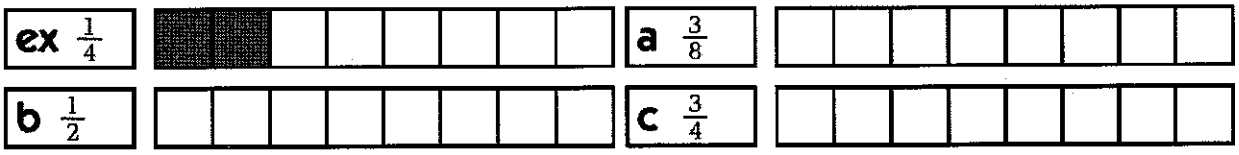
Webster County School District

5th Grade Math

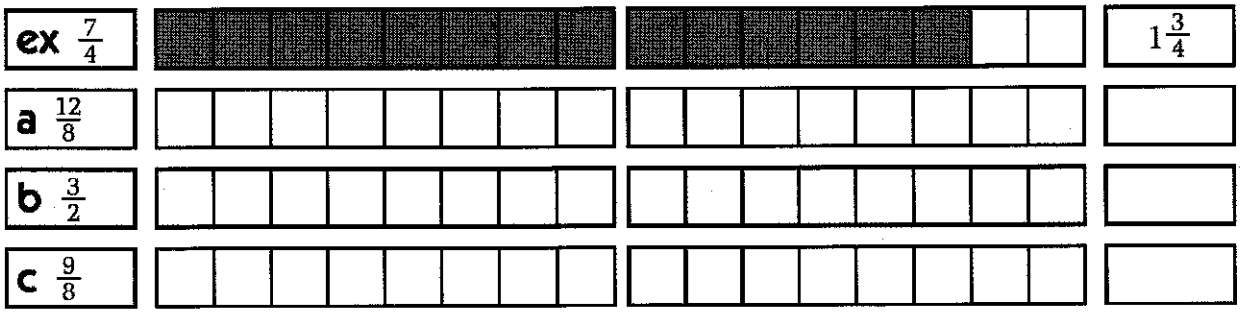
At Home Learning Packet

Objective: I can add and subtract fractions with unlike denominators (including mixed numbers).

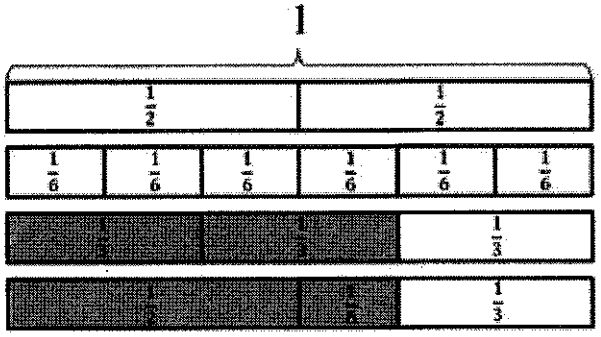
Daily Fluency: Color in the strip to show the fractions named below. Each fraction represents one whole. (5 min)



Color in the strips to show the improper fractions below. Then write the fraction as a mixed number. Each strip represents one whole.



1. Ancient Egyptians used unit fractions, such as 1/2 and 1/3, to represent all fractions. For example, you might write the number 2/3 as 1/2 + 1/6. (20 min)



We often think of 2/3 as 1/3 + 1/3, but the ancient Egyptians would not write it this way because they didn't use the same unit fraction twice.

a. Write each of the following Egyptian fractions as a single fraction:

   i. ½ + 1/3,

   ii. ½ + 1/3 + 1/5,

   iii. ¼ + 1/5 + 1/12.

b. How might the ancient Egyptians have written the fraction we write as 3/4?

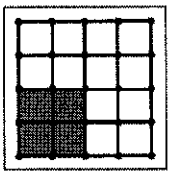
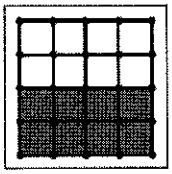
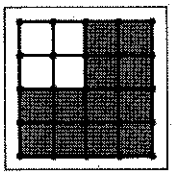
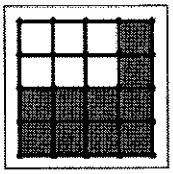
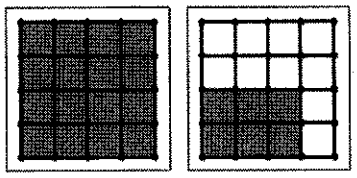
2. Add or subtract. Create a visual to support your answer.

   a. $2 + 1\frac{1}{5} =$

   b. $2 - 1\frac{3}{8} =$

Objective: I can add and subtract fractions with unlike denominators (including mixed numbers).

Daily Fluency: Write as many names as you can for the fractions shown on the geoboard. Each geoboard represents one whole. Then use >, <, or = to compare the fraction shown to the other fraction named. (5 min)

Fraction	Fraction Names	Comparison
ex 	$\frac{1}{4}$ $\frac{2}{8}$ $\frac{4}{16}$	$\frac{4}{16} < \frac{1}{2}$
1 		$\frac{5}{8}$
2 		$\frac{1}{2}$
3 		$\frac{3}{4}$
4 		$1\frac{1}{2}$

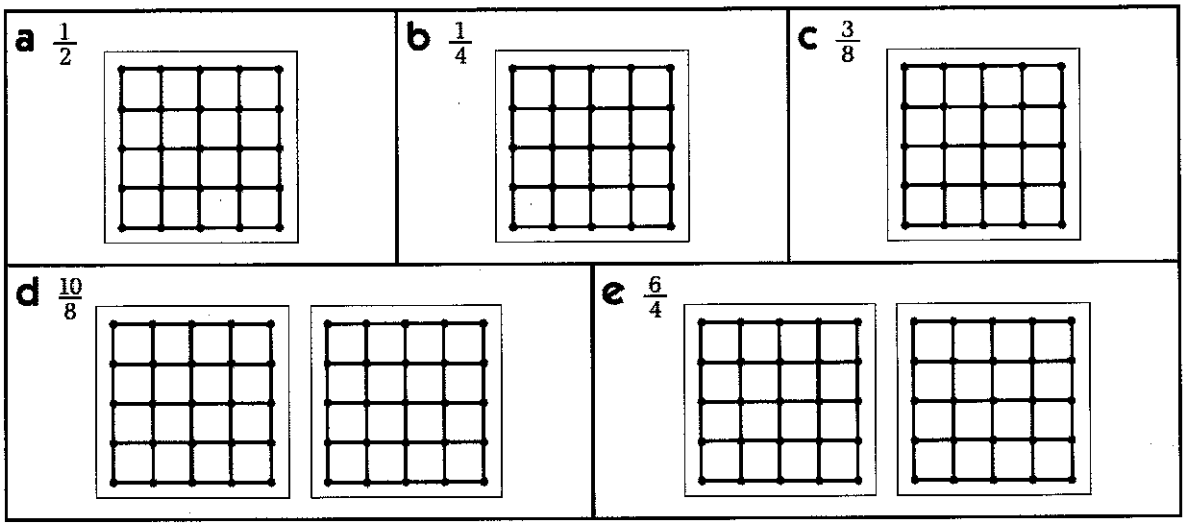
3. Using two different strategies, find the sum of the expression below.

$$1\frac{1}{3} + 2\frac{3}{5}$$

4. Create a pictorial model for the expression below, then solve using the standard algorithm.

$$1\frac{3}{4} - \frac{6}{7}$$

Daily Fluency: Color in the geoboard to represent each fraction below. Each board represents one whole. (5 min)



Use the pictures above to help complete each comparison below using <, >, or =.

ex $\frac{1}{2} > \frac{3}{8}$	a $\frac{6}{4}$ $1\frac{1}{2}$	b $\frac{3}{8}$ $\frac{3}{4}$
c $\frac{10}{8}$ $1\frac{1}{2}$	d $\frac{6}{8}$ $\frac{6}{4}$	e $\frac{3}{8}$ $\frac{1}{4}$

To add fractions, we usually first find a common denominator.

