



# **UNIT 8: Geometry**

## ***Similarity, Congruence, Symmetry & Transformation of Shapes***

*Note: All key terms are based on the Math Standards for Alaska and reflect terms vital to academic achievement in math.*





# **INTRODUCTION OF MATH VOCABULARY**

# Process Skills

## Concrete Introduction of Key Vocabulary

**Note:** A vocabulary graphic is provided in this unit for each of the key words.

Definitions for all of the key words can be found in the glossary at the back of this program.

### **symmetry**

*The human mind often prefers things that are symmetric in form. Ask the students to list objects in the room that are symmetric. Which are not symmetric and why?*

### **transformation**

*Pass out an animal cracker to each student. Ask them to do an outline of the shape on a piece of paper using a pencil. Now ask them to do a series of shape transformations. How did they “transform” the shape?*

### **proportionality**

*Show the students a cherry and a grapefruit. Explain that though they can be slightly different sizes from time to time, grapefruits are generally proportionally larger than cherries and that the relationship holds constant. That relationship is also seen between variables in some mathematic equations!*

# Process Skills

## Concrete Introduction of Key Vocabulary

**Note:** A vocabulary graphic is provided in this unit for each of the key words.

Definitions for all of the key words can be found in the glossary at the back of this program.

### translations

*Give the students a piece of graph paper and ask them to draw a small simple figure or object. Now have them duplicate that object by moving each point the same distance in the same direction. Explain that this is a translation.*

### rotations

*Have each student draw the front of a penny on a piece of paper including an Abraham Lincoln with a funny face. Now have them draw the penny upside down. Explain that this was a rotation of the shape. Who has the funniest Lincoln?*

### reflections

*Show the students the picture of the horses on the beach on page 573. Explain that their image is being reflected on the water. Have them draw an animal and reflect it on the paper. Who had the most accurate reflection?*

# Process Skills

## Concrete Introduction of Key Vocabulary

**Note:** A vocabulary graphic is provided in this unit for each of the key words.

Definitions for all of the key words can be found in the glossary at the back of this program.

**dilatations**

*Have the students draw a plane figure in many sizes. Explain that dilatations are enlargements or reductions of a plane figure. Why would you want to enlarge or reduce a figure without changing its shape?*



# VOCABULARY PICTURES









## **SYMMETRY**



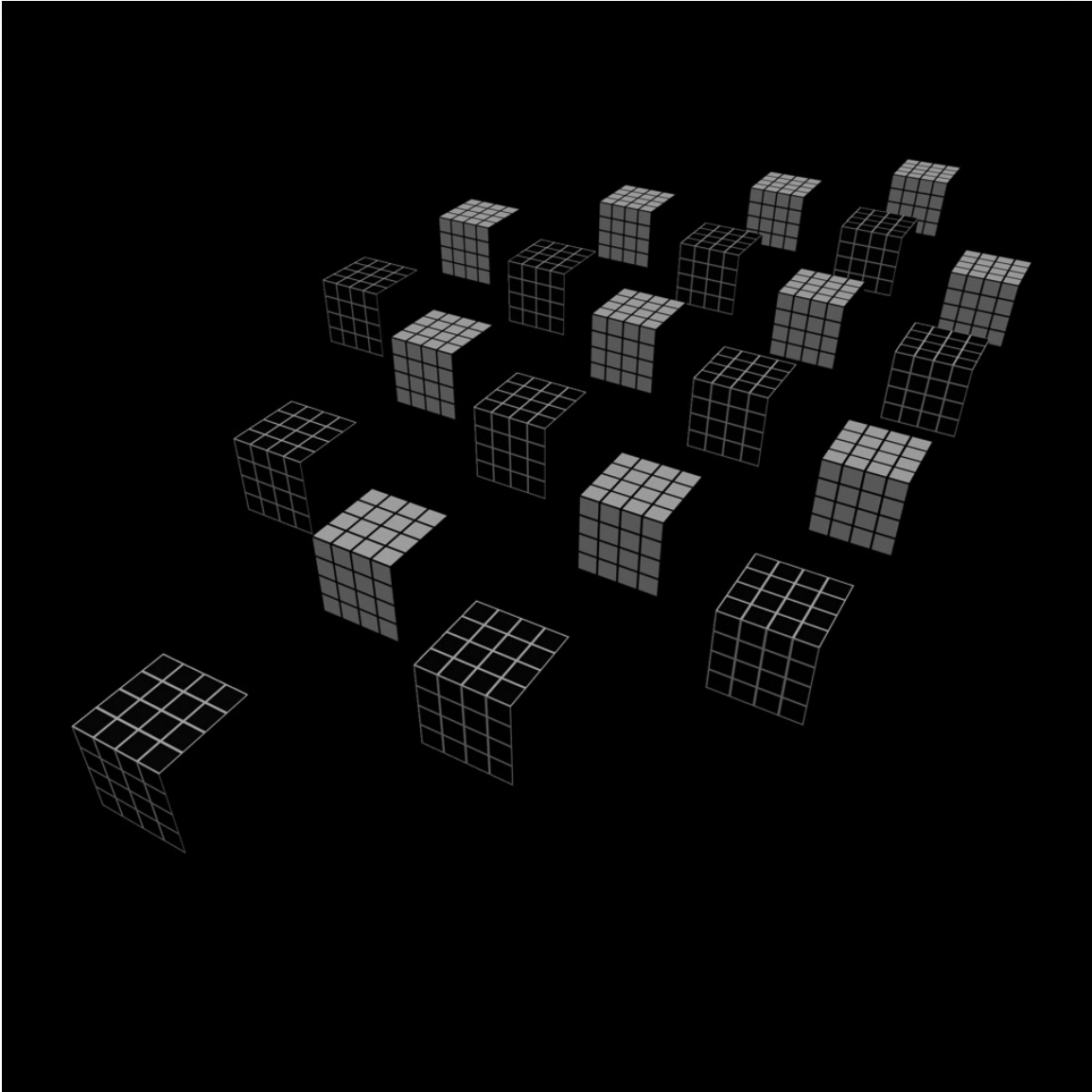


# TRANSFORMATION





# PROPORTIONALITY





## TRANSLATIONS







## ROTATIONS





## REFLECTIONS





## **DILATATIONS**



# LANGUAGE ACTIVITIES

# Language and Skills Development

## LISTENING

*Review the key math words introduced in this unit. If the vocabulary pictures were not presented during the introduction, show them to the students at this time.*



### Stretch

Place the vocabulary pictures on the floor, in a scattered form. The pictures should be quite close together. Have a student stand beside the pictures. Say a vocabulary word for one of the pictures. The student should place his/her left foot on that picture. Then, say other vocabulary words and the student must identify the correct pictures with different parts of his/her body. You may wish to have two students participate in this process at the same time for added motivation.

