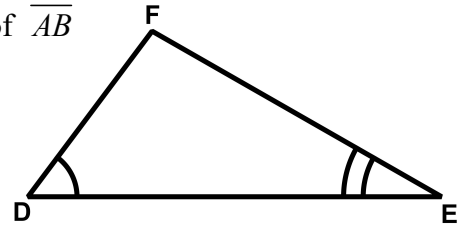
Name: _____ Date: _____

SIMILARITY CRITERIA
COMMON CORE GEOMETRY

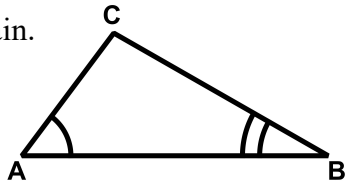
We saw in the last lesson that if two triangles are similar then **corresponding pairs of angles** have **equal measures** and **corresponding pairs of sides** have **proportional lengths**. Just as with **congruence**, we can tell that two triangles are similar with less information than all angle and side pairs. There are three major criteria that can be used to prove triangles are congruent. We will explore each one using **similarity transformations.**

***Exercise* #1:** Given ΔABC and ΔDEF with $\angle A \cong \angle D$ and $\angle B \cong \angle E$, do the following:

(a) Give a dilation of ΔABC centered at A that would make the image of $\overline{AB}$ congruent to $\overline{DE}$. Be as specific as possible.



(b) Would this dilation change the $m\angle A$ or $m\angle B$? Explain.

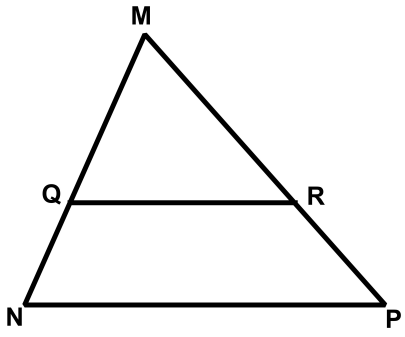


(c) Why would $\Delta A'B'C'$ now be congruent to ΔDEF?

THE ANGLE-ANGLE CRITERIA FOR SIMILARITY

If two angles of one triangle are congruent to two angles of another triangle, the two triangles are similar.

***Exercise* #2:** In the diagram shown, $\overline{QR} \parallel \overline{NP}$. Prove that ΔMQR is similar to ΔMNP.



***Exercise* #3:** If in the above diagram $MQ = 8$, $NQ = 6$ and $NP = 21$, then what is the length of $\overline{QR}$?

There are two additional criteria for similarity that we will present and then informally prove.

THE SIDE-SIDE-SIDE CRITERIA FOR SIMILARITY

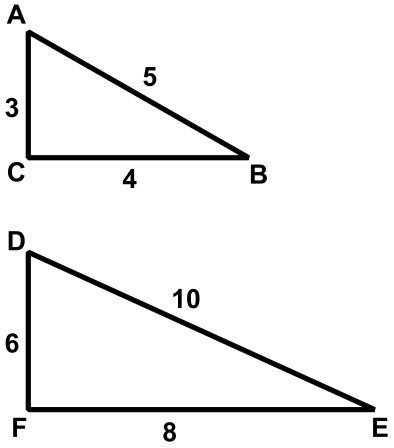
If all three pairs of corresponding sides of two triangles are proportional, then the two triangles are similar.

THE SIDE-ANGLE-SIDE CRITERIA FOR SIMILARITY

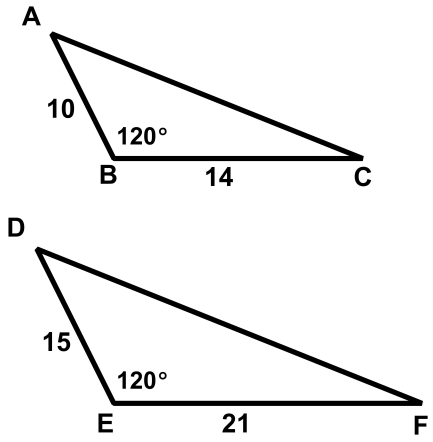
If two pairs of sides of two triangles are proportional and the angles included between the proportional side pairs are congruent, then the two triangles are similar.

***Exercise* #4:** Say that you have the following diagrams with only the information marked. In both cases, give a dilation, with a center and factor, that would map ΔABC onto an image $\Delta A'B'C'$ that is congruent to ΔDEF. Justify the congruence using a congruence theorem.

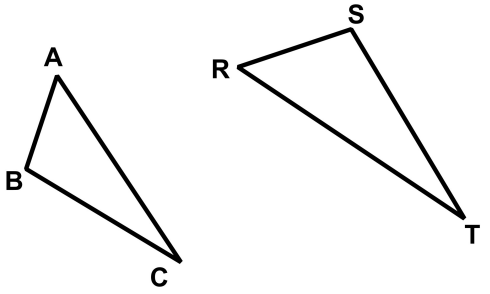
(a)



(b)



***Exercise* #5:** In the diagram below, which of the following information would not be sufficient to show that ΔABC is similar to ΔRST?



