#McKeesport STRONG

Review & Enrichment

Week of April 27th

Grade 8

Student Name _____

Teacher Name _____

If possible, please return paper copies to drop boxes at food distribution sites or if using online access email teacher upon completion.

McKeesport Area School District
Flexible Instruction Days –Founders Hall Lesson Plan

GRADE/SUBJECT: 8 History			LESSON TITLE: CNN 10	
☒LESSON 1: 1st or 2nd 9-Weeks	☒ LESSON 2: 2nd or 3rd 9-Weeks	☒ LESSON 3: 2nd or 3rd 9-Weeks	☒ LESSON 4: 2nd or 3rd 9-Weeks	☒ LESSON 5: 3rd or 4th 9-Weeks

STANDARD(S): 5.1.8.C, 5.1.8.F, 5.2.8.B

INSTRUCTIONAL OUTCOMES:
Students will:
- Understand one major current event in the world
- Be able to list the major events both locally and worldly for the upcoming quiz

STUDENT PARTICIPATION *(Lesson steps):*
Students will:
1. Watch the CNN 10 video clip online
2. Complete the CNN 10 Student News Guided Worksheet

ACCOMMODATIONS:
For struggling learners:
- Students can only write their reflection on one of the current event stories in the video.

For advanced learners:
- Students can complete both sides of the worksheet and receive bonus for choosing a single story on the reverse side

HANDOUTS *(exact names of ALL accompanying handouts)* **& RESOURCES** *(materials, websites, books, etc.)*
- CNN 10 website
- CNN Student News Guided Worksheet
- Current Event Reviewsheet

EVIDENCE OF LEARNING
Students will demonstrate their:
- Understanding of the main ideas for the major stories discussed in the video
- By being able to provide the correct answers on the weekly quiz from the notes on the video and the completed worksheet
- By being able to discuss their reflection on their worksheet when they return to class

Name: _____   Date: _____

CNN Student News Guided Worksheet – Week of _____

Instructions: As you watch the news, complete the chart for each day. If that section is not used for the day, just leave it blank.

Day of the Week _____   Describe the news stories from the day:

1. _____
   _____
   _____

2. _____
   _____
   _____

3. _____
   _____
   _____

4. _____
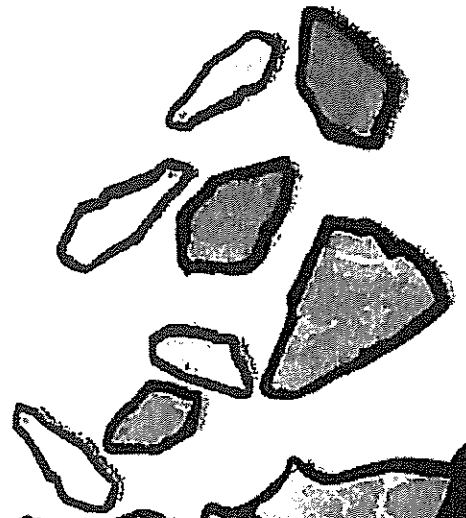   _____
   _____

Describe the "Before We Go":
_____
_____
_____

Reflection: What's your opinion on one of today's top stories? Write a short summary:
_____
_____
_____
_____

NAME_____

DATE_____

Current Event

_____

Publication or Website_____

Topic of _Stories_____

Briefly summarize the important information from the _Stories._

_____

_____

_____

_____

_____

_____

_____

_____

_____

What is your opinion or reaction to this article?

_____

_____

_____

_____

_____

McKeesport Area School District
Flexible Instruction Days –Founders Hall Lesson Plan

GRADE/SUBJECT: 8th ELA			LESSON TITLE: Golden Glass	
☒LESSON 1: 1st or 2nd 9-Weeks	☐ LESSON 2: 2nd or 3rd 9-Weeks	☐ LESSON 3: 2nd or 3rd 9-Weeks	☐ LESSON 4: 2nd or 3rd 9-Weeks	☐ LESSON 5: 3rd or 4th 9-Weeks

STANDARD(S): 1) Cite textual evidence. 2) Draw inferences about character traits and motivations based on clues in the text. 3)analyze how dialogue or story incidents reveal aspects of a character

INSTRUCTIONAL OUTCOMES:
Students will:
- Understand inferencing, character traits, & dialogue
- Be able to analyze how dialogue or incidents in a story propel the action and reveal character traits

STUDENT PARTICIPATION *(Lesson steps):*
Students will:
1. Complete a close read of Golden Glass (pages 3 - 8) completing questions 1 – 10 including the short response.

ACCOMMODATIONS:
For struggling learners:
- Students will complete the even questions as well as the short response.

For advanced learners:
- Along with providing definitions for the vocabulary in the margins, they must also use each word in a sentence.

HANDOUTS *(exact names of ALL accompanying handouts)* & **RESOURCES** *(materials, websites, books, etc.)*
- Close Reader

EVIDENCE OF LEARNING
Students will demonstrate their:
- Understanding of inferencing, character traits, & dialogue
- By being able to complete the short response question with textual evidence.

Golden Glass

Short Story by Alma Luz Villanueva

CLOSE READ
Notes

1. **READ ▷** As you read lines 1–25, begin to cite text evidence.

   • Underline text that describes Ted's character.

   • In the margin, write an inference that explains what food represents to Ted.

I t was his fourteenth summer. He was thinning out, becoming angular and clumsy, but the cautiousness, the old-man seriousness he'd had as a baby, kept him contained, ageless and safe. His humor, always dry and to the bone since a small child, let you know he was watching everything.

He seemed always to be at the center of his own universe, so it was no surprise to his mother to hear Ted say: "I'm building a fort and sleeping out in it all summer, and I won't come in for anything, not even food. Okay?"

10   This had been their silent **communion**, the steady presence of love that flowed regularly, daily—food. The presence of his mother preparing it, his great appetite and obvious enjoyment of it—his nose smelling everything, seeing his mother more vividly than with his eyes.