### Student Support Materials

Have the students work on the activity pages from the Student Support Materials from this unit. Afterward, review their work.



# Language and Skills Development

## SPEAKING



### **Right or Wrong?**

Mount the vocabulary pictures on the board. Point to one of the pictures and say its vocabulary word. The students should repeat the vocabulary word for that picture. However, when you point to a picture and say an incorrect vocabulary word for it, the students should remain silent. Repeat this process until the students have responded a number of times to the different vocabulary pictures.

### **Change Time**

Group the students into pairs. One student should be without a partner to be “it” for the first round of the activity. Have the pairs of students stand, back to back, with elbows interlocked. Say a vocabulary word. Tell the students to listen for that word repeated once again. Say a number of vocabulary words—eventually repeating the vocabulary word you said at the beginning of the round. The students should drop arms and find new partners. However, “it” must also find a partner, thus producing a new “it” for the next round of the game. The student who is left without a partner must then use the vocabulary word you said (at the beginning of the round) in a complete sentence of his/her own. Repeat this process until all students have responded.

# Language and Skills Development

## READING

*Introduce the math sight words to the students — match the sight words with the vocabulary graphics. The sight words are included in the Student Support Materials, attached to these lesson plans.*



### **The Disappearing Word**

Mount all of the sight words on the board. For added motivation, you may wish to prepare an extra set of sight word cards to add to those on the board. Have the students look carefully at the sight words. Then, the students should close their eyes. When the students' eyes are closed, remove one of the sight words from the board. Have the students open their eyes and identify the missing word. Repeat this process until all of the sight words have been removed from the board and identified in this way.

### **Letter Encode**

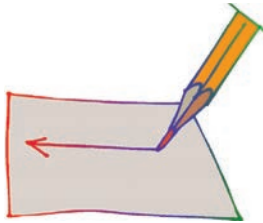
Give each student his/her envelope that contains the alphabet letters. Show a picture from this unit. The students must use the cut-out letters to spell the word for the picture. Review the students' work. Repeat, until all of the words have been spelled.

### **Student Support Materials**

Have the students work on the activity pages from the Student Support Materials from this unit. Afterward, review their work.

# Language and Skills Development

## WRITING



### Flashlight Writing

If possible, darken the classroom. Give a student a flashlight. Say one of the vocabulary words and the student should write that word with the light of the flashlight on a wall or on the board. Repeat until many students have had a chance to participate. An alternative is to provide each student with writing paper and a pen. Darken the classroom, if possible. Use the light of a flashlight to write one of the sight words on the wall or board. When you have completed the writing of the word, each student should then write the same word on his/her sheet of paper. Repeat until all sight words have been written in this way.

This activity may also be done in team form. In this case, group the students into two teams. Darken the classroom. Use the light of a flashlight to write one of the sight words on the board. When you say “Go,” the first player in each team should rush to the board and use chalk to write the same word on the board. The first player to do this correctly wins the round. Repeat until all players have played.

### Student Support Materials

Have the students work on the activity pages from the Student Support Materials from this unit. Afterward, review their work.



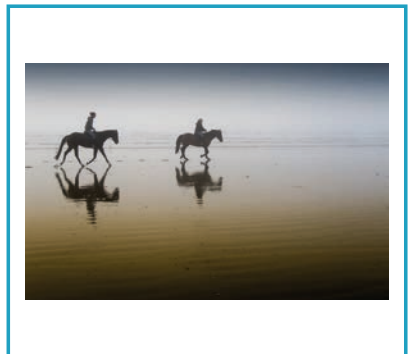
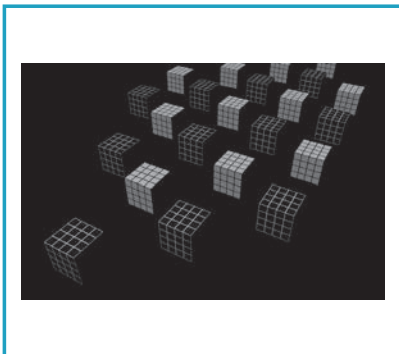
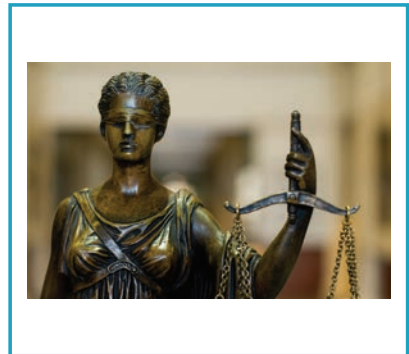
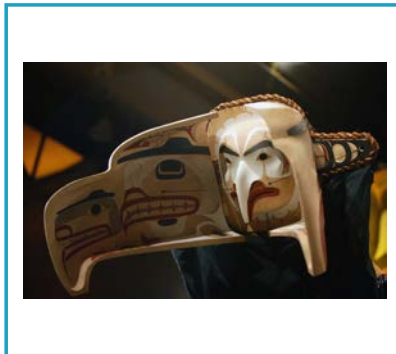


