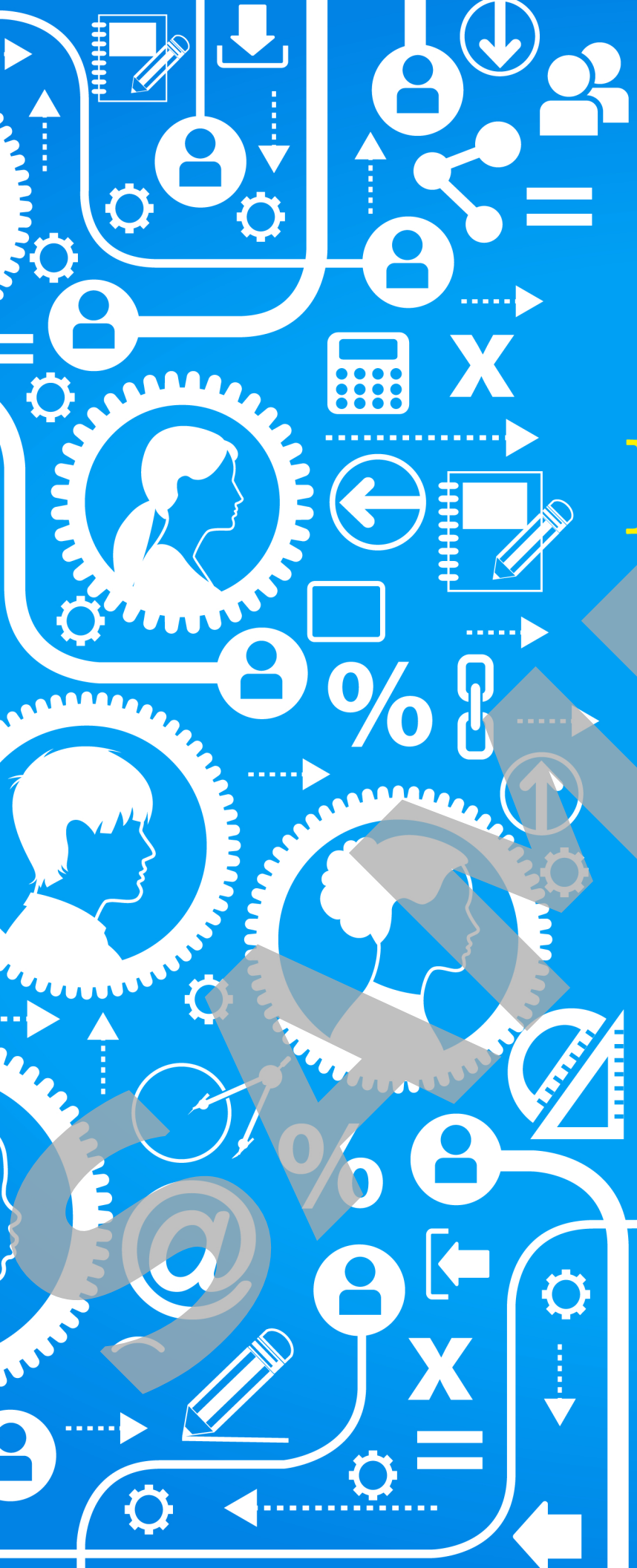

Engaging Mathematics, Volume II: Grade 8

region4®

Engaging Mathematics, Volume II: Grade 8

Teacher Edition

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Region 4 Education Service Center supports student achievement by providing educational products and services that focus on excellence in service for children.

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Table of Contents

What is *Engaging Mathematics, Volume II: Grade 8*?

1 An instructional resource featuring over 100 Texas Essential Knowledge and Skills (TEKS)-based, classroom-ready mathematics activities that each take approximately 10 to 15 minutes to complete.

