SAVE THIS PACKET BECAUSE YOU CAN USE IT ON THE CH.2 SUMMATIVE AS WELL AS THE SEM. 1 FINAL.

2.1 Use Inductive Reasoning

Name:

Goal • Describe patterns and use inductive reasoning.

Your Notes

Rewrite the Goal as an "I can" statement!

VOCABULARY
Conjecture
Inductive Reasoning
Counterexample

Complete the vocab. with definitions or pictures that make sense to you.

Example 1 *Describe a visual pattern*

Describe how to sketch the fourth figure in the pattern. Then sketch the fourth figure.

Figure 1

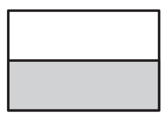



Figure 2

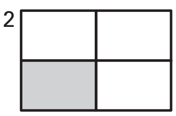
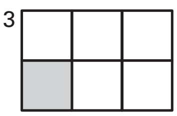



Figure 3


Solution

Each rectangle is divided into ________ as many equal regions as the figure number. Sketch the fourth figure by dividing the rectangle into __________. Shade the section just ________ the horizontal segment at the _____.

____

Figure 4

Checkpoint Complete the following exercise.

Stop and get the teacher's signature before you move on.

1. Sketch the fifth figure in the pattern in Example 1.

Your Notes

Three dots (. . .) tell you that the pattern continues.

Example 2 *Describe the number pattern*

Describe the pattern in the numbers −1, −4, −16, −64, ... Write the next three numbers in the pattern.

Notice that each number in the pattern is ______ times the previous number.

−1,   −4,   −16,   −64, . . .

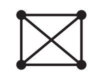
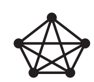
× ___   × ___   × ___   × ___

The next three numbers are ______________________.

Example 3 *Make a conjecture*

Given five noncollinear points, make a conjecture about the number of ways to connect different pairs of the points.

Make a table and look for a pattern. Notice the pattern in how the number of connections __________. You can use the pattern to make a conjecture.

Number of points	1	2	3	4	5
Picture					
Number of connections	___	___	___	___	?

+ ___   + ___   + ___   + ?

Conjecture You can connect five noncollinear points ___ + ___, or _____ different ways.

Checkpoint **Complete the following exercises.**

2. Describe the pattern in the numbers 1, 2.5, 4, 5.5, . . . and write the next three numbers in the pattern.

3. Rework Example 3 if you are given six noncollinear points.

Stop and get the teacher's signature before you move on.

Your Notes

Example 4 *Make and test a conjecture*

Numbers such as 1, 3, and 5 are called consecutive odd numbers. Make and test a conjecture about the sum of any three consecutive odd numbers.

Step 1 **Find** a pattern using groups of small numbers.

$1 + 3 + 5 = \_\_\_ = 3 \cdot 3$

$3 + 5 + 7 = \_\_\_\_ = \_\_\_ \cdot 3$

$5 + 7 + 9 = \_\_\_\_ = \_\_\_ \cdot 3$

$7 + 9 + 11 = \_\_\_\_ = \_\_\_ \cdot 3$

Conjecture The sum of any three consecutive odd numbers is three times ____________________.

Step 2 **Test** your conjecture using other numbers.

$-1 + 1 + 3 = \_\_\_ = \_\_\_ \cdot 3$ ✓

$103 + 105 + 107 = \_\_\_\_\_ = \_\_\_\_\_ \cdot 3$ ✓

✔ ***Checkpoint*** **Complete the following exercise.**

Stop and get the teacher's signature before you move on.

4. Make and test a conjecture about the sign of the product of any four negative numbers.

1. What do you think will happen if you multiply four negative numbers? (this is your conjecture)
2. Pick 4 neg. numbers and test it.

Example 5 *Find a counterexample*

A student makes the following conjecture about the difference of two numbers. Find a counterexample to disprove the student's conjecture.

Conjecture The difference of any two numbers is always smaller than the larger number.

To find a counterexample, you need to find a difference that is _________ than the ________ number.

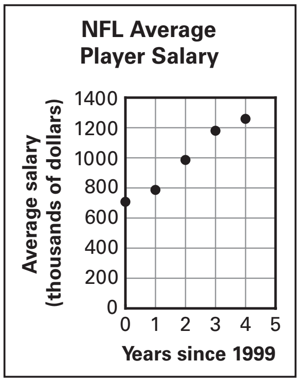
$8 - (-4) = \_\_\_\_$

Because ____ $\not<$ ___, a counterexample exists. The conjecture is false.