# STUDENT SUPPORT MATERIALS

Listening • Mini Pictures

# Listening: Mini Pictures

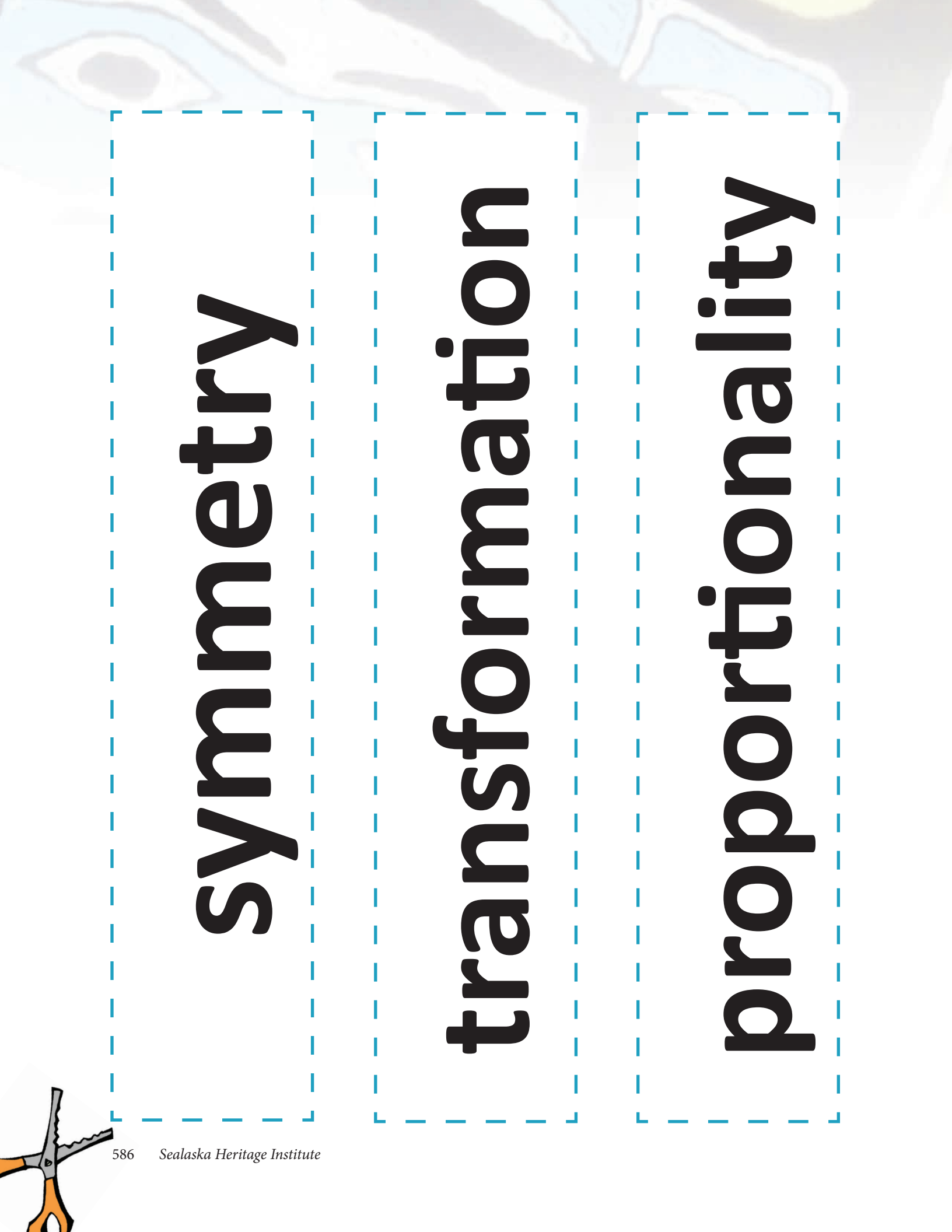
Have the students cut out the pictures. Say the key math words from this unit, and the students should hold up the pictures for them.