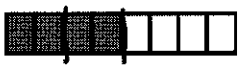
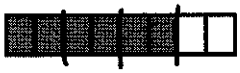
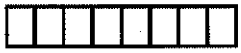
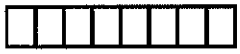
5. Find two different common denominators for 1/5 and 1/15.

6. Use each common denominator to find the value of 1/5 + 1/15. Draw a picture that shows your solution.

7. Find 3/4 + 1/5. Draw a picture that shows your solution.

8. Find 14/8 + 15/12.

Daily Fluency: Show the fractions on the strips then add them and write the sum. (5 min)

First	Second	Add Them	Sum
ex $\frac{2}{4}$ 	$\frac{3}{4}$ 		$1\frac{1}{4}$
a $\frac{3}{4}$ 	$\frac{3}{4}$ 		
b $\frac{3}{8}$ 	$\frac{1}{2}$ 		
c $\frac{5}{8}$ 	$\frac{3}{4}$ 		

For each of the following word problems, determine whether or not the expression *2/5 + 3/10* represents the problem. Explain your reasoning.

9. A farmer planted 2/5 of his forty acres in corn and another 3/10 of his land in wheat. Taken together, what fraction of the 40 acres had been planted in corn or wheat?

10. Jim drank 2/5 of his water bottle and John drank 3/10 of his water bottle. How much water did both boys drink?

11. Allison has a batch of eggs in the incubator. On Monday 2/5 of the eggs hatched, By Wednesday, 3/10 more of the original batch hatched. How many eggs hatched in all?

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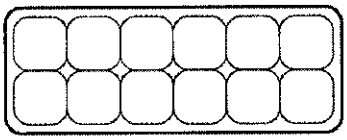
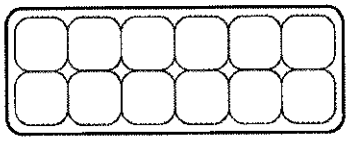
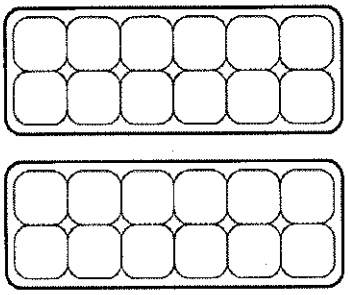
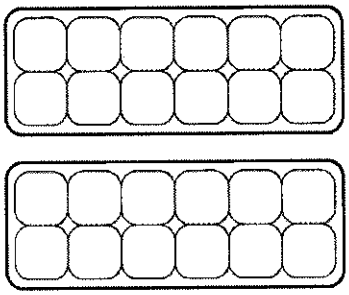
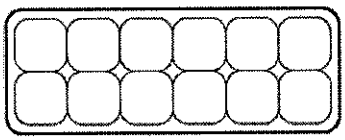
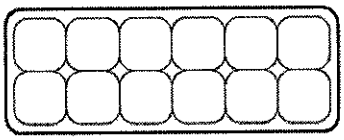
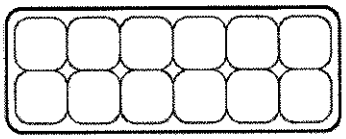
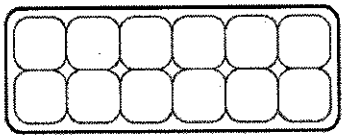
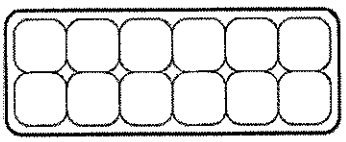
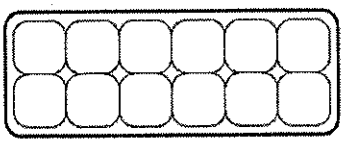
12. Mr. Neville Ice-guy mixed $12\frac{3}{5}$ gallons of chili for a party. If $7\frac{3}{4}$ gallons of chili were mild, and the rest was extra spicy, how much extra spicy chili did Mr. Ice-guy make? Draw a visual representation and write one sentence explaining your answer.

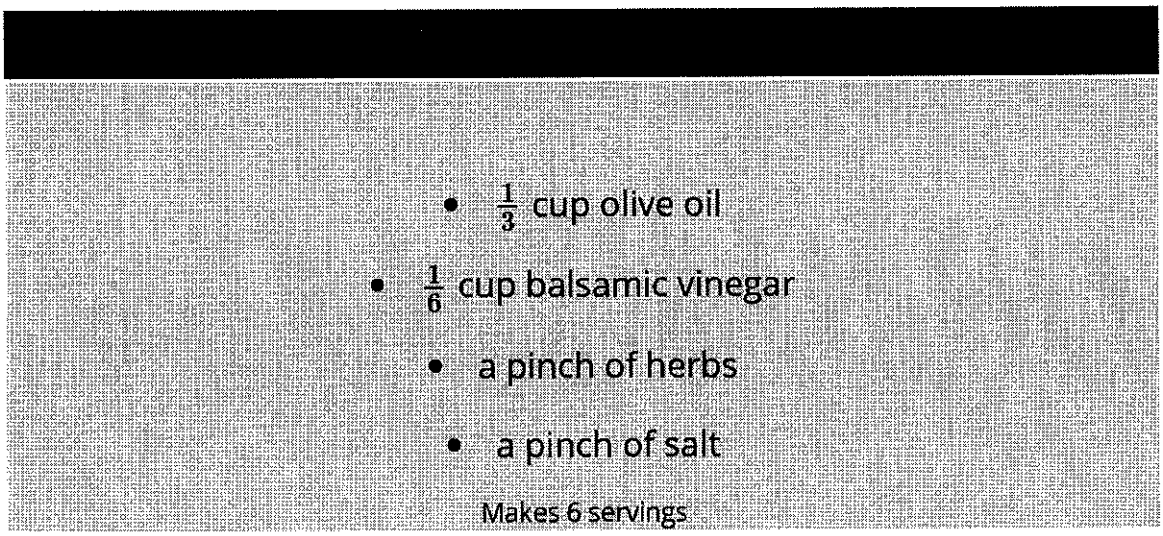
Daily Fluency: Show the fractions on the egg cartons. Each carton represents one whole. (5 min)

a $\frac{1}{2}$ 	**b** $\frac{3}{4}$ 
c $1\frac{2}{3}$ 	**d** $\frac{9}{6}$ 

Add the fractions below. If the sum is greater than one, write it as a mixed number.

a $\frac{5}{6} + \frac{1}{2} =$ 	
b $\frac{2}{3} + \frac{3}{6} =$ 	
c $\frac{13}{12} + \frac{3}{4} =$ 	

13.



a. How many cups of salad dressing will this recipe make? Write an equation to represent your thinking. Assume that the herbs and salt do not change the amount of dressing.

b. If this recipe makes 6 servings, how much dressing would there be in one serving? Write a number sentence to represent your thinking.

14. Gavin had 20 minutes to do a three-problem quiz. He spent $9\frac{3}{4}$ minutes on Problem One and $3\frac{4}{5}$ minutes on Problem Two. How much time did he have left for Problem Three? Write the answer in minutes and seconds.

15. A teacher prepares $^5/_6$ liter of apple juice and $^1/_3$ as much orange juice as apple juice. Which equation represents the amount of orange juice, in liters, the teacher prepares?

