

4.7

Name (print first and last) \_\_\_\_\_ Per \_\_\_\_\_ Date: 12/2 due 12/4

4.7 Angles: Proving theorems we use

Geometry Regents 2013-2014 Ms. Lomac

SLO: I can write proofs about the theorems we have been using.

(1)  A **theorem** is a statement that can be proven. We have used the **theorems** below already. Describe what each one tells us. (use the notes pages from 4.2 and 4.5)

**triangle sum theorem** \_\_\_\_\_

**exterior angle theorem** \_\_\_\_\_

**vertical angles theorem** \_\_\_\_\_

**alternate interior angles theorem** \_\_\_\_\_

**alternate exterior angles theorem** \_\_\_\_\_

**same side interior angles theorem** \_\_\_\_\_

(2)  Today, we will prove some of theorems listed above. Sometimes it is good to think about where your proof is starting and where it will end. You must start at the top of the proof with the given and work your way to what you are trying to prove, HOWEVER, you may want to start at the end and think backwards about what facts can lead to the conclusion you are proving.

**PROVE:** If lines are parallel ( $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ ), then same side interior angles are supplementary (sum =  $180^\circ$ ).

**Given**

**Prove**

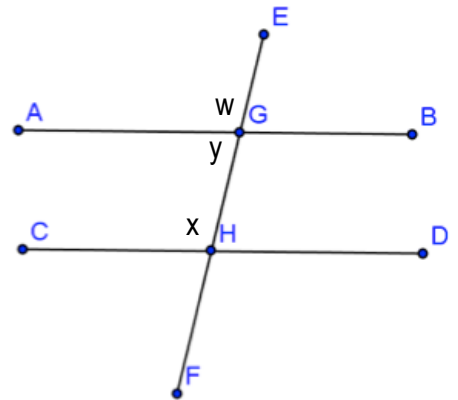
① The information that I am given is

② Because lines are parallel and  $\angle$  \_\_\_\_\_ and  $\angle$  \_\_\_\_\_ are \_\_\_\_\_ angles,  
I know that \_\_\_\_\_ = \_\_\_\_\_

③ From the diagram, I know that  $\angle$  \_\_\_\_\_ and  $\angle$  \_\_\_\_\_ are a \_\_\_\_\_  
\_\_\_\_\_ which means that \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_.

④ Because \_\_\_\_\_ = \_\_\_\_\_ and \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_  
I can substitution \_\_\_\_\_ in for \_\_\_\_\_ to say that \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_

⑤ Same side interior angles are supplementary when lines are parallel because \_\_\_\_\_ and \_\_\_\_\_ sum to 180  
and are \_\_\_\_\_ angles,



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(3)  Below is the same statement you proved in #1. This time, you choose the angles that you will use to prove the statement. Choose different angles than the angles used in #1.

**PROVE:** If lines are parallel ( $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$ ), then same side interior angles are supplementary (sum =  $180^\circ$ ).

① The information that I am given is \_\_\_\_\_  
\_\_\_\_\_

↓

② Because lines are parallel \_\_\_\_\_  
\_\_\_\_\_

↓

③ I know that \_\_\_\_\_  
\_\_\_\_\_

↓

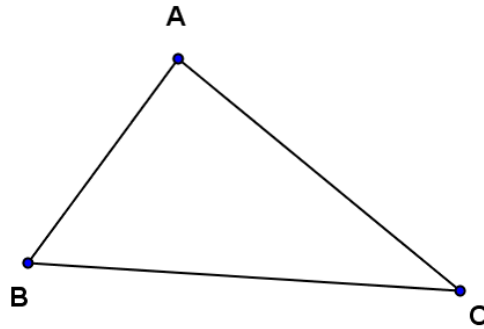
④ Because \_\_\_\_\_ and \_\_\_\_\_ then \_\_\_\_\_  
\_\_\_\_\_

↓

⑤ \_\_\_\_\_  
because \_\_\_\_\_ and \_\_\_\_\_

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(3) □ Use the triangle below to prove the triangle sum theorem. You will need to add an auxiliary line (label it QR) through point A that is parallel to  $\overline{BC}$ . Add the letters a,b,c,d, and e to the angles in the diagram. (See activity 4.4 #5 to help you with this proof.)



