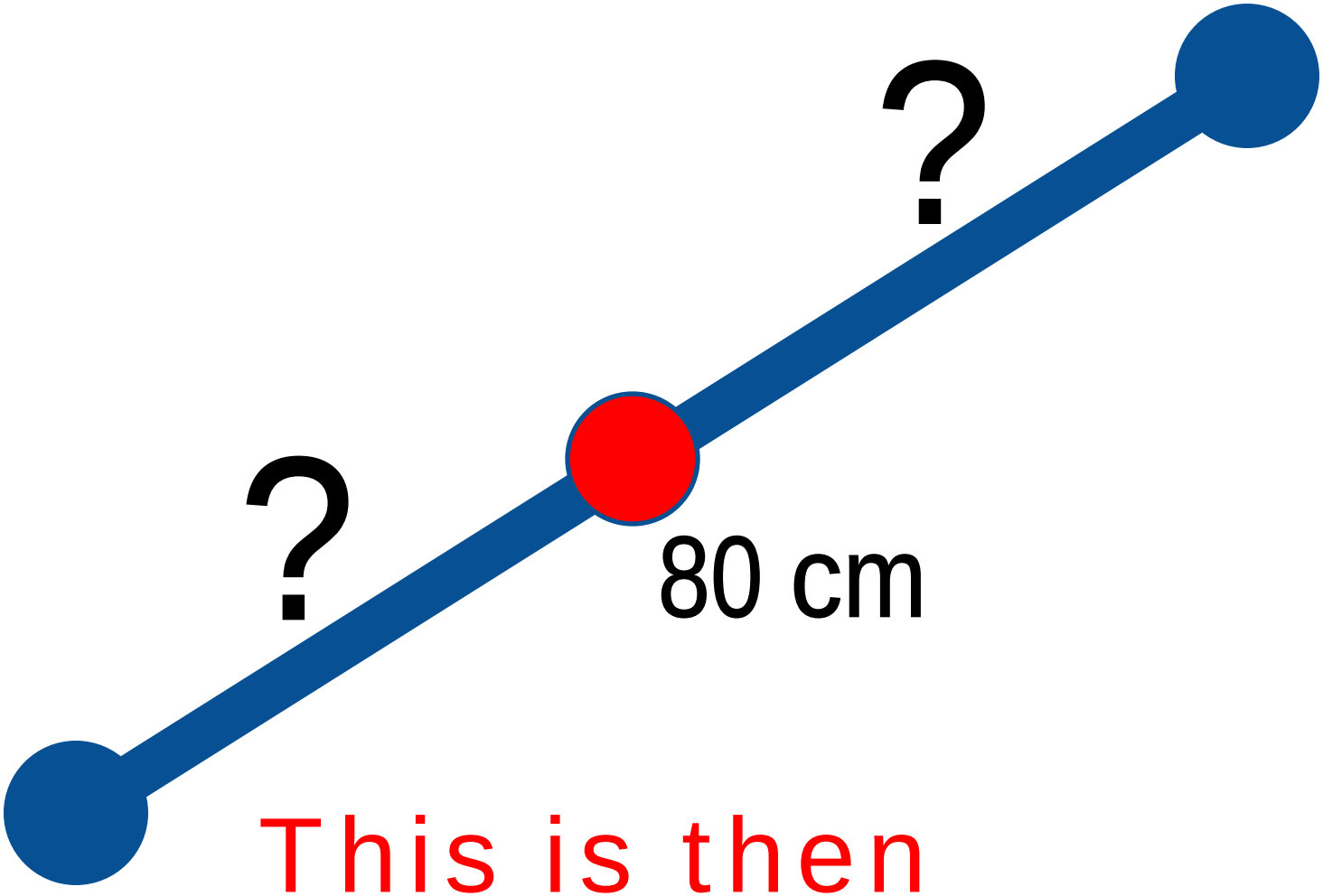
Point C is a midpoint of segment AB.
Point T is a midpoint of segment MN.
Point E is a midpoint of segment QD.

Not midpoints of segments



Points B and C are not midpoints of segment AD.
Point P is not a midpoint of segment OY.
Point L is not a midpoint of segment KM.

Now What?