A $\frac{5}{6} \times \frac{1}{3} = \frac{5}{18}$

B $\frac{5}{6} \times \frac{1}{3} = \frac{6}{18}$

C $\frac{6}{5} \times \frac{3}{1} = \frac{18}{6}$

D $\frac{6}{5} \times \frac{3}{1} = \frac{18}{5}$

Use the information given to answer questions 16-17.

A family goes to the grocery store to purchase fruit. The list shows the amount of each fruit the family purchases.

Fruit	Amount (in pounds)
apples	$4\frac{1}{2}$
bananas	2
grapes	$\frac{7}{8}$
oranges	$3\frac{1}{4}$

16. What is the total amount of fruit the family purchases?

A $9\frac{5}{8}$ pounds of fruit

B $9\frac{9}{8}$ pounds of fruit

C $10\frac{5}{8}$ pounds of fruit

D $10\frac{9}{8}$ pounds of fruit

17. If the family decides to purchase $5\ ^{4}/_{6}$ pounds of strawberries, what is the difference between the amount of strawberries and the amount of oranges?

A $1\frac{3}{12}$ pounds

B $1\frac{5}{12}$ pounds

C $2\frac{3}{12}$ pounds

D $2\frac{5}{12}$ pounds

18. What is the difference of $5\ ^{1}/_{4} - {}^{6}/_{8}$?

A $5\frac{4}{8}$

B $5\frac{2}{8}$

C $4\frac{4}{8}$

D $4\frac{2}{8}$

19. A rectangular piece of cardboard has a length of $^3/_8$ foot and a width of $^5/_{12}$ foot. What is the area of the piece of cardboard?

A $\frac{5}{32}$ square foot

B $\frac{5}{20}$ square foot

C $\frac{8}{32}$ square foot

D $\frac{8}{20}$ square foot

20. A student cuts $^1/_7$ meter of rope into 4 equal pieces. What is the length, in meters, of each piece of rope?

A $\frac{1}{3}$ meter

B $\frac{1}{4}$ meter

C $\frac{1}{11}$ meter

D $\frac{1}{28}$ meter

21. A teacher has a 25-pound bag of sand. If the teacher wants to distribute the sand evenly among 10 groups of students, how many pounds of sand will each group receive?

A $2\frac{3}{5}$ pounds of sand

B $2\frac{1}{2}$ pounds of sand

C $2\frac{2}{5}$ pounds of sand

D $2\frac{1}{3}$ pounds of sand

22. Which statement is true about the product of $6 \times {}^{9}/_{3}$?

A The product is less than 6 because $\frac{9}{3} = 3$, which is less than 6.

B The product is less than 6 because $\frac{9}{3} = 3$, which is greater than 6.

C The product is greater than 6 because $\frac{9}{3} = 3$, which is less than 1.

D The product is greater than 6 because $\frac{9}{3} = 3$, which is greater than 1.

23. What is the sum of $^{2}/_{5} + {}^{9}/_{3}$ and why?

A $\frac{51}{15}$ because $\frac{6}{15} + \frac{45}{15} = \frac{51}{15}$

B $\frac{51}{30}$ because $\frac{6}{15} + \frac{45}{15} = \frac{51}{30}$

C $\frac{11}{15}$ because $\frac{2}{15} + \frac{9}{15} = \frac{11}{15}$

D $\frac{11}{30}$ because $\frac{2}{15} + \frac{9}{15} = \frac{11}{30}$

24. A catering service prepares 45 gallons of lemonade for an event. The caterers pour the same amount of lemonade into 6 containers. How many gallons of lemonade are in each container?

A $\frac{45}{6}$ gallons of lemonade

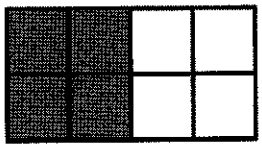
B $\frac{39}{6}$ gallons of lemonade

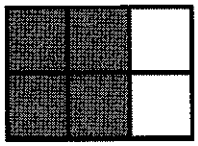
C $\frac{38}{45}$ gallon of lemonade

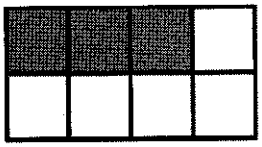
D $\frac{6}{45}$ gallon of lemonade

25. After a party, $^{3}/_{4}$ cake is left over. Dennis eats ½ of the leftover cake. Which fraction model represents the amount of cake Dennis eats?

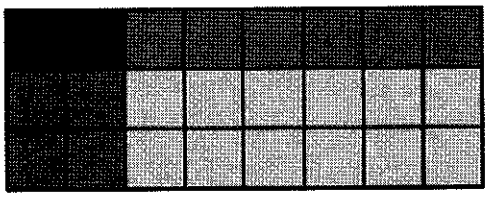
A 

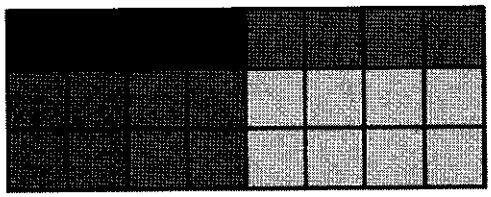
C 

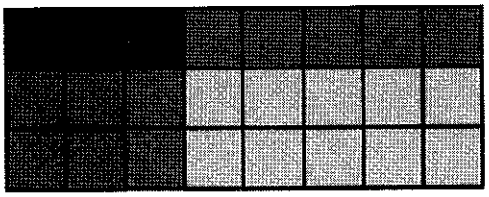
B 

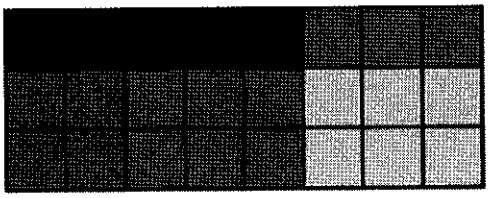
D 

26. Janessa has $^{5}/_{8}$ pizza. She gives $^{1}/_{3}$ of the pizza to her friend, Lewis. Which model represents the amount of pizza Janessa gives to Lewis?

A 

C 

B 

D 

27. Which two expressions have a value less than **15**?

A $\frac{1}{15} \times 15$

B $\frac{11}{12} \times 15$

C $\frac{12}{11} \times 15$

D $\frac{9}{8} \times 15$

E $\frac{8}{7} \times 15$

28. What is the value of $(5 \div {}^{1}/_{4})$, and why?

A 9 because $9 \times \frac{1}{4} = 5$

B 9 because $9 \times \frac{4}{1} = 5$

C 20 because $20 \times \frac{1}{4} = 5$

D 20 because $20 \times \frac{4}{1} = 5$

10 Free Math Learning Websites

- **IXL**
  - https://www.ixl.com/inspiration/family-learning
  - **Math practice on each and every math skill.**

- **Khan Academy**
  - https://www.khanacademy.org/signup?isparent=1
  - **Math practice and interactive videos to help your child learn math.**

- **Eureka Math**
  - https://gm.greatminds.org/en-us/knowledgeonthego
  - **Content videos and student practice on math skills.**

- **Learn Zillion**
  - https://learnzillion.com/resources/73932
  - Interactive learning videos for math!

- **Education.Com**
  - **www.education.com**
  - **Math practice worksheets and interactive lessons!**

- **Fun Brain**
  - **www.funbrain.com**
  - **Play games while practicing math and reading skills!**

- **Cool Math**
  - https://www.coolmathgames.com/
  - **Cool math games for learning!**

- **Hooda Math**
  - https://www.hoodamath.com/
  - **Math games by grade level for math learning fun!**

- **Splash Learn**
  - **https://www.splashlearn.com/**
  - **Math games for kids that make learning fun.**

- **Cool Math 4 Kids**
  - https://www.coolmath4kids.com/
  - Math games with learning.