He watched her now for signs of offense, alarm, and only saw interest. "Where will you put the fort?" Vida asked.

angular:

communion:

3

She trusted him to build well and not ruin things, but of course she had to know where. She looked at his dark, contained face and her eyes turned in and saw him when he was small, with curly golden

20 hair, when he wrapped his arms around her neck. Their quiet times— undemanding—he could be let down, and a small toy could delight him for hours. She thought of the year he began kissing her elbow in passing, the way he preferred. Vida would touch his hair, his forehead, his shoulders—the body breathing out at the touch, his stillness. Then the explosion out the door told her he needed her touch, still.

"I'll build it by the redwoods, in the cypress trees. Okay?"

"Make sure you keep your nails together and don't dig into the trees. I'll be checking. If the trees get damaged, it'll have to come down."

30 "Jason already said he'd bring my food and stuff."

"Where do you plan to shower and go to the bathroom?" Vida wondered.

"With the hose when it's hot and I'll dig holes behind the barn," Ted said so quietly as to seem unspoken. He knew how to slither under her, smoothly, like silk.

"Sounds interesting, but it better stay clean—this place isn't that big. Also, on your dinner night, you can cook outdoors."

His eyes flashed, but he said, "Okay."

He began to gather wood from various stacks, drying it patiently

40 from the long rains. He kept in his room one of the hammers and a supply of nails that he'd bought. It was early June and the seasonal creek was still running. It was pretty dark out there and he wondered if he'd meant what he'd said.

Ted hadn't seen his father in nearly four years, and he didn't miss him like you should a regular father, he thought. His father's image blurred with the memory of a football hitting him too hard, pointed (a bullet), right in the stomach, and the punishment for the penny candies—a test his father had set up for him to fail. His stomach

2. **◄ REREAD** Reread lines 1–25. In the margin, write an inference about Ted's relationship with his mother, Vida.

3. **READ ►** As you read lines 26–59, underline text that suggests that Ted may change his mind about the fort.

hardened at the thought of his father, and he found he didn't miss him
50 at all.

He began to look at the shapes of the trees, where the limbs were
solid, where a space was provided (he knew his mother really would
make him tear down the fort if he hurt the trees). The cypress was
right next to the redwoods, making it seem very remote. Redwoods
do that—they suck up sound and time and smell like another place.
So he counted the footsteps, when no one was looking, from the fort
to the house. He couldn't believe it was so close; it seemed so separate,
alone—especially in the dark, when the only safe way of travel seemed
flight (invisible at best).

60 Ted had seen his mother walk out to the bridge at night with a
glass of wine, looking into the water, listening to it. He knew she loved
to see the moon's reflection in the water. She'd pointed it out to him
once by a river where they camped, her face full of longing—too
naked somehow, he thought. Then, she swam out into the water, at
night, as though trying to touch the moon. He wouldn't look at her.
He sat and glared at the fire and roasted another marshmallow the
way he liked it: bubbly, soft and brown (maybe six if he could get away
with it). Then she'd be back, chilled and bright, and he was glad she
went. Maybe I like the moon too, he thought, involuntarily, as though
70 the thought weren't his own—but it was.

He built the ground floor directly on the earth, with a cover of old
plywood, then scattered remnant rugs that he'd asked Vida to get for
him. He **concocted** a latch and a door, with his hand ax over it, just in
case. He brought his sleeping bag, some pillows, a transistor radio,
some clothes, and moved in for the summer. The first week he slept
with his buck knife open in his hand and his pellet gun loaded on the
same side, his right. The second week Ted sheathed the knife and put
it under his head, but kept the pellet gun loaded at all times. He

concocted

4. **REREAD** Reread lines 26–38. In the margin, write what you learn
about Ted and Vida's relationship from the dialogue.

5. **READ** As you read lines 60–92, continue to cite textual evidence.
   • Circle text that tells something Ted and Vida might have in common.
   • In the margin, explain how the plot advances in each paragraph.

missed no one in the house but the dog, so he brought him into
80   the cramped little space, enduring dog breath and farts because he
missed *someone.*

Ted thought of when his father left, when they lived in the city,
with forty kids on one side of the block and forty on the other. He
remembered that one little kid with the funny sores on his body who
chose an apple over candy every time. He worried they would starve
or something worse. That time he woke up screaming in his room (he
forgot why), and his sister began crying at the same time, "Someone's
in here," as though they were having the same terrible dream. Vida
ran in with a chair in one hand and a kitchen knife in the other,
90   which frightened them even more. But when their mother realized it
was only their hysteria, she became angry and left. Later they all
laughed about this till they cried, including Vida, and things felt safer.

He began to build the top floor now but he had to prune some
limbs out of the way. Well, that was okay as long as he was careful. So
he stacked them to one side for kindling and began to brace things in
place. It felt weird going up into the tree, not as safe as his small,
contained place on the ground. He began to build it, thinking of light.
He could bring his comic books, new ones, sit up straight, and eat
snacks in the daytime. He would put in a side window facing the
100   house to watch them, if he wanted, and a tunnel from the bottom
floor to the top. Also, a ladder he'd found and repaired—he could pull
it up and place it on hooks, out of reach. A hatch at the top of the
ceiling for leaving or entering, tied down inside with a rope. He began
to sleep up here, without the dog, with the tunnel closed off.

Vida noticed Ted had become cheerful and would stand next to
her, to her left side, talking sometimes. But she realized she mustn't
face him or he'd become silent and wander away. So she stood

6. **◀ REREAD AND DISCUSS** Reread lines 82–92. With a small group,
discuss how Ted feels about his father leaving.

7. **READ ▶** As you read lines 93–135, continue to cite textual
evidence.

- Underline text that shows that Ted has changed.
- In the margin, summarize how Ted has changed.
- In the margin, write something you learn about Ted when Vida
compares him to wild pheasants in lines 107–112.

listening in the same even breath and heartbeat she kept when she
spotted the wild pheasants with their long, lush tails trailing the grape
110   arbor, picking delicately and greedily at the unpicked grapes in the
early autumn light. So sharp, so perfect, so rare to see a wild thing
at peace.