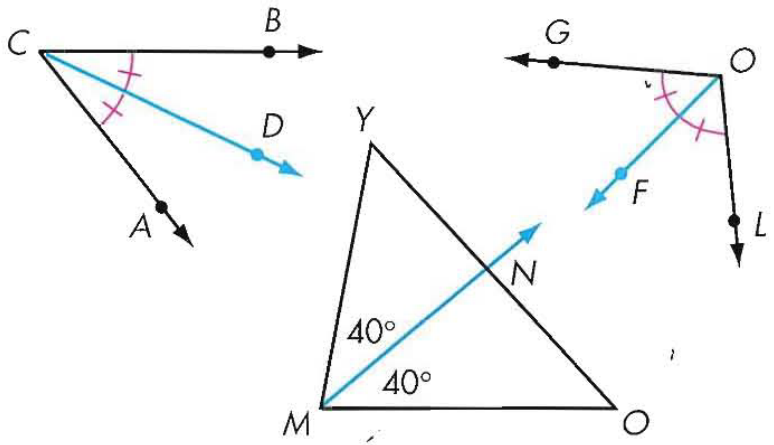
This is then deductive reasoning

Have we done inductive reasoning already?

-Observe
-Find a Pattern
-Make a Conjecture

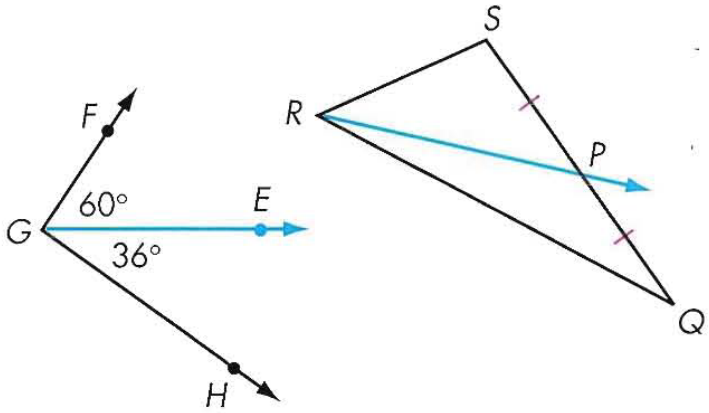
5. Define *angle bisector.*

Angle bisectors



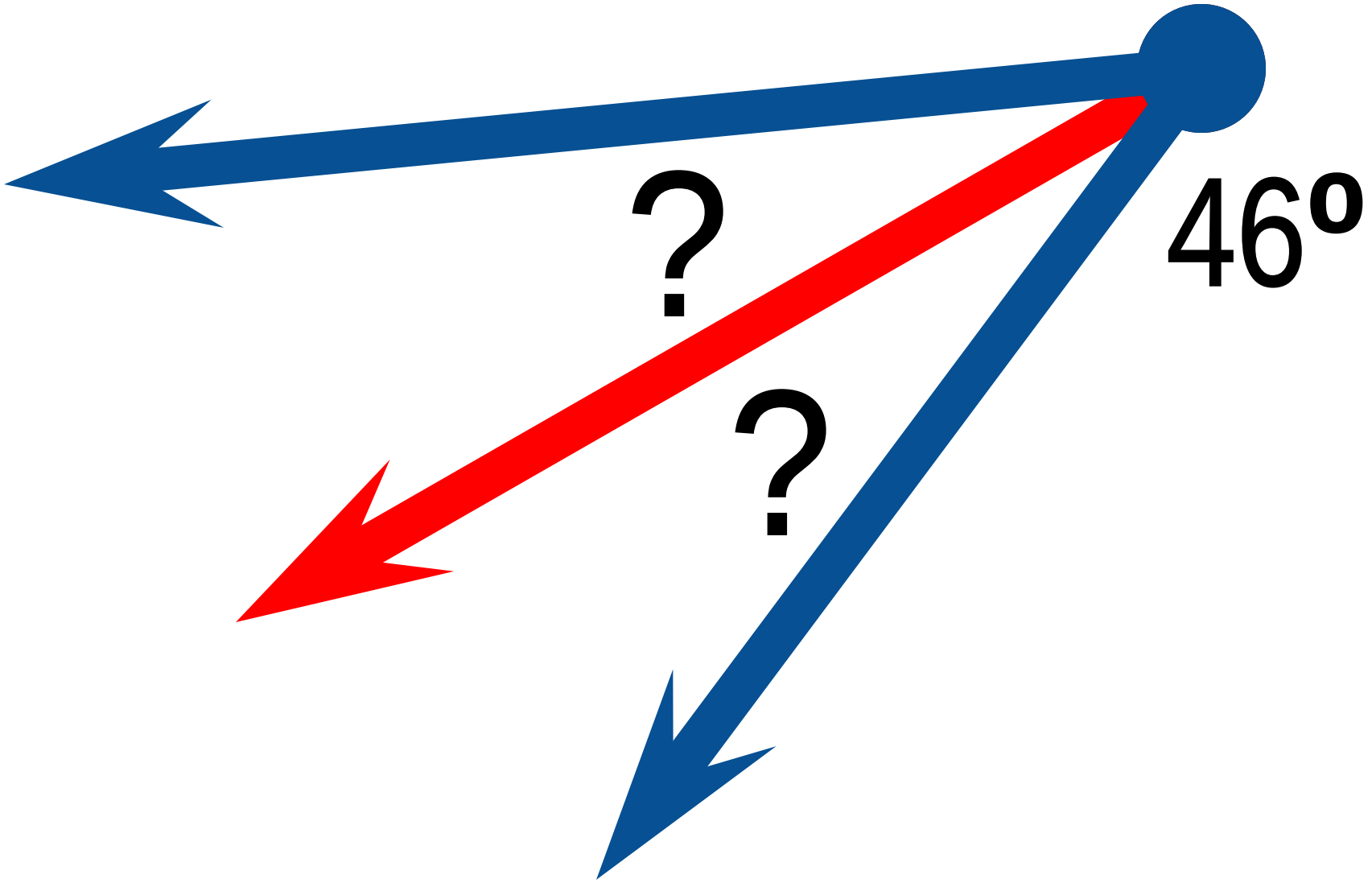
Ray *CD*, ray *OF*, and ray *MN* are angle bisectors.

Not angle bisectors



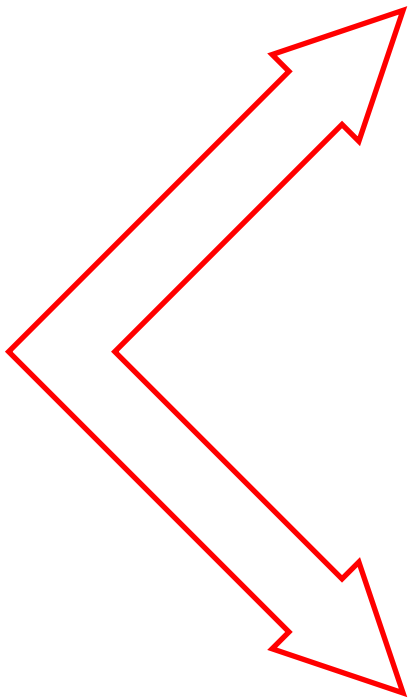
Ray *GE* and ray *RP* are not angle bisectors.

Now What?



Types of Knowledge (Conclusions)

Conjectures



Postulates

Conjectures _____

_____

_____

Theorems

Conjectures _____

_____

_____

Geometry Pool of Knowledge

Def. of Congruency	If objects are congruent, then the objects are equal in measure.
Def. of a Midpoint	If a point is a midpoint, then it divides a segment into two congruent parts.
Def. of an Angle Bisector	If a ray is an angle bisector, then it divides and angle into two congruent smaller angles
Def. of a Right Angle	If an angle is a right angle, then it has a measure of 90 degrees.
Def. of Complementary Angles	If two angles are complementary, then their sum is 90 degrees
Def. of Supplementary Angles	If two angles are supplementary, then their sum is 180 degrees.
Def. of Linear Pair	If two angles lie on a line and are adjacent, then they are a linear pair.
Segment Addition Postulate	If C lies on $\overline{AB}$, then $AC + CB = AB$.
Angle Addition Postulate	If D lies within $\angle ABC$, then $m\angle ABD + m\angle DBC = m\angle ABC$.
Commutative Property	
Associative Property	
Distributive Property	
Substitution Property	
Reflexive Property	
Symmetric Property	
Addition Property of Equality	
Subtraction Property of Equality	
Multiplication Property of Equality	
Division Property of Equality	