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5th Grade Science

At Home Learning Packet

5th grade Daily Science Assignments:

Day 1 Make flash cards for the following vocabulary words and play one of the vocabulary games listed on Vocabulary Sheet: force, gravity, friction, matter, mass, motion, speed, acceleration, inertia, momentum, velocity, balanced forces, unbalanced forces

Day 2 Use Motion Student Guide to help answer questions 1-16 on Forces and Motions Problem Sheet

Day 3 Work P.5.6 Independent Practice Sheets

Day 4 Read and answer questions from Gravity Reading Passage and Balanced and Unbalanced Reading Forces Passage

Day 5 Make flash cards for the following vocabulary words and play one of the vocabulary games listed on Vocabulary Sheet: Rotation, Orbit, Revolution, Tilt, Inner Planets, Outer Planets, Season, Phases, Earth Centered Model, Sun Centered Model, Aristotle, Ptolemy, Copernicus, Galileo

Day 6 Using E58A Study Guide fill out and answer questions from Planet Worksheet

Day 7 Read and answer questions from Our Solar System passage

Day 8 Work E58A Independent Practice Sheets

Day 9 Using E58B Study Guide answer E58A and E58B Earth Questions 1-12

Day 10 Using E58B Study Guide answer E58A and E58B Earth Questions 13-23

Day 11 Work E58B Independent Practice Sheets

Day 12 Work Moon Phase 1,2,and 3 worksheets

Day 13 Read and answer questions from Rotation and Revolution reading passage and What Causes Seasons reading passage

Day 14 - Using L53B Study Guide answer Ecosystems Questions 19-28

Day 15- Introduction to Ecosystems -Create Ecosystems

Vocabulary Games and Directions:

Game 1: Card Sort for Individual or Group Review:

1. Separate the vocabulary cards and definition cards into two stacks.
2. Mix / shuffle the cards in each stack.
3. This is a mix/match game. Your goal is to correctly pair each vocabulary card with the correct definiton card.
4. If instructed, record each term and definition on the provided recording sheet or a piece of notebook paper

Game 2: Catch Phrase Style

1. Place the vocabulary cards facedown in a stack.
2. One student draws a card, looks at the word, but does not allow the other students in the group to see the card. The student drawing the card is the "clue---giver." This student must describe the word, define the word, make gestures about the word, or give any sort of verbal clues in an attempt to get the other members of the group to guess the word. The clue---giver cannot use the word in the descrip7on, nor give out hints, such as the first letter of the word.
3. Award the student guessing the word a point. The student responding with the correct word becomes the clue---giver in the next round. Continue playing until all vocabulary words have been reviewed.

Game 3: Concentration

1. Spread out the vocabulary cards (facedown) on one side of the table. Spread out the corresponding definiton cards (facedown) on the other side of the table. Cards should be placed in straight rows and columns.
2. Begin game play by having one student turn over a vocabulary card and a definition card. If there is no match, both cards are turned facedown in the same posi7on and play passes to the next student.
3. If the cards match (the correct definition card with the vocabulary card), the student keeps the matching cards, and is allowed to try to make another match. You must "concentrate" to remember where you have seen a particular vocabulary or defini7on card. Continue play until all cards are matched. The winner is the student who made the most matches.

Game 4: Pictionary Style

Shuffle the vocabulary cards and place them facedown on the table.
One student begins the game by drawing a vocabulary card from the deck. This student attempts to draw a picture or diagram of the vocabulary word. Other students in the group will attempt to guess the vocabulary word.
Game play then passes to another student in the group.

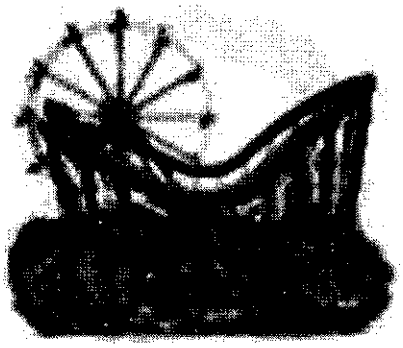
Game 5: Let's Talk About It!

You will be paired with a single partner.
Mix up the vocabulary cards and place them facedown.
Draw 10 cards from the stack.
When the teacher starts the game, you and your partner must have a conversation in which you use (correctly!) as many of the vocabulary words in your stack as possible. The conversation cannot consist of you reciting definitions to one another!
As you use a word, the card should be removed from your hand and placed on the table. The game ends when you or your partner have used all 10 words on your vocabulary cards

SOL 4.2 -- MOTION

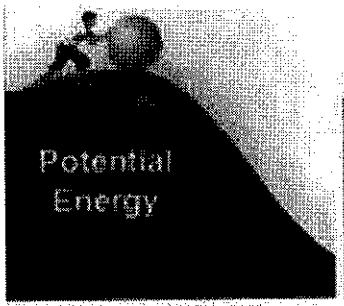
SOL 4.2 Motion – Key concepts:

a. **motion is described by an object's direction and speed;**
b. **changes in motion are related to force and mass;**
c. **friction is a force that opposes motion; and**
d. **moving objects have kinetic energy.**

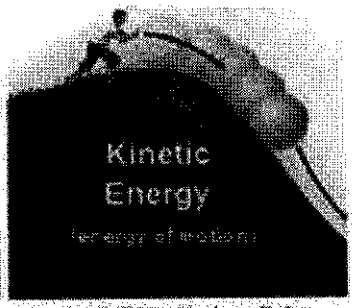


KINETIC AND POTENTIAL ENERGY

- Energy may exist in two states: kinetic or potential.
- Kinetic energy is the energy of motion.



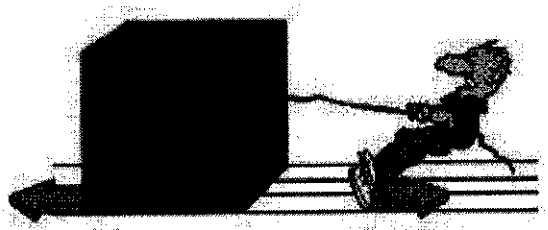
Height and the pull of gravity give this ball potential energy.



As the ball begins to roll down the hill, kinetic energy increases and potential energy decreases.

FORCES

- A force is any push or pull that causes an object to move, stop, or change speed or direction.
- The greater the force, the greater the change in motion will be. The more massive an object, the less effect a given force will have on the object.



Friction Force

Pulling Force

- Unless acted on by a force, objects in motion tend to stay in motion and objects at rest remain at rest.

FRICTION

- Friction is the resistance to motion created by two objects moving against each other.
- Friction creates heat.

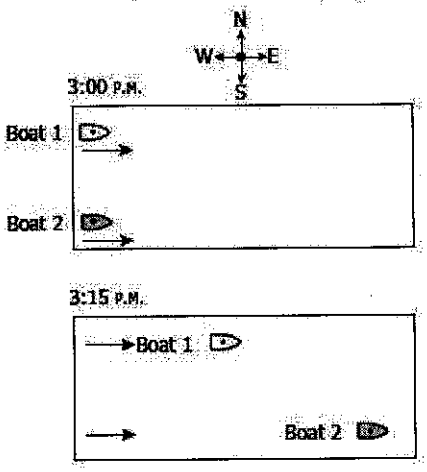
Forces and Motion Questions

Motion

1. To describe this car's motion, a student should use its —
(2007 test – question 9)
   a. direction and speed
   b. mass and volume
   c. speed and color
   d. volume and direction

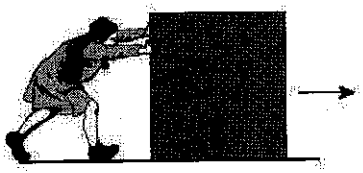
2. An object is traveling north at a speed of 12 kilometers per hour. Which characteristic of the object is being described?
(2011 test – question 9)
   a. Matter
   b. Motion
   c. Volume
   d. Temperature

Diagram of Photographs



3. Two moving boats are photographed from above at 3:00 p.m. and 3:15 p.m. Which statement correctly compares their motion?
(2010 test – question 22)
   a. They are traveling in the same direction at equal speeds.
   b. They are traveling in opposite directions at equal speeds.
   c. They are traveling in the same direction, and boat 2 has a greater speed.
   d. They are traveling in opposite directions, and boat 2 has a slower speed.