# STUDENT SUPPORT MATERIALS

**Sight Words**



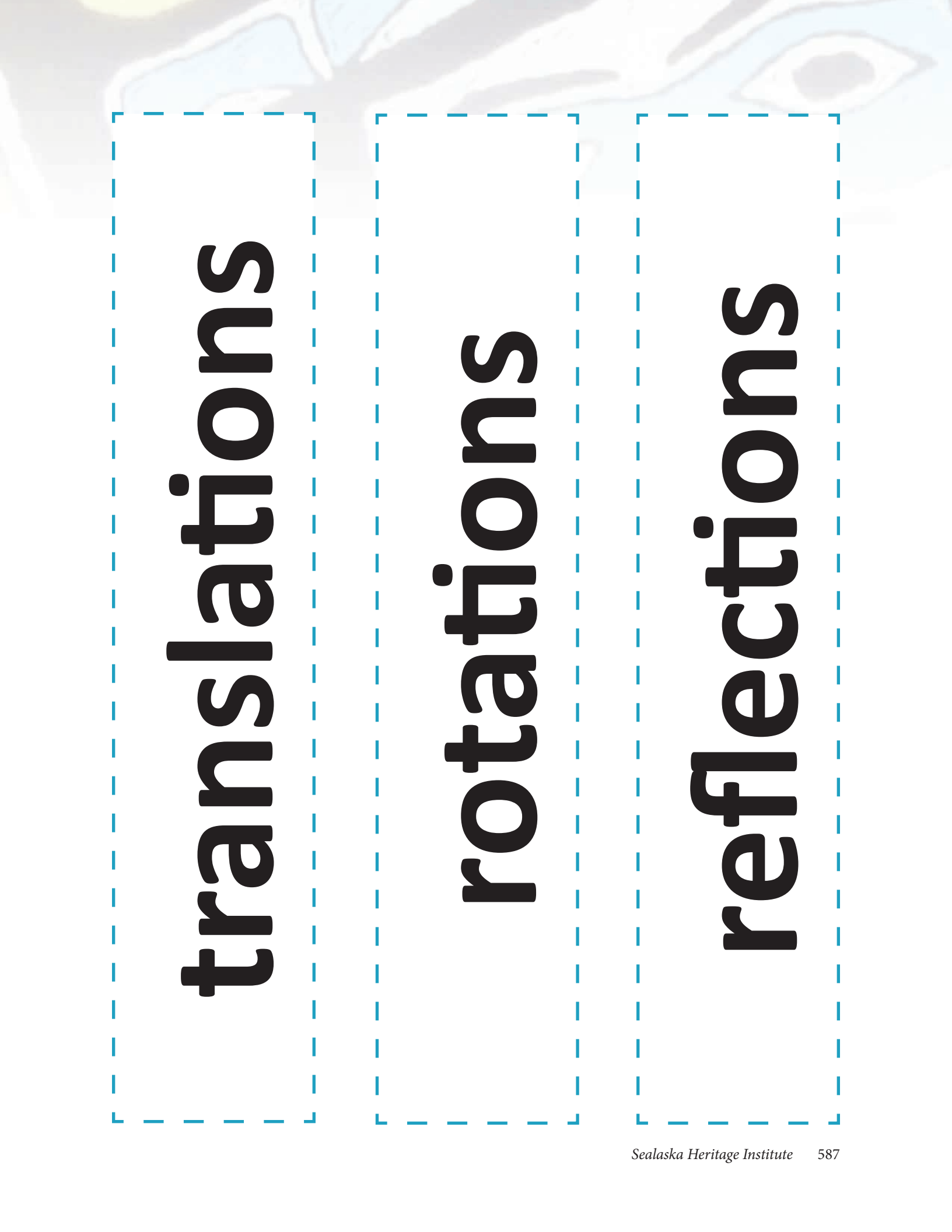
**symmetry**

**transformation**

**proportionality**







**translations**

**rotations**

**reflections**



dilatations



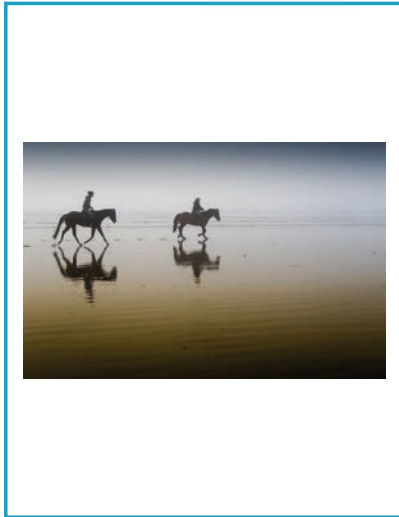
# STUDENT SUPPORT MATERIALS

Reading • Sight Recognition

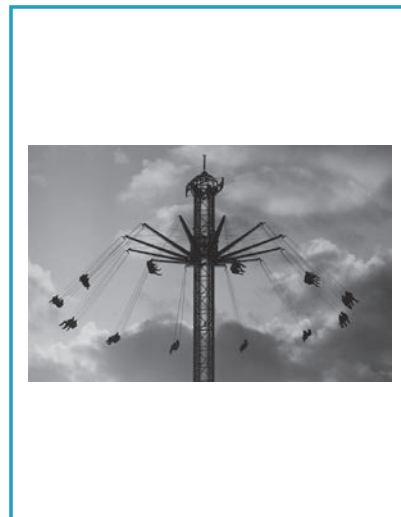
# Sight Words Activity Page



Have the students circle the word for each picture.



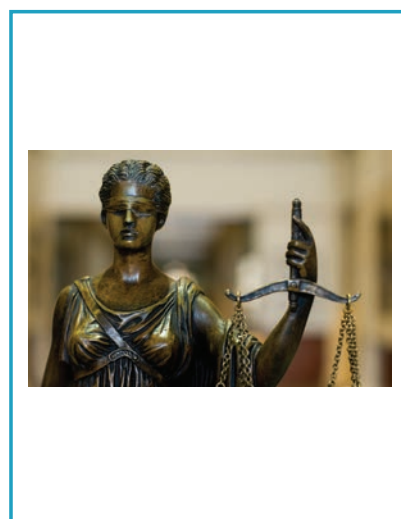
symmetry  
transformation  
proportionality  
translations  
rotations  
reflections  
dilatations



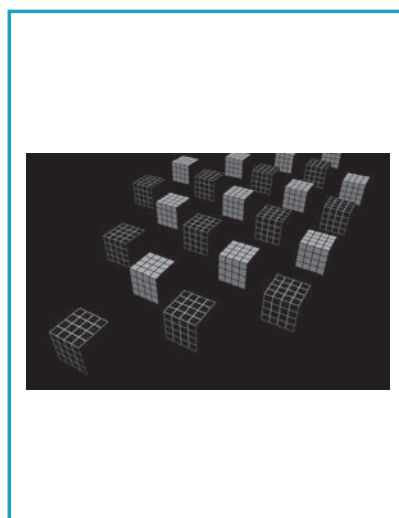
symmetry  
transformation  
proportionality  
translations  
rotations  
reflections  
dilatations



symmetry  
transformation  
proportionality  
translations  
rotations  
reflections  
dilatations



symmetry  
transformation  
proportionality  
translations  
rotations  
reflections  
dilatations

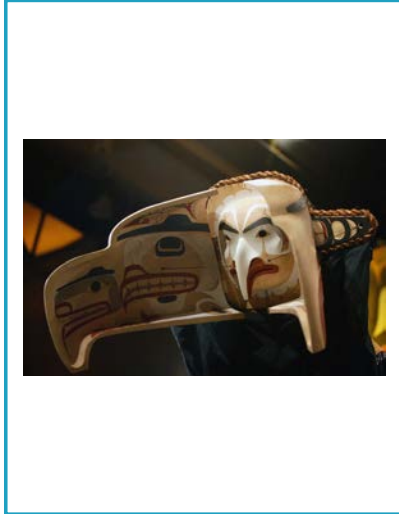


symmetry  
transformation  
proportionality  
translations  
rotations  
reflections  
dilatations



symmetry  
transformation  
proportionality  
translations  
rotations  
reflections  
dilatations

# *Sight Words Activity Page*

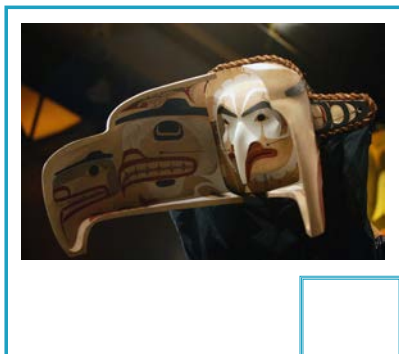
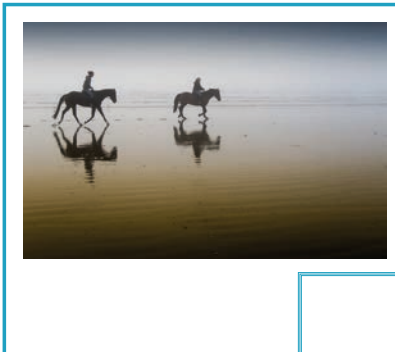
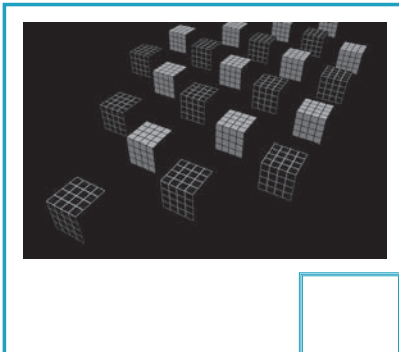


- symmetry**
- transformation**
- proportionality**
- translations**
- rotations**
- reflections**
- dilatations**

# Sight Words Activity Page



Write the numbers on their correct vocabulary graphics.



