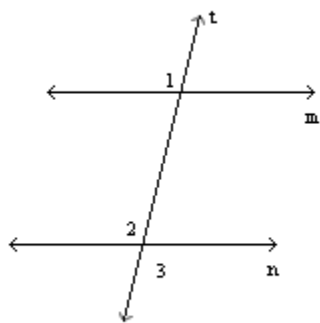


***Elementary Geometry for College Students 7th edition***  
***Alexander Test Bank***

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## Chapter 02: Proof Problems



1. Supply missing *reasons* for this proof.

Given:  $m \parallel n$

Prove:  $\angle 1 \cong \angle 3$

S1.  $m \parallel n$  R1.

S2.  $\angle 1 \cong \angle 2$  R2.

S3.  $\angle 2 \cong \angle 3$  R3.

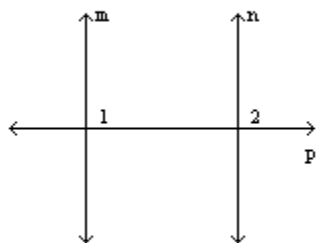
S4.  $\angle 1 \cong \angle 3$  R4.

ANSWER: R1. Given

R2. If 2 parallel line are cut by a transversal, then corresponding angles are congruent.

R3. If two lines intersect, the vertical angles formed are congruent.

R4. Transitive Property of Congruence



2. Supply missing *statements* and missing *reasons* for the following proof.

Given:  $m \parallel n$  and transversal  $p$ ;  $\angle 1$  is a right angle

Prove:  $\angle 2$  is a right angle

S1.  $m \parallel n$  and transversal  $p$  R1.

S2.  $\angle 1 \cong \angle 2$  R2.

S3. R3. Congruent measures have equal measures.

S4.  $m\angle 1 = 90^\circ$  R4.

## Chapter 02: Proof Problems

S5. R5. Substitution Property of Equality

S6. R6. Definition of a right angle

ANSWER: R1. Given

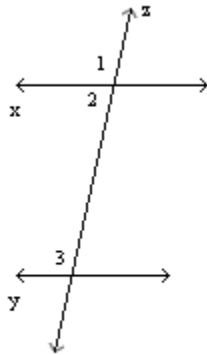
R2. If 2 parallel lines are cut by a trans, corresponding angles are congruent.

S3.  $m\angle 1 = m\angle 2$

R4. Given

S5.  $m\angle 2 = 90$

S6.  $\angle 2$  is a right angle



3. In the figure,  $x \parallel y$  and transversal  $z$ . Explain why  $\angle 2$  and  $\angle 3$  must be supplementary.

ANSWER: With  $x \parallel y$ , corresponding angles 1 and 3 must be congruent. Then  $m\angle 1 = m\angle 3$ .

But  $\angle 1$  and  $\angle 2$  are supplementary in that the exterior sides of these adjacent angles form a straight line. Then  $m\angle 1 + m\angle 2 = 180$ . By substitution,  $m\angle 3 + m\angle 2 = 180$ . Then  $\angle 2$  and  $\angle 3$  are supplementary.

4. Use an indirect proof to complete the following problem.

Given:  $\angle 1$  and  $\angle 2$  are supplementary (no drawing)

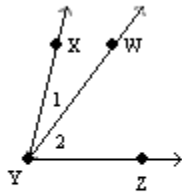
Prove:  $\angle 1$  and  $\angle 2$  are *not* both obtuse angles.

ANSWER: Suppose that  $\angle 1$  and  $\angle 2$  are both obtuse angles. Then  $m\angle 1 > 90$  and  $m\angle 2 > 90$ .

It follows that  $m\angle 1 + m\angle 2 > 180$ . But it is given that  $\angle 1$  and  $\angle 2$  are supplementary, so that  $m\angle 1 + m\angle 2 = 180$ .