She knew he ate well—his brother brought out a half gallon of
milk that never came back, waiting to be asked to join him, but never
daring to ask. His sister made him an extra piece of ham for his four
eggs; most always he ate cold cereal and fruit or got a hot chocolate on
the way to summer school. They treated Ted somewhat like a stranger,
because he was.

Ted was taking a makeup course and one in stained glass. There,
120   he talked and acted relaxed, like a boy; no one expected any more or
less. The colors of the stained glass were deep and beautiful, and
special—you couldn't waste this glass. The sides were sharp, the cuts
were slow and **meticulous** with a steady pressure. The design's plan
had to be absolutely followed or the beautiful glass would go to waste,
and he'd curse himself.

It was late August and Ted hadn't gone inside the house once. He
liked waking up, hearing nothing but birds—not his mother's voice or
his sister's or his brother's. He could tell the various bird calls and
liked the soft brown quail call the best. He imagined their taste and
130   wondered if their flesh was as soft as their song. Quail would've been
okay to kill, as long as he ate it, his mother said. Instead, he killed jays
because they irritated him so much with their shrill cries. Besides, a
neighbor paid Ted per bird because he didn't want them in his garden.
But that was last summer and he didn't do that anymore, and the
quail were proud and plump and swift; and Ted was glad.

meticulous:

8.   **◀ REREAD** Reread lines 119–125. Explain what Ted's attitude
     toward working with stained glass reveals about his character.

_____

_____

9.   **READ ▶** As you read lines 136–147, cite textual evidence.

    • Underline text that describes the stained glass.
    • In the margin, write an inference about why Ted "wouldn't mind at all"
      being inside again.

The stained glass was finished and he decided to place it in his fort facing the back fields. In fact, it looked like the back fields—trees and the sun in a dark sky. During the day the glass sun shimmered a beautiful yellow, the blue a much better color than the sky outside:

140 deeper, like night.

He was so used to sleeping outside now he didn't wake up during the night, just like in the house. One night, toward the end when he'd have to move back with everyone (school was starting, frost was coming and the rains), Ted woke up to see the stained glass full of light. The little sun was a golden moon and the inside glass sky and the outside sky matched.

In a few days he'd be inside, and he wouldn't mind at all.

10. **◀ REREAD AND DISCUSS** Reread lines 136–147. With a small group, discuss what the stained glass means to Ted. Cite specific text evidence from the story in your discussion.

SHORT RESPONSE

Cite Text Evidence How does Ted change over the course of the summer? How does his relationship with his mother change? Review your reading notes, and be sure to cite text evidence from the story in your response.

_____

_____

_____

_____

_____

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_____

_____

_____

_____

McKeesport Area School District
Flexible Instruction Days – Exemplar Lesson Template

GRADE / SUBJECT: 8th Grade Science	LESSON TITLE: Energy

STANDARDS AND SEQUENCE:

- Demonstrate their knowledge to classify types of energy and how to calculate them

INSTRUCTIONAL OUTCOMES:

Students will:

- Understand how the formulas for energy relate to the type of energy they are calculating.

STUDENT PARTICIPATION:

Students will:

1. Read and review notes and complete worksheet.

ACCOMMODATIONS:

For struggling learners:

- Use a calculator

For advanced learners:

Create a scenario for an object's potential from things you find in your house and calculator it's potential energy

RESOURCES:

- Writing Utensil/calculator if needed

EVIDENCE OF LEARNING

Students will demonstrate their:

- Understanding of the types of energy and how to utilize their formulas
- Ability to differentiate between the types of energy.

ENERGY LESSON

ENERGY is the ability to do work or cause change.

There are many types of energy

1.**electrical**- ex. Powers a toaster, hair dryer, TV

2. **chemical**- ex. Food, fuel

3. **radiant** (electromagnetic)- light (sun or artificial light)

4. **thermal**- heat

Energy *can* be **changed** from one form to another, but energy *cannot* be created or destroyed. For example, a toaster changes electrical energy into radiant and then thermal to toast your bread.

All forms of energy are measured in calories or units called **Joules(J)**. Joules are the units used in physics.

KINETIC ENERGY- the energy of a *moving* object

The amount of energy an object has depends on the object's **MASS** and **VELOCITY.**

To **calculate** the kinetic energy of an object we use this...

Kinetic Energy = .5mass x (velocity)^2

OR

KE = .5mv^2

Example: What is the kinetic energy of a baseball with a mass of .15kg moving at a speed of 40m/s?

Formula: Work:

KE=.5mv^2 KE= (.5 x .15) (40^2)

                                        KE= (.075) (1600)

                                        Answer____**120**____   Units __**J**__

Example: What is the kinetic energy of a 6kg bowling ball moving at a speed of 12m/s?

Formula:

$KE = .5mv^2$

Work:

$KE = (.5 \times 6)(12^2)$

$KE = (3)(144)$

Answer _____ **432** _____ Units __J__

POTENTIAL ENERGY- Energy that is **stored** due to the interactions between objects. For example, an apple hanging from a tree has potential energy because of its height above the ground. When it falls, it will cause change.

There are several different types of potential energy.

1. **Elastic potential** -energy stored in something that can *stretch* or *compress*, (ex. Rubberband or spring)
2. **Chemical potential** – energy stored in the chemical bonds of *food* or *fuels*. When the bonds are broken, the energy is released.
3. **Gravitational potential (GPE)** – energy stored by objects due to their position *above* Earth's surface (*height* above ground).
   a. The amount of GPE depends on an objects **MASS** and **HEIGHT** above the ground.
   b. GPE of an object **increases** if the *mass* or the *height* **increases**.
   c. As an object falls, the GPE **decreases** since height *decreases*, BUT the **kinetic** energy **increases** since the objects speed *increases*.
   d. To calculate GPE, we use this...

$$GPE = \text{mass} \times 9.8 \times \text{height}$$

OR

$$GPE = mgh$$

Example: What is the GPE of a 3kg book sitting on a shelf that is 2m high?