1. symmetry
2. transformation
3. proportionality
4. translations
5. rotations
6. reflections
7. dilatations

# Sight Words Activity Page

Write the key words from this unit horizontally in the boxes (more than one copy of each word can be written). Fill in all other boxes with any letters. Exchange page with another student. Find key words and circle.




# Sight Words Activity Page



Highlight or circle the words in this word find.

symmetry  
dilatations  
proportionality

rotations  
transformation  
translations

reflections

t t y l a a r p r m m t r a n s l a t i o n s o s  
a r m l t r o n i o o a r i s o p i y t r i p s l  
r s o t o l l n t a n r o o l t i s r l o s i i t  
t i p s r n s r t f n t n r t i r t i c p r n a n  
i s p r o p o r t i o n a l o r t a t s t i o r i  
o s s f r n f l i o e y r i o p t n r o o t t a l  
t r o t a t i o n s r i t e m c i n t n p a o o t  
l p o i o s s m f f n i i r i l a f n r l e t a n  
y r a o t a c r n p e m t n i i e o f o t a t t m  
d o o y n a i o t a y o t n o n e o o t r t o f a  
i t r a n s l a t i o n t i l t a r a o l o m n t  
a i s s e i i t o s y y i l n s y m m e t r y o a  
o a n t r a m n e n m n p s i o m l i i c m i t n  
l p r o i o r p n s m r r t f m i a a n t a o s t  
t m s s t s c y m m r e f l e c t i o p t s i e t  
l r r o r f i o r n l a o t o r c l t s a d i o r  
a t t e t c s t i o m e t s r r s l o t r t p o m  
s o r o i t y r l r o i o n l s r n m o a a e i t  
r o r t o i a i t t r y t r a n s f o r m a t i s  
e d i l a t a t i o n s p y r a l f t r o s y i c  
n o r s o d i l a t a t i o n e l f s t t n a i a  
s m a n e n r a a s o s o r p o n d p t s i n n n  
f o l i s y m m e s t r a n s f o r m a t i o n a  
s r p a a r i t l o o t m n o s o t e d a r s t r  
o a o i t t t n r r e f l e c t i o n s t t l s t  
a r t r o t a t i t o o i p m n f l n s i o p r y  
n t l a r d i a n o i e n i a s a y f l m r l a  
y l s p r o p o r t i o n a l i t y i s e r o r r  
i t o t y s r n i t r m f l l n e i l n p s o n i  
a a n m t t t n n n r n e t t n r f p n t c i n i



# Sight Words Activity Page



ANSWER KEY

symmetry  
dilatations  
proportionality

rotations  
transformation  
translations

reflections

t t y l a a r p r m m **t r a n s l a t i o n s** o s  
a r m l t r o n i o o a r i s o p i y t r i p s l  
r s o t o l l n t a n r o o l t i s r l o s i i t  
t i p s r n s r t f n t n r t i r t i c p r n a n  
i s p r o p o r t i o n a l o r t a t s t i o r i  
o s s f r n f l i o e y r i o p t n r o o t t a l  
t **r o t a t i o n s** r i t e m c i n t n p a o o t  
l p o i o s s m f f n i i r i l a f n r l e t a n  
y r a o t a c r n p e m t n i i e o f o t a t t m  
d o o y n a i o t a y o t n o n e o o t r t o f a  
i t r a n s l a t i o n t i l t a r a a o l o m n t  
a i s s e i i t o s y y i l n **s y m m e t r y** o a  
o a n t r a m n e n m n p s i o m l i i c m i t n  
l p r o i o r p n s m r r t f m i a a n t a o s t  
t m s s t s c y m m r e f l e c t i o p t s i e t  
l r r o r f i o r n l a o t o r c l t s a d i o r  
a t t e t c s t i o m e t s r r s l o t r t p o m  
s o r o i t y r l r o i o n l s r n m o a a e i t  
r o r t o i a i t t r y t r a n s f o r m a t i s  
e **d i l a t a t i o n s** p y r a l f t r o s y i c  
n o r s o d i l a t a t i o n e l f s t t n a i a  
s m a n e n r a a s o s o r p o n d p t s i n n n  
f o l i s y m m e s **t r a n s f o r m a t i o n** a  
s r p a a r i t l o o t m n o s o t e d a r s t r  
o a o i t t t n r **r e f l e c t i o n s** t t l s t  
a r t r o t a t i t o o i p m n f l n s i o p r y  
n t l a r d i a n o i e n i a s a y f l l m r l a  
y l s **p r o p o r t i o n a l i t y** i s e r o r r  
i t o t y s r n i t r m f l l n e i l n p s o n i  
a a n m t t t n n n r n e t t n r f p n t c i n i





# STUDENT SUPPORT MATERIALS

Reading • Encoding

# Encoding Activity Page

Have the students cut out the word parts and glue them into their correct words.



s \_\_\_\_\_ try

t \_\_\_\_\_ ation

pro \_\_\_\_\_ ality

t \_\_\_\_\_ lations

rot \_\_\_\_\_ s

ransform	rans	ymme
----------	------	------

latat	ation
-------	-------



# Encoding Activity Page



re \_\_\_\_\_ ions

di \_\_\_\_\_ ions

flex	port
------	------

# Encoding Activity Page



Have the students cut out the word halves and glue them together to create the key words for this unit.

