Practice Test - Chapter 2

Write a conjecture that describes the pattern in each sequence. Then use your conjecture to find the next item in the sequence.

1. 15, 30, 45, 60

SOLUTION:

Here, 15 is added to each term to get the next term. So, the next term is 60 + 15 = 75.

ANSWER:

Each consecutive terms is the next multiple of 15;75

2. 

SOLUTION:

Each figure is rotated by an angle of 90° and then the mirror image of the rotated figure is taken. So, the next figure will be as shown.

ANSWER:

The triangle rotates to the right 90° and the shading moves to the top to right.

Use the following statements to write a compound statement for each conjunction or disjunction. Then find its truth value.

***p*: 5 < –3**

***q*: All vertical angles are congruent.**

***r*: If 4*x* = 36, then *x* =9.**

3. *p* and *q*

SOLUTION:

Find the conjunction *p* and *q*. A conjunction is true only when both statements that form it are true.
The statement *p* is "5 < –3" which is false. The statement *q* is "all vertical angles are congruent." is true. Since *p* is false, the conjunction is false.

ANSWER:

5 < –3 and all vertical angles are congruent; false.

4. $(p \vee q) \wedge r$

SOLUTION:

Find the disjunction $p \vee q$. A disjunction is true if at least one of the statements is true. Then find the conjunction $(p \vee q) \wedge r$. A conjunction is true only when both statements that form it are true.

The statement $(p \vee q) \wedge r$ is $5 < -3$ or all vertical angles are congruent, and if $4x = 36$, then $x = 9$. The statement $(p \vee q)$ is true because it is enough for either of the statements p or q to be true for the statement $(p \vee q)$ to be true and it is true that all vertical angles are congruent. Here, r is a true statement. Therefore, $(p \vee q) \wedge r$ is a true statement.

ANSWER:

$5 < -3$ or all vertical angles are congruent, and if $4x = 36$, then $x = 9$; true.

5. **PROOF** Write a paragraph proof.

Given: $\overline{JK} \cong \overline{CB}, \overline{KL} \cong \overline{AB}$

Prove: $\overline{JL} \cong \overline{AC}$

SOLUTION:

You need to walk through the proof step by step. Look over what you are given and what you need to prove. Here, you are given two sets of congruent segments. Use the properties that you have learned about congruent segments and equivalent expressions in algebra to walk through the proof.

Proof: Since $\overline{JK} \cong \overline{CB}$ and $\overline{KL} \cong \overline{AB}$,
$JK = BC$ and $KL = AB$ by the definition of congruent segments. By the Addition Property, $JK + KL = CB + AB$. Using the Segment Addition Postulate, $JL = JK + KL$ and $AC = AB + BC$. By substitution, $JL = AC$. Because the measures are equal, $\overline{JL} \cong \overline{AC}$ by the definition of congruent segments.

ANSWER:

Proof: Since $\overline{JK} \cong \overline{CB}$ and $\overline{KL} \cong \overline{AB}$
$JK = BC$ and $KL = AB$ by the definition of congruent segments. By the Addition Property, $JK + KL = CB + AB$. Using the Segment Addition Postulate, $JL = JK + KL$ and $AC = AB + BC$. By substitution, $JL = AC$. Because the measures are equal, $\overline{JL} \cong \overline{AC}$ by the definition of congruent segments.

6. **SPORTS** Refer to the Venn diagram that represents the sports students chose to play at South High School last year.

a. Describe the sports that the students in the non-intersecting portion of the tennis region chose.
b. How many students played soccer and tennis?

SOLUTION:

a. .The students in the non-intersecting portion of the tennis region chose only to play tennis.
b. Find (soccer and tennis). The number of students in the intersecting region is 23. So, 23 students played soccer and tennis.

ANSWER:

a. These students only played tennis.
b. 23

7. Determine whether the stated conclusion is valid based on the given information. If not, write *invalid*. Explain your reasoning.
Given: If a lawyer passes the bar exam, then he or she can practice law. Candice passed the bar exam.
Conclusion: Candice can practice law.

SOLUTION:

By the Law of Detachment if $p \rightarrow q$ is a true statement and p is true, then q. Here, the statement "if a lawyer passes the bar exam, then he or she can practice law" is a true statement and Candice passed the bar exam. So, Candice can practice law is a valid statement.

ANSWER:

valid; Law of Detachment

8. **PROOF** Copy and complete the following proof.
Given: $3(x - 4) = 2x + 7$
Prove: $x = 19$
Proof:

Statements	Reasons
a. $3(x-4) = 2x + 7$	a. Given
b. $3x - 12 = 2x + 7$	b. ___?___
c. ___?___	c. Subtraction Property
d. $x = 19$	d. ___?___

SOLUTION:

The 2nd row is uses the Distributive Property to simplify the left side of the equation.
The 3rd row changes the subtraction property to subtract $2x$ from each side.
The 4th row uses the Addition Property to add 12 to each side

Statements	Reasons
a. $3(x-4) = 2x + 7$	a. Given
b. $3x - 12 = 2x + 7$	b. Distributive Property
c. $x - 12 = 7$	c. Subtraction Property
d. $x = 19$	d. Addition Property

ANSWER:

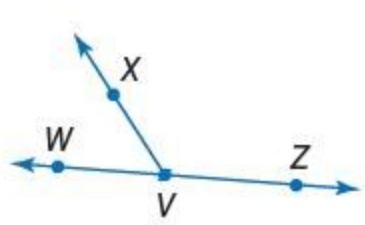
Statements	Reasons
a. $3(x-4) = 2x + 7$	a. Given
b. $3x - 12 = 2x + 7$	b. ___?___ **Dist. Prop.**
c. ___?___ **$x - 12 = 7$**	c. Subtraction Property
d. $x = 19$	d. ___?___ **Add. Prop.**

Determine whether each statement is *always, sometimes,* or *never* true.

