Corresponding Parts of Similar Triangles

MATH NSPIRED

TEACHER NOTES

Math Objectives

- Students will identify corresponding parts of similar triangles.
- Students will use the ratio of similarity to find missing measures in similar triangles.
- Students will relate the ratio of similarity to reductions and enlargements.
- Students will look for and make use of structure (CCSS Mathematical Practice).

Vocabulary

- scale factor (ratio of similarity)
- corresponding parts
- reduction
- enlargement
- coincide; coincidental

About the Lesson

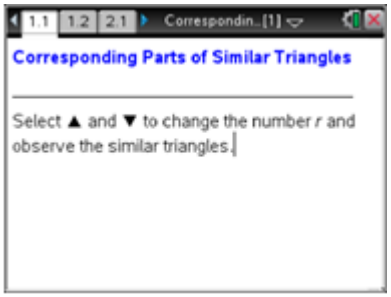
- This lesson involves manipulating the scale factor (*r*) and observing changes in similar triangles, changing the ratio of similarity, and matching corresponding parts of similar triangles.
- As a result, students will:
  - Produce reductions, enlargements, and congruent figures.
  - Compare corresponding angles and corresponding sides.
  - Infer the relationship between ratio of similarity (scale factor) and the measures of the sides.

TI-Nspire™ Navigator™

- Use Live Presenter for student demonstrations.
- Use Quick Poll to check students' understanding of the concepts.
- Use Class Capture to display successful student work.

Activity Materials

- Compatible TI Technologies: TI-Nspire™ CX Handhelds, TI-Nspire™ Apps for iPad®, TI-Nspire™ Software



Tech Tips:

- This activity includes screen captures taken from the TI-Nspire CX handheld. It is also appropriate for use with the TI-Nspire family of products including TI-Nspire software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials

Lesson Files:

Student Activity

- Corresponding_Parts_of_Similar_Triangles_Student.pdf
- Corresponding_Parts_of_Similar_Triangles_Student.doc

TI-Nspire document

- Corresponding_Parts_of_Similar_Triangles.tns

Discussion Points and Possible Answers

Tech Tip: Tap the arrows to change the values of the slider.

Tech Tip: To change the slider settings, press and hold on an arrow. Select "Settings." Then change any values in the Settings menu.

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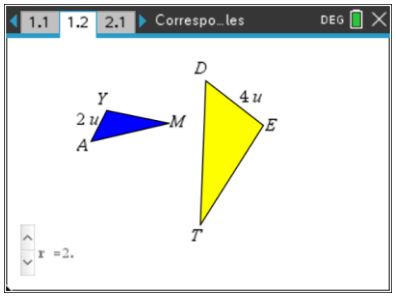

1. The triangles pictured are similar. Select Δ and ∇ in the bottom left corner of the screen.
   a. What happens to Δ*DET* as the scale factor *r* changes?

      Answer: The triangle gets larger (enlarges) and smaller (reduces).

   b. What happens to $\overline{AY}$ and $\overline{DE}$ as *r* changes?

      Answer: $\overline{AY}$ stays the same and $\overline{DE}$ increases and decreases as *r* increases and decreases.

2. Use Δ and ∇ to change *r*.

   Teacher Tip: Note that *r* ranges from 0 to 3 in increments of 0.1.

   a. What is the relationship between the two triangles when *r* = 1?

      Answer: They are congruent.

      Teacher Tip: If students say, "They are the same size," use questions to help them clarify what they mean by this statement and apply appropriate vocabulary for this course.

   b. What is the relationship between the two triangles when 0 < *r* < 1?

      Answer: Δ*DET* is a reduction of Δ*AYM*.

Teacher Tip: Students will likely say, "ΔDET is smaller than ΔAYM." Use questions to help them clarify what they mean by this statement and apply appropriate vocabulary for this course.

c. What is the relationship between the two triangles when $r > 1$?

Answer: ΔDET is an enlargement of ΔAYM.

Teacher Tip: Students will likely say, "ΔDET is larger than ΔAYM." Use questions to help them clarify what they mean by this statement and apply appropriate vocabulary for this course.

Tech Tip: If students experience difficulty dragging a point, check to make sure that they have moved the arrow until it becomes a hand (☜) getting ready to grab the point, not a hand pointing at the point (☝). Press ctrl ☜ to grab the point and close the hand (✊).

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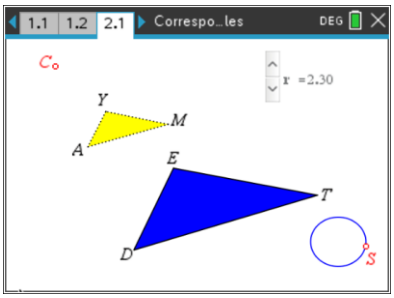

3. a. Move point *S* around the circle. What happens to ΔDET?

Answer: It turns or rotates.

b. Move point *C*. What happens to ΔDET?

Answer: It slides or translates.

TI-Nspire Navigator Opportunity: *Live Presenter*
See Note 1 at the end of this lesson.