**sym**

**tions**

**trans**

**metry**

**prop**

**portionality**

**transla**

**formation**

**ro**

**lections**



# Encoding Activity Page



**ref**

**latations**

**di**

**tations**

# Encoding Activity Page



Cut out and encode the syllables of the words OR number the syllables in their correct sequence.

ry || met || sym

---

ma || for || tion || trans

---

tio || por || pro || lity || na

---



# Encoding Activity Page



la || trans || tions

---

ro || tions || ta

---

tions || ref || lec

---

# Encoding Activity Page



ta || la || di || tions

---



# STUDENT SUPPORT MATERIALS

**Reading Comprehension**

# What's the Answer?



Read the text and then select the correct answer for it. Fill in the bullet beside the answer of your choice.

- ① Many flowers are the same or very similar on their right halves and on their left halves. This is an example of
  - Symmetry
  - Pollination
  - Creativeness
  - Alignment
  
- ② \_\_\_\_\_ is the movement of one geometric shape to another according to some rule.
  - Speed
  - Destruction
  - Shift
  - Transformation
  
- ③ Proportionality is the \_\_\_\_ of proportions.
  - Size
  - Shape
  - Ratio
  - Speed
  
- ④ \_\_\_\_\_ are exact duplications of geometric figures formed by moving each point in the figure the same distance and in the same direction.
  - Ration
  - Simulation
  - Vacation
  - Translation
  
- ⑤ The motion used to turn the handle on a fishing reel is a
  - Gyration
  - Meditation
  - Reflection
  - Rotation

# What's the Answer?



- ⑥ Objects can often be seen duplicated as \_\_\_\_\_ on water when the water is very still and the sun is shining.
- Aliens
  - Thoughts
  - Frivolous
  - Reflections
- ⑦ The enlargement or reduction of a plane figure is a \_\_\_\_\_.
- Dilatation
  - Dilution
  - Dissolution
  - Damper

# What's the Answer?



## ANSWER KEY

- ① Many flowers are the same or very similar on their right halves and on their left halves. This is an example of
  - Symmetry
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  - Creativeness
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- Dilatation
  - Dilution
  - Dissolution
  - Damper

# Reading Comprehension Activity Page

Write the numbers/letters for sentence halves that match.



- |  |   |
|--|---|
| ① Plants and animals often have a large                              | ① ratio of proportions.                   |
| ② A transformation is the movement of one geometric shape to another | ② degree of symmetry in their body forms. |
| ③ Proportionality is the   | ③ he or she is seeing a reflection.       |
| ④ Moving each point of a figure in the same direction and the        | ④ is considered rotation.                 |
| ⑤ The movement of a car's wheel around the axle                      | ⑤ a plane figure is a dilatation.         |
| ⑥ When one looks in the mirror,                                      | ⑥ same distance is a translation.         |
| ⑦ An enlargement or reduction of                                     | ⑦ according to some rule.                 |

1 → \_\_\_\_\_    2 → \_\_\_\_\_    3 → \_\_\_\_\_    4 → \_\_\_\_\_  
5 → \_\_\_\_\_    6 → \_\_\_\_\_    7 → \_\_\_\_\_



# Reading Comprehension Activity Page

ANSWER KEY



- |  |   |
|--|---|
| ① Plants and animals often have a large                              | ① ratio of proportions.                   |
| ② A transformation is the movement of one geometric shape to another | ② degree of symmetry in their body forms. |
| ③ Proportionality is the   | ③ he or she is seeing a reflection.       |
| ④ Moving each point of a figure in the same direction and the        | ④ is considered rotation.                 |
| ⑤ The movement of a car's wheel around the axle                      | ⑤ a plane figure is a dilatation.         |
| ⑥ When one looks in the mirror,                                      | ⑥ same distance is a translation.         |
| ⑦ An enlargement or reduction of                                     | ⑦ according to some rule.                 |

1 →   B      2 →   G      3 →   A      4 →   F    
5 →   D      6 →   C      7 →   E

# Reading Comprehension Activity Page

Cut out the words and glue them under their definitions.



**Rotating around an axis**

**Exact reflection of form**

**Changes position or direction of axis**

**Enlargement or reduction**

**Direction of axis is reversed**

**Origin moved to another position**

**Ratio of two constant quantities**

<b>symmetry</b>	<b>transformation</b>	<b>proportionality</b>	<b>translations</b>
<b>rotations</b>	<b>reflections</b>	<b>dilatations</b>	



# Reading Comprehension Activity Page

ANSWER KEY



**Rotating around an axis**

ALIGNMENT

**Exact reflection of form**

symmetry

**Changes position or direction of axis**

transformation

**Enlargement or reduction**

dilatations

**Direction of axis is reversed**

reflections

**Origin moved to another position**

translations

**Ratio of two constant quantities**

proportionality



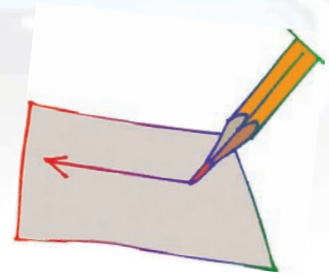


# STUDENT SUPPORT MATERIALS

**Writing**

# Writing Activity Page

Have the students complete the writing of the key math words.



sym\_\_\_\_\_ry

tra\_\_\_\_\_ormation

pro\_\_\_\_\_tionality

tr\_\_\_\_\_lation

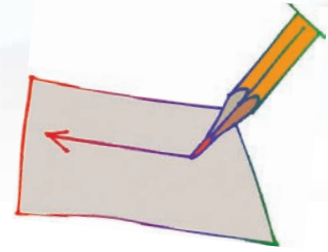
ro\_\_\_\_\_ions

ref\_\_\_\_\_ions

di\_\_\_\_\_ations

# Writing Activity Page

Have the students complete the writing of the key math words.



