Parallel Lines Proportionality Theorems

1) Go to http://tube.geogebra.org/material/simple/id/3108761. A quick way to do this is simply to go to tube.geogebra.org and then type in the number **3108761** in the "Search Materials" bar.

2) Slide the first slider slowly all the way to the right. What can you conclude about the 3 lines?

3) As you moved the first slider, what transformation(s) took place with the pink angles?

4) Did this/these transformation(s) change the measure of this pink angle?

5) What theorem now justifies the fact that the top 2 lines are parallel? Write it out as a conditional ("if-then" statement).

6) What theorem now justifies the fact that the bottom 2 lines are parallel? Write it out as a conditional ("if-then" statement).

7) Now slide the 2nd (black) slider slowly all the way to the right. Pay careful attention to what's happening as you do.

8) What 1st transformation took place on segment $\overline{DE}$?

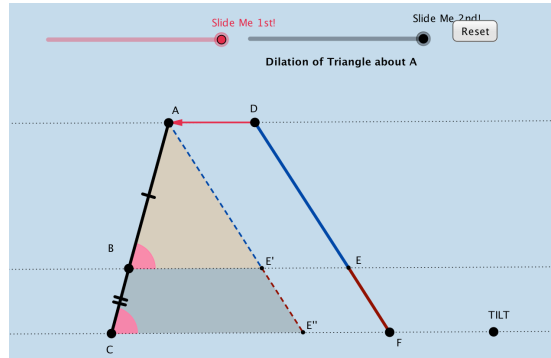
9) Did this transformation change the length DE?

10) What transformation took place on $\Delta ABE'$?

11) What can you now conclude about $\Delta ABE'$ and $\Delta ACE''$? Explain fully why you can definitely conclude this.

12) Use your results from (11) above to fill in the blanks:
Because $\Delta ABE'$ and $\Delta ACE''$ are ______________________________, we can easily write

$$\frac{AC}{AB} = \frac{AE''}{\qquad} = \frac{\qquad}{DE}$$



But wait!

$$AC = \qquad + \qquad$$

$$FD = \qquad + \qquad$$

Therefore,

$$\frac{AC}{AB} = \frac{\qquad + \qquad}{AB}$$

and

$$\frac{DF}{DE} = \frac{\qquad + \qquad}{DE}$$

Now, if we set the right sides of both equations equal to each other (by substitution), we have

$$\frac{\quad + \quad}{AB} = \frac{\quad + \quad}{DE}$$

If we use the distributive property, we now obtain

$$\frac{\quad}{AB} + \frac{\quad}{AB} = \frac{\quad}{DE} + \frac{\quad}{DE}$$

Simplifying both sides now yields

$$\frac{\quad}{AB} = \frac{\quad}{DE}$$