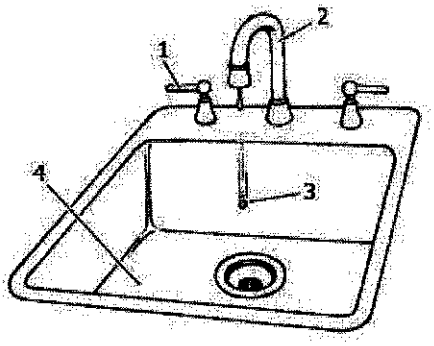
4. A person pushes a box as shown. What is the push most likely to change?
(2008 test – question 3)
   a. The size of the box
   b. The mass of the box
   c. The color of the box
   d. The position of the box



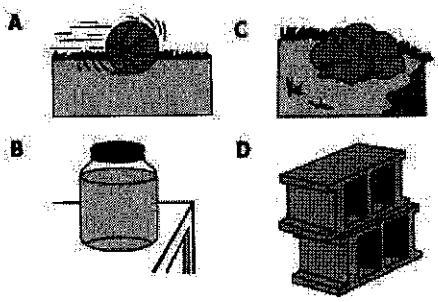
Kinetic – Potential Energy

5. What kind of energy do all moving objects have?
(2009 test – question 12)
   a. Light energy
   b. Solar energy
   c. Kinetic energy
   d. Renewable energy

6. Which labeled part in this picture has evidence of kinetic energy?
(2008 test – question 39)
   a. 1
   b. 2
   c. 3
   d. 4

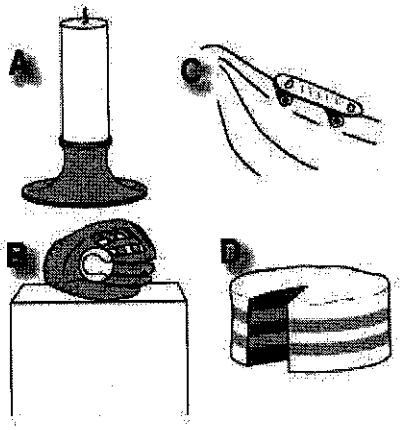


7. Which of these has kinetic energy?
(2007 test – question 27)



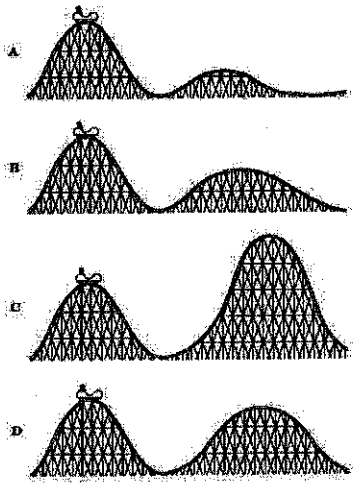
8. Which of these best shows kinetic energy?

(2004 test – question 22)



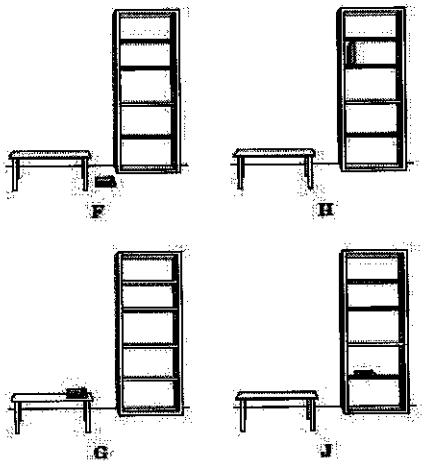
9. A student throws a ball. Which of these best describes the moving ball?
(2008 test – question 20)
   a. The ball has light energy.
   b. The ball has kinetic energy.
   c. The ball is transferring sound energy to the air.
   d. The ball is transferring light energy to the air.

10. Which roller coaster will not have enough kinetic energy at the bottom of the first hill to carry the car over the second hill?
(2001 test – question 3)

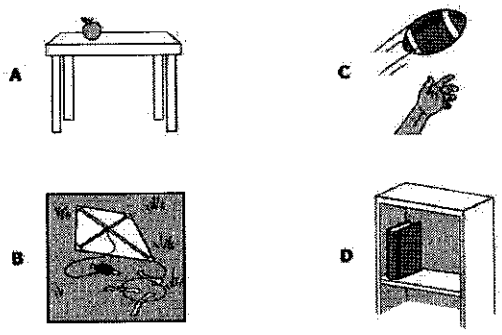


11. When a coin is dropped, it falls to the ground. As the coin falls, it loses potential energy and gains what kind of energy?
(2002 test – question 34)
   a. Kinetic
   b. Chemical
   c. Electrical
   d. Solar

12. Which picture shows the book with the most potential energy?
(2001 test – question 32)

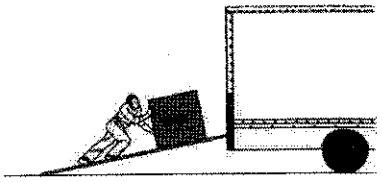


13. Which picture shows an object that has kinetic energy?
(2011 test – question 13)



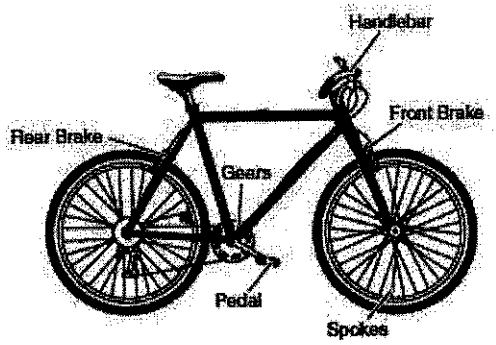
FRICTION

14. The box would be easier to move if the surface of the ramp was smoother because there would be less —
(2011 test – question 37)
   a. mass in the box
   b. friction opposing the box
   c. gravity pulling on the box
   d. distance to push the box



15. A student rolls a ball on the ground. Which of these causes the ball to slow down and then stop?
(2009 test – question 27)
   a. The motion of the ball
   b. The speed of the ball
   c. Friction from the ground
   d. A magnetic field

16. A bicyclist rides on a flat road and then stops pedaling but does not apply the brakes. The bicycle stops because of —
(2008 test – question 25)
   a. balance
   b. friction
   c. attraction
   d. magnetism



17. Useful friction is created by the —
(2005 test – question 12)
   a. gears
   b. curved handlebars
   c. spokes
   d. brakes

Independent Practice

Name: _____ Date: _____

Part I: Diagrams

Directions: Draw a simple diagram of each word. Write the letter of the statement that explains the word next to the word.