Your Notes

Example 6 ***Making conjectures from data displays***

The scatter plot shows the average salary of players in the National Football League (NFL) since 1999. Make a conjecture based on the graph.



Solution

The scatter plot shows that the values __________ each year. So, one possible conjecture is that the average player in the NFL is earning ______ money today than in 1999.

Checkpoint **Complete the following exercises.**

Stop and get the teacher's signature before you move on.

5. Find a counterexample to show that the following conjecture is false.

Conjecture The quotient of two numbers is always smaller than the dividend.

6. Use the graph in Example 6 to make a conjecture that *could* be true. Give an explanation that supports your reasoning.

Look at the graph and tell me what you think will happen after year 4.

Homework

2.2 Analyze Conditional Statements

Goal • Write definitions as conditional statements.

Your Notes

Rewrite the Goal as an "I can" statement!

Complete the vocab. with definitions or pictures that make sense to you.

VOCABULARY

Conditional statement

If-then form

Hypothesis

Conclusion

Negation

Converse

Inverse

Contrapositive

Equivalent statements

Perpendicular lines (draw a picture)

Biconditional statement

Your Notes

Stop and get the teacher's signature before you move on.

Example 1 *Rewrite a statement in if-then form*

Rewrite the conditional statement in if-then form.

All vertebrates have a backbone.

Solution

First, identify the hypothesis and the conclusion. When you rewrite the statement in if-then form, you may need to reword the hypothesis or conclusion.

All vertebrates have a backbone.

If ________________________, then ________

__________.

Checkpoint **Write the conditional statement in if-then form.**

1. All triangles have 3 sides.	**2.** When $x = 2$, $x^2 = 4$.

Example 2 *Write four related conditional statements*

Write the if-then form, the converse, the inverse, and the contrapositive of the conditional statement "Olympians are athletes." Decide whether each statement is *true* or *false*.

Solution

If-then form ______________________________________

____

Converse ______________________________________

____

Inverse ______________________________________

____

____

Contrapositive ______________________________________

____

____

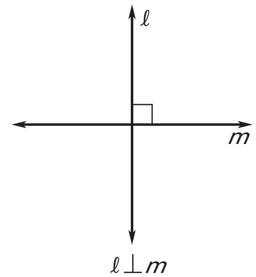
Your Notes

PERPENDICULAR LINES

Definition If two lines intersect to form a ______ angle, then they are perpendicular lines.

The definition can also be written using the converse: If any two lines are perpendicular lines, then they intersect to form a ______ angle.

You can write "line ℓ is perpendicular to line m" as $\ell \perp m$.

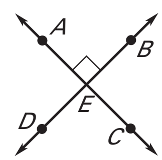


Example 3 ***Use definitions***

Decide whether each statement about the diagram is true. *Explain* your answer using the definitions you have learned.

a. $\overleftrightarrow{AC} \perp \overleftrightarrow{BD}$

b. $\angle AED$ and $\angle BEC$ are a linear pair.



Solution

a. The statement is _____. The right angle symbol indicates that the lines intersect to form a ______ angle. So you can say the lines are ______________.

b. The statement is ______. Because $\angle AED$ and $\angle BEC$ are not _________ angles, $\angle AED$ and $\angle BEC$ are not a __________.

Example 4 ***Write a biconditional***

Write the definition of parallel lines as a biconditional.

Definition: If two lines lie in the same plane and do not intersect, then they are parallel.

Solution

Converse: ____

____

Biconditional: ____________________________________

____

Your Notes

Stop and get the teacher's signature before you move on.

Square: A 4-sided polygon that has 4 right angles and 4 congruent sides.

Rectangle: A 4-sided polygon that has 4 right angles.

Checkpoint Complete the following exercises.

3. Write the if-then form, the converse, the inverse, and the contrapositive of the conditional statement "Squares are rectangles." Decide whether each statement is *true* or *false*.

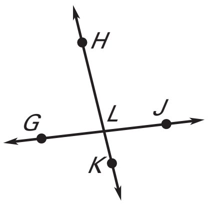
if-then:

converse:

inverse:

contrapositive:

4. Decide whether each statement about the diagram is true. *Explain* your answer using the definitions you have learned.



a. $\angle GLK$ and $\angle JLK$ are supplementary.

b. $\overleftrightarrow{GJ} \perp \overleftrightarrow{HK}$

5. Write the statement below as a biconditional.

Statement: If a student is a boy, he will be in group A.

converse → If a student is in group A, the student must be a boy.

