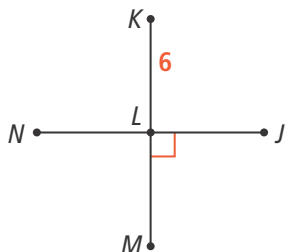




UNDERSTAND

- 11. Construct Arguments** Write an indirect proof for this conditional statement about the given figure

If $\overline{NJ}$ is the perpendicular bisector of $\overline{KM}$, then $LM = 6$.

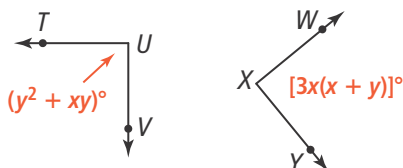


- 12. Higher Order Thinking** Write an indirect proof about the given conditional using either contradiction or contrapositive. What is an advantage of the method you chose?

Given that x is a whole number, if x and $3x$ are both less than 10, then $x \leq 3$.

- 13. Mathematical Connections** Write a proof by contrapositive to prove the following conditional about the figures.

If $\angle TUV \cong \angle WXY$, then $x \neq y$.



- 14. Error Analysis** Consider the conditional, "If x^2 is even, then x is even." Anna uses the contrapositive to prove the conditional. What is Anna's error?

Assume x is even. Then x can be written in the form $2k$, where k is an integer. Substitute this into x^2 to get $(2k)^2$, or $4k^2$. This expression can be written in the form $2m$, where m is an integer, which proves x^2 is even. **X**

PRACTICE

Use indirect reasoning to draw a conclusion in each situation. SEE EXAMPLE 1

- 15.** Every student in Mr. Green's 2nd period class got an A on the math test. Paige got a B on the test.
- 16.** Only students who studied at least 3 hours for the history test got an A on it. Derek studied 2 hours for the test.

Write the first step of an indirect proof of each statement. SEE EXAMPLE 2

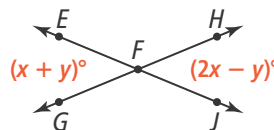
- 17.** $ST + TU + UV = 150$
- 18.** Ray DE is the angle bisector of $\angle ADC$.

Identify the two statements that contradict each other in each set. SEE EXAMPLE 2

- 19.** I. $m\angle K + m\angle L = 150$
II. $m\angle K - m\angle L = 20$
III. $m\angle K = 180$
- 20.** I. $\angle S$ is an acute angle.
II. $m\angle S = 80$
III. $m\angle S + m\angle T = 40$

21. Write an indirect proof for the following conditional about the figure. SEE EXAMPLE 2

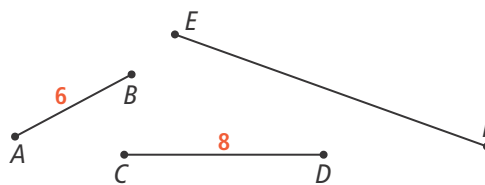
If $\angle EFG$ and $\angle HFJ$ are vertical angles, then $x \neq 3y$.



22. Write a proof of the contrapositive to prove the following conditional about the figures.

SEE EXAMPLE 3

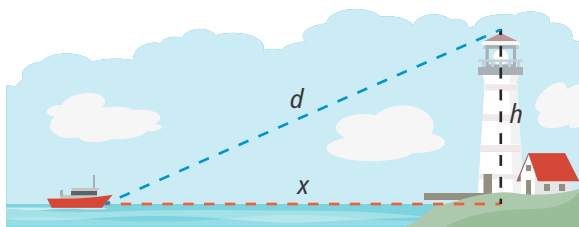
If $AB + CD = EF$, then $EF = 14$.





APPLY

23. **Model With Mathematics** The lighthouse forms a right angle with the path of the boat.



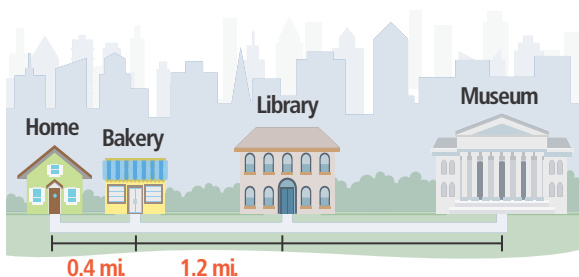
- Write an equation relating h , d , and x .
- Write an indirect proof of the statement by proving the contrapositive.

If x decreases, then d decreases.

24. **Reason** Friends eat the entire 6 slices of a pie. No slices are shared. Prove the following conditional by proving the contrapositive for the conditional.

If four friends share the pie, then at most two of the friends will have more than one slice of pie each.

25. **Reason** The library is at the midpoint between Nicky's home and the museum.



Nicky begins at her home and walks toward the museum. Write an indirect proof for this conditional: When she gets to the library, she will have less than 2 miles left to go.



ASSESSMENT PRACTICE

26. Does this pair of statements contradict each other? Explain.

$\angle P$ and $\angle Q$ are both obtuse angles.

$\angle P$ and $\angle Q$ are supplementary.

27. **SAT/ACT** If you write a proof of the following conditional by proving the contrapositive, what should your assumption be?

If $\overrightarrow{JK}$ is the angle bisector of $\angle HJL$, then $m\angle HJK + m\angle KJL = 90$.

Ⓐ $\overrightarrow{JK}$ is the angle bisector of $\angle HJL$.

Ⓑ $\overrightarrow{JK}$ is not the angle bisector of $\angle HJL$.

Ⓒ $m\angle HJK + m\angle KJL = 90$

Ⓓ $m\angle HJK + m\angle KJL \neq 90$

28. **Performance Task** Customers who eat lunch at a diner have the following meal choices:



Part A Write an indirect proof of the following conditional.

If a customer chooses a meal with a banana, then the customer also has a cheese sandwich.

Part B Write another conditional statement related to which meal a customer has at the diner. Then write an indirect proof of your conditional statement.