Formula:

$GPE = mgh$

Work:

$GPE = (3)(9.8)(2)$

Answer_____ **58.8** _____ Units __J__

Example: What is the GPE of a ceiling fan with a mass of 4kg that is 2.5m above the floor?

Formula:

Work:

GPE = mgh

GPE = (4) (9.8) (2.5)

Answer_____ **98**_____   Units __J_

PHYSICS PRACTICE SHEET   THE NATURE OF ENERGY

Part A. The three forms of potential energy are GRAVITATIONAL, CHEMICAL, AND ELASTIC. For each example below, identify the type(s) of potential energy the object has. Some examples will have MORE THAN ONE ANSWER!

_____ 1. Chocolate chip cookies

_____ 2. Gasoline

_____ 3. A bicycle at the top of a hill

_____ 4. A stretched rubber band

_____ 5. An apple hanging from a tree (2 answers!)

_____ 6. A coiled spring

_____ 7. A Big Mac

_____ 8. A ton of coal

_____ 9. A can of Pepsi

_____ 10. A vase sitting on a shelf

Part B. Choose the best word or phrase to complete each sentence:

_____ 11. _____ is NOT used to calculate the kinetic energy of an object.
          A.   Height   B. Mass

_____ 12. The _____ potential energy of an object increases with height.
          A.   chemical   B. gravitational

_____ 13. The kinetic energy of an object increases as its _____ increases.
          A.   height above the ground   B. speed (velocity)

_____ 14. The energy stored in a spring is _____ potential energy.
          A.   elastic   B. electrical

_____ 15. The energy in foods and fuels is _____ potential energy.
          A.   chemical   B. elastic

_____ 16. Energy is measured in units called _____.
          A.   Newtons   B. Joules

Part C. Identify each statement as TRUE or FALSE:

_____ 17. The energy of a moving object is gravitational potential energy.

_____ 18. A rock at rest on the edge of a cliff has kinetic energy.

_____ 19. A rock at rest on the edge of a cliff has gravitational potential energy.

_____ 20. As the mass of a moving object increases, so does its kinetic energy.

_____ 21. The energy stored in the bonds of the food we eat is elastic potential energy.

_____ 22. One type of energy cannot change into another type of energy.

_____ 23. A toaster uses chemical energy to toast bread.

_____ 24. The kinetic energy of an object quadruples if the velocity of the object doubles.

Part D. Solve the following problems using the four step method.

KE = $.5mv^2$	GPE = mgh
m = mass, v = velocity	m = mass, g = 9.8, h = height

25. What is the kinetic energy of a jogger with a mass of 60 kg jogging at a speed of 3 m/s?
    Formula: Work:

                                          Answer _____ Units _____

26. What is the gravitational potential energy (GPE) of a bunch of bananas with a mass of 3 kg hanging
    4 m above the ground?
    Formula: Work:

                                          Answer _____ Units _____

McKeesport Area School District
Flexible Instruction Days –Founders Hall Lesson Plan

GRADE/SUBJECT: Math – Grade 8	LESSON TITLE: Transformations in the Plane

☒LESSON 1: 1ˢᵗ or 2ⁿᵈ 9-Weeks	☐ LESSON 2: 2ⁿᵈ or 3ʳᵈ 9-Weeks	☐ LESSON 3: 2ⁿᵈ or 3ʳᵈ 9-Weeks	☐LESSON 4: 2ⁿᵈ or 3ʳᵈ 9-Weeks	☐LESSON 5: 3ʳᵈ or 4ᵗʰ 9-Weeks

STANDARD(S):

- 8.G.A.1
- 8.G.A.2
- 8.G.A.3

INSTRUCTIONAL OUTCOMES:
Students will:
- Use properties of mathematical transformations to create visual representations of pre-images and images in a Cartesian coordinate plane

STUDENT PARTICIPATION *(Lesson steps):*
Students will:
1. Review transformations through an interactive game on the internet (if possible)
2. Complete the reteach and homework practice activities (or ask 4 good questions)
3. Optional – complete the enrichment word problem activities (due next school day for bonus)

ACCOMMODATIONS:
For struggling learners:
- Asking good questions in lieu of completing the activities
For advanced learners:
- Bonus activities geared toward higher leveled thinkers

HANDOUTS *(exact names of ALL accompanying handouts)* **& RESOURCES** *(materials, websites, books, etc.)*
- Directions page
- Worksheets
- enrichment

EVIDENCE OF LEARNING
Students will demonstrate their:
- Understanding of how different figures are manipulated through geometric transformations on the coordinate plane.

Transformations in the Plane

FIRST... Play this game to refresh your memory...   (optional)

Google:

Shape Mods – Math Playground

Google   shape mods math playground   🎤 🔍

🔍 All   🛒 Shopping   ▶ Videos   🖼 Images   📰 News   ⋮ More   Settings   Tools

About 421,000 results (0.56 seconds)

https://www.mathplayground.com › ShapeMods ▾
Shape Mods | Math Playground
Play Shape Mods at Math Playground! Use translations, reflections, and rotations to solve each geometry puzzle.

https://www.mathplayground.com › TransformationWorkshop ▾
Transformation Workshop | Math Playground
Practice reflections, rotations, and translations at MathPlayground.com

https://www.mathplayground.com › shape_inlay ▾
Shape Inlay | Math Playground
Play Shape Inlay at MathPlayground.com! Create a geometric work of art by adding shapes to the board as quickly as possible
Missing: mods | Must Include mods

https://www.augusta.k12.va.us › site › ModuleInstanceID=19549 ▾
Math Playground Shape Mods game
Math Playground Shape Mods game https://www.mathplayground.com/ ShapeMods/index.html Search Submit. Student/Parent PortalRegister OnlineTeacher

When you are done, complete the Reteach and Homework Practice Activities

If you are unsure about what to do, write down 4 *GOOD* questions you would ask me if we were in class together.

For Extra credit, complete the Word Problem Practice Pages.
(Due tomorrow).