A biconditional does not start with the word "if".

Homework

2.3 Apply Deductive Reasoning

Goal • Form logical arguments using deductive reasoning.

Your Notes

Rewrite the Goal as an "I can" statement!

Complete the vocab. with definitions or pictures that make sense to you.

VOCABULARY
Deductive Reasoning

LAWS OF LOGIC

Law of Detachment If the hypothesis of a true conditional statement is true, then the ____________ is also true.

Law of Syllogism

If hypothesis p, then conclusion q.
If hypothesis q, then conclusion r.
If these statements are true,

If hypothesis p, then conclusion r.
then this statement is true.

The Law of Detachment is also called a *direct argument*. The Law of Syllogism is sometimes called the *chain rule*.

Example 1 *Use the Law of Detachment*

When you use the 'Law of Detachment' you will restate the conclusion from the original conditional.

Use the Law of Detachment to make a valid conclusion in the true situation.

a. If two angles have the same measure, then they are congruent. You know that $m\angle A = m\angle B$.

b. Jesse goes to the gym every weekday. Today is Monday.

Solution

a. Because $m\angle A = m\angle B$ satisfies the hypothesis of a true conditional statement, the conclusion is also true. So, ____________.

b. First, identify the hypothesis and the conclusion of the first statement. The hypothesis is "____________________," and the conclusion is "______________________________."

"Today is Monday" satisfies the hypothesis of the conditional statement, so you can conclude that ________________________________.

Your Notes

When you use the 'Law of Syllogism' you will create a new if-then statement.

Example 2 ***Use the Law of Syllogism***

If possible, use the Law of Syllogism to write the conditional statement that follows from the pair of true statements.

a. If Ron eats lunch today, then he will eat a sandwich. If Ron eats a sandwich, then he will drink a glass of milk.

b. If $x^2 > 36$, then $x^2 > 30$. If $x > 6$, then $x^2 > 36$.

c. If a triangle is equilateral, then all of its sides are congruent. If a triangle is equilateral, then all angles in the interior of the triangle are congruent.

The order in which the statements are given does not affect whether you can use the Law of Syllogism.

Solution

a. The conclusion of the first statement is the hypothesis of the second statement, so you can write the following.

If Ron eats lunch today, then ______________________________.

b. Notice that the conclusion of the second statement is the hypothesis of the first statement, so you can write the following.

If $x > 6$, then __________.

c. Neither statement's conclusion is the same as the other statement's ______________. You cannot use the Law of Syllogism to write a new conditional statement.

Stop and get the teacher's signature before you move on.

✓ ***Checkpoint*** **Complete the following exercises.**

1. If $0° < m\angle A < 90°$, then A is acute. The measure of $\angle A$ is 38°. Using the Law of Detachment, what statement can you make?

2. State the law of logic that is illustrated below.

If you do your homework, then you can watch TV. If you watch TV, then you can watch your favorite show.

If you do your homework, then you can watch your favorite show.

Your Notes

Example 3 *Use inductive and deductive reasoning*

What conclusion can you make about the sum of an odd integer and an odd integer?

Solution

Step 1 **Look** for a pattern in several examples. Use inductive reasoning to make a conjecture.

$-3 + 5 =$ ___, $-1 + 5 =$ ___, $3 + 5 =$ ___

$-3 + (-5) =$ ____, $1 + (-5) =$ ____,
$3 + (-5) =$ ____

Conjecture: Odd integer + Odd integer = ______ integer

Step 2 **Let** n and m each be any integer. Use deductive reasoning to show the conjecture is true.

$2n$ and $2m$ are ______ integers because any integer multiplied by 2 is ______.

$2n -$ 1 and $2m +$ ___ are ______ integers because $2n$ and $2m$ are ______ integers.

$(2n -$ 1 $) + (2m +$ ___$)$ represents the sum of an ______ integer $2n -$ 1 and an ______ integer $2m +$ ___.

$(2n -$ ___$) + (2m +$ ___$) =$ ___$(n + m)$

The result is the product of ___ and an integer $n + m$. So, ___$(n + m)$ is an ______ integer.

The sum of an odd integer and an odd integer is an ______ integer.

Checkpoint **Complete the following exercise.**

3. Use inductive reasoning to make a conjecture about the sum of a negative integer and itself. Then use deductive reasoning to show the conjecture is true.

Inductive: use patterns and examples.

Deductive: use algebra and variables.

