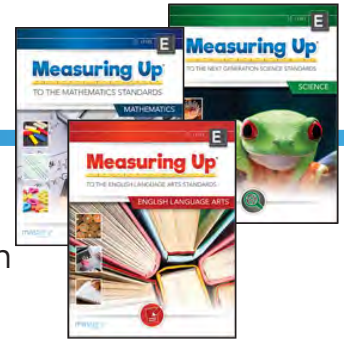


Try It Out! Sample Pack | Science | Grade 4 | Lesson 3

Measuring Up to the Standards



The **Try It Out!** sample pack features:

- 1 full student lesson with complete Teacher Edition lesson
- 1 full Table of Contents for your grade level
- Correlation to the standards

Developed to meet the rigor of the standards, **Measuring Up** employs support for using and applying critical thinking skills with direct standards instruction that elevate and engage student thinking.

Standards-based lessons feature introductions that set students up for success with:

- ✓ Vocabulary in Action
- ✓ Relevant real-world connections
- ✓ Clearly identified learning goals
- ✓ Connections to prior learning

Guided Instruction and Independent Learning strengthen learning with:

- ✓ Deep thinking prompts
- ✓ Collaborative learning
- ✓ Self-evaluation
- ✓ Demonstration of problem-solving logic
- ✓ Application of higher-order thinking

Flexible design meets the needs of whole- or small-group instruction. Use for:

- ✓ Introducing standards
- ✓ Reinforcement or standards review
- ✓ Intervention
- ✓ Remediation
- ✓ Test Preparation

Extend learning with online digital resources!

Measuring Up Live 2.0 blends instructional print resources with online, dynamic assessment and practice. Meet the needs of all students for standards mastery with resources that pinpoint student needs with customized practice.



WORDS TO KNOW

adaptation

growth

behavior

reproduction

Lesson 3

HOW ARE ANIMALS ABLE TO GROW, SURVIVE, AND REPRODUCE?

THE BIG IDEA

▶ TURN AND TALK

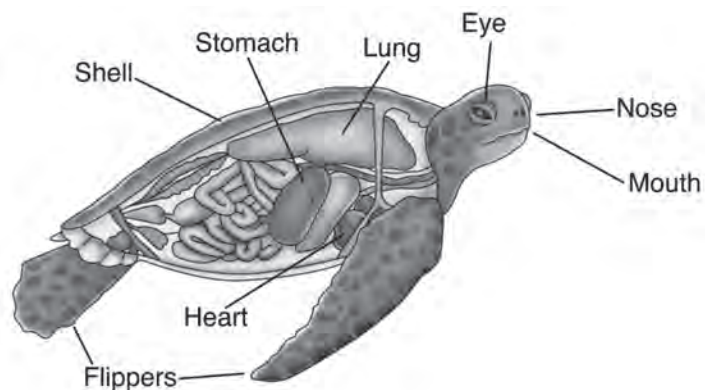
What is one of your favorite animals? Does it have any unique structures, such as the elephant's trunk or the hummingbird's wings? Does it have any unique behaviors, such as otters cracking open clams or fish swimming in schools? Talk about how these special features help the animal survive.

- Animals have structures inside and outside their bodies that help them live, grow, and reproduce.

WHAT I NEED TO KNOW

Animals live in different places, so they have different **adaptations**, or features that help them survive in their environments. For example, a seal has a layer of fat to keep it warm in ocean water.

Adaptations include structures on the outside of the animal, such as scales, long necks, or feathers. Adaptations also include structures inside the animal. For example, a sea turtle can slow its heart down to one beat every nine minutes! Other internal structures of animals include their lungs, brains, muscles, and stomachs.



These structures are important to an animal's **growth**, or the process of getting bigger. For example, the long, thin nose and tongue of an anteater helps it find and slurp up ants. The anteater's stomach does its job, sending nutrients to the body.

An animal's structures work together as a system. For instance, a dolphin's lungs absorb oxygen, and its heart pumps that oxygen to the muscles that need it. The muscles move the dolphin toward food, or away from a predator. Structures work together to help the animal survive.

Animals use their senses to learn about their environment. The way they respond to changes is called **behavior**. An elephant fans its ears to cool off in the heat. In the cold, penguins huddle together for warmth. Animals may run or hide when they see or smell danger. Animal behaviors change with the seasons. Birds build nests in spring, monarch butterflies migrate to warmer places in fall, and bats and bears both hibernate in winter.