**s** \_\_\_\_\_ **y**

**t** \_\_\_\_\_ **f** \_\_\_\_\_ **n**

**p** \_\_\_\_\_ **t** \_\_\_\_\_ **y**

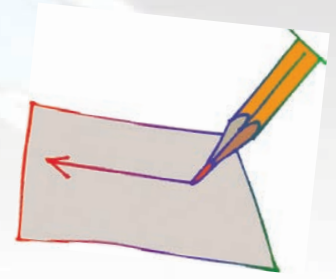
**t** \_\_\_\_\_ **n**

**r** \_\_\_\_\_ **s**

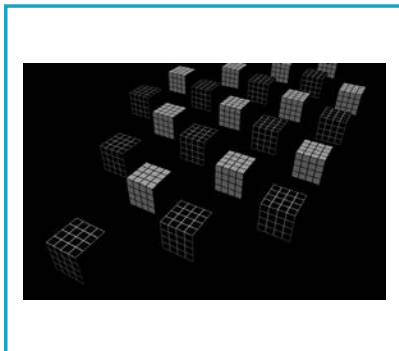
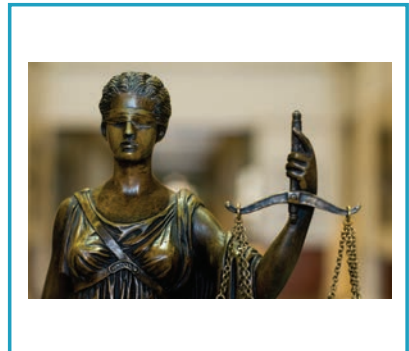
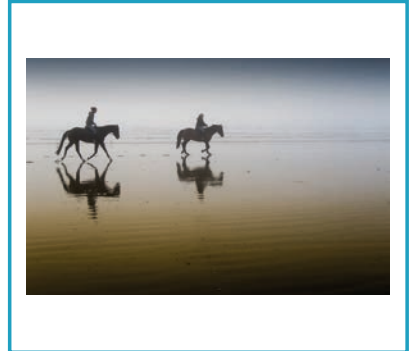
**r** \_\_\_\_\_ **f** \_\_\_\_\_ **s**

**d** \_\_\_\_\_ **s**

# Basic Writing Activity Page

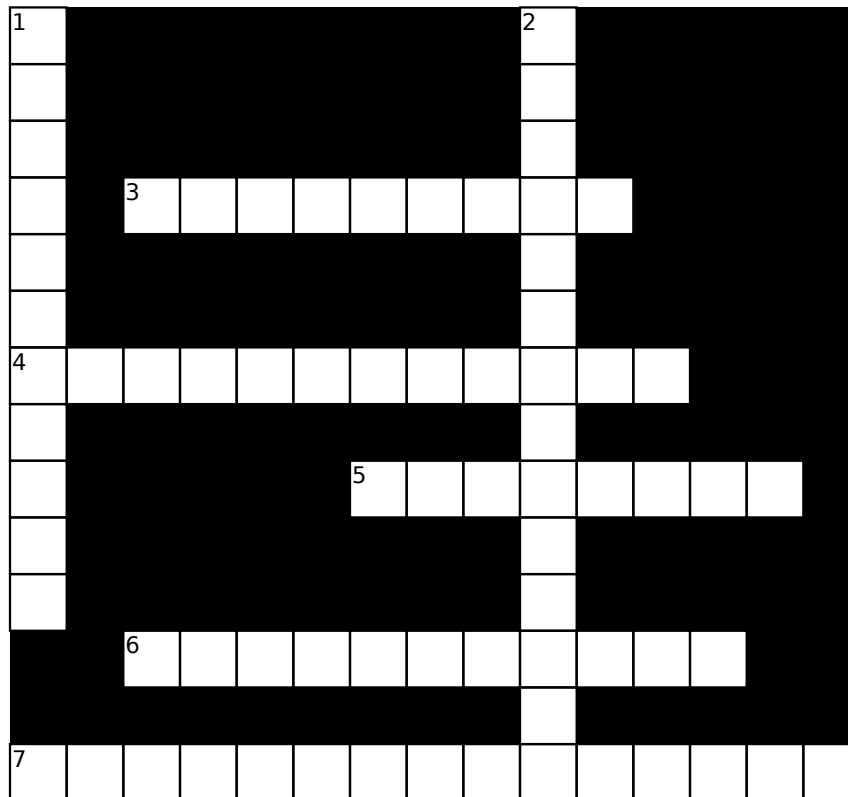
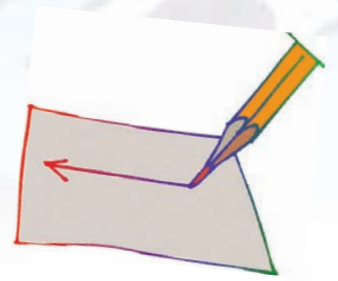


Have the students write the word for each picture.





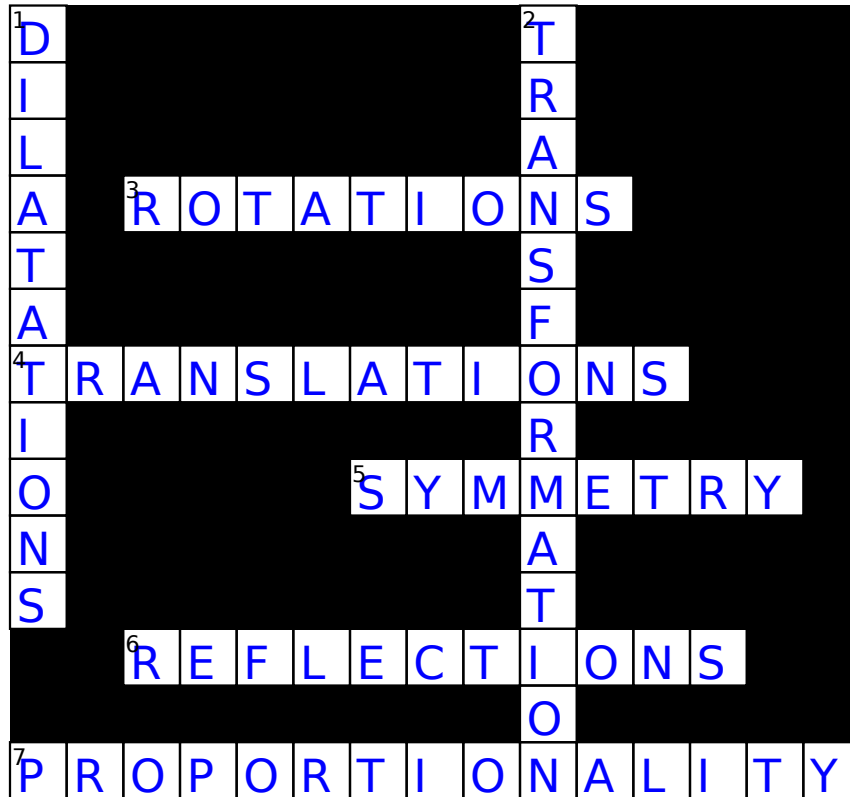
# Crossword Puzzle



- Across
- 3 Rotating around an axis
  - 4 Origin moved to another position
  - 5 Exact reflection of form
  - 6 Direction of axis is reversed
  - 7 Ratio of two constant quantities