Translations

> When a figure is translated, each point is moved the same distance and in the same direction. The translated figure is congruent to the original figure and has the same orientation.

Example
Draw the image of quadrilateral *ABCD* after a translation 2 units right and 3 units up.

Step 1   To find the corresponding point for vertex *A*, start at *A* and move 2 units to the right along the horizontal grid line and then move up 3 units along the vertical grid line. Draw a point and label it *A'*. Repeat for each vertex.
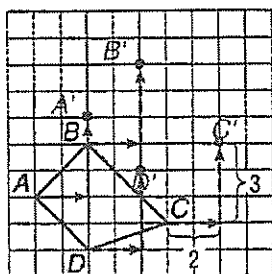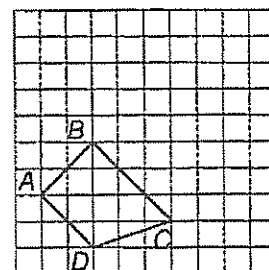
Step 2   Connect the new vertices to form quadrilateral *A'B'C'D'*.
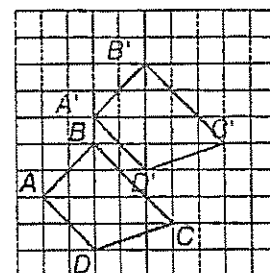
Exercises
Draw the image of the figure after the indicated translation.

1. 5 units right and 4 units down
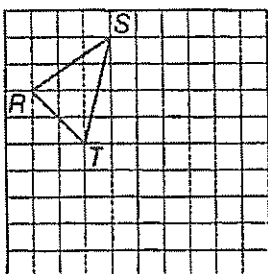
2. 3 units left and 2 units up
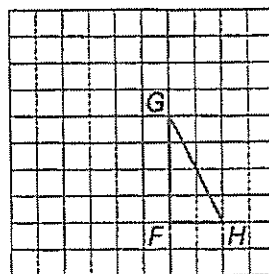
Lesson 1 Homework Practice

Translations

Draw the image of the figure after the indicated translation.

1. 3 units right and 2 units up
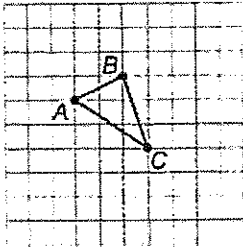
2. 5 units right and 3 units down
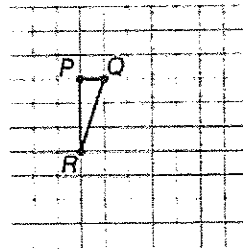
3. 2 units left and 1 unit up
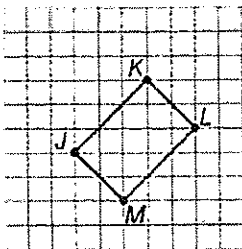
4. 4 units left and 2 units down
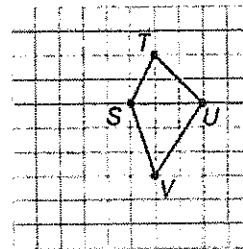
Graph the figure with the given vertices. Then graph the image of the figure after the indicated translation, and write the coordinates of its vertices.

5. △*FGH* with vertices *F*(1, 3), *G*(2, 4), and *H*(3, 2); translated 3 units left and 1 unit down
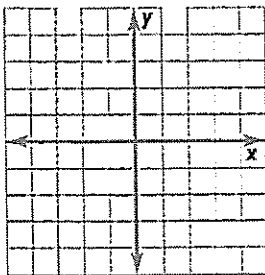
6. rectangle *PQRS* with vertices *P*(−4,−1), *Q*(0, 1), *R*(1,−1), and *S*(−3,−3) translated 2 units right and 3 units up
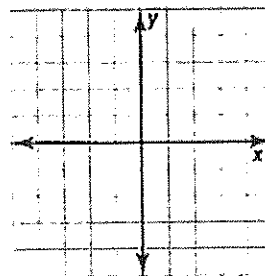
7. **QUILTS** The quilt design at the right is a traditional American design. Describe the minimum number of translations of the original pattern, A, needed to create the section shown.

8 in.

8 in.
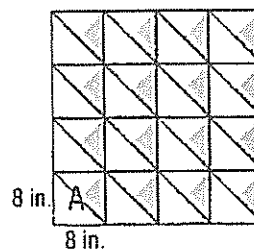
Reflections

A type of transformation where a figure is flipped over a line of reflection is a reflection. To reflect a figure over the x-axis, multiply the y-coordinates by −1. To reflect a figure over the y-axis, multiply the x-coordinates by −1.

Example

Triangle DEF has vertices D(2, 2), E(5, 4), and F(1, 5). Find the coordinates of the reflected image. Graph the figure and its reflected image over the x-axis.

Plot the vertices and connect to form △DEF. The x-axis is the line of symmetry. The distance from a point on △DEF to the line of symmetry is the same as the distance from the line of symmetry to the reflected image. The image coordinates are D(2, −2), E(5, −4), and F(1, −5).
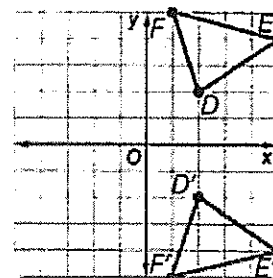
Exercises

1.   Triangle ABC has vertices A(0, 4), B(2, 1), and C(4, 3). Find the coordinates of the vertices of ABC after a reflection over the x-axis. Then graph the figure and its reflected image.
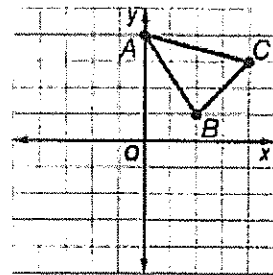
For Exercises 2 and 3, use the following information.
Triangle FGH has vertices F(−4, 2), G(2, 2), and H(0, −3).