9. Two angles that are supplementary form a linear pair.

SOLUTION:

Two angles that are supplementary form a linear pair only if they share one of their legs. So, the statement is *sometimes* true.



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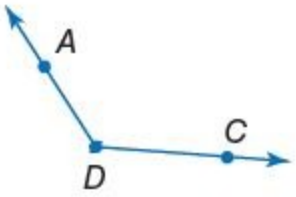
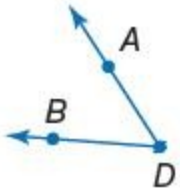




ANSWER:

sometimes

10. If B is between A and C, then $AC + AB = BC$.

SOLUTION:

If B is between A and C, then $AB + BC = AC$. So, the statement is *never* true.

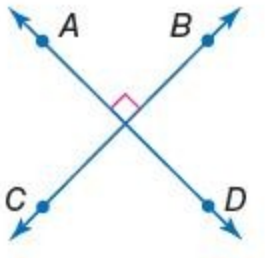
ANSWER:

never

11. If two lines intersect to form congruent adjacent angles, then the lines are perpendicular.

SOLUTION:

If two lines intersect the two adjacent angles have to be supplementary and since they are congruent each one of the angles measure 90 degrees. So, the lines are perpendicular. Therefore, the statement is *always* true.

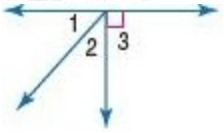


ANSWER:

always

Find the measure of each numbered angle, and name the theorems that justify your work.

12. $m\angle 1 = x$,
$m\angle 2 = x - 6$



SOLUTION:

Angles 1, 2, and 3 form a linear pair. Since we are given that angle 3 is right, angles 1 and 2 are complementary. By the Complementary Angles Theorem, the sum of their measures is 90.

$x + x - 6 = 90$

$2x - 6 = 90$

Solve for x.

$2x = 96$

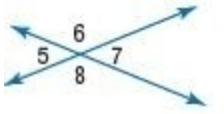
$x = 48$

Therefore, $m\angle 1 = 48$, $m\angle 2 = 48 - 6 = 42$, and $m\angle 3 = 90$.

ANSWER:

$m\angle 1 = 48, m\angle 2 = 42$; Comp. Thm., $m\angle 3 = 90$; Given

13. $m\angle 7 = 2x + 15$,
$m\angle 8 = 3x$



SOLUTION:

The angles 7 and 8 are supplementary. So, by the Supplementary Angles Theorem the sum of their measures is 180.

$2x + 15 + 3x = 180$

$5x + 15 = 180$

Solve for x.

$5x = 165$

$x = 33$

Therefore, $m\angle 7$ = 2(33) + 15 or 81 and $m\angle 8$ = 3(33) or 99. $m\angle 5 = m\angle 7$ or 81 and $m\angle 6 = m\angle 8$ or 99 by the Vertical Angles Theorem.

ANSWER:

$m\angle 7 = 81, m\angle 8 = 99$, Supp. Thm.; $m\angle 5 = 81, m\angle 6 = 99$, Vert. $\angle$s Thm.

Write each statement in if-then form.

14. An acute angle measures less than 90.

SOLUTION:

To write these statements in if-then form, identify the hypothesis and conclusion. The word if is not part of the hypothesis. The word then is not part of the conclusion.
If an angle is acute, then it measures less than 90 degrees.

ANSWER:

If an angle is acute, then it measures less than 90.

15. Two perpendicular lines intersect to form right angles.

SOLUTION:

To write these statements in if-then form, identify the hypothesis and conclusion. The word if is not part of the hypothesis. The word then is not part of the conclusion.
If two lines are perpendicular, then they form right angles.

ANSWER:

If two lines are perpendicular, then they form right angles.

16. **MULTIPLE CHOICE** If a triangle has one obtuse angle, then it is an obtuse triangle.

Which of the following statements is the contrapositive of the conditional above?

A If a triangle is not obtuse, then it has one obtuse angle.
B If a triangle does not have one obtuse angle, then it is not an obtuse triangle.
C If a triangle is not obtuse, then it does not have one obtuse angle.
D If a triangle is obtuse, then it has one obtuse angle.

SOLUTION:

The contrapositive is formed by negating both the hypothesis and the conclusion of the converse of the conditional. So, the contrapositive of the given statement is “if a triangle is not obtuse, then it does not have one obtuse angle”. Therefore, the correct choice is C.

ANSWER:

C