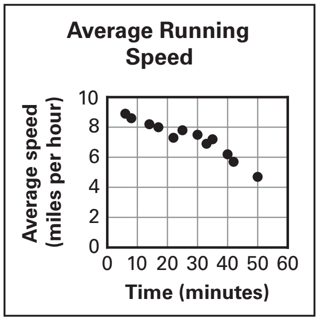
Stop and get the teacher's signature before you move on.

Do this problem like example 3. You will probably need more space.

Your Notes

Example 4 ***Reasoning from a graph***

Tell whether the statement is the result of *inductive reasoning* or *deductive reasoning*. *Explain* your choice.



a. The runner's average speed decreases as time spent running increases.

b. The runner's average speed is slower when running for 40 minutes than when running for 10 minutes.

Solution

a. ____________ reasoning, because it is based on a pattern in the data

b. ____________ reasoning, because you are comparing values that are given on the graph

Stop and get the teacher's signature before you move on.

✔ ***Checkpoint*** **Complete the following exercises.**

4. Use inductive reasoning to write another statement about the graph in Example 4.

5. Use deductive reasoning to write another statement about the graph in Example 4.

Homework

2.4 Use Postulates and Diagrams

Goal • Use postulates involving points, lines, and planes.

Your Notes

Rewrite the Goal as an "I can" statement!

VOCABULARY

Line perpendicular to a plane (draw a picture)

Complete the vocab. with definitions or pictures that make sense to you.

POINT, LINE, AND PLANE POSTULATES

Postulate 5 Through any two points there exists exactly one ______.

Postulate 6 A line contains at least two ________.

Postulate 7 If two lines intersect, then their intersection is exactly ___________.

Postulate 8 Through any three ______________ points there exists exactly one plane.

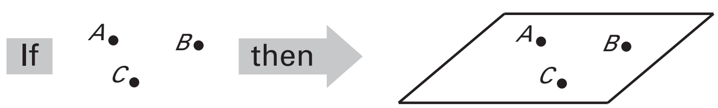
Postulate 9 A plane contains at least three ______________ points.

Postulate 10 If two points lie in a plane, then the line containing them _________________.

Postulate 11 If two planes intersect, then their intersection is a _____.

Example 1 ***Identify a postulate illustrated by a diagram***

State the postulate illustrated by the diagram.



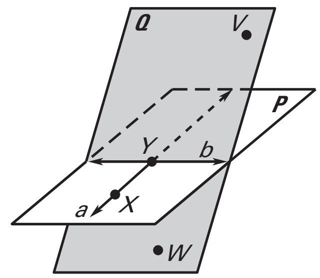
Solution

Postulate ___ Through any three ______________ points there exists exactly one plane.

Your Notes

Example 2 *Identify postulates from a diagram*

Use the diagram to write examples of Postulates 9 and 11.



Postulate 9 Plane ___ contains at least three noncollinear points, _____________.

Postulate 11 The intersection of plane *P* and plane *Q* is _______.

✔ ***Checkpoint*** **Use the diagram in Example 2 to complete the following exercises.**

Stop and get the teacher's signature before you move on.

1. Which postulate allows you to say that the intersection of line *a* and line *b* is a point?

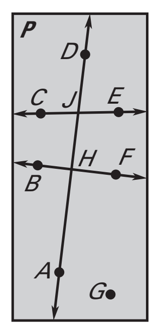
2. Write examples of Postulates 5 and 6.

CONCEPT SUMMARY: INTERPRETING A DIAGRAM

When you interpret a diagram, you can only assume information about size or measure if it is marked.

You CAN Assume.

YOU CAN~~NOT~~ ASSUME



All points shown are __________.

$\angle AHB$ and ________ are a linear pair.

$\angle AHF$ and ________ are vertical angles.

A, *H*, *J*, and *D* are __________.

$\overleftrightarrow{AD}$ and $\overleftrightarrow{BF}$ intersect at ___.

YOU CANNOT ASSUME

G, *F*, and *E* are collinear.

$\overleftrightarrow{BF}$ and $\overleftrightarrow{CE}$ intersect.

$\overleftrightarrow{BF}$ and $\overleftrightarrow{CE}$ do not intersect.

$\angle BHA \cong \angle CJA$

$\overleftrightarrow{AD} \perp \overleftrightarrow{BF}$ or $m\angle AHB = 90°$

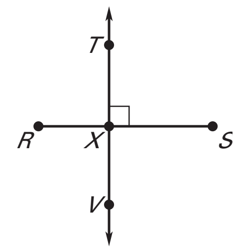
Your Notes

Notice that the picture was drawn so that X does not look like a midpoint of $\overline{RS}$.