Animals' different structures and behaviors are also important to **reproduction**, or making new animals or offspring. Female peacocks tend to choose males with the brightest tail feathers. Walrus use their tusks to compete for females and the best territory. The fastest wolves will catch the most prey to feed their pups.

WHAT I HAVE LEARNED

1. Which is not a function of the system of structures on the outside and inside of an animal?
- (A) To help the animal grow
 - (B) To assist in reproduction
 - (C) To help the animal survive
 - (D) To provide the animal's ecosystem

THINK ABOUT IT

Think about a favorite animal again. What structures does it use to catch and eat food? How do you think these structures help this animal grow?

2. To live and grow, hawks and eagles catch prey such as mice or rabbits. They scan the ground for these small animals from up to 1,000 feet in the air, which is as high as a 100-story skyscraper. These birds can see 8-10 times better than humans.

Which conclusion makes the most sense?

- (A) Hawks and eagles have better eyesight because they spend time training their eyes from high in the sky.
- (B) Hawks and eagles have adaptations in their eyes that allow them to find food so they grow and survive.
- (C) Hawks and eagles probably use sonar like bats to see such small objects from far away.
- (D) Hawks and eagles decided to adapt because they have to fly so high.

3. When oil spills pollute water and shorelines, animals are affected. Sea otters and fur seals are marine mammals that grow thick fur on their skin. When oil coats their bodies they quickly become cold. They may die of hypothermia, or low body temperature, from the excess cold.

Based on this information, how does fur help marine mammals survive?

- (A) Fur helps otters and seals keep oil spills off of their skin.
- (B) Fur helps otters and seals keep their bodies at the right temperature.
- (C) Fur attracts the best mates during mating season.
- (D) Fur traps oil that helps the otters and seals stay warm.

4. Scientists observed Hawaiian crows picking up sticks with their beaks and putting the sticks into holes in logs. If a stick did not fit, the crows chose different sticks. Using the sticks, the crows pulled insects and larvae out and ate them.

What conclusion could the scientists make based on this information?

- (A) Crows are not very smart animals, so they eat insects and larvae.
- (B) Crows like to play with sticks, logs, and insects.
- (C) Crows' behavior, beaks, and brains helps them grow and survive.
- (D) Crows are loud and noisy animals that get into a lot of trouble.

5. Some frog tadpoles in a pond had white skin instead of the normal dark color. A scientist put some in a tank and left others in the pond. The white tadpoles in the pond disappeared, while those in the tank lived. She concluded that the white tadpoles did not survive as well because predators were more likely to eat them.

What other evidence would help support the scientist's conclusion?

- (A) Evidence of predators eating white tadpoles more often than dark tadpoles
- (B) Evidence that the white tadpoles had more difficulty finding algae to eat
- (C) Evidence that the predators found tadpoles by listening for their sound, not seeing their color
- (D) Evidence that all the tadpoles in the pond died

HINT, HINT

Read all the choices. For each one, ask yourself these questions. Does this support the conclusion that the tadpoles died because predators ate them? Does this support the conclusion that the color of the tadpoles mattered?

HINT, HINT

To put ideas in order, it helps to ask questions. What does the reader need to know first, second, and last? What happened first, and what happened next? What ties this idea to that idea? What is the final idea, or conclusion?

6. Ishta is writing a report about the bowerbirds of Australia and New Guinea. Here are her notes so far.

- A. The bowerbird uses its beak to collect objects to make and decorate its nest, or bower.
- B. The male bowerbird has very interesting behaviors to attract a mate.
- C. Females are attracted by the brightly colored objects in the nest, such as fruit, rocks, or pieces of plastic or glass.



How should she order these sentences to best show how the structures and behaviors of bowerbirds help them reproduce?

- (A) A, B, C
- (B) A, C, B
- (C) B, A, C
- (D) C, A, B

ANNOTATED TEACHER EDITION

CONTENTS

Introduction

Letter to Students	vi
Letter to Parents and Families	vii
What You'll See in <i>Measuring Up to the Next Generation Science Standards</i>	viii

Unit I Structure, Function, and Information Processing

NGSS

4-PS4-2

4-LSI-1

4-LSI-1

4-LSI-2

3-5-ETS1-1, 4-LSI-2

LESSON

1. How Do We See Objects?	1
2. How Are Plants Able to Grow, Survive, and Reproduce?	6
3. How Are Animals Able to Grow, Survive, and Reproduce?	12
4. Why Do Animals Behave the Way They Do?	17
Unit I Information Processing Lab Investigation	21
Unit I Building Stamina	25

