

Determine the converse, inverse, and contrapositive of the conditional statements. Indicate whether each statement is true or false.

1. Conditional Statement: If two lines are parallel, then their same side interior angles are supplementary.

Converse: If same sides int. \angle 's are supp, then the lines are parallel T F

Inverse: If 2 lines are not parallel, then their same side int. \angle 's are not supp. T F

Contrapositive: If the same side int. \angle 's are not supp then they are not parallel T F

Biconditional (if possible. If not, explain) Two lines are \parallel iff their same side int. \angle 's are supp.

Which is the contrapositive of the statement "If a number is a natural number, then it is an integer."?

- A. If a number is an integer, then it is a natural number.
- B. If a number is not a natural number, then it is not an integer.
- C. If a number is not an integer, then it is not a natural number.
- D. If a number is not a natural number, then it is an integer.

Statement A: "If it rains, then the softball game will be canceled."

Statement B: "If it does not rain, then the softball game will not be canceled."

Statement B is the -

- A. Inverse
- B. Converse
- C. Contrapositive
- D. Biconditional

Which statement is true?

- A. The diagonals of a rhombus are congruent and 10 is a prime number.
- B. The diagonals of a rhombus are congruent or 10 is a prime number.
- C. The diagonals of a rhombus are not congruent and 10 is not a prime number.
- D. The diagonals of a rhombus are congruent and 10 is not a prime number.

Statement X: "If two circles are congruent, then their diameters are congruent."

Statement Y: "If the diameters of two circles are congruent, then the circles are congruent."

Statement Y is the -

- A. Inverse
- B. Converse
- C. Contrapositive
- D. Biconditional

Identify the property that justifies each statement.

2. If $\angle ABC \cong \angle DEF$, then $\angle DEF \cong \angle ABC$.

Symmetric prop. of \cong

3. $\angle 1 \cong \angle 2$ and $\angle 2 \cong \angle 3$, so $\angle 1 \cong \angle 3$.

Transitive prop.

4. If $FG = HJ$, then $HJ = FG$.

Symmetric prop. of =

5. $\overline{WX} \cong \overline{WX}$

Reflexive

Write a justification for each step.

6. $CE = CD + DE$

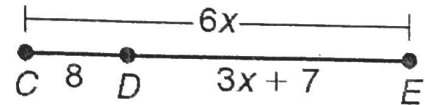
$6x = 8 + (3x + 7)$

$6x = 15 + 3x$

$3x = 15$

$x = 5$

Segment Add. Post
Substitution
simplify / combine like terms
subtraction POE
Division POE



7. $m\angle PQR = m\angle PQS + m\angle SQR$

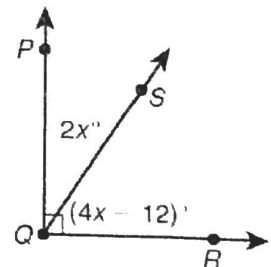
$90^\circ = 2x^\circ + (4x - 12)^\circ$

$90 = 6x - 12$

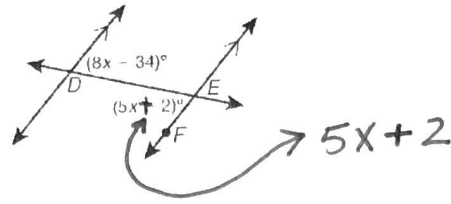
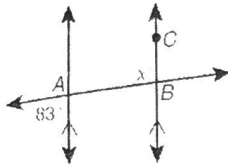
$102 = 6x$

$17 = x$

Angle Add Post.
Substitution
Simplify / combine like terms
Addition POE
Division POE



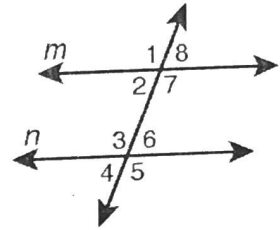
ch angle measure.



8. $m\angle ABC = 97^\circ$

9. $m\angle DEF = 62^\circ$

Use the figure for Exercises 15-18. Tell whether lines m and n must be parallel from the given information. If they are, state your reasoning. (Hint: The angle measures may change for each exercise, and the figure is for reference only.)



10. $\angle 7 \cong \angle 3$

11. $m\angle 3 = (15x + 22)^\circ$, $m\angle 1 = (19x - 10)^\circ$, $x = 8$

Converse of Alt. Int. \angle 's Thm Converse of corresponding \angle 's Thm.

