

Questions on lesson 2.1 so far?

Look over Lesson 2.1's homework,  
we will be taking our content  
mastery quiz soon!

## Content Mastery Quiz #5 - Lesson 2.1 day 1

**\*\*Show ALL work to receive full points\*\***

You hear from your teacher that spending too much time in the sun without sunblock increases the risk of skin cancer. Your friend Susan spends as much time as she can outside working on her tan without sunscreen, so you tell her that she is increasing her risk of skin cancer when she is older.

- 1) What is the conclusion for the above situation?
- 2) Is this an example of induction or deduction?



**PG.127 IN YOUR BOOK**

**PROBLEM 4 Why Is This False?**

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There are two reasons why a conclusion may be false. Either the assumed information is false, or the argument is not valid.



1. Derek tells his little brother that it will not rain for the next 30 days because he "knows everything." Why is this conclusion false?

To show that a statement is false, you can provide a *counterexample*. A *counterexample* is a specific example that shows that a general statement is not true.

5. Provide a counterexample for each of these statements to demonstrate that they are not true.

- a. All prime numbers are odd.

2, 3, 5, 7, 11, ...

2 is a counterexample.

# 2.1

## A Little Dash of Logic Foundations for Proof

DAY 2

PG.128 IN YOUR BOOK

### PROBLEM 5 You Can't Handle the Truth Value



A **conditional statement** is a statement that can be written in the form "If  $p$ , then  $q$ ." This form is the **propositional form** of a conditional statement. It can also be written using symbols as  $p \rightarrow q$ , which is read as " $p$  implies  $q$ ." The variables  $p$  and  $q$  are **propositional variables**. The **hypothesis** of a conditional statement is the variable  $p$ . The **conclusion** of a conditional statement is the variable  $q$ .

The **truth value** of a conditional statement is whether the statement is true or false. If a conditional statement could be true, then the truth value of the statement is considered true. The truth value of a conditional statement is either true or false, but not both.

In this case,  $p$  and  $q$  represent statements, not numbers.



You can identify the hypothesis and conclusion from a conditional statement.

**Conditional Statement**

If  $x^2 = 36$ , then  $x = 6$  or  $x = -6$ .

**Hypothesis of the Conditional Statement**

$x^2 = 36$

**Conclusion of the Conditional Statement**

$x = 6$  or  $x = -6$ .

Consider the conditional statement: If the measure of an angle is  $32^\circ$ , then the angle is acute.

hypothesis  $p$

conclusion  $q$

1. What is the hypothesis  $p$ ?

2. What is the conclusion  $q$ ?

**PG.128 IN YOUR BOOK**

3. If  $p$  is true and  $q$  is true, then the truth value of a conditional statement is true.
- a. What does the phrase "If  $p$  is true" mean in terms of the conditional statement?

the angle is  $32^\circ$

- b. What does the phrase "If  $q$  is true" mean in terms of the conditional statement?

the angle is acute

- c. Explain why the truth value of the conditional statement is true if both  $p$  and  $q$  are true.

If we have an angle that is  $32^\circ$  it is acute by definition of acute angle.

**TAKE 5 MINS TO WORK ON PG.129**



**PG.130 IN YOUR BOOK**

A **truth table** is a table that summarizes all possible truth values for a conditional statement  $p \rightarrow q$ . The first two columns of a truth table represent all possible truth values for the propositional variables  $p$  and  $q$ . The last column represents the truth value of the conditional statement  $p \rightarrow q$ .

The truth values for the conditional statement "If the measure of an angle is  $32^\circ$ , then the angle is acute" is shown.

The truth value of the conditional statement  $p \rightarrow q$  is determined by the truth value of  $p$  and the truth value of  $q$ .

- If  $p$  is true and  $q$  is true, then  $p \rightarrow q$  is true.
- If  $p$  is true and  $q$  is false, then  $p \rightarrow q$  is false.
- If  $p$  is false and  $q$  is true, then  $p \rightarrow q$  is true.
- If  $p$  is false and  $q$  is false, then  $p \rightarrow q$  is true.

$p$	$q$	$p \rightarrow q$
F	T	T
T	F	F
F	T	T
F	F	T

$p$	$q$	$p \rightarrow q$
the measure of an angle is $32^\circ$	the angle is acute	If the measure of an angle is $32^\circ$ , then the angle is acute.
T	T	T
T	F	F
F	T	T
F	F	T

7. Consider the conditional statement: If  $m\overline{AB} = 6$  inches and  $m\overline{BC} = 6$  inches, then  $\overline{AB} \cong \overline{BC}$ .
- What is the hypothesis  $p$ ?
  - What is the conclusion  $q$ ?
  - If both  $p$  and  $q$  are true, what does that mean? What is the truth value of the conditional statement if both  $p$  and  $q$  are true?

PG.132 IN YOUR BOOK

**PROBLEM 6** Rewriting Conditional Statements

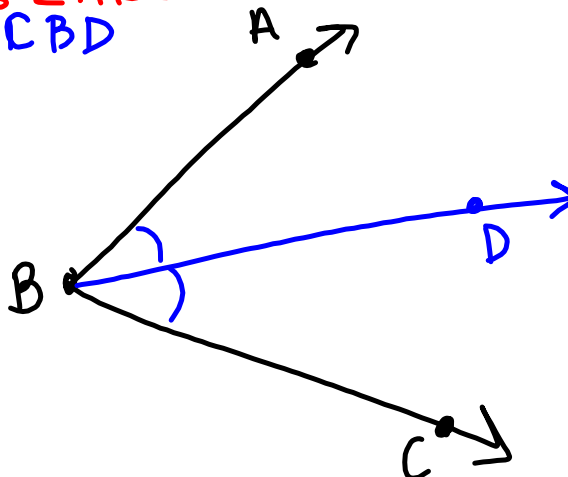


For each conditional statement, draw a diagram and then write the hypothesis as the "Given" and the conclusion as the "Prove."