Force	Unbalanced Force	Balanced Force

Position	Direction	Speed

1. A push or a pull that causes an object to move, stop, or change direction
2. A force not cancelled out by another force
3. How fast something is moving
4. Where something is
5. Has a net force of zero
6. A straight path

Independent Practice

Part II: True Statements

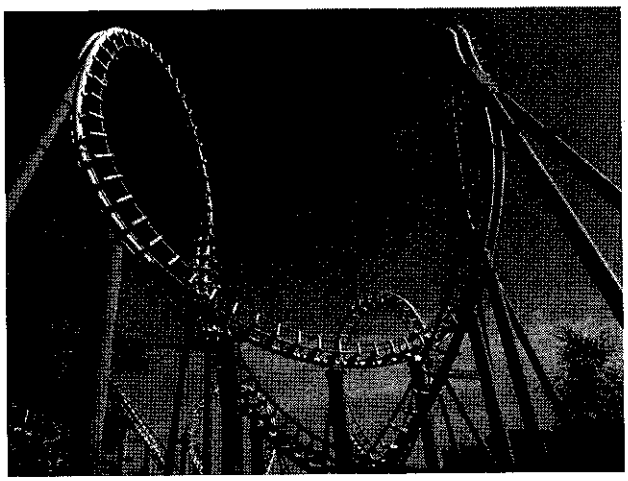
Directions: Circle the word in parentheses that makes the statement true.

1. A toy car is pushed across a room, which shows a change in its position and location. This is called (**friction**, **movement**).
2. An iron nail is (**pushed**, **pulled**) toward a magnet.
3. (**Motion**, **speed**) is when an object is moving faster than other objects nearby, resulting in a noticeable difference.
4. A baseball player wears cleats to increase the (**position**, **friction**) between his shoes and the ground.
5. A person standing behind another on a swing will (**pull**, **push**) to continue movement.
6. If no motion happens, the forces are considered (**unbalanced**, **balanced**).
7. Opening a door is an example of a(n) (**balanced**, **unbalanced**) force.
8. A change in (**direction**, **speed**) would be turning left or right.

Reading Science

Name: _____ Date: _____

Gravity



1 Jessica had compiled a list of the top 20 activities she hoped to accomplish this year. Jessica double-checked her list, and there it was: *#14. Ride a roller coaster.* It was already November, so she needed to get serious if she wanted to complete her list on time. She had talked her family into heading to the amusement park for their weekend destination.

2 "I'm the oldest, so I say we sit in the first cart," Jessica declared. She was only 11, but she was still older than her two brothers, Mike, who was 9, and Johnny, who was 7. "Besides, it's my list!" The family was impatiently waiting in line for their turn to ride the roller coaster. The roller coaster was famous for its high elevation and drop, and all the kids were excited to experience it. However, the problem was they all thought that different carts would be the best spot to sit. Jessica wanted the first cart, Mike wanted the last cart, and Johnny wanted the middle cart.

3 "No!" Johnny argued. "I'm telling you, the middle cart would be great!"

4 "No way! I want the first cart, so we can see what's coming up!" Jessica insisted. "I don't want my vision blocked by people in front of me."

Reading Science

5 "Guys, we all know the last one would be the most fun! Right, Dad?" Mike asked. "It would be the best for the big drop, right?" Their dad turned and faced all the kids.

6 "Actually, if you want to get the most out of the drop, then Mike is right. The rear car is the best spot on a roller coaster because the twists and turns are more noticeable," their dad said. Jessica and Johnny scowled as they looked down toward the ground. Mike grinned and said, "I told you so!"

7 "It all depends on the force of gravity, so the last cart would be the best," their dad explained. "When the carts start going up the hill, it slows down because gravity is pulling on it from behind, but when the first car makes it over the apex, gravity pulls the car down the other side of the hill. So, because of the pull of gravity, the first car starts to accelerate, which accelerates the second car, then the third car, and so on."

8 "So by the time the last cart finally arrives at the top, it will be speeding like a rocket!" Mike proudly exclaimed.

9 Jessica and Johnny were both angry that Mike was right, but they still agreed to the last cart. After all, Jessica did want to cross #14 off her list! The family waited anxiously as the line got shorter and shorter.

10 "Which cart?" the man that was in charge of the roller coaster asked. Mike smiled and proudly replied.

11 "We want the last one. Since the force of gravity will start to pull on the first cart at the beginning of the drop, the last cart will receive the most acceleration!"

12 "Well, kid, it looks like you know your stuff. The last one it is!" The man stepped aside as they piled into the last cart. The kids had butterflies in their stomachs as the roller coaster jerked forward and they slowly ascended. They gripped the handlebars as the top got nearer and nearer. The first cart lurched over the top,

Reading Science

and everyone screamed. Jessica and her family raised their arms in the air as, one by one, the carts were hauled over by the carts in front of them, and soon, the last cart went racing over the top!

13 All too soon, the ride slowly came to a stop. Jessica hated to admit it, but Mike had made her #14 activity awesome!

Reading Science

1 The author uses figurative language in Paragraph 8 to emphasize–

A. how the roller coaster looks.
B. that the roller coaster is very loud.
C. the roller coaster's speed.
D. the roller coaster's up-and-down movement.

---

2 Which of the following details supports the conclusion that Jessica likes to be right?

A. "Besides, it's my list"
B. *Jessica hated to admit it, but Mike had made her #14 activity awesome!*
C. "I'm telling you, the middle cart would be great!"
D. *Jessica wanted the first cart, Mike wanted the last cart, and Johnny wanted the middle cart.*

---

3 Paragraphs 2 through 5 are important because they show–

A. the setting of the story.
B. the ages of the kids.
C. how tall and fast the roller coaster is.
D. the problem in the story.

---

4 Which words help the reader to know the meaning of the word *apex*?

A. Arrives at the top
B. Starts to accelerate
C. Pulling the car down
D. Like a chain reaction

Reading Science

5 Which sentence best supports the idea that gravity plays a part in the speed of the roller coaster carts?

A. "Well kid, it looks like you know your stuff. The last one it is!"

B. "The rear car is the best spot on a roller coaster because the twists and turns are more noticeable."

C. "Because of the pull of gravity, the first car starts to accelerate, which accelerates the second car, then the third car, and so on."

D. *Jessica and her family raised their arms in the air as, one by one, the carts were hauled over by the carts in front of them, and soon, the last cart went racing over the top!*

Name: _____

Balanced and Unbalanced Forces

A **force** is a push or a pull on an object. Forces are at work all around you all the time. More than one force can-and usually does- act on an object at the same time. Sometimes two forces act in the same direction. An example is when two people work together to push a heavy object. Sometimes the forces act in different directions.

Imagine a tug-of-war between you and one friend. If you are stronger, you apply more force to the rope. You pull your friend across the line, and you are the winner! If your friend is stronger, he might pull you across the line. Sometimes the forces are equal. Neither you nor your friend moves across the line. The two forces are balanced.

We say that the **net force** on an object is the combination of all the forces acting on it. To find the net force of forces that are acting in the same direction, add them together. For example, if you pull on a box with a force of 25 newtons (N) while your friend pushes the box (in the same direction you are pulling) with a force of 30 N, the net force applied to the box in that direction is 55 newtons.

To find the net force of forces that are acting in opposite directions, subtract the smaller force from the larger one. If you are pulling on a tug-of-war rope with a force of 40 N, and your friend is pulling with a force of 35 N in the opposite direction, the net force on the rope is 5 newtons in your direction. You win!

When the net force on an object is zero, the two forces are balanced. **Balanced forces** don't cause any change in the motion of an object. Balanced forces are equal and in opposite directions. If the object is not moving and two forces are applied to it that equal zero when combined, then the object will not move. If the object is already moving and two balanced forces are applied to it, the object will continue moving at the same speed and in the same direction that it was before the forces were applied.

That doesn't mean that balanced forces have no effect on an object, however. Think about what would happen to an empty soda can if you pushed against it in one direction, and a friend pushed against it in the opposite direction with an equal amount of force. If the amount of force was equal, the can wouldn't move. But the two opposing forces would probably crush the can.

When the net force on an object is greater than zero, the forces are unbalanced. **Unbalanced forces** cause the object to move. An object that is not already moving will begin to move in the direction of the larger force. An object that is already moving will change its speed and/or its direction.