2. What are the coordinates of the image of point F after a reflection over the x-axis?

3. Graph triangle FGH and its image after a reflection over the x-axis.
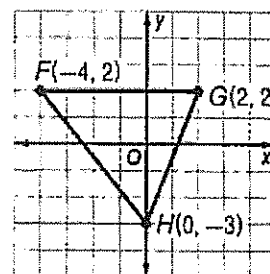
For Exercises 4–6, use the following information.
Quadrilateral WXYZ has vertices W(3, −1), X(3, −4), Y(0, −1), and Z(−3, −4).

4. What are the coordinates of the image of point W after a reflection over the y-axis?

5. What are the coordinates of the image of point X after a reflection ov the y-axis?

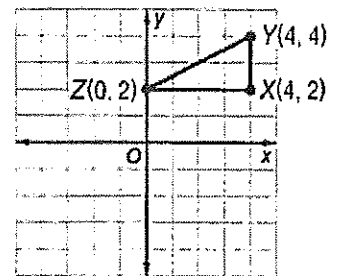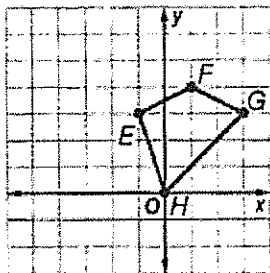**6.** Graph quadrilateral WXYZ and its image after a reflection over the y-axis.
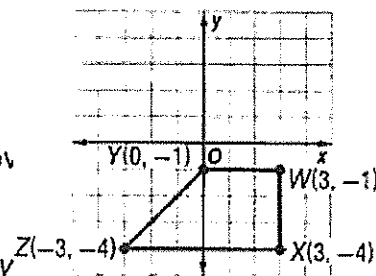
Lesson 2 Homework Practice

Reflections

1. Graph △*ABC* with vertices *A*(2, 2), *B*(5, 4),and *C*(5, 1) and its reflection over the *x*-axis. Then find the coordinates of the reflected image.
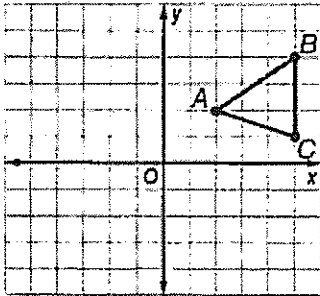
2. Graph square *ABCD* with vertices *A*(−1, 2), *B*(2, −1), *C*(5, 2), and *D*(2, 5) \and its reflection over the *y*-axis. Then find the coordinates of the reflected image.
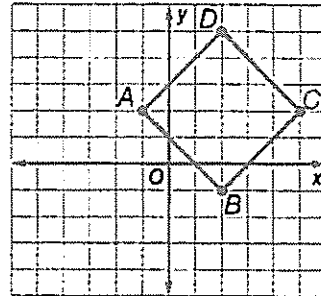
The coordinates of a point and its image after a reflection are given. Describe the reflection as over the *x*-axis or *y*-axis.

3. $B(1, -2) \rightarrow B'(1, 2)$

4. $J(-3, 5) \rightarrow J'(-3, -5)$

5. $W(-7, -4) \rightarrow W'(7, -4)$

For Exercises 6–9, use the following information.

Triangle *XYZ* has vertices *X*(4, 2), *Y*(4, 4), and *Z*(0, 2).

6. What are the coordinates of the image of point *X* after a reflection over the *y*-axis?

7. What are the coordinates of the image of point *Y* after a reflection over the *y*-axis?

8. What are the coordinates of the image of point *Z* after a reflection over the *y*-axis?

9. Graph triangle *XYZ* and its image after a reflection over the *x*-axis.

Rotations

For Exercises 1 and 2, graph quadrilateral *EFGH* and its image after each rotation. Then give the coordinates of the vertices for quadrilateral *E'F'G'H'*.
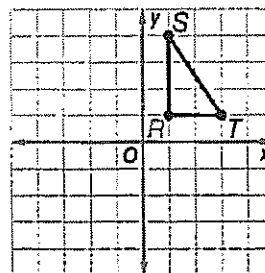
**1.** 180° clockwise about vertex *H*
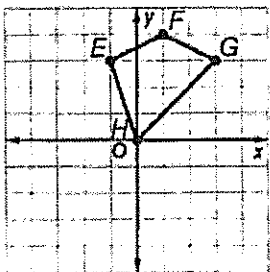
2. 180° counterclockwise about vertex *E*

3. Triangle *RST* has vertices *R*(1, 1), *S*(1, 4), and *T*(3, 1). Graph the figure and its rotated image after a clockwise rotation of 180° about the origin. Then give the coordinates of the vertices for triangle *R'S'T'*.

4. Quadrilateral *KLMN* has vertices *K*(2, 0), *L*(4, 0), *M*(5, −2), and *N*(1, −2). Graph the figure and its rotated image after a counterclockwise rotation of 90° about the origin. Then give the coordinates of the vertices for quadrilateral *K'L'M'N'*.
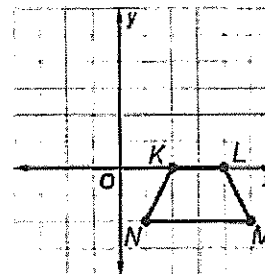
Rotations

> A rotation is a transformation in which a figure is rotated, or turned, about a fixed point. The center
> of rotation is the fixed point. The preimage and the image are congruent.

Example 1
Triangle *ABC* has vertices *A*(3, 2), *B*(5, 4), *C*(6, 2). Graph the figure and its image after a
counterclockwise rotation of 90° about vertex *A*. Then give the coordinates of the vertices for
A'B'C'.

Step 1	Graph the original triangle.

Step 2   Graph the rotated image. Use a protractor to measure an
          angle of 90° with *B* as one point on the ray and *A* as the
          vertex. Mark off a point the same distance as $\overline{BA}$. Label
          this point *B'* as shown.