4. Move ΔDET by dragging points *S* and *C*. Position ΔDET on top of the other triangle so that a pair of corresponding angles match up (are coincidental).

a. List the three pairs of corresponding angles.

Answer: $\angle A$ and $\angle D$; $\angle M$ and $\angle T$; $\angle Y$ and $\angle E$

b. List the three pairs of corresponding sides.

Answer: $\overline{AM}$ and $\overline{DT}$; $\overline{MY}$ and $\overline{TE}$; $\overline{YA}$ and $\overline{ED}$

c. Write a similarity statement for the two triangles and justify your answer.

Sample Answer: $\Delta AMY \sim \Delta DTE$
The fact that letters *A* and *D* are listed first means that $\angle A$ corresponds to $\angle D$. Similarly, the fact that letters *M* and *T* are in the middle means that $\angle M$ corresponds to $\angle T$, and the fact that letters *Y* and *E* are last means that $\angle Y$ and $\angle E$ correspond. Additionally, since $\overline{AM}$ and $\overline{DT}$ correspond, they are listed in the same locations, and so on.

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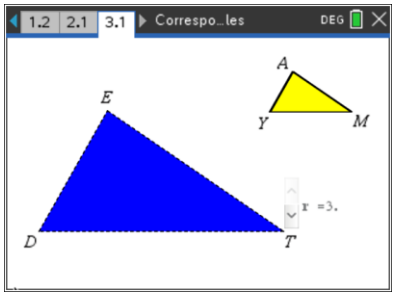


5. Change the value of *r* and drag copies of ΔAMY. How many copies of $\overline{AY}$ would it take to cover $\overline{DE}$ when
   a. $r = 3$?

   Answer: 3 copies

   b. $r = 0.5$?

   Answer: $\frac{1}{2}$ copy

   c. $r = 1.5$?

   Answer: $1\frac{1}{2}$ copies

TI-Nspire Navigator Opportunity: *Quick Poll* and *Class Capture*
See Note 2 at the end of this lesson.

6. If $\overline{AY}$ is 2 units, $\overline{AM}$ is 4.25 units, and $\overline{YM}$ is 3.25 units, what are the measures of $\overline{ET}$, $\overline{DE}$, and $\overline{DT}$ when
   a. $r = 1$?

   Answer: $DE = 2$; $DT = 4.25$; $ET = 3.25$

b. $r = 0.75$?

Answer: $DE = 1.5$; $DT = 3.1875$; $ET = 2.4375$

c. $r = 4$?

Answer: $DE = 8$; $DT = 17$; $ET = 13$

Wrap Up

Upon completion of the discussion, the teacher should ensure that students understand:

- How to write a similarity statement that properly states the correspondence of parts of similar figures.
- Given a pair of similar figures and the scale factor, how to find missing measures.
- How to determine, based on scale factor, whether the image is a reduction or enlargement of the original figure.

Assessment

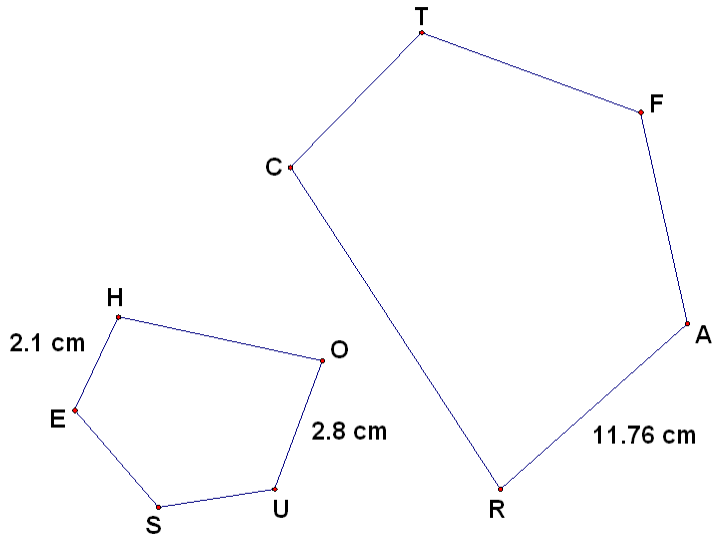
Pentagon *HOUSE* and Pentagon *CRAFT* are similar pentagons but not drawn to scale.

a. Name the sides in *CRAFT* that correspond to $\overline{OH}$ and $\overline{HE}$.

$\overline{OH}$ → _____ and $\overline{HE}$ → _____

b. Find the similarity ratio (scale factor).

c. Use the ratio to find the measure of the side in *CRAFT* from (a) that does not have a measure.



Answers:

a. $\overline{RC}$ and $\overline{CT}$

b. $\frac{5}{21}$

c. $CT = 8.82$ cm

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Note 1

Question 3*, Live Presenter:* Make a student the *Live Presenter* so that you can discuss as a class what happens when you move *C* and *S*.

Note 2

Question 5, *Quick Poll* and *Class Capture:* Use an *Open Response Quick Poll* to collect students' responses to question 5. If some students have difficulty determining how many copies of $\overline{AY}$ it would take to cover $\overline{DE}$ for various values of *r*, use *Class Captures* of successful student work and have them explain how they arrived at their solutions.