With a contradiction of the known fact, it follows that the supposition must be false; thus,  $\angle 1$  and  $\angle 2$  are *not* both obtuse angles.

## Chapter 02: Proof Problems

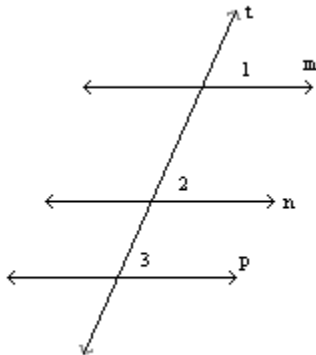


5. Use an indirect proof to complete the following problem.

Given:  $\angle 1$  is not congruent to  $\angle 2$

Prove:  $\overrightarrow{YW}$  does not bisect  $\angle XYZ$

**ANSWER:** Suppose that  $\overrightarrow{YW}$  does bisect  $\angle XYZ$ . Then  $\angle 1 \cong \angle 2$ .  
But it is given that  $\angle 1$  is not congruent to  $\angle 2$ .  
Thus, the supposition must be false and it follows that  
 $\overrightarrow{YW}$  does not bisect  $\angle XYZ$



6. Supply missing *statements* in the following proof.

Given:  $m \parallel n$  and  $n \parallel p$

Prove:  $m \parallel p$

S1. R1. Given

S2. R2. If 2 parallel lines are cut by a transversal, corr. angles are congruent.

S3. R3. Given

S4. R4. Same as #2.

S5. R5. Transitive Property of Congruence

S6. R6. If 2 lines are cut by a transversal so that corresponding angles are congruent, then these lines are parallel.

**ANSWER:** S1.  $m \parallel n$

## Chapter 02: Proof Problems

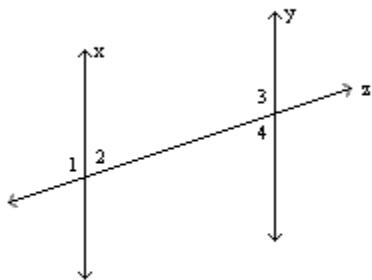
S2.  $\angle 1 \cong \angle 2$

S3.  $n \parallel p$

S4.  $\angle 2 \cong \angle 3$

S5.  $\angle 1 \cong \angle 3$

S6.  $m \parallel p$



7. Supply missing *statements* and *reasons* for the following proof.

Given:  $\angle 1$  is supplementary to  $\angle 4$

Prove:  $x \parallel y$

S1. R1.

S2.  $\angle 3$  is supp. to  $\angle 4$  R2. If the ext. sides of 2 adj. angles form a line, the angles are supp.

S3. R3. Angles supp. to the same angle are congruent.

S4. R4.

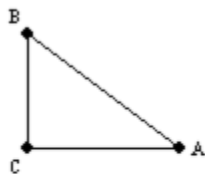
ANSWER: S1.  $\angle 1$  is supplementary to  $\angle 4$

R1. Given

S3.  $\angle 1 \cong \angle 3$

S4.  $x \parallel y$

R4. If 2 lines are cut by a trans. so that corr. angles are congruent, these lines are parallel.



8. In the triangle shown,  $\angle C$  is a right angle. Explain why  $\angle A$  and  $\angle B$  are complementary.

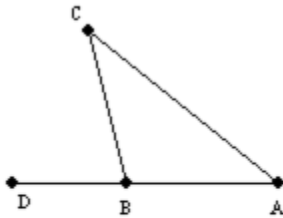
## Chapter 02: Proof Problems

**ANSWER:** The sum of the angles of a triangle is 180. With  $\angle C$  being a right angle,  $m\angle C = 90$ .  
Then  $m\angle A + m\angle B + 90 = 180$ . By subtraction,  $m\angle A + m\angle B = 90$ .  
Thus,  $\angle A$  and  $\angle B$  are complementary.

9. Explain the following statement.

The measure of each interior angle of an equiangular triangle is 60.