Example 3 *Use given information to sketch a diagram*

Sketch a diagram showing $\overline{RS}$ perpendicular to $\overleftrightarrow{TV}$, intersecting at point X.

Solution



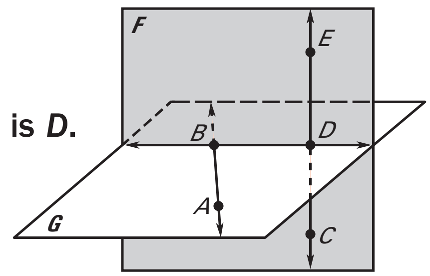
Step 1 **Draw** $\overline{RS}$ and label points R and S.

Step 2 **Draw** a point X ____________ R and S.

Step 3 **Draw** $\overleftrightarrow{TV}$ through X so that it is ________________ to $\overline{RS}$.

Example 4 *Interpret a diagram in three dimensions*

Which of the following statements *cannot* be assumed from the diagram?



E, D, and C are collinear.

The intersection of $\overleftrightarrow{BD}$ and $\overleftrightarrow{EC}$ is D.

$\overleftrightarrow{BD} \perp \overleftrightarrow{EC}$

$\overleftrightarrow{EC} \perp$ plane G

Solution

With no right angles marked, you cannot assume that ____________ or ________________.

Stop and get the teacher's signature before you move on.

Checkpoint **Complete the following exercises.**

3. In Example 3, if the given information indicated that $\overline{RX}$ and $\overline{XS}$ are congruent, how would the diagram change?

4. In the diagram for Example 4, can you assume that $\overleftrightarrow{BD}$ is the intersection of plane F and plane G?

Homework

2.5 Reason Using Properties from Algebra

Goal • Use algebraic properties in logical arguments.

Your Notes

Rewrite the Goal as an "I can" statement!

ALGEBRAIC PROPERTIES OF EQUALITY

Let a, b, and c be real numbers.

Addition Property	If $a = b$, then ________.
Subtraction Property	If $a = b$, then ________.
Multiplication Property	If $a = b$, then ______.
Division Property	If $a = b$ and $c \neq 0$, then ____.
Substitution Property	If $a = b$, then ________ ________________ ________________.

Example 1 ***Write reasons for each step***

Solve $2x + 3 = 9 - x$. Write a reason for each step.

Equation	Explanation	Reason
$2x + 3 = 9 - x$	Write original equation.	**Given**
$2x + 3 +$ ___ $= 9 - x +$ ___	Add ___ to each side.	________
____ $+ 3 =$ ___	Combine like terms.	________
____ $=$ ___	Subtract ___ from each side.	________
$x =$ ___	Divide each side by ___.	________

The value of x is ___.

Your Notes

DISTRIBUTIVE PROPERTY

$a(b + c) =$ __________, where a, b, and c are real numbers.

Example 2 *Use the Distributive Property*

Solve $-4(6x + 2) = 64$. Write a reason for each step.

Solution

Equation	Explanation	Reason
$-4(6x + 2) = 64$	Write original equation.	**Given**
___________ $= 64$	Multiply.	________________ ________________
________ $=$ _____	Add ___ to each side.	________________ **Property of Equality**
___ $=$ _____	Divide each side by ______.	________________ **Property of Equality**

Checkpoint **Complete the following exercises.**

Stop and get the teacher's signature before you move on.

1. Solve $x - 5 = 7 + 2x$. Write a reason for each step.

2. Solve $4(5 - x) = -2x$. Write a reason for each step.

Your Notes

Example 3 ***Use properties in the real world***

Speed A motorist travels 5 miles per hour slower than the speed limit s for 3.5 hours. The distance traveled d can be determined by the formula $d = 3.5(s - 5)$. Solve for s.

Equation	Explanation	Reason
$d = 3.5(s - 5)$	Write original equation.	**Given**
$d =$ ______	Multiply.	______ ______
$d +$ ______ $=$ ______	Add ______ to each side.	______ **Property of Equality**
$\frac{d + \square}{\square} = s$	Divide each side by ______.	______ **Property of Equality**

REFLEXIVE PROPERTY OF EQUALITY

Real Numbers	For any real number a, ______.
Segment Length	For any segment AB, ______.
Angle Measure	For any angle A, ______.

SYMMETRIC PROPERTY OF EQUALITY

Real Numbers	For any real numbers a and b, if $a = b$, then ______.
Segment Length	For any segments AB and CD, if $AB = CD$, then ______.
Angle Measure	For any angles A and B, if $m\angle A = m\angle B$, then ______.

