NAME_____**DATE**_____**PER.**_____

2.2 BICONDITIONALS & REASONING

Write the conditional statement and converse within each biconditional.

1. Conditional: Converse:	Perry can paint the entire living room if and only if he has enough paint.
2. Conditional: Converse:	Three points are coplanar if and only if they lie in the same plane.
3. Conditional: Converse:	A lunar eclipse occurs if and only if Earth is between the sun and the moon.

For each conditional statement below, write the converse and a biconditional statement.

4. Converse: Biconditional:	If a student is a sophomore, then the student is in the tenth grade.
5. Converse: Biconditional:	If Greg has the fastest time, then he wins the race.

Write each definition as a biconditional.

6.	Parallel lines are two coplanar lines that never intersect.
7.	A circle is the set of all points in a plane that are a fixed distance from a given point.

Determine if each biconditional is true. If false, give a counterexample.

8. TRUE or FALSE Counterexample:	$xy = 0 \leftrightarrow x = 0$ or $y = 0$
9. TRUE or FALSE Counterexample:	Felipe is a swimmer if and only if he is an athlete.

Find the next item in each pattern.

10. March, May, July, …
11. $\mathbf{75}, \mathbf{64}, \mathbf{53}, \ldots$

Complete each conjecture.

12. The product of two negative numbers is _____.
13. The sum of the angles in a linear pair is _____.

Make a conjecture about each pattern. Write the next two items.

14. $2, 4, 16, \ldots$	Conjecture:
15. $-3, 6, -9, 12, \ldots$	Conjecture:

Show that each conjecture is false by finding a counterexample.

16. Counterexample:	Kennedy is the youngest U.S. president to be inaugurated.
17. Counterexample:	Three points on a plane always form a triangle.
18. Counterexample:	For any real number x, if $x^2 \geq 1$, then $x \geq 1$.
19. Counterexample:	Every pair of supplementary angles includes one obtuse angle.

Determine if each conjecture is true. If not, write or draw a counterexample.

20. TRUE or FALSE Counterexample:	Points $X, Y,$ and Z are coplanar.
21. TRUE or FALSE Counterexample:	If n is an integer, then $-n$ is positive.
22. TRUE or FALSE Counterexample:	In a triangle with one right angle, two of the sides are congruent.

Determine whether each conclusion uses inductive or deductive reasoning.

23.	At Bell High School, students must take Biology before they take Chemistry. Sam is in Chemistry, so Marcia concludes that he has taken Biology.
24.	The sum of the angle measures of a triangle is $180°$. Two angles of a triangle measure $40°$ and $60°$, so Kandy concludes that the third angle measures $80°$.
25.	All of the students in Henry's Geometry class are juniors. Alex takes Geometry but has another teacher. Henry concludes that Alex is also a junior.