**1.** In the movie, *Field of Dreams*, a voice from the sky says, “If you build it, he will come.” The movie is referring to the main character and if he builds a baseball field, then the ghost of a baseball player will come and play on it.

The quote from the movie is a conditional statement. Conditional statements use the connective, ***if…then***.

Using **p** and **q** as our statements, the compound statement **“if p then q”**, means

**“p implies q”**

We write it in symbol form as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*“If”* is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and *“then”* is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

🞽 The words after **“IF”** give a condition the makes the statement after **“THEN”** to be true. This does not mean it is a cause and effect situation. For example,

If I pass this math class, then the sun will rise the next day.

In general, **“IF”** a condition is met, **“THEN”** this statement becomes is true.

In everyday language, we speak in conditional statements all the time, however, sometimes we use *if…then* and sometimes we do not. Sometimes the connective is “hidden” in everyday expressions or statements.

**EXAMPLE:** Rewrite the following statements as a conditional statement using ***if…then***. Rearrange the words and add words if needed but keep the same meaning of the original statement.

1. All Marines love boot camp. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. Big girls don’t cry. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Doing my homework will help me pass math class. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. Texting during class might cause me to fail math class. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

5. It’s hard to study when I’m distracted. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2.** ***If…then***

Find the truth value, ***T*** or ***F***, of compound statements using the connective, ***if…then***. Let’s use ordinary language and statements to create the rules for finding truth values. Then we will write the rule in symbol form.

***If…then*** **(🡒)** is a connective that **“*implies*”**, “**IF**” a condition is met, “**THEN**” this statement is true.

**For example**, “If it rains then the ballgame will be cancelled.” The weather is the condition for the ball game happening or not.

**EXAMPLE:** “If I get paid, then I will give you twenty dollars.” This statement implies that you get twenty dollars depending on the condition of me getting paid.

***p*** = If I get paid (the condition)

***q*** = then I will give you twenty dollars (the consequence or maybe a promise)

|  |  |
| --- | --- |
| p q | p 🡒 q |
| paid? give $ | If I get paid, I give money |

Truth Table RULE for **IF…THEN**

|  |  |
| --- | --- |
| p q | p 🡒 q |
|  |  |

🞽If…then has “order”, left to right because of the arrow pointing left to right.

**EXAMPLE:** If ***p* and *r* are a false** statement and ***q* is a true** statement, find the truth value for the given compound statements.

1. ~r 🡒 q =
2. q 🡒 p =
3. ~p 🡒 (q ∧ r) =

**TRUTH TABLES:**

1. Draw a basic table
2. *p* and *q* are the statements and go on the left side of the table.

🞽 You need to know how many basic combinations of TRUE and FALSE will be in your truth table (left side/column). In other words, how many rows are in the truth table? Use the same formula from Chapter 2, when we looked for the number of subsets created from one given set: 2n where n was the number of elements in a set. Now n will be the number of statements.

The formula: \_\_\_\_\_\_\_\_\_\_\_\_\_ How many rows? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. In many mathematical problems, sometimes you have several steps to get to the final answer. Create a column for each step, the last column being your final answer.
2. We solve math problems using Order of Operations, so you must fill in truth tables in a particular order, too:

Parentheses

Not

And, Or, If…Then

1. Refer back the basic truth table rules to follow the pattern and find your answers.

**EXAMPLE:** Using the four basic truth table rules, (rules for and, or, not, if…then) construct and complete a truth table for the following compound statements:

1. ~ q 🡒 p
2. (p **∨** q) 🡒 (q **∨** p)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is when the last column (final answer) in a truth table has all TRUE values

1. (~ p 🡒 q) 🡒 p