NAME ______________________________ DATE ____________

Challenge: Skills and Applications

For use with pages 71–78

Find the inverse, converse, and contrapositive of the statement. (You may need to rewrite the statement in if-then form first.)

1. If a bicycle is red, then it has two seats.
2. If a thopfoo can make a pucho, then all gorups are purple.
3. A student who enjoys mathematics certainly must have a logical mind.
4. All citizens of the Regal Kingdom have blue hair.

Tell whether the statement is *true* or *false*, state the converse of the statement, and tell whether the converse is *true* or *false*. If either is false, give a counterexample.

5. If a positive integer is divisible by 15, then it is divisible by both 3 and 5.
6. If a positive integer is divisible by both 2 and 3, then it is divisible by 12.
7. For an integer n, if n^2 is divisible by 3, then n is divisible by 3.
8. For an integer n, if n^2 is divisible by 4, then n is divisible by 4.

Tell whether the statement is *true* or *false*. Explain your answer.

9. The intersection of any two planes is a line.
10. Through any two points there exists exactly one plane.
11. A plane contains of at least three points.
12. If three points lie in a plane, the points are noncollinear.

In Exercises 13–18, let *a* and *b* be two intersecting lines that intersect at point *X*.

13. Make a conjecture about the number of planes that contain both a and b.
14. Which postulate allows you to state that there is a point Y, distinct from X, on line a, and a point Z, distinct from X, on line b?
15. Which postulate guarantees that point Y is not on line b?
16. Which postulate allows you to conclude that there is exactly one plane P that contains points X, Y, and Z?
17. Which postulate guarantees that lines a and b are contained in plane P?
18. Was the conjecture you made in Exercise 13 correct?