

## Conditionals Extra Practice Drill #1

*Instructions: Symbolize the following rules. Be sure to symbolize contrapositives as well.*

*Each rule includes an indication as to what kind of game it is associated with. Ordering games consist solely of ordered spots. Binary games consist solely of two groups, one of which should be considered the “yes” group, with the other as the “no” group. Grouping games consist of more than two groups. Hybrid games consist of both ordered spots and an excluded (or “no”) group.*

1. If F is hired in marketing, then G is hired in safety. (Binary game)
2. H is not transferred, unless J is promoted. (Grouping Game)
3. If K presents any project, L and M do also, all of L's preceding any of M's. (Hybrid game)
4. Nation N exports textiles if, but only if, Nation O does also. (Grouping game)
5. If P is added first, then Q is added at some time before R. (Ordering game)
6. If S is repaired, T is repaired. (Binary game)
7. If the store carries U, then it carries V or W or both. (Binary game)
8. If X is paid on Monday, Y must be paid on Tuesday. (Binary game)
9. F performs third only if G performs fifth. (Ordering game)
10. If P visits the factory, then Q and R both visit the headquarters. (Grouping game)
11. If L immediately precedes M, then N does not immediately precede L. (Ordering game)
12. If O is selected, P is also selected. (Binary game)
13. If Q is refilled, neither S nor T is refilled. (Binary game)
14. If he selects one or more W, then she does not select any X. (Binary game)
15. If more than one Y is selected, then at most one Z is selected. (Binary game)
16. Either F or G must be selected, but F and G cannot both be selected. (Binary game)
17. If H is performed on the ocarina, then J is performed on the kazoo. (Grouping game)
18. K cannot be played fifth unless L is played first. (Ordering game)
19. Dave will only ride in either cabin 2 or cabin 3. (Grouping game)
20. If P is reduced, L is not reduced. (Binary Game)

**Answers:**

1.  $F \rightarrow \sim G$   
 $G \rightarrow \sim F$   
(Assuming marketing is the “yes” group)

2.  $\sim J_P \rightarrow \sim H_T$   
 $H_T \rightarrow J_P$

3.  $K \rightarrow L \text{---} M$   
 $\sim L \text{ OR } \sim M \text{ OR } M \text{---} L \rightarrow \sim K$

4.  $N_T \rightarrow O_T$   
 $\sim O_T \rightarrow \sim N_T$   
 $O_T \rightarrow N_T$   
 $\sim N_T \rightarrow \sim O_T$   
 (“If and only if” is like two conditionals combined. You could also use an NO block that applies only to the textile group.)

5.  $P_1 \rightarrow Q \text{---} R$   
 $R \text{---} R \rightarrow \sim P_1$

6.  $S \rightarrow T$   
 $\sim T \rightarrow \sim S$

7.  $U \rightarrow V \text{ OR } W$   
 $\sim V \text{ AND } \sim W \rightarrow \sim U$   
(The “or” already accounts for the possibility of both)

8.  $X \rightarrow \sim Y$   
 $Y \rightarrow \sim X$   
(Assuming that Monday is the “yes” group)

9.  $F_3 \rightarrow G_5$   
 $\sim G_5 \rightarrow \sim F_3$

10.  $P_F \rightarrow Q_H \text{ AND } R_H$   
 $\sim Q_H \text{ OR } \sim R_H \rightarrow \sim P_F$

11.  $\boxed{LM} \rightarrow \boxed{\cancel{NL}}$   
 $\boxed{NL} \rightarrow \boxed{LM}$

12.  $O \rightarrow P$   
 $\sim P \rightarrow \sim O$

13.  $Q \rightarrow \sim S \text{ AND } \sim T$   
 $T \text{ OR } S \rightarrow \sim Q$

14.  $1^+W \rightarrow \sim X$   
 $X \rightarrow \sim W$   
(Where  $1^+$  means “one or more”)

15.  $2^+Y \rightarrow 1^-Z$   
 $2^+Z \rightarrow 1^-Y$   
(Where  $1^-$  means “one or fewer”)

16.  $F \rightarrow \sim G$   
 $G \rightarrow \sim F$   
 $\sim F \rightarrow G$   
 $\sim G \rightarrow F$   
(A better symbol would be a barbell across the two groups or an antiblock showing that F and G must be separated)

17.  $H_O \rightarrow J_K$   
 $\sim J_K \rightarrow \sim H_O$

18.  $\sim L_1 \rightarrow \sim K_5$   
 $K_5 \rightarrow L_1$

19.  $\sim D_2 \rightarrow D_3$   
 $\sim D_3 \rightarrow D_2$   
(A barbell would also work)

20.  $P \rightarrow \sim L$   
 $L \rightarrow \sim P$