Remember that two forces applied to an object in the same direction will combine by adding the two together.

Name: _____ edHelper

Two forces applied to an object in opposite directions will be subtracted. The net force is the combination of the two forces, whether by addition or subtraction. If the net force is zero, no change will happen to the object's motion. If the forces are unbalanced, meaning there is some amount of net force, then the object will move in the direction of the force.

Balanced and Unbalanced Forces

Questions

1. What is a force?

_____

_____

_____ 2. A combination of all the forces acting on an object is called:

A. net force
B. gross force
C. balanced force
D. unbalanced force

_____ 3. To find the net force on an object:

A. divide the larger force by the smaller one
B. combine the amounts of the forces acting on the object
C. always subtract the amounts of the forces
D. multiply the forces together

_____ 4. When the net force on an object is zero, we say that the two forces are:

A. unbalanced
B. balanced
C. gross
D. cancelled out

_____ 5. When the net force on an object is zero, the object's motion will:

A. stop
B. not change
C. change

_____ 6. When forces are balanced, they:

A. have no effect on the object
B. don't cause any change in the motion of an object
C. might crush the object
D. both b and c are correct

_____ 7. If you are pushing a box toward your friend with a force of 20 N, and your friend is pushing the box toward you with a force of 30 N, what will happen to the box?

A. The box will move toward you with a force of 10 N.
B. The box will move toward your friend with a force of 10 N.
C. The box will move toward your friend with a force of 50 N.
D. The box will move toward you with a force of 50 N.

Name: _____

_____ 8. If you are pulling on a box with a force of 30 N, and your friend is pushing the box in the same direction with a force of 30 N, what will happen to the box?

A. The box will move in the direction of your pull with a force of 30 N.
B. The box will not move because the forces are balanced.
C. The box will move in the direction of the push and pull with a force of 60 N.
D. The box will move in the direction of your friend's push with a force of 30 N.

Name: _____

Describe a situation where two unbalanced forces are acting on a box. Be sure to tell the amount of each force and what will happen to the box.

Don't stop writing. Use a blank piece of paper to continue.

SOL 4.7 -- SUN, MOON, EARTH

Key concepts include:

a. the planets in the solar system;

b. the order of the planets in the solar system; and

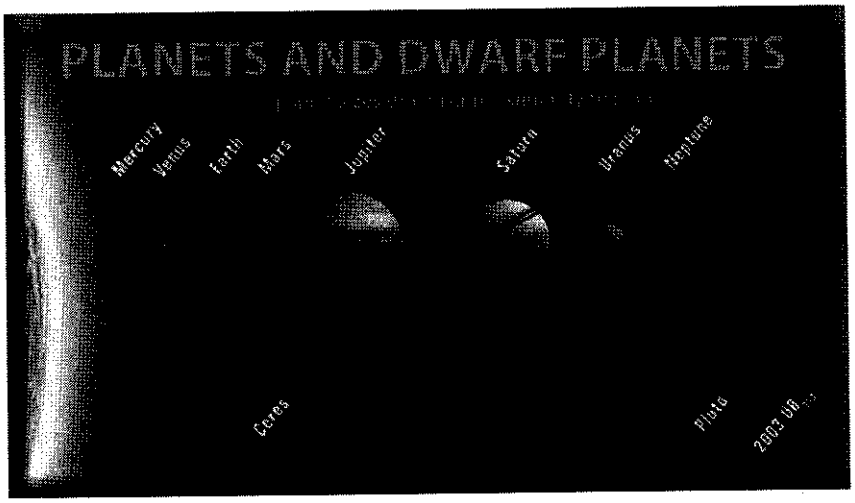
c. the relative sizes of the planets.

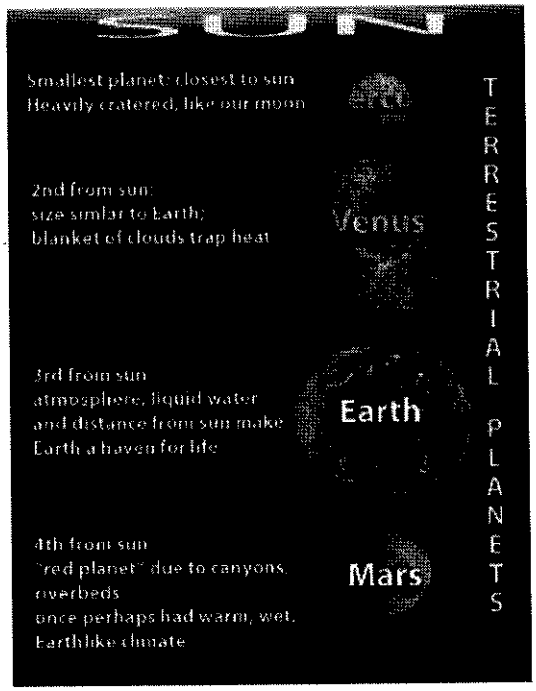
OUR SOLAR SYSTEM

- Our solar system is ancient. Early astronomers believed that Earth was the center of the universe and all other heavenly bodies orbited around Earth.
- We now know that our sun is the center of our solar system and eight planets, a handful of dwarf planets, 170 named moons, dust, gas, and thousands of asteroids and comets orbit around the sun.

THE EIGHT PLANETS

- Our solar system is made up of eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.
- The eight planets sorted by size from largest to smallest are: Jupiter, Saturn, Uranus, Neptune, Earth, Venus, Mars, and Mercury.



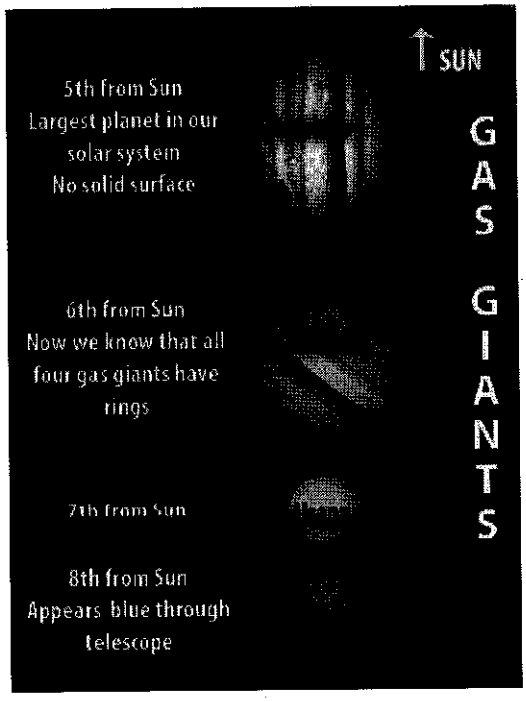


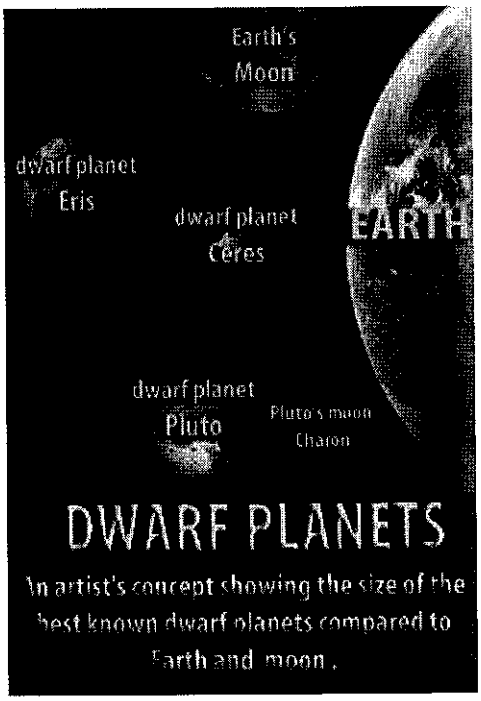
INNER TERRESTRIAL PLANETS

- Mercury, Venus, Earth, and Mars are considered terrestrial planets.
- Mercury is closest to the sun and is a small, heavily cratered planet. Mercury looks like our moon. Since Pluto's reclassification from planet to dwarf planet, Mercury is now the smallest planet in our solar system.
- Venus is second from the sun. It is similar to Earth in size and mass, and has a permanent blanket of clouds that trap so much heat that the temperatures on the surface of Venus are hot enough to melt lead.
- Earth is third from the sun. Earth's atmosphere, the liquid water found on Earth, and its distance from the sun, among many other factors, make Earth a haven for life.
- Mars is fourth from the sun. The atmosphere on Mars is thin and there is a vast network of canyons and riverbeds on the red planet. Scientists hypothesize that Mars once supported a wet, warm Earth-like climate.

