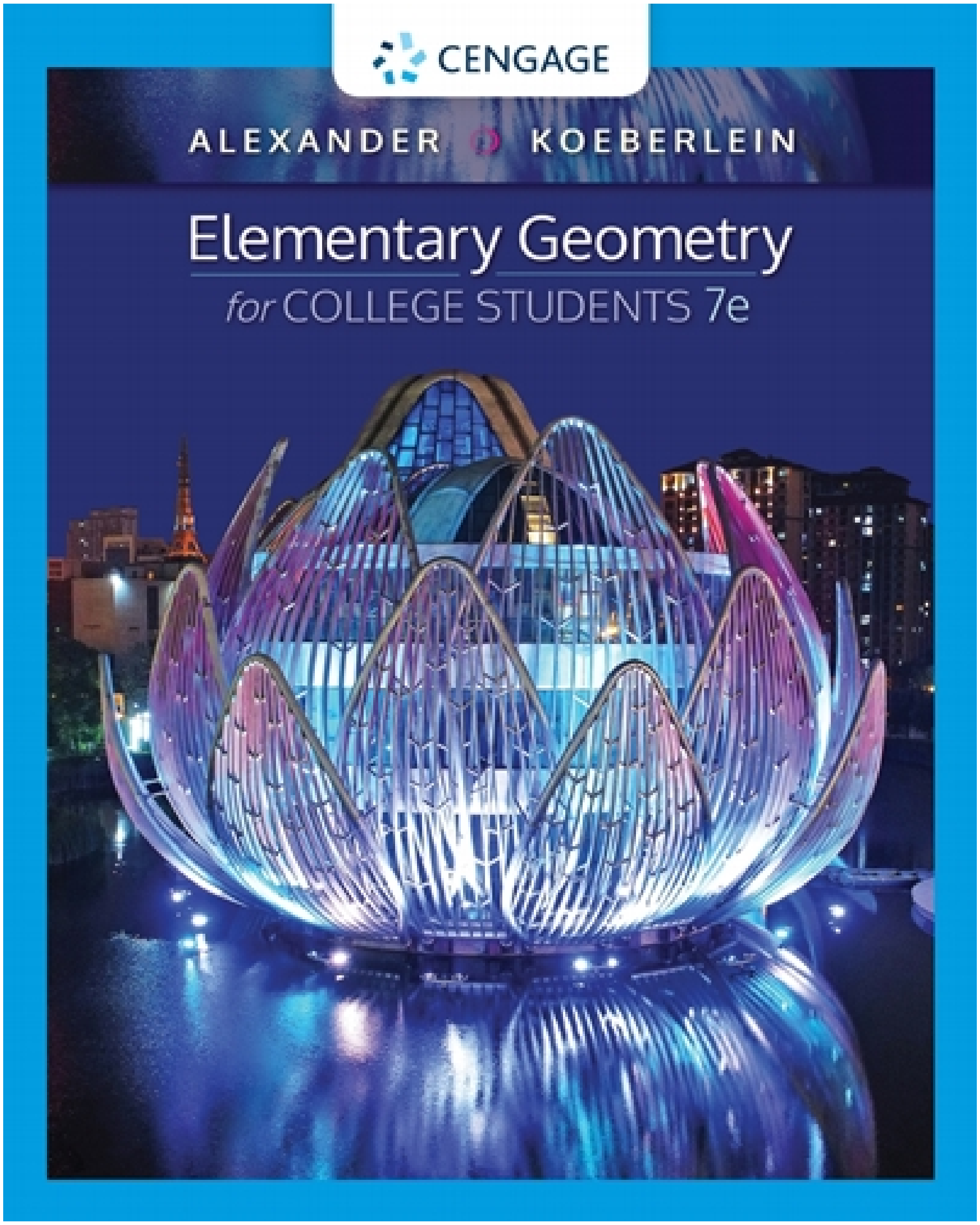
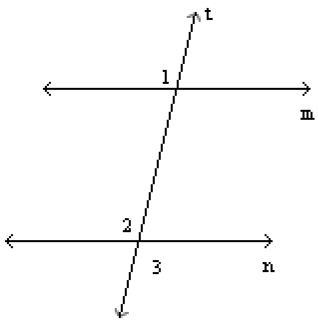
Test Bank for Elementary Geometry for College Students 7th Edition by Alexander



Test Bank

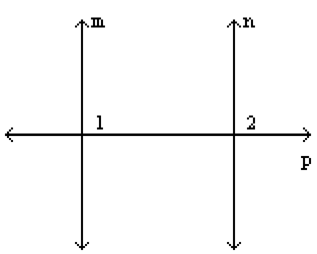
Chapter 02: Proof Problems



1. Supply missing *reasons* for this proof.

Given: *m* || *n*
Prove: $\angle 1 \cong \angle 3$

S1. *m* || *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



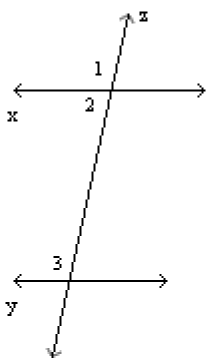
2. Supply missing *statements* and missing *reasons* for the following proof.