TRANSITIVE PROPERTY OF EQUALITY

Real Numbers	For any real numbers a, b, and c, if $a = b$ and $b = c$, then ______.
Segment Length	For any segments AB, CD, and EF, if $AB = CD$ and $CD = EF$, then ______.
Angle Measure	For any angles A, B, and C, if $m\angle A = m\angle B$ and $m\angle B = m\angle C$, then ______.

Your Notes

Example 4 *Use properties of equality*

Show that $CF = AD$.

Equation	**Reason**
$AB =$ _____	Given
$BC =$ _____	Given
$AC = AB + BC$	______________________ ___________
$DF =$ _____ + _____	Segment Addition Postulate
$DF = BC + AB$	_______________ Property of Equality
$DF =$ _____	___________ Property of Equality
$DF + CD =$ _____ $+ CD$	___________ Property of Equality
_____ = _____	Substitution Property of Equality

✔ ***Checkpoint*** **Complete the following exercises. In Exercises 4–6, name the property of equality that the statement illustrates.**

Stop and get the teacher's signature before you move on.

3. Suppose the equation in Example 3 is $d = 5(s + 3)$. Solve for s. Write a reason for each step.

4. If $GH = JK$, then $JK = GH$.

5. If $r = s$, and $s = 44$, then $r = 44$.

6. $m\angle N = m\angle N$

Homework

2.6 Prove Statements about Segments and Angles

Goal • Write proofs using geometric theorems.

Your Notes

Rewrite the Goal as an "I can" statement!

VOCABULARY
Proof
Two-column proof
Theorem

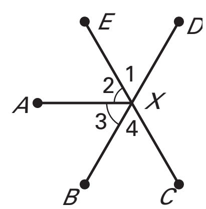
Complete the vocab. with definitions or pictures that make sense to you.

Example 1 ***Write a two-column proof***

Use the diagram to prove $m\angle 1 = m\angle 4$.

Given $m\angle 2 = m\angle 3$, $m\angle AXD = m\angle AXC$

Prove $m\angle 1 = m\angle 4$



Writing a two-column proof is a formal way of organizing your reasons to show a statement is true.

Statements	Reasons
1. $m\angle AXC = m\angle AXD$	1. ______
2. $m\angle AXD = m\angle$ ___ $+ m\angle$ ___	2. Angle Addition Postulate
3. $m\angle AXC = m\angle$ ___ $+ m\angle$ ___	3. Angle Addition Postulate
4. $m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	4. ______
5. $m\angle 2 = m\angle 3$	5. ______
6. $m\angle 1 + m\angle$ ___ $= m\angle 3 + m\angle 4$	6. Substitution Property of Equality
7. $m\angle 1 = m\angle 4$	7. ______

Your Notes

THEOREM 2.1 CONGRUENCE OF SEGMENTS

Segment congruence is reflexive, symmetric, and transitive.

Reflexive For any segment AB, ________.

Symmetric If $\overline{AB} \cong \overline{CD}$, then ________.

Transitive If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then ________.

THEOREM 2.2 CONGRUENCE OF ANGLES

Angle congruence is reflexive, symmetric, and transitive.

Reflexive For any angle A, ________.

Symmetric If $\angle A \cong \angle B$, then ________.

Transitive If $\angle A \cong \angle B$ and $\angle B \cong \angle C$, then ________.

Example 2 ***Name the property shown***

Name the property illustrated by the statement.

If $\angle 5 \cong \angle 3$, then $\angle 3 \cong \angle 5$.

____

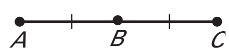
Stop and get the teacher's signature before you move on.

Checkpoint **Complete the following exercises.**

1. Three steps of a proof are shown. Give the reasons for the last two steps.

Given $BC = AB$

Prove $AC = AB + AB$



Statements	Reasons
1. $BC = AB$	**1.** Given
2. $AC = AB + BC$	**2.** ________
3. $AC = AB + AB$	**3.** ________

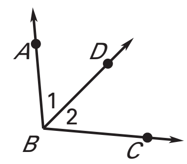
2. Name the property illustrated by the statement. If $\angle H \cong \angle T$ and $\angle T \cong \angle B$, then $\angle H \cong \angle B$.

Your Notes

Before writing a proof, organize your reasoning by copying or drawing a diagram for the situation described. Then identify the GIVEN and PROVE statements.