Use the properties to copy and complete the statements

1) Reflexive Property of Congruence _____ $\cong \overline{SE}$

2) Symmetric Property of Congruence If _____ $\cong$ _____, then $\angle RST \cong \angle JKL$

3) Transitive Property of Congruence If $\angle F \cong \angle J$ and _____ $\cong$ _____, then $\angle F \cong \angle L$

Name the property illustrated by the statement

4) If $\overline{DG} \cong \overline{CT}$, then $\overline{CT} \cong \overline{DG}$ _____

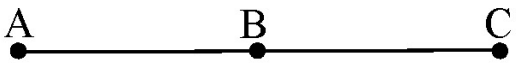
5) $\angle VWX \cong \angle VWX$ _____

6) If $\overline{JK} \cong \overline{MN}$ and $\overline{MN} \cong \overline{XY}$, then $\overline{JK} \cong \overline{XY}$ _____

Complete each proof by supplying the missing reasons and statements.

Given: $AC = AB + AB$

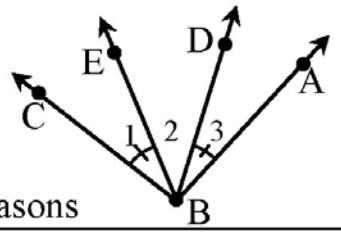
Prove: $AB = BC$



Statement	Reasons
1. $AC = AB + AB$	_____
2. $AB + BC = AC$	_____
3. $AB + AB = AB + BC$	_____
4. $\therefore AB = BC$	_____

Given: $m\angle 1 = m\angle 3$

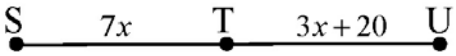
Prove: $m\angle EBA = m\angle CBD$



Statement	Reasons
1. $m\angle 1 = m\angle 3$	
2. $m\angle EBA = m\angle 2 + m\angle 3$	
3. $m\angle EBA = m\angle 2 + m\angle 1$	
4. $m\angle EBA = m\angle 1 + m\angle 2$	
5. $m\angle 1 + m\angle 2 = m\angle CBD$	
6. $\therefore m\angle EBA = m\angle CBD$	

Given: T is the midpoint of $\overline{SU}$

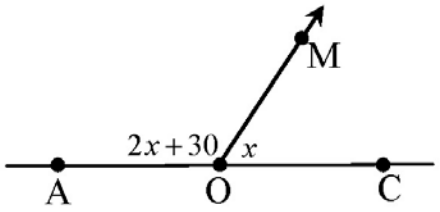
Prove: $x = 5$



Statement	Reasons
1. T is the midpoint of $\overline{SU}$	_____
2. $\overline{ST} \cong \overline{TU}$	_____
3. $ST = TU$	_____
4. $7x = 3x + 20$	_____
5. _____	_____
6. $\therefore$ _____	_____

Given: $\angle AOM$ & $\angle MOC$ are supplementary.

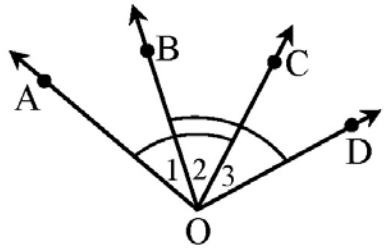
Prove: $x = 50$



Statement	Reasons
1. $\angle AOM$ & $\angle MOC$ are supplementary	_____
2. $m\angle AOM + m\angle MOC = 180$	_____
3. $(2x + 30) + x = 180$	_____
4. _____	_____
5. _____	_____
6. $\therefore$ _____	_____

Given: $m\angle AOC = m\angle BOD$

Prove: $m\angle 1 = m\angle 3$



Statement	Reasons
1. $m\angle AOC = m\angle BOD$	_____
2. $m\angle AOC = m\angle 1 + m\angle 2$; $m\angle BOD = m\angle 2 + m\angle 3$	_____
3. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	_____
4. $m\angle 2 = m\angle 2$	_____
5. $\therefore m\angle 1 = m\angle 3$	_____