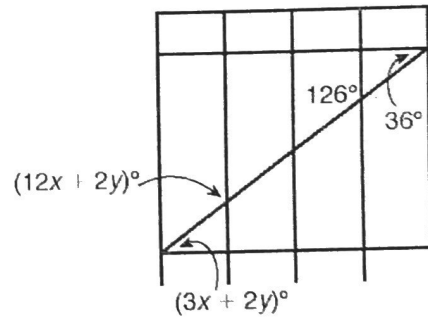
12. $\angle 7 \cong \angle 6$

13. $m\angle 8 = (6x - 1)^\circ$, $m\angle 4 = (5x + 3)^\circ$, $x = 9$

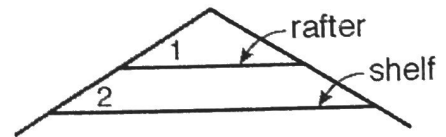
* only if they are suppl's not parallel

14. In the diagram of the gate, the horizontal bars are parallel and the vertical bars are parallel. Find x and y .

$x = 10$ $y = 3$



15. A bedroom has sloping ceilings as shown. Marcel is hanging a shelf below a rafter. If $m\angle 1 = (8x - 1)^\circ$, $m\angle 2 = (6x + 7)^\circ$, and $x = 4$, show that the shelf is parallel to the rafter above it.



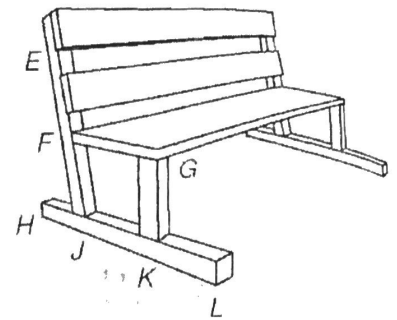
$m\angle 1 = 31^\circ$, $m\angle 2 = 31^\circ$, converse of corr. \angle 's thm.

16. For two parallel lines and a transversal, $m\angle 1 = 83^\circ$. For which pair of angle measures is the sum the least

- A) $\angle 1$ and corresponding angle
- B) $\angle 1$ and a same-side interior angle
- C) $\angle 1$ and its supplement
- D) $\angle 1$ and its complement

Choose the best answer.

17. In the bench, $m\angle EFG = (4n + 16)^\circ$, $m\angle FJL = (3n + 40)^\circ$, $m\angle GKL = (3n + 22)^\circ$, and $n = 24$. Which is a true statement?

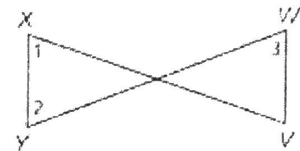


- A) $\overline{FG} \parallel \overline{HK}$ by the Converse of the Corr. \sphericalangle Post.
- B) $\overline{FG} \parallel \overline{HK}$ by the Converse of the Alt. Int. \sphericalangle Thm.
- C) $\overline{EJ} \parallel \overline{GK}$ by the Converse of the Corr. \sphericalangle Post.
- D) $\overline{EJ} \parallel \overline{GK}$ by the Converse of the Alt. Int. \sphericalangle Thm.

18. Complete the following two-column proof (Number of steps will vary)

Given: $\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 1$

Prove: $\overline{XY} \parallel \overline{WV}$

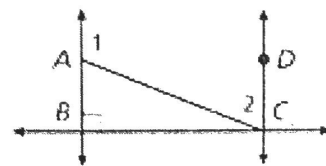


Statements	Reasons
$\angle 1 \cong \angle 2$, $\angle 3 \cong \angle 1$	Given (these can be written as two different statements or one)
$\angle 2 \cong \angle 3$	Substitution or Transitive Prop
$\overline{XY} \parallel \overline{WV}$	Converse of Alt. Int. \sphericalangle 's Thm.

19. Complete the following two-column proof

Given: $\overline{AB} \perp \overline{BC}$, $m\angle 1 + m\angle 2 = 180^\circ$

Prove: $\overline{BC} \perp \overline{CD}$



Statements	Reasons
1. $\overline{AB} \perp \overline{BC}$	1. Given
2. $m\angle 1 + m\angle 2 = 180^\circ$	2. Given
3. $\angle 1$ and $\angle 2$ are supp.	3. Def of Supplementary
4. $\overline{AB} \parallel \overline{CD}$	4. Converse of Same Side Int. \sphericalangle 's Theorem
5. $\overline{BC} \perp \overline{CD}$	5. Corresponding \sphericalangle 's Thm