① I am given \_\_\_\_\_ and I added auxiliary line \_\_\_\_\_ that passes through point \_\_\_\_\_ and is \_\_\_\_\_ to  $\overline{BC}$

② \_\_\_\_\_ = \_\_\_\_\_ and \_\_\_\_\_ = \_\_\_\_\_ because they are \_\_\_\_\_ angle pairs and the lines are \_\_\_\_\_

③ \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_ because the three angles together form a \_\_\_\_\_ angle which is \_\_\_\_\_.

④ \_\_\_\_\_ + \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_ by substituting equivalent values from step 2 into the equation in step 3.

⑤ \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_ are the interior angles of a \_\_\_\_\_ AND their sum is \_\_\_\_\_.  
Therefore, the sum of the angles in a \_\_\_\_\_ is \_\_\_\_\_.

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(4)  Draw and label a diagram and complete the proof of the statement below.

Prove: *If two lines are perpendicular to the same line, they are parallel to each other.*

↴ **DIAGRAM** ↴

① In the diagram \_\_\_\_\_  $\perp$  \_\_\_\_\_ and \_\_\_\_\_  $\perp$  \_\_\_\_\_.  
*(label lines and points of intersection)*

②  $m\angle$  \_\_\_\_\_ = \_\_\_\_\_ because \_\_\_\_\_ is \_\_\_\_\_ to \_\_\_\_\_  
*(What does  $\perp$  mean?)*

③  $m\angle$  \_\_\_\_\_ = \_\_\_\_\_ because \_\_\_\_\_ is \_\_\_\_\_ to \_\_\_\_\_  
*(What does  $\perp$  mean? Does the angle you chose have a relationship with the 1<sup>st</sup> angle you chose so that you can show lines are parallel? If not, choose a different angle)*

④  $m\angle$  \_\_\_\_\_ =  $m\angle$  \_\_\_\_\_ because both \_\_\_\_\_ and \_\_\_\_\_ are \_\_\_\_\_ angles.  
*(If 2 angles have the same measure, can you say they are equal? Do you have two angles with the same measure?)*

⑤  $\angle$  \_\_\_\_\_ and  $\angle$  \_\_\_\_\_ are congruent \_\_\_\_\_ angles  
 which means that line \_\_\_\_\_ and line \_\_\_\_\_ are \_\_\_\_\_  
*(What angle relationship do you have and does it lead to parallel lines?)*

⑥ Starting with \_\_\_\_\_  
 led to the 2 lines being \_\_\_\_\_ to each other  
*(What angle relationship do you have and does it lead to parallel lines?)*

4.7 Exit Ticket Name \_\_\_\_\_ Per \_\_\_\_\_

Given that  $x = y$ , prove that  $AB \parallel EF$ .

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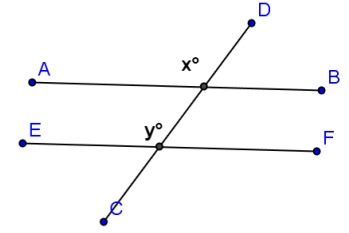
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- 😎 I got this! 🌟
- 😊 I can with a bit of help 🧑🏫
- 😊 I will, given lots of help 🧑🏫
- 😞 I can't 🧑🏫
- 😞 I won't bother to 🧑🏫
- 😞 I refuse to 🧑🏫



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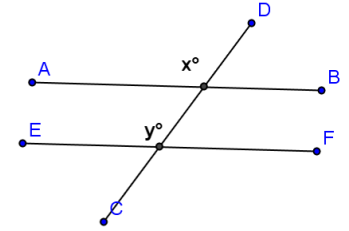
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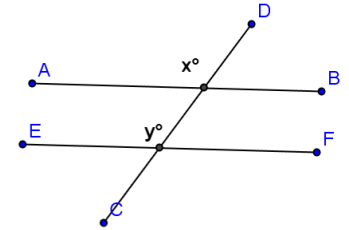
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