Step 3   Repeat Step 2 for point *C*. Since *A* is the point at which
          △*ABC* is rotated, *A'* will be in the same position as *A*.
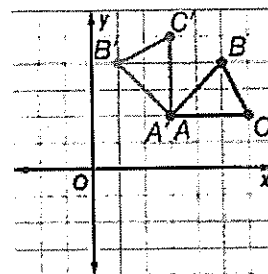
So, the coordinates of the vertices of △*ABC* are *A'* (3, 2), *B'* (1, 4), *C'* (3, 5).
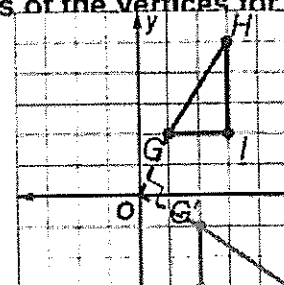
Example 2
Triangle *GHI* has vertices *G*(1, 2), *H*(3, 5), *I*(3, 2). Graph the figure and its image after a
clockwise rotation of 90° about the origin. Then give the coordinates of the vertices for △*G'H'I'*.

Step 1   Graph △*GHI* on a coordinate
plane.

Step 2   Sketch $\overline{GO}$ connecting point *G* to the origin. Sketch
          another segment, *G'O'* so that the angle between point *G*,
          O, and *G'* measures 90° and the segment is congruent to
          $\overline{GO}$.

Step 3   Repeat Step 2 for points *H* and *I*. Then connect the
          vertices to form △*G'H'I'*.

So, the coordinates of the vertices of △*G'H'I'* are *G'*(2, −1), *H'*(5, −3), and *I'*(2, −3).

Exercises
Refer to △*GHI* in Example 2 above. Graph *GHI* after each rotation.
Then give the coordinates of the vertices for *G'H'I'*. Triangle *GHI* has vertices *G*(1, 2), *H*(3, 5),
I(3, 2).

1. 180° counterclockwise about vertex *G*

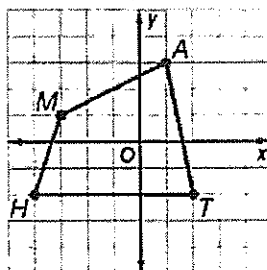2. 180° clockwise about the origin

Dilations

Find the coordinates of the vertices of each figure after a dilation with the given scale factor *k*. Then graph the original image and the dilation.
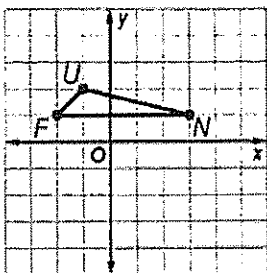
1. $S(-2, 1)$, $U(0, 1)$, $N(-1, -1)$; $k = 4$
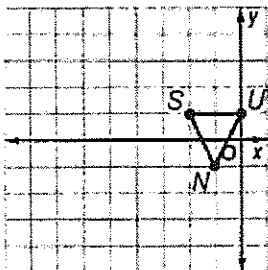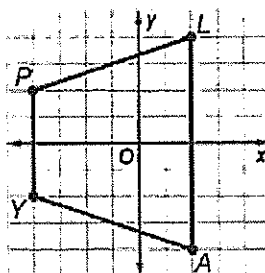

2. $M(-3, 1)$, $A(1, 3)$, $T(2, -2)$, $H(-4, -2)$; $k = \frac{1}{2}$

3. $F(-2, 1)$, $U(-1, 2)$, $N(3, 1)$; $k = 2$

4. $P(-4, 2)$, $L(2, 4)$, $A(2, -4)$, $Y(-4, -2)$; $k = \frac{1}{4}$

5. MAPS Rachel and her cousin, Lena, live in different cities that are about 100 miles apart. On a map, the two cities measure 5 inches apart. What is the scale factor used for the map?

6. GEOMETRY A square has vertices $J(-1, 4)$, $U(5, 4)$, $M(5, -2)$, $P(-1, -2)$. After a dilation, square *JUMP* has vertices $J(-0.5, 2)$, $U(2.5, 2)$, $M(2.5, -1)$, $P(-0.5, -1)$. What is the scale factor of the dilation?

7. LANDSCAPING A landscape designer has a drawing of a flower bed that measures 6 inches by 9 inches. The owner wants the actual flower bed to be 5 feet by 7.5 feet. What is the scale factor the designer must use to install the new flower bed?

Dilations

> A **dilation** is a transformation that enlarges or reduces a figure by a scale factor. The preimage and image are similar figures.

Example 1

A triangle has vertices $C(-2, -1)$, $D(1, 1)$, and $E(2, -3)$. Find the coordinates of the vertices of the triangle after a dilation with a scale factor of 2.
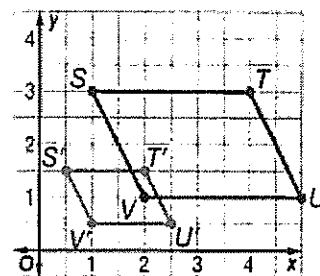
The dilation is $(x, y) \rightarrow (2x, 2y)$. Multiply the coordinates of each vertex by 2.

$$C(-2, -1) \qquad\qquad \rightarrow [2 \cdot (-2), 2 \cdot (-1)] \qquad \rightarrow (-4, -2)$$
$$D(1, 1) \rightarrow (2 \cdot 1, 2 \cdot 1) \quad \rightarrow (2, 2)$$
$$E(2, -3) \rightarrow [2 \cdot 2, 2 \cdot (-3)] \rightarrow (4, -6)$$

So, the coordinates after the dilation are $C'(-4, -2)$, $D'(2, 2)$, $E'(4, -6)$.

Example 2

A figure has vertices $S(1, 3)$, $T(4, 3)$, $U(5, 1)$, and $V(2, 1)$. Graph the figure and its image after a dilation with a scale factor of $\frac{1}{2}$.