Unit 2 Transferring Energy and Information

NGSS

	LESSON	
4-PS3-2	5. What Is Energy and How Does It Move from Place to Place?	33
4-PS3-2	6. How Do Sound, Light, and Heat Transfer Energy?	37
4-PS3-2	7. How Does an Electric Current Transfer Energy?	40
4-PS3-4	8. How Are Electric Currents Transformed into Usable Energy?	44
4-PS3-4	9. How Does Stored Energy Become Usable Energy?	48
4-PS4-3	10. How Does Information Get from Place to Place?	51
3-5ETS1-1, 4-PS3-2	Unit 2 Transferring Energy Lab Investigation	55
	Unit 2 Building Stamina	58

Unit 3 Energy and Collisions

NGSS

	LESSON	
4-PS3-1	11. How Does an Object's Speed Compare to Its Energy?	64
4-PS3-3	12. What Happens to an Object's Energy When It Hits Another Object?	68
4-PS3-3	13. What Makes the Sounds We Hear When Objects Collide?	71
3-5-ETS1-3, 4-PS3-3	Unit 3 Collisions Lab Investigation	75
	Unit 3 Building Stamina	79

CONTENTS

Unit 4 Earth's Landscape

NGSS

4-PS4-1

4-ESS1-1

4-ESS1-1

4-ESS2-1

4-ESS2-2

3-5-ETS1-2, 4-ESS2-1

LESSON

14. How Do Waves Make Objects Move? 85

15. Why Does Earth's Landscape Change Over Time? 89

16. What Can Fossils Tell Us About Earth's Landscape? 93

17. How Do Earth's Materials Move Around? 96

18. What Do We Know About the Location of Earth's Features? 100

Unit 4 Landscape Lab Investigation 104

Unit 4 Building Stamina 107

Unit 5 Earth and Humans

NGSS

4-ESS3-1

4-ESS3-2

3-5-ETS1-2, 4-ESS3-1,

4-ESS3-2

LESSON

19. What Effects Do Natural Resources Have on Earth? 113

20. How Do Earth's Natural Processes Impact Humans? 117

Unit 5 Earthquake Lab Investigation 121

Unit 5 Building Stamina 125

References

Acknowledgments 131

Correlation to the Next Generation Science Standards 132

Glossary 135

Graphic Organizers 137

CORRELATIONS

Correlation to the Next Generation Science Standards

This worktext is customized to the Next Generation Science Standards.

NGSS Grade 4 Standards	Lessons
Disciplinary Core Idea 4-PS3: Energy	
4-PS3-1 Use evidence to construct an explanation relating the speed of an object to the energy of that object. <i>Assessment Boundaries: Assessment does not include quantitative measures of changes in the speed of an object or on any precise or quantitative definition of energy.</i>	11
4-PS3-2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. <i>Assessment Boundaries: Assessment does not include quantitative measurements of energy.</i>	5, 6, 7, Unit 2 Lab Investigation
4-PS3-3 Ask questions and predict outcomes about the changes in energy that occur when objects collide. <i>Clarification Statements: Emphasis is on the change in the energy due to the change in speed, not on the forces, as objects interact.</i> <i>Assessment Boundaries: Assessment does not include quantitative measurements of energy.</i>	12, 13, Unit 3 Lab Investigation
4-PS3-4 Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. <i>Clarification Statements: Examples of devices could include electric circuits that convert electrical energy into motion energy of a vehicle, light, or sound; and, a passive solar heater that converts light into heat. Examples of constraints could include the materials, cost, or time to design the device.</i> <i>Assessment Boundaries: Devices should be limited to those that convert motion energy to electric energy or use stored energy to cause motion or produce light or sound.</i>	8, 9
Disciplinary Core Idea 4-PS4: Waves and their Applications in Technologies for Information Transfer	
4-PS4-1 Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. <i>Clarification Statements: Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.</i> <i>Assessment Boundaries: Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.</i>	14
4-PS4-2 Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. <i>Assessment Boundaries: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.</i>	1
4-PS4-3 Generate and compare multiple solutions that use patterns to transfer information. <i>Clarification Statements: Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.</i>	10