2 A TEKS-based resource that addresses all Grade 8 mathematics TEKS and provides—

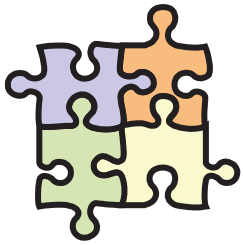
- Rigorous problem-solving tasks
- Manipulative-based tasks
- Vocabulary development tasks
- Sorting and classifying tasks

3 A resource that supports high-quality, research-based instruction by providing activities that can be used for various purposes, including—

- Engaging warm-ups and opening tasks that draw students into relevant and challenging mathematics
- Instructional support for all students, from at-risk to gifted and talented, to help learners articulate, refine, and retain important mathematical concepts, processes, and skills
- Short-cycle, formative assessments that provide immediate and ongoing feedback to guide instruction for the teacher and learning for the student
- Supplemental tasks to support intervention strategies

4 A resource that incorporates the mathematics process standards by promoting—

- Reasoning, generalizing, and problem solving in mathematical and real-world contexts
- Modeling, using tools, and connecting representations
- Analysis
- Communication

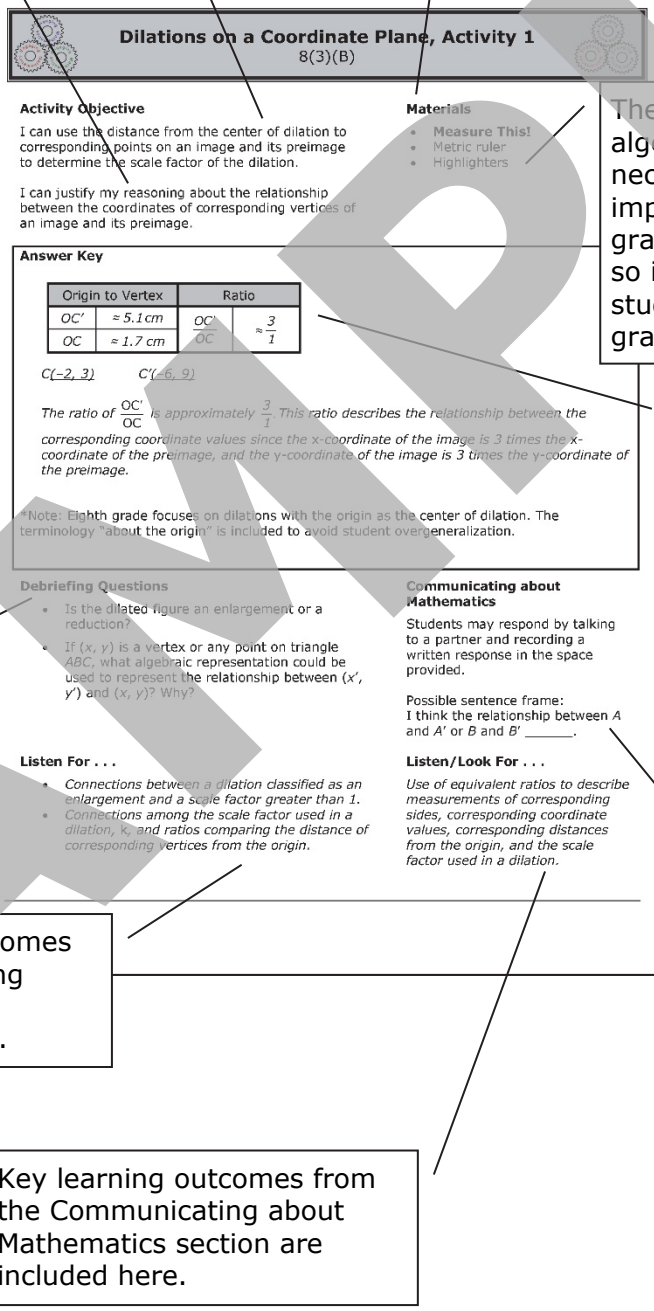


What is found in an Engaging Mathematics TEKS-based activity?

TEKS have been phrased in student-friendly language so that students may gauge their learning.

Common classroom materials are used for ease of preparation. Materials are listed 1-per-student unless otherwise noted. Page titles for student handouts are bolded.

ELPS have been included in the form of a student-friendly language objective.



Dilations on a Coordinate Plane, Activity 1
8(3)(B)

Activity Objective

I can use the distance from the center of dilation to corresponding points on an image and its preimage to determine the scale factor of the dilation.