**ANSWER:** The sum of the three angles of a triangle is 180. Let  $x$  represent the measure of each angle of the equiangular triangle. Then  $x + x + x = 180$ , so  $3x = 180$ . Dividing by 3,  $x = 60$ . That is, the measure of each interior angle of an equiangular triangle is 60.



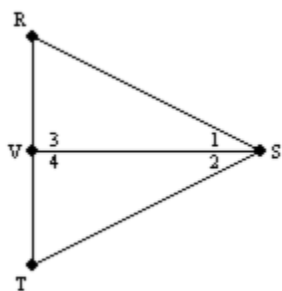
10. Supply missing *reasons* for the following proof.

Given:  $\triangle ABC$  with D-B-A  
Prove:  $m\angle 1 = m\angle A + m\angle C$

- S1.  $\triangle ABC$  with D-B-A R1.  
S2.  $m\angle A + m\angle C + m\angle CBA = 180$  R2.  
S3.  $\angle 1$  and  $\angle CBA$  are supp. R3.  
S4.  $m\angle 1 + m\angle CBA = 180$  R4.  
S5.  $m\angle 1 + m\angle CBA = m\angle A + m\angle C + m\angle CBA$  R5.  
S6.  $m\angle 1 = m\angle A + m\angle C$  R6.

**ANSWER:** R1. Given  
R2. The sum of the interior angles of a triangle is 180.  
R3. If the exterior sides of 2 adjacent angles form a line, these angles are supplementary.  
R4. Definition of supplementary angles  
R5. Substitution Property of Equality  
R6. Subtraction Property of Equality

## Chapter 02: Proof Problems



11. Supply missing *statements* and missing *reasons* for the following proof.

Given:  $\triangle RST$  so that  $\overline{VS}$  bisects  $\angle RST$ ;

also,  $\angle 3 \cong \angle 4$

Prove:  $\angle R \cong \angle T$

S1.  $\triangle RST$  so that  $\overline{VS}$  bisects  $\angle RST$  R1.

S2. R2.

S3. R3. Given

S4. R4. If 2 angles of one triangle are congruent to 2 angles of a second triangle, then the third angles of these triangles are also congruent.

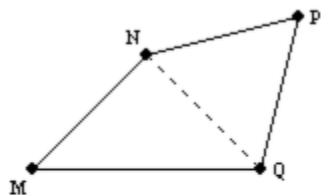
ANSWER: R1. Given

S2.  $\angle 1 \cong \angle 2$

R2. Definition of angle-bisector

S3.  $\angle 3 \cong \angle 4$

S4.  $\angle R \cong \angle T$



12. Using the drawing provided, explain the following statement.

The sum of the interior angles of a quadrilateral is 360.

ANSWER: In  $\triangle MNQ$ ,  $m\angle M + m\angle 1 + m\angle 3 = 180$ . Similarly,  $m\angle P + m\angle 2 + m\angle 4 = 180$ .

## **Chapter 02: Proof Problems**

By the Addition Property of Equality,  $m\angle M + (m\angle 1 + m\angle 2) + m\angle P + (m\angle 3 + m\angle 4) = 360$ .  
That is,  $m\angle M + m\angle MNP + m\angle p + m\angle PQM = 360$ .

13. Use an indirect proof to complete the following problem.

Given:  $\triangle ABC$  (not shown)

Prove:  $\angle A$  and  $\angle B$  cannot both be right angles.

**ANSWER:** Suppose that  $\angle A$  and  $\angle B$  are both be right angles. Then  $m\angle A = 90$  and  $m\angle B = 90$ .

By the Protractor Postulate,  $m\angle C > 0$ . Then  $m\angle A + m\angle B + m\angle C > 180$ . But this last statement contradicts the fact that the sum of the three interior angles of a triangle is exactly 180. Thus, the supposition must be false and it follows that  $\angle A$  and  $\angle B$  cannot both be right angles.