Example 3 ***Use properties of equality***

If you know that $\overrightarrow{BD}$ bisects $\angle ABC$, prove that $m\angle ABC$ is two times $m\angle 1$.



Given $\overrightarrow{BD}$ bisects $\angle ABC$.

Prove $m\angle ABC = 2 \cdot m\angle 1$

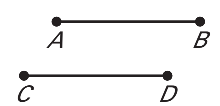
Statements	Reasons
1. $\overrightarrow{BD}$ bisects $\angle ABC$.	1. ______
2. ________	2. Definition of angle bisector
3. __________	3. Definition of congruent angles
4. $m\angle 1 + m\angle 2 = m\angle ABC$	4. ____________ ________
5. $m\angle 1 + m\angle$___ $= m\angle ABC$	5. Substitution Property of Equality
6. ______________	6. Distributive Property

CONCEPT SUMMARY: WRITING A TWO-COLUMN PROOF

Proof of the Symmetric Property of Segment Congruence

Given $\overline{AB} \cong \overline{CD}$

Prove $\overline{CD} \cong \overline{AB}$



Copy or draw diagrams and label information to help develop proofs.

Statements	Reasons
1. $\overline{AB} \cong \overline{CD}$	1. ______
2. ________	2. Definition of congruent segments
3. ________	3. Symmetric Property of Equality
4. $\overline{CD} \cong \overline{AB}$	4. Definition of congruent segments

Statements based on facts that you know or conclusions from deductive reasoning

The number of statements will vary.

Remember to give a reason for the last statement.

Definitions, postulates, or proven theorems that allow you to state the corresponding statement.

Your Notes

Example 4 ***Solve a multi-step problem***

Interstate There are two exits between rest areas on a stretch of interstate. The Rice exit is halfway between rest area A and the Mason exit. The distance between rest area B and the Mason exit is the same as the distance between rest area A and the Rice exit. Prove that the Mason exit is halfway between the Rice exit and rest area B.

Solution

Step 1 **Draw** a diagram.

Step 2 **Draw** diagrams showing relationships.

Step 3 **Write** a proof.

Given R is the midpoint of $\overline{AM}$, $MB = AR$.

Prove M is the midpoint of $\overline{RB}$.

Statements	Reasons
1. R is the midpoint of $\overline{AM}$, $MB = AR$.	1. ________
2. ________	2. Definition of midpoint
3. ________	3. Definition of congruent segments
4. $MB = RM$	4. ________
5. ________	5. Definition of congruent segments
6. M is the midpoint of $\overline{RB}$.	6. ________

Stop and get the teacher's signature before you move on.

Homework

✔ ***Checkpoint*** **Complete the following exercise.**

3. In Example 4, there are rumble strips halfway between the Rice and Mason exits. What other two places are the same distance from the rumble strips?

2.7 Prove Angle Pair Relationships

Goal • Use properties of special pairs of angles.

Your Notes

Rewrite the Goal as an "I can" statement!

THEOREM 2.3 RIGHT ANGLES CONGRUENCE THEOREM

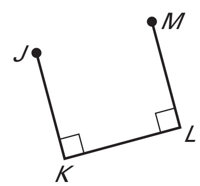
All right angles are ___________.

Example 1 ***Use right angle congruence***

Write a proof.

Given $\overline{JK} \perp \overline{KL}$, $\overline{ML} \perp \overline{KL}$

Prove $\angle K \cong \angle L$

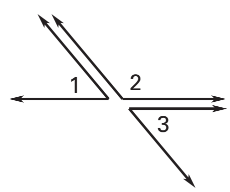


The given information in Example 1 is about perpendicular lines. You must then use deductive reasoning to show that the angles are right angles.

Statements	Reasons
1. $\overline{JK} \perp \overline{KL}$, $\overline{ML} \perp \overline{KL}$	1. _______
2. _______________ _______________	2. Definition of perpendicular lines
3. $\angle K \cong \angle L$	3. _______________ _______________

THEOREM 2.4 CONGRUENT SUPPLEMENTS THEOREM

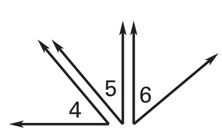
If two angles are supplementary to the same angle (or to congruent angles), then they are ___________.



If $\angle 1$ and $\angle 2$ are supplementary and $\angle 3$ and $\angle 2$ are supplementary, then __________.

THEOREM 2.5 CONGRUENT COMPLEMENTS THEOREM

If two angles are complementary to the same angle (or to congruent angles), then they are ___________.



