

Name Key

○ Rewrite the conditional statement in if-then form.

1. It is time for dinner if it is 6 P.M. *If it is 6 P.M., then it is time for dinner*
2. There are 12 eggs if the carton is full. *If the carton is full, then there are twelve eggs*
3. An obtuse angle is an angle that measures more than  $90^\circ$  and less than  $180^\circ$ .

*If an angle is obtuse, then its measure is more than  $90^\circ$  and less than  $180^\circ$*

Write the converse, inverse, and contrapositive of each statement.

4. If you like hockey, then you go to the hockey game.  
*If you go to the hockey game, then you like hockey.*  
*If you don't like hockey, then you don't go to the hockey game.*  
*If you don't go to the hockey game, then you don't like hockey.*
5. If  $x$  is odd, then  $3x$  is odd.  
*If  $3x$  is odd, then  $x$  is odd.*  
*If  $x$  is not odd, then  $3x$  is not odd.*  
*If  $3x$  is not odd, then  $x$  is not odd.*

Decide whether the statement is true or false. If false, provide a counterexample.

6. The equation  $4x - 3 = 12 + 2x$  has exactly one solution. *True*
7. If  $x^2 = 36$ , then  $x$  must equal 18 or  $-18$ . *False, 6 or -6*
8. If  $m\angle A = 122^\circ$ , then the measure of the supplement of  $\angle A$  is  $58^\circ$ . *True*

Write the converse of each true statement. Tell whether the converse is true or false.

9. If an angle measures  $30^\circ$ , then it is acute.  
*If an angle is acute, then its measure is  $30^\circ$ . False*
10. If two angles are supplementary, then their sum is  $180^\circ$ .  
*If the sum of two angles measures is  $180^\circ$ , then the angles are supplementary*
11. If two circles have the same diameter, then they have the same circumference. *True*  
*If two circles have the same circumference, then they have the same diameter*

Decide whether the statement is a valid definition. *True*

12. If a number is divisible by 2 and 3, then it is divisible by 6. *Valid*
13. If two angles have the same measure, then they are congruent. *Valid*
14. If two angles are not adjacent, then they are vertical angles. *Invalid*

If possible, make a conclusion using either the Law of Detachment or the Law of Syllogism. If you make a conclusion, state which law was used. If you cannot make a conclusion, write "no conclusion".

15. If an angle measures more than  $90^\circ$ , then it is not acute.

$$m\angle ABC = 120^\circ$$

$\angle ABC$  is not acute.

Law of Detachment

16. All  $45^\circ$  angles are congruent.

$$\angle A \cong \angle B$$

NO CONCLUSION

17. If you order the apple pie, then it will be served with ice cream.

Matthew ordered the apple pie.

Matthew will be served ice cream.

Law of Detachment

18. If you wear the school colors, then you have school spirit.

If you have school spirit, then the team feels great.

Law of Syllogism

If you wear the school colors,  
then the team feels great.

19. If you eat too much turkey, then you will get sick.

Kinsley got sick.

NO CONCLUSION

20. If  $\angle 2$  is acute, then  $\angle 3$  is obtuse.

If  $\angle 3$  is obtuse, then  $\angle 4$  is acute.

If  $\angle 2$  is acute, then  $\angle 4$   
is acute.

Law of Syllogism

In Exercises 21 and 22, state whether the argument is valid. Explain your reasoning.

21. Jeff knows that if he does not do his chores in the morning, he will not be allowed to play video games later the same day. Jeff does not play video games on Saturday afternoon. So Jeff did not do his chores on Saturday morning.

Invalid

Jeff could have not played video games for many reasons. We do not know that he didn't do his chores.

22. Katie knows that all sophomores take driver education in her school. Brandon takes driver education. So Brandon is a sophomore.

Invalid

Katie knows that all sophomores take drivers education. we don't know that only sophomores can take drivers ed, though. We can't say for certain that Brandon is a Sophomore.

In Exercises 23-26, use the true statements below to determine whether you know the conclusion is *true* or *false*. Explain your reasoning.

If Dan goes shopping, then he will buy a pretzel.

If the mall is open, then Jodi and Dan will go shopping.

If Jodi goes shopping, then she will buy a pizza.

The mall is open.

23. Dan bought a pizza. *False*. We know they went shopping and that Dan bought a pretzel.  
 24. Jodi and Dan went shopping. *True*, the mall was open, therefore they went shopping.  
 25. Jodi bought a pizza. *True*, mall was open, she went shopping, and bought a pizza.  
 26. Jodi had some of Dan's pretzel. *False*. We don't know whether or not Jodi ate any of Dan's pretzel.

Use the diagram to state and write out the postulate that verifies the truth of the statement.

27. The points  $E$ ,  $F$ , and  $H$  lie in a plane (labeled  $R$ ).

Postulate 8: Through any 3 noncollinear points there is exactly one plane.

28. The points  $E$  and  $F$  lie on a line (labeled  $m$ ).

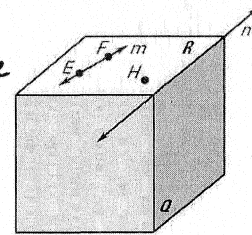
Postulate 5: Through any two points, there exists exactly one line.

29. The planes  $Q$  and  $R$  intersect in a line (labeled  $n$ ).

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

30. The points  $E$  and  $F$  lie in a plane  $R$ . Therefore, line  $m$  lies in plane  $R$ .

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



In Exercises 31-38, use the diagram to determine if the statement is *true* or *false*.

31. Points  $A$ ,  $B$ ,  $D$ , and  $J$  are coplanar. *True*

32.  $\angle EBA$  is a right angle. *False*

33. Points  $E$ ,  $G$ , and  $A$  are collinear. *False*

34.  $\overleftrightarrow{FG} \perp$  plane  $H$  *False*

35.  $\angle ABD$  and  $\angle EBC$  are vertical angles. *True*

36. Planes  $H$  and  $K$  intersect at  $\overleftrightarrow{AB}$ . *True*

37.  $\overleftrightarrow{FG}$  and  $\overleftrightarrow{DE}$  intersect. *False*

38.  $\angle GCA$  and  $\angle CBD$  are congruent angles. *False*