I can justify my reasoning about the relationship between the coordinates of corresponding vertices of an image and its preimage.

Materials

- **Measure This!**
- Metric ruler
- Highlighters

Answer Key

Origin to Vertex		Ratio	
OC'	$\approx 5.1\,cm$	$\frac{OC'}{OC}$	$\approx \frac{3}{1}$
OC	$\approx 1.7\,cm$		

$C(-2, 3)$ $C'(-6, 9)$

The ratio of $\frac{OC'}{OC}$ is approximately $\frac{3}{1}$. This ratio describes the relationship between the corresponding coordinate values since the x-coordinate of the image is 3 times the x-coordinate of the preimage, and the y-coordinate of the image is 3 times the y-coordinate of the preimage.

*Note: Eighth grade focuses on dilations with the origin as the center of dilation. The terminology "about the origin" is included to avoid student overgeneralization.

Debriefing Questions

- Is the dilated figure an enlargement or a reduction?
- If (x, y) is a vertex or any point on triangle ABC, what algebraic representation could be used to represent the relationship between (x', y') and (x, y)? Why?

Communicating about Mathematics

Students may respond by talking to a partner and recording a written response in the space provided.

Possible sentence frame:
I think the relationship between A and A' or B and B' _____.

Listen For . . .

- *Connections between a dilation classified as an enlargement and a scale factor greater than 1.*
- *Connections among the scale factor used in a dilation, k, and ratios comparing the distance of corresponding vertices from the origin.*

Listen/Look For . . .

Use of equivalent ratios to describe measurements of corresponding sides, corresponding coordinate values, corresponding distances from the origin, and the scale factor used in a dilation.

The emphasis on algebra readiness skills necessitates the implementation of graphing calculators, so it is assumed all student have access to graphing calculators.

An answer key is included for each activity.

Debriefing questions are included to assist the teacher with facilitating a post-activity student discussion.

Each activity includes an opportunity for students to articulate and summarize their own learning.
A sentence frame is provided for students who may need language support.

Key learning outcomes from the debriefing discussion are summarized here.

Key learning outcomes from the Communicating about Mathematics section are included here.

Texas Essential Knowledge and Skills (TEKS) Alignment Chart

Numbers and operations

Focus TEKS	Activity	Page
8(2)(A)	Real Number Relationships	2
8(2)(B)	Irrational Numbers, Activity 1	4
8(2)(B)	Irrational Numbers, Activity 2	6
8(2)(C)	Scientific Notation, Activity 1	16
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8(2)(D)	Ordering Real Numbers, Activity 1	8
8(2)(D)	Ordering Real Numbers, Activity 2	10
8(2)(D)	Ordering Real Numbers, Activity 3	14

Proportionality

Focus TEKS	Activity	Page
8(3)(A)	Attributes of a Dilation, Activity 1	142
8(3)(A)	Attributes of a Dilation, Activity 2	146
8(3)(A)	Attributes of a Dilation, Activity 3	148
8(3)(B)	Dilations on a Coordinate Plane, Activity 1	150
8(3)(C)	Dilations on a Coordinate Plane, Activity 2	152
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8(4)(A)	Slope, Activity 1	68
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8(4)(C)	Rate of Change or Slope and *y*-intercept, Activity 4	78
8(5)(A)	Proportional Relationships, Activity 1	116
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Expressions, equations, and relationships

Two-dimensional shapes

Measurement and data

Personal financial literacy

Attributes of a Dilation, Activity 3

8(3)(A)

Activity Objective

I can determine if a given statement about a shape and its dilation is true or false.

I can describe how I determined if a statement is always true.