(1) $\frac{RS}{AB}=\frac{ST}{BC}=\frac{TR}{CA}$

(2) $\frac{AB}{RS}=\frac{AC}{RT}$ and $m\angle A = m\angle R$

(3) $m\angle S = m\angle B$ and $m\angle C = m\angle T$

(4) $\frac{RT}{AC}=\frac{TS}{CB}$ and $m\angle B = m\angle S$

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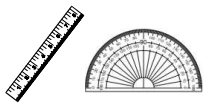


SIMILARITY CRITERIA
COMMON CORE GEOMETRY HOMEWORK

MEASUREMENT AND CONSTRUCTION

1. In the diagram below, two segments have been drawn, where $DE = 2AB$. Using your protractor, create two triangles, ΔABC and ΔDEF, from these bases such that $m\angle A = m\angle D = 30^\circ$ and $m\angle B = m\angle E = 60^\circ$

A B D E

2. In the above diagram, measure $\overline{AC}$, $\overline{BC}$, $\overline{DF}$ and $\overline{EF}$ to the nearest millimeter. Then, calculate the ratios asked for.

$AC =$ $DF =$ $\frac{DF}{AC} =$

$BC =$ $EF =$ $\frac{EF}{BC} =$

3. Why were the ratios you calculated in #2 equal (or they should have)?

PROBLEM SOLVING

4. Which of the following would be enough information to know that $\Delta ABC \sim \Delta MNP$?

(1) $m\angle P = m\angle C$ and $\frac{BC}{NP} = \frac{AB}{MN}$

(2) $m\angle A = m\angle M$ and $\frac{AB}{MN} = \frac{AC}{MP}$

(3) $m\angle B = m\angle N$ and $AB = MN$

(4) $m\angle P = m\angle C$ and $\frac{BC}{NP} = \frac{MP}{AC}$

_____

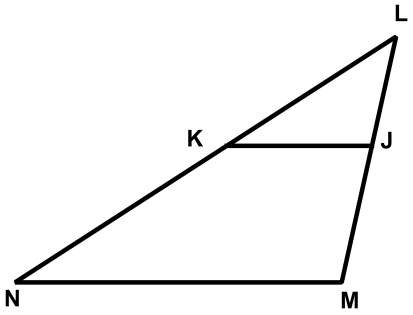
5. Which of the following measurements below would justify that $\Delta LJK \sim \Delta LMN$?

(1) $KJ = 8, NM = 16, KL = 11,$ and $LN = 22$

(2) $KL = 8, LN = 12, LJ = 6,$ and $LM = 9$

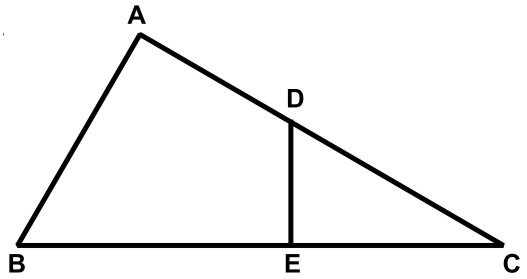
(3) $KJ = 3, NM = 9, LJ = 4,$ and $JM = 8$

(4) $KL = 12, LN = 20, LJ = 9,$ and $JM = 15$



REASONING

6. In the following diagram it is known that $\overline{AB} \perp \overline{AC}$ and $\overline{DE} \perp \overline{BC}$.

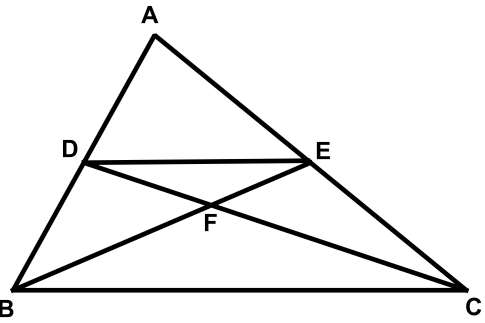


(a) Explain why ΔBAC must be similar to ΔDEC .

(b) If $BC = 20, DE = 4,$ and $DC = 8$ then find the length of $\overline{AB}$. Show your work.

7. In the diagram of ΔABC shown below, the midpoints of sides $\overline{AB}$ and $\overline{AC}$ are D and E respectively. Segments $\overline{BE}$ and $\overline{CD}$ have been drawn and intersect at F.

(a) Because D and E are midpoints of sides $\overline{AB}$ and $\overline{AC}$, what can we conclude about $\overline{DE}$ and $\overline{BC}$? (See Unit #6.Lesson #4)?



(b) What similarity criteria could be used to prove that ΔDEF is similar to ΔBCF ? Explain.

(c) Explain why $\dfrac{BF}{FE} = 2$.