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. $m\angle 1 = 90$ R4.

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* || *y* and transversal *z*. Explain why $\angle 2$and $\angle 3$must be supplementary.

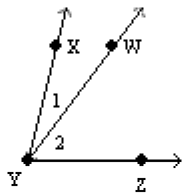
ANSWER: With *x* || *y*, corresponding angles 1 and 3 must be congruent. Then $m\angle 1 = m\angle 3$.
But $\angle 1$and $\angle 2$are supplementary in that the exterior sides of these adjacent angles form a straight line. Then $m\angle 1 + m\angle 2 = 180$. By substitution, $m\angle 3 + m\angle 2 = 180$. 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.

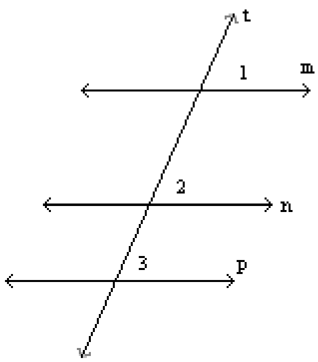
ANSWER: Suppose that $\angle 1$and $\angle 2$are both obtuse angles. Then $m\angle 1 > 90$and $m\angle 2 > 90$.
It follows that $m\angle 1 + m\angle 2 > 180$. But it is given that $\angle 1$and $\angle 2$are supplementary, so that $m\angle 1 + m\angle 2 = 180$.
With a contradiction of the known fact, 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 $\angle XYZ$

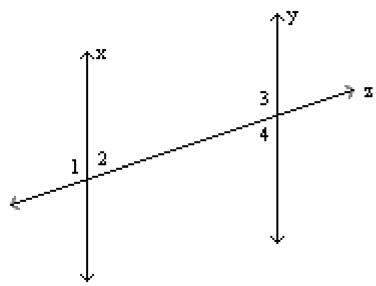


6. Supply missing *statements* in the following proof.

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. $m \parallel n$

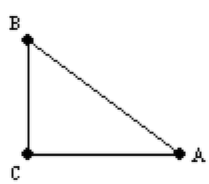
S2. $\angle 1 \cong \angle 2$
S3. $n \parallel p$
S4. $\angle 2 \cong \angle 3$
S5. $\angle 1 \cong \angle 3$
S6. $m \parallel p$



7. Supply missing *statements* and *reasons* for the foloowing 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.



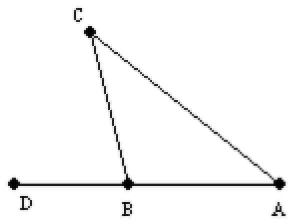
8. In the triangle shown, $\angle C$is a right angle.Explain why $\angle A$and $\angle B$are complementary.

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.

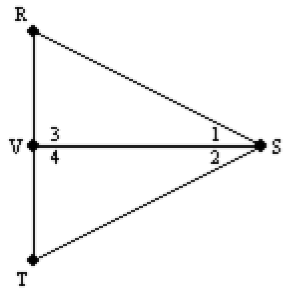


10. Supply missing *reasons* for the following proof.

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

S1. ΔABC 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 agles form a line, these angles are supplementary.
R4. Definition of supplementary angles
R5. Substitution Property of Equality
R6. Subtraction Property of Equality

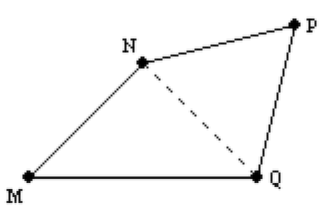


11. Supply missing *statements* and missing *reasons* for the following proof.

Given: ΔRST so that $\overline{VS}$ bisects $\angle RST$;
also, $\angle 3 \cong \angle 4$
Prove: $\angle R \cong \angle T$

S1. ΔRST 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 ΔMNQ, $m\angle M + m\angle 1 + m\angle 3 = 180$. Similarly, $m\angle P + m\angle 2 + m\angle 4 = 180$.

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: ΔABC(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 teh 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.