Materials

- **Dilations: True or False**

Answer Key

	Statement	True or False	Justification
1.	The corresponding angles of a shape and its dilation will have the same measures.	*True*	*Possible answer: A shape and its dilation are similar figures and therefore corresponding angles are congruent.*
2.	A shape and its dilation are similar figures.	*True*	*Possible answer: If a shape is dilated, the image and preimage are similar.*
3.	The scale factor, k, of a dilation can be determined by writing a ratio comparing the length of a side of the image to the length of the corresponding side of the preimage.	*True*	*Possible answer: The scale factor of a shape and its dilation is the ratio comparing the length of a side of the image to the corresponding side length of the preimage.*
4.	If one side length of a shape is 8.4 cm and the corresponding side length of its dilation is 23.1 cm, the scale factor is $\frac{4}{11}$.	*False*	*Possible answer: The scale factor is the ratio comparing the side length of the image to the corresponding side length of the preimage:* $\frac{23.1}{8.4}$ *or* $\frac{11}{4}$.

Debriefing Questions

- How can you determine the scale factor, k, used to dilate a figure?
- How could you use a counterexample to justify that a statement is false?

Listen For . . .

- *Understanding of scale factor as the ratio of the side length of the image to the corresponding side length of the preimage.*
- *Use of vocabulary such as angle measures, dilations, image, preimage, ratio of corresponding side lengths of the image to the preimage, scale factor, and similar figures.*

Communicating about Mathematics

Students may respond by talking to a partner and recording a written response in the space provided.

Possible sentence frame:
I used _____ to determine if a statement is always true.

Listen/Look For . . .

Use of the critical attributes of similar figures to evaluate statements regarding dilations.

Student Name: _____ Date: _____

Dilations: True or False

Determine if each statement below is true or false. Write a sentence justifying your selection.

	Statement	True or False	Justification
1.	The corresponding angles of a shape and its dilation will have the same measures.		
2.	A shape and its dilation are similar figures.		
3.	The scale factor, *k*, of a dilation can be determined by writing a ratio comparing the length of a side of the image to the length of the corresponding side of the preimage.		
4.	If one side length of a shape is 8.4 cm and the corresponding side length of its dilation is 23.1 cm, the scale factor is $\frac{4}{11}$.		

Communicating about Mathematics
How did you determine if a statement is always true?

_____
_____
_____
_____
_____
_____

# Volume of Cylinders, Activity 2
8(6)(A)

Activity Objective

I can interpret the volume formula for a cylinder.

I can describe the relationship between the length of a cylinder and $V = Bh$.

Materials

- **Volume: Who Is Correct?**

Answer Key

Orlando is incorrect.
Possible answer: Orlando correctly divided the diameter by two to determine the radius. However, he then calculated the circumference of the circle instead of the area. He then multiplied this by the length (height) of the tube.

Seth is correct.
Possible answer: Since the base of the packing tube is a circle, the area of the base should be calculated using $A = \pi r^2$ *. Seth correctly calculated the area of the circle. Then he multiplied his answer by the length (height) of the tube.*

Debriefing Questions

- What does B represent in $V = Bh$?
- What parts of the formula were applied correctly? Incorrectly? Justify your answer.
- What advice would you give a student who was incorrect to consider on the next volume problem he or she has to work?

Listen For . . .

- *Connections between given information and* $V = Bh$.
- *Connections between the diameter of a circle and* $A = \pi r^2$.

Communicating about Mathematics

Students may respond by talking to a partner and recording a written response in the space provided.

Possible sentence frame:
The length of the packing tube is the _____ in the formula.

Listen/Look For . . .

Connections between the diameter and length of the packing tube and the base and height of a cylinder.

Student Name: _____ Date: _____

Volume: Who Is Correct?

Orlando and Seth were asked to set-up the following problem:

> A packing tube has a diameter of 5.5 inches and a length of 19 inches. What is the volume of the packing tube?

Orlando and Seth each set the problem up differently. Their work is shown below.

Orlando's Work

$$V = Bh$$
$$V = 2\pi(2.75)(19)$$

Is Orlando correct? Justify your answer.

_____
_____
_____
_____
_____
_____

Seth's Work

$$V = Bh$$
$$V = \pi(2.75)^2(19)$$

Is Seth correct? Justify your answer.

_____
_____
_____
_____
_____
_____

Communicating about Mathematics
Draw a sketch of the packing tube described in the problem above. Label its dimensions, and shade its bases. What is the relationship between the length of the packing tube and the formula $V = Bh$?