1. If  $\overrightarrow{BD}$  bisects  $\angle ABC$ , then  $\angle ABD \cong \angle CBD$ .

Given:  $\overrightarrow{BD}$  bisects  $\angle ABC$

Prove:  $\angle ABD \cong \angle CBD$



## 2.2

# And Now From a New Angle

## Special Angles and Postulates

PG. 136-7 IN YOUR BOOK

Two angles are **supplementary angles** if the sum of their angle measures is equal to  $180^\circ$ .

Complementary  
angles that share a  
side form a right  
angle.



Supplementary  
angles that share a  
side form a straight line,  
or a straight angle.



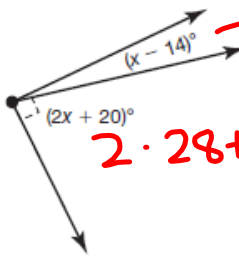
Two angles are **complementary angles** if the sum of their angle measures is equal to  $90^\circ$ .



PG. 139 IN YOUR BOOK

Determine the angle measures in each diagram.

a.



$\rightarrow 28 - 14 = 14^\circ$   
 $2 \cdot 28 + 20 = 76^\circ$

$$90 = (x - 14) + (2x + 20)$$

$$90 = x + 14 + 2x + 20$$

$$90 = 3x + 34$$

$$\begin{array}{r} -34 \\ \hline 56 = 3x \\ \hline 18.67 = x \end{array}$$

$28 = x$

PG. 140 IN YOUR BOOK

**PROBLEM 2** Angle Relationships



You have learned that angles can be supplementary or complementary. Let's explore other angle relationships.

<p><math>\angle 1</math> and <math>\angle 2</math> are adjacent angles.</p>	<p><math>\angle 5</math> and <math>\angle 6</math> are <i>not</i> adjacent angles.</p>
<p><math>\angle 3</math> and <math>\angle 4</math> are adjacent angles.</p>	<p><math>\angle 7</math> and <math>\angle 8</math> are <i>not</i> adjacent angles.</p>

### PG. 142 IN YOUR BOOK

$\angle 1$  and  $\angle 2$  form a linear pair.       $\angle 5$  and  $\angle 6$  do *not* form a linear pair.

$\angle 3$  and  $\angle 4$  form a linear pair.       $\angle 7$  and  $\angle 8$  do *not* form a linear pair.

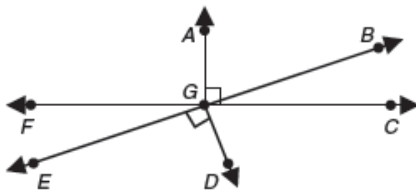
### PG. 144 IN YOUR BOOK

$\angle 1$  and  $\angle 2$  are vertical angles.       $\angle 5$  and  $\angle 6$  are *not* vertical angles.

$\angle 3$  and  $\angle 4$  are vertical angles.       $\angle 7$  and  $\angle 8$  are *not* vertical angles.

NOT IN YOUR BOOK

8. Identify each of the following in the figure.



a. Name two pairs of complementary angles.

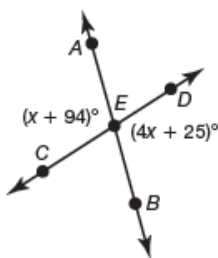
b. Name six pairs of supplementary angles.

c. Name four pairs of angles that form linear pairs.

d. Name two pairs of vertical angles.

## PG. 146 IN YOUR BOOK

4. Determine  $m\angle AED$ . Explain how you determined the angle measure.



Make sure to carefully read the name of the angle whose measure you want to know.

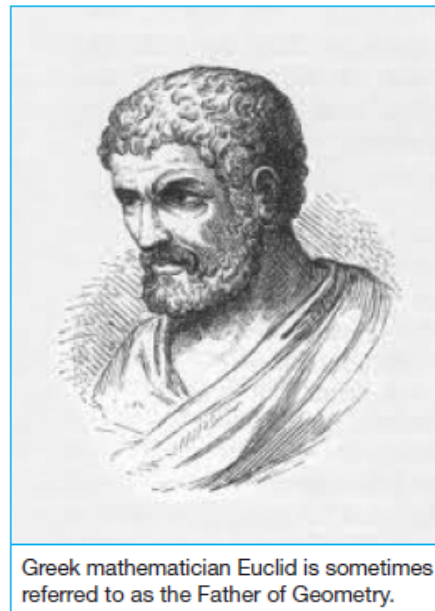


## PG. 148 IN YOUR BOOK

A **postulate** is a statement that is accepted without proof.

A **theorem** is a statement that can be proven.

*The Elements* is a book written by the Greek mathematician Euclid. He used a small number of undefined terms and postulates to systematically prove many theorems. As a result, Euclid was able to develop a complete system we now know as **Euclidean geometry**.



Greek mathematician Euclid is sometimes referred to as the Father of Geometry.

\*For each of these postulates, sketch a picture in your text, that is a question for your homework\*

PG. 150 IN YOUR BOOK

The **Linear Pair Postulate** states: "If two angles form a linear pair, then the angles are supplementary."

PG. 151 IN YOUR BOOK

The **Segment Addition Postulate** states: "If point  $B$  is on  $\overline{AC}$  and between points  $A$  and  $C$ , then  $AB + BC = AC$ ."

PG. 152 IN YOUR BOOK

The **Angle Addition Postulate** states: "If point  $D$  lies in the interior of  $\angle ABC$ , then  $m\angle ABD + m\angle DBC = m\angle ABC$ ."

Homework

Finish lesson 2.1 & 2.2