NGSS Grade 4 Standards	Lessons
Disciplinary Core Idea 4-LS1: From Molecules to Organisms: Structures and Processes	
<p>4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. <i>Clarification Statements: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.</i> <i>Assessment Boundaries: Assessment is limited to macroscopic structures within plant and animal systems.</i></p>	2, 3
<p>4-LS1-2 Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. <i>Clarification Statements: Emphasis is on systems of information transfer.</i> <i>Assessment Boundaries: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.</i></p>	4, Unit 1 Lab Investigation
Disciplinary Core Idea 4-ESS1: Earth's Place in the Universe	
<p>4-ESS1-1 Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. <i>Clarification Statements: Examples of evidence from patterns could include rock layers with marine shell fossils above rock layers with plant fossils and no shells, indicating a change from land to water over time; tilted rock layers indicate past crustal movement; glacial scratches on rock formations indicating glacier movement; and, a canyon with different rock layers in the walls and a river in the bottom, indicating that over time a river cut through the rock.</i> <i>Assessment Boundaries: Assessment does not include specific knowledge of the mechanism of rock formation or memorization of specific rock formations and layers. Assessment is limited to relative time.</i></p>	15, 16
Disciplinary Core Idea 4-ESS2: Earth's Systems	
<p>4-ESS2-1 Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. <i>Clarification Statements: Examples of variables to test could include angle of slope in the downhill movement of water and/or loose Earth materials due to gravity, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.</i> <i>Assessment Boundaries: Assessment is limited to a single form of weathering or erosion.</i></p>	17, Unit 4 Lab Investigation
<p>4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features. <i>Clarification Statements: Maps can include topographic maps of Earth's land and ocean floor, as well as maps of the locations of mountains, continental boundaries, volcanoes, and earthquakes.</i></p>	18
Disciplinary Core Idea 4-ESS3: Earth and Human Activity	
<p>4-ESS3-1 Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. <i>Clarification Statements: Examples of renewable energy resources could include wind, water behind dams, and sunlight; nonrenewable energy resources are fossil fuels and fissile materials. Examples of environmental effects could include loss of habitat due to dams, loss of habitat due to surface mining, and air pollution from burning of fossil fuels.</i></p>	19, Unit 5 Lab Investigation
<p>4-ESS3-2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans. <i>Clarification Statements: Examples of solutions could include designing an earthquake resistant building and improving monitoring of volcanic activity.</i> <i>Assessment Boundaries: Assessment is limited to earthquakes, floods, tsunamis, and volcanic eruptions.</i></p>	20, Unit 5 Lab Investigation

CORRELATIONS

NGSS Grade 4 Standards	Lessons
Disciplinary Core Idea 3-5-ETS1: Engineering Design	
3-5-ETS1-1 Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.	Unit 1 Lab Investigation, Unit 2 Lab Investigation
3-5-ETS1-2 Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.	Unit 4 Lab Investigation, Unit 5 Lab Investigation
3-5-ETS1-3 Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.	Unit 3 Lab Investigation

UNIT 1

WORDS TO KNOW

- adaptation
- growth
- behavior
- reproduction

LESSON 3

HOW ARE ANIMALS ABLE TO GROW, SURVIVE, AND REPRODUCE?

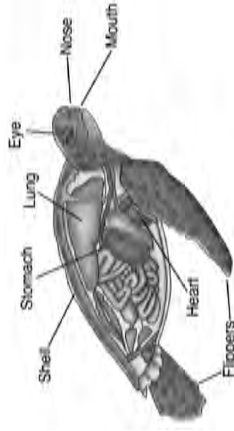
THE BIG IDEA

- Animals have structures inside and outside their bodies that help them live, grow, and reproduce.

WHAT I NEED TO KNOW

Animals live in different places, so they have different adaptations, or features that help them survive in their environments. For example, a seal has a layer of fat to keep it warm in ocean water.

Adaptations include structures on the outside of the animal, such as scales, long necks, or feathers. Adaptations also include structures inside the animal. For example, a sea turtle can slow its heart down to one beat every nine minutes! Other internal structures of animals include their lungs, brains, muscles, and stomachs.



These structures are important to an animal's growth, or the process of getting bigger. For example, the long, thin nose and tongue of an anteater helps it find and slurp up ants. The anteater's stomach does its job, sending nutrients to the body.

[12] masteryeducation.com | Science | Level D

Copying is prohibited.

THINK ABOUT IT

Think about a favorite animal again. What structures does it use to catch and eat food? How do you think these structures help this animal grow?

An animal's structures work together as a system. For instance, a dolphin's lungs absorb oxygen, and its heart pumps that oxygen to the muscles that need it. The muscles move the dolphin toward food, or away from a predator. Structures work together to help the animal survive.

Animals use their senses to learn about their environment. The way they respond to changes is called behavior. An elephant fans its ears to cool off in the heat. In the cold, penguins huddle together for warmth. Animals may run or hide when they see or smell danger. Animal behaviors change with the seasons. Birds build nests in spring, monarch butterflies migrate to warmer places in fall, and bats and bears both hibernate in winter.