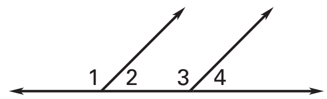
If $\angle 4$ and $\angle 5$ are complementary and $\angle 6$ and $\angle 5$ are complementary, then __________.

Your Notes

Example 2 *Use the Congruent Supplements Theorem*

Write a proof.

Given $\angle 1$ and $\angle 2$ are supplements.
$\angle 1$ and $\angle 4$ are supplements.
$m\angle 2 = 45°$



Prove $m\angle 4 = 45°$

Statements	**Reasons**
1. $\angle 1$ and $\angle 2$ are supplements. $\angle 1$ and $\angle 4$ are supplements.	**1.** ________
2. ____________	**2.** Congruent Supplements Theorem
3. $m\angle 2 = m\angle 4$	**3.** _______________ ____________________
4. $m\angle 2 = 45°$	**4.** ________
5. ______________	**5.** Substitution Property of Equality

Checkpoint **Complete the following exercises.**

Stop and get the teacher's signature before you move on.

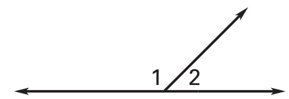
1. In Example 1, suppose you are given that $\angle K \cong \angle L$. Can you use the Right Angles Congruence Theorem to prove that $\angle K$ and $\angle L$ are right angles? *Explain*.

2. Suppose $\angle A$ and $\angle B$ are complements, and $\angle A$ and $\angle C$ are complements. Can $\angle B$ and $\angle C$ be supplements? *Explain*.

Your Notes

POSTULATE 12 LINEAR PAIR POSTULATE

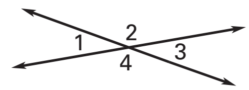
If two angles form a linear pair, then they are ______________.



$\angle 1$ and $\angle 2$ form a linear pair, so $\angle 1$ and $\angle 2$ are supplementary and $m\angle 1 + m\angle 2 =$ ______.

THEOREM 2.6 VERTICAL ANGLES CONGRUENCE THEOREM

Vertical angles are ___________.



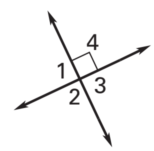
Example 3 *Use the Vertical Angles Congruence Theorem*

You can use information labeled in a diagram in your proof.

Write a proof.

Given $\angle 4$ is a right angle.

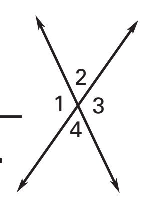
Prove $\angle 2$ and $\angle 4$ are supplementary.



Statements	Reasons
1. $\angle 4$ is a right angle.	1. ________
2. ______________	2. Definition of a right angle
3. $\angle 2 \cong \angle 4$	3. ________________________
4. ________________	4. Definition of congruent angles
5. $m\angle 2 = 90°$	5. ________________________
6. ________________	6. $m\angle 2 + m\angle 4 = 180°$

Stop and get the teacher's signature before you move on.

Checkpoint In Exercises 3 and 4, use the diagram.



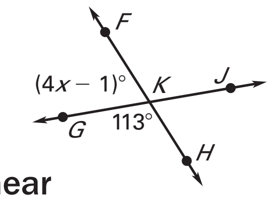
3. If $m\angle 4 = 63°$, find $m\angle 1$ and $m\angle 2$.

4. If $m\angle 3 = 121°$, find $m\angle 1$, $m\angle 2$, and $m\angle 4$.

Your Notes

Example 4 ***Find angle measures***

Write and solve an equation to find *x*. Use *x* to find *m∠FKG*.



Solution

Because *m∠FKG* and *m∠GKH* form a linear pair, the sum of their measures is ______.

$(4x - 1)° + 113° =$ ______	**Write equation.**
$4x +$ ______ $=$ ______	**Simplify.**
$4x =$ ______	**Subtract ______ from each side.**
$x =$ ______	**Divide each side by 4.**

Use $x =$ ______ to find *m∠FKG*.

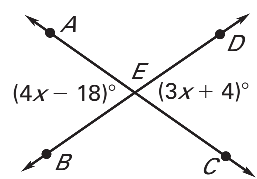
$m\angle FKG = (4x - 1)°$	**Write equation.**
$= [4($______$) - 1]°$	**Substitute ______ for *x*.**
$= [$______ $- 1]°$	**Multiply.**
$=$ ______	**Simplify.**

The measure of ∠*FKG* is ______.

Checkpoint **Complete the following exercise.**

Stop and get the teacher's signature before you move on.

5. Find *m∠AEB*.



Homework