- Down
- 1 Enlargement or reduction
  - 2 Changes position or direction of axis

# Crossword Puzzle Answers



- Across
- 3 Rotating around an axis
  - 4 Origin moved to another position
  - 5 Exact reflection of form
  - 6 Direction of axis is reversed
  - 7 Ratio of two constant quantities

- Down
- 1 Enlargement or reduction
  - 2 Changes position or direction of axis



# UNIT ASSESSMENT





# *Similarity, Congruence, Symmetry & Transformation of Shapes*

**Unit Assessment Teacher's Notes**  
**Grade 8 • Unit 8**

**Date:** \_\_\_\_\_

# Unit Assessment

Provide each student with a copy of the students' pages. Read the following instructions aloud. The students should answer the questions on their copies of the assessment.

## BASIC LISTENING

Turn to page 1 in your test. Look at the pictures in the boxes.

1. Write the number 1 by the picture for **SYMMETRY**.
2. Write the number 2 by the picture for **TRANSFORMATION**.
3. Write the number 3 by the picture for **PROPORTIONALITY**.
4. Write the number 4 by the picture for **TRANSLATIONS**.
5. Write the number 5 by the picture for **ROTATIONS**.
6. Write the number 6 by the picture for **REFLECTIONS**.
7. Write the number 7 by the picture for **DILATATIONS**.

## SIGHT RECOGNITION

Turn to page 2 in your test. Look at the pictures in the boxes. Circle the word for each picture.

## DECODING/ENCODING

Turn to page 3 in your test. Look at the word parts in the boxes. Circle the other half or part of each word.

## READING COMPREHENSION

Turn to page 4 in your test. Write each word under its definition.

*Refer to Student Support Materials for answer key.*

## BASIC WRITING

Turn to page 5 in your test. Look at the pictures in the boxes. Write the word for each picture.





*Teacher: To get a percentage for this student's assessment, divide the total number of questions correct by the total number of questions, then multiply this answer by 100 to determine the percentage of questions answered correctly.*





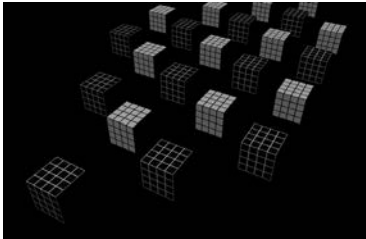
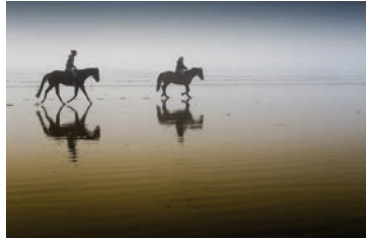


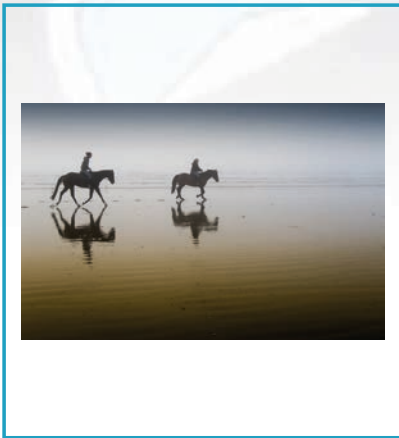
# MATH PROGRAM

Unit Assessment Student Pages  
Grade 8 • Unit 8

Date: \_\_\_\_\_ Student's Name: \_\_\_\_\_

Number Correct: \_\_\_\_\_ Percent Correct: \_\_\_\_\_





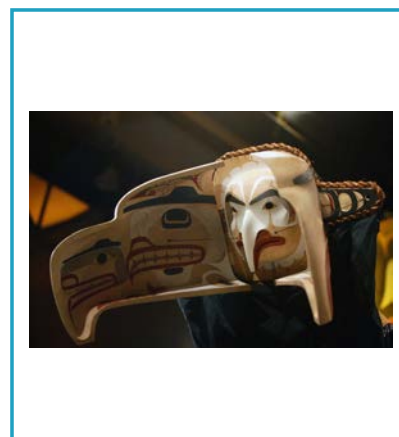
symmetry  
 transformation  
 proportionality  
 translations  
 rotations  
 reflections  
 dilatations



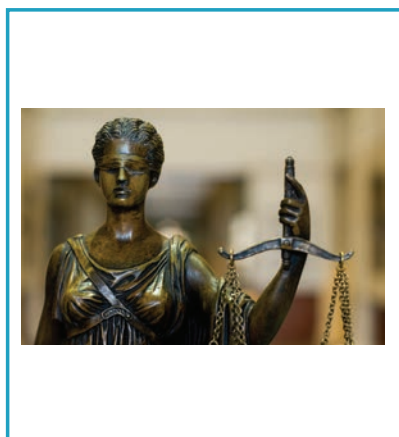
symmetry  
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symmetry  
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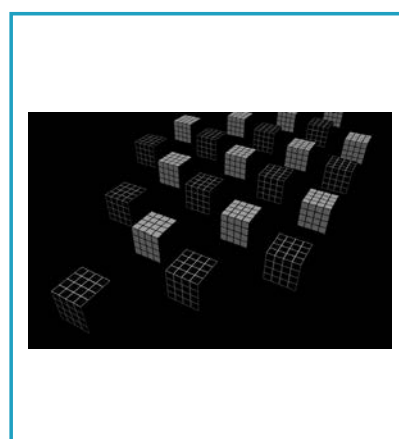
symmetry  
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symmetry  
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 rotations  
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 dilatations



symmetry  
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 dilatations

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**dilatat**\_\_\_\_\_

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ions



**Rotating around an axis**

**Exact reflection of form**

**Changes position or direction of axis**

**Enlargement or reduction**

**Direction of axis is reversed**

**Origin moved to another position**

**Ratio of two constant quantities**

**symmetry**

**transformation**

**proportionality**

**translations**

**rotations**

**reflections**

**dilatations**