Animals' different structures and behaviors are also important to reproduction, or making new animals or offspring. Female peacocks tend to choose males with the brightest tail feathers. Walrus use their tusks to compete for females and the best territory. The fastest wolves will catch the most prey to feed their pups.

WHAT I HAVE LEARNED

1. Which is not a function of the system of structures on the outside and inside of an animal?

- A To help the animal grow
 - B To assist in reproduction
 - C To help the animal survive
 - D To provide the animal's ecosystem
- [DOK 1]

Copying is prohibited.

Unit 1 | Structure, Function, and Information Processing | masteryeducation.com [13]

2. To live and grow, hawks and eagles catch prey such as mice or rabbits. They scan the ground for these small animals from up to 1,000 feet in the air, which is as high as a 100-story skyscraper. These birds can see 8-10 times better than humans.

Which conclusion makes the most sense?

- A) Hawks and eagles have better eyesight because they spend time training their eyes from high in the sky.
- B) Hawks and eagles have adaptations in their eyes that allow them to find food so they grow and survive.
- C) Hawks and eagles probably use sonar like bats to see such small objects from far away.
- D) Hawks and eagles decided to adapt because they have to fly so high.

[DOK 3]

3. When oil spills pollute water and shorelines, animals are affected. Sea otters and fur seals are marine mammals that grow thick fur on their skin. When oil coats their bodies they quickly become cold. They may die of hypothermia, or low body temperature, from the excess cold.

Based on this information, how does fur help marine mammals survive?

- A) Fur helps otters and seals keep oil spills off of their skin.
- B) Fur helps otters and seals keep their bodies at the right temperature.
- C) Fur attracts the best mates during mating season.
- D) Fur traps oil that helps the otters and seals stay warm.

[DOK 2]

4. Scientists observed Hawaiian crows picking up sticks with their beaks and putting the sticks into holes in logs. If a stick did not fit, the crows chose different sticks. Using the sticks, the crows pulled insects and larvae out and ate them.

What conclusion could the scientists make based on this information?

- A) Crows are not very smart animals, so they eat insects and larvae.
- B) Crows like to play with sticks, logs, and insects.
- C) Crows' behavior, beaks, and brains helps them grow and survive.
- D) Crows are loud and noisy animals that get into a lot of trouble.

[DOK 3]

5. Some frog tadpoles in a pond had white skin instead of the normal dark color. A scientist put some in a tank and left others in the pond. The white tadpoles in the pond disappeared, while those in the tank lived. She concluded that the white tadpoles did not survive as well because predators were more likely to eat them.

What other evidence would help support the scientist's conclusion?

- A) Evidence of predators eating white tadpoles more often than dark tadpoles
- B) Evidence that the white tadpoles had more difficulty finding algae to eat
- C) Evidence that the predators found tadpoles by listening for their sound, not seeing their color
- D) Evidence that all the tadpoles in the pond died

[DOK 3]

HINT, HINT

Read all the choices. For each one, ask yourself these questions. Does this support the conclusion that the tadpoles died because predators ate them? Does this support the conclusion that the color of the tadpoles mattered?

HINT, HINT

To put ideas in order, it helps to ask questions. What does the reader need to know first, second, and last? What happened first, and what happened next? What ties this idea to that idea? What is the final idea, or conclusion?

6. Ishta is writing a report about the bowerbirds of Australia and New Guinea. Here are her notes so far.
- A. The bowerbird uses its beak to collect objects to make and decorate its nest, or bower.
 - B. The male bowerbird has very interesting behaviors to attract a mate.
 - C. Females are attracted by the brightly colored objects in the nest, such as fruit, rocks, or pieces of plastic or glass.



How should she order these sentences to best show how the structures and behaviors of bowerbirds help them reproduce?

- (A) A, B, C
 - (B) A, C, B
 - (C) B, A, C
 - (D) C, A, B
- [DOK 3]

TEACHER NOTES

STANDARDS 4-LS1-1

Performance Expectation

Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

Disciplinary Core Idea

LS1.A: Structure and Function - Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

Science and Engineering Practices

Engaging in Argument from Evidence - Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Construct an argument with evidence, data, and/or a model.

Cross Cutting Concepts

Systems and System Models - A system can be described in terms of its components and their interactions.

Prerequisite Knowledge & Standards

LS1.A: Structure and Function - All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)

LS1.D: Information Processing - Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1)

LS3.B: Variation of Traits - Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)

The environment also affects the traits that an organism develops. (3-LS3-2).

Math Connection

4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. (4-LS1-1)