The dilation is $(x, y) \rightarrow (\frac{1}{2}x, \frac{1}{2}y)$. Multiply the coordinates of each vertex by $\frac{1}{2}$.

$$S(1, 3) \rightarrow (\tfrac{1}{2} \cdot 1, \tfrac{1}{2} \cdot 3) \rightarrow (\tfrac{1}{2}, 1\tfrac{1}{2})$$

$$T(4, 3) \rightarrow (\tfrac{1}{2} \cdot 4, \tfrac{1}{2} \cdot 3) \rightarrow (2, 1\tfrac{1}{2})$$

$$U(5, 1) \rightarrow (\tfrac{1}{2} \cdot 5, \tfrac{1}{2} \cdot 1) \rightarrow (2\tfrac{1}{2}, \tfrac{1}{2})$$

$$V(2, 1) \rightarrow (\tfrac{1}{2} \cdot 2, \tfrac{1}{2} \cdot 1) \rightarrow (1, \tfrac{1}{2})$$

Example 3

BIKES Zach has a toy bicycle that is 2 inches tall. An actual tricycle that is 16 inches tall. What is the scale factor of the dilation?

Write a ratio comparing the heights of the two bicycles.

$$\frac{\text{height of actual}}{\text{height of toy}} = \frac{16}{2}$$
$$= 8$$

So, the scale factor of the dilation is 8.

Find the coordinates of the vertices of the figure after a dilation with the given scale factor k. Then graph the original image and the dilation.

1. $W(-1, 4)$, $X(1, 2)$, $Y(-2, 1)$; $k = 3$

2. **BOXES** Janelle has a box that measures 4 feet by 3 feet. She needs a box similar to this one that measures 2 feet by 1.5 feet. What is the scale factor of the dilation?

Translations

1. BUILDINGS The figure shows an outline of the White House in Washington, D.C., plotted on a coordinate system. Find the coordinates of points *C* and *D* after the figure is translated 2 units ri	**2. BUILDINGS** Refer to the figure in Exercise 1. Find the coordinates of points *C* and *D* after the figure is translated 1 unit left and 4 units up.
3. ALPHABET The figure shows a capital "N" plotted on a coordinate system. Find the coordinates of points *F* and *G* after the figure is translated 2 units right and 2 units down.	**4. ALPHABET** Refer to the figure in Exercise 3. Find the coordinates of points *F* and *G* after the figure is translated 5 units right and 6 units down.
5. QUILT The beginning of a quilt is shown below. Look for a pattern in the quilt. Copy and translate the quilt square to finish the quilt.	**6. BEACH** Tylia is walking on the beach. Copy and translate her footprints to show her path in the sand.

Reflections

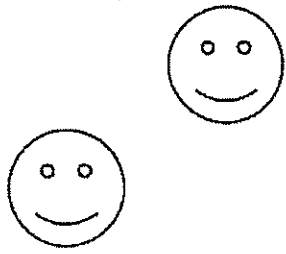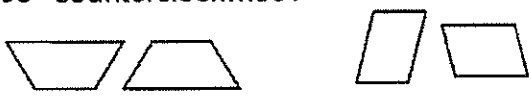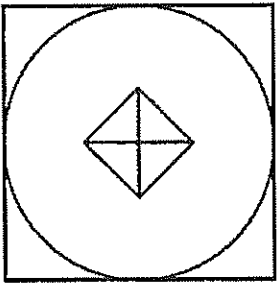|	
1. DESIGNS Half of a design is shown below. Reflect the figure across the *x*-axis to obtain the complete	**2. DESIGNS** Half of a design is shown below. Reflect the figure across the *y*-axis to obtain the complete
3. LOGO Half of a logo is shown below. Reflect the figure across the *y*-axis to obtain the completed figure.	**4. SYMBOLS** The figure shows a ray plotted on a coordinate system. Reflect the ray across the *x*-axis. Graph the reflected image.
5. ARCHITECTURE A corporate plaza is to be built around a small lake. Building 1 has already been built. Suppose there are axes through the lake as shown. Show where Building 2 should be built if it will be a reflection of Building 1 across the *y*-axis followed by ᵃ⸍ ⁱᵉ *x*-axis.	**6. ARCHITECTURE** Use the information from Exercise 5. Suppose that a third building is to be built as shown. To complete the business park, show where a fourth building should be built if it is a reflection of Building 3 across the *x* and *y*-axis.

Rotations

| 1. **OPEN-ENDED** Draw a figure that has rotational symmetry with 90° and 180° as its angles of rotation.	2. **CLASSIFY** Identify the transformation shown below as a translation, reflection, or rotation. Explain.
3. **ROTATIONS** Which figure below was rotated 90° counterclockwise?	4. **LETTERS** Which capital letters in the word TRANSFORMATION produce the same letter after being rotated 180°?
5. **REAL-WORLD** Describe a real-world example of where you could find a rotation.	6. **ART** An art design is shown. State the angles of rotation.

Dilations

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1. GEOMETRY Find the coordinates of the triangle shown below after a dilation with a scale
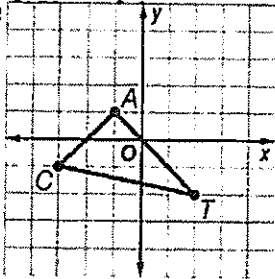
2. PHOTOS Daniel is using a scale factor of 10 to enlarge a class photo that measures 3.5 inches by 5 inches. What are the dimensions of the photo after the dilation?

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3. DOGS Isabel has a mother dog and her puppy that look exactly alike. The puppy weighs 6 pounds, and the mother weighs 48 pounds. Assuming the two dogs are similar, what is the scale factor of the dilation?

4. GEOMETRY Find the coordinates of the quadrilateral shown below after a dilation with a scale factor of $\frac{1}{2}$.

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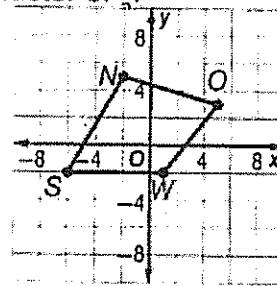
5. BLUEPRINTS Abby's family is building a new house. On the blueprints of the house, Abby's bedroom measures 3 inches by 3.75 inches. Her actual bedroom will measure 8 feet by 10 feet. What is the scale factor for the dilation?

6. ART William saw a painting in a museum, and later found a picture of that same painting in a book. The actual painting measured 36 inches by 54 inches. The picture of the painting measured 4 inches by 6 inches. What is the scale factor for the dilation?