GAS GIANTS

- **Jupiter, Saturn, Uranus, and Neptune are called gas giants.**
- **Jupiter is fifth from the sun. Jupiter is the largest planet in the solar system and is considered a gas giant. Jupiter has no solid surface.**
- **Saturn is sixth from the sun. Early scientists thought Saturn was the only planet with rings, but we now know that all four gas giants (Jupiter, Saturn, Uranus, and Neptune) have rings**
- **Uranus is seventh from the sun. Uranus is a gas giant.**
- **Neptune is eighth from the sun. Neptune appears blue through telescopes and is a gas giant.**





DWARF PLANETS

- **Pluto is no longer included in the list of planets in our solar system due to its small size and irregular orbit.**
- Many astronomers questioned whether Pluto should be grouped with worlds like Earth and Jupiter.
- In 2006, this debate led the International Astronomical Union (IAU), the recognized authority in naming heavenly objects, to formally reclassify Pluto.
- On August 24, 2006, Pluto's status was officially changed from planet to dwarf planet.
- A new distinct class of objects called "**dwarf planets**" was identified in 2006. It was agreed that "planets" and "dwarf planets" are two distinct classes of objects.
- The first members of the dwarf planet category are Ceres, **Pluto** and 2003 UB313, given the name Eris. More dwarf planets are expected to be announced by the IAU in the future.
- What differentiates a dwarf planet from a planet?
- For the most part, they are identical, but there is one key difference: A dwarf planet has not "cleared the neighborhood" around its orbit, which means it has not **become gravitationally dominant** and it shares its orbital space with other bodies of a similar size.
- Pluto is smaller than seven of the moons in our solar system and cannot be seen without a telescope.

Explore

Name: _____ Date: _____

Earth and Space: Planets, Earth, Moon, and Sun

Planet Description Chart

Planet Name	Rock or Gas?	Large or Small?	Near or Far?

1. Which planet is the smallest? Which is the largest?

_____

2. Which planet is the closest to the Sun? Which is the farthest away?

_____

3. What can you say about the smaller planets and their distances from the Sun?

_____

4. What can you say about the larger planets and their distances from the Sun?

_____

5. The Sun is the center of our solar system, and all of the planets travel, or **revolve**, around the Sun. What do we call the path that a planet travels on? What shape is that path?

_____

_____

Explore

6. What is a good way to remember the order of the planets from closest to the Sun to farthest away from the Sun?

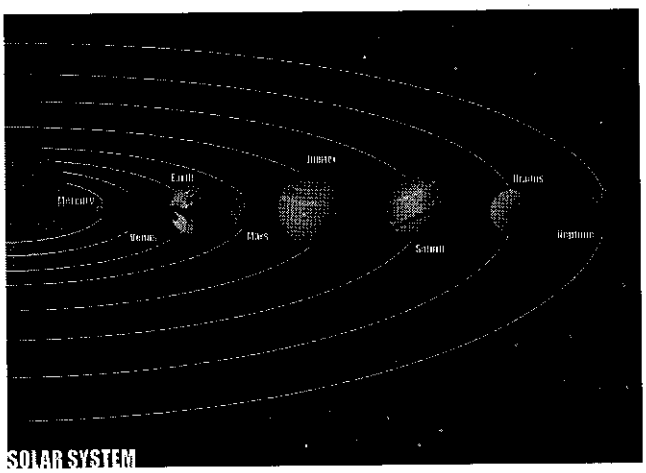
7. Draw and label your model of the orbital path of each planet.

8. Write a question about your model here.

Reading Science

Name: _____ Date: _____

Our Solar System



1 We live on planet Earth. Earth is not alone in space, but rather, it is part of the solar system.The solar system is made up of the Sun and all the planets that **orbit**, or travel, around it. In addition, the solar system is made up of the moons, asteroids, and comets that orbit the Sun. These objects orbit the Sun because the Sun is larger than the rest of them. Basically, this means that the Sun has enough gravity to hold them in orbit.

Mercury

2 Mercury is the planet closest to the Sun. It has the shortest orbit around the Sun. It only takes about three months for Mercury to move all the way around the Sun. Mercury is also the smallest of all the planets.

Venus

3 Venus is the second planet from the Sun and the hottest planet in our solar system. It is the closest planet to Earth. Venus is covered with clouds that reflect the Sun's light. Many people think it is a star, because it reflects so much light and appears very bright from Earth.

Reading Science

Earth

4 The third planet from the Sun is Earth. It is believed to be the only planet with life on it. Earth has one moon, which is held in orbit by Earth's gravity. Although the Moon appears to shine at night, what we actually see is the Sun's light reflecting off the Moon's surface. Since the Moon is so close to Earth, humans have been able to travel there and explore it.

Mars

5 Mars is a very cold planet. It has ice caps that can be seen on its north and south poles. Scientists have found that the soil on Mars is rich in iron. The iron gives the soil a red color, which is why Mars is sometimes known as the Red Planet.

Asteroids

6 Asteroids are large pieces of rock that orbit the Sun. Most of these asteroids are found in the space between Mars and Jupiter. Scientists believe that they are leftover chunks of rock from when the solar system was formed. Some are large enough to have their own names, while others are just tiny pieces of rock.

Jupiter

7 Jupiter is our solar system's largest planet. It is made up of the same gases as the Sun. Jupiter's atmosphere is very stormy. One storm is called the Great Red Spot because the clouds appear red. Humans have watched this storm for over 400 years, and it is still going strong!

Saturn

8 Typically, when we think of Saturn, we think of the rings that circle it. It has over 1,000 rings, made of dust and ice. Saturn spins so fast that it flattens out at the top and bottom. Scientists believe it only takes Saturn about 10 hours to rotate, or spin, one time!

Reading Science

Uranus

9 Uranus is different from all the other planets. It is unique because it rotates on its side and its poles face the Sun. It has about 11 rings made up of dark, boulder-sized objects.

Neptune

10 Neptune is the planet farthest from the Sun. It appears blue, like water. As a result, it was named after the Roman god of the sea. Neptune has 13 moons.

Pluto

11 At one time, Pluto was considered the ninth planet. However, as scientists learned more about its true size, they decided that it was not really a planet. It is now known as a dwarf planet.

12 Just as scientists discovered these new facts about Pluto, they are constantly learning more about our solar system and what lies beyond it. Someday, humans might even visit some of the other objects in our solar system. At that point, we can learn even more!

Reading Science

1 Which of these is NOT part of the solar system?

A. The Sun
B. Other stars
C. Earth
D. Asteroids

---

2 What is NOT something that orbits the Sun?

A. Earth
B. Mars
C. Asteroids
D. Other stars

---

3 Why did the author write this passage?

A. To inform the reader about the solar system
B. To persuade the reader that Earth is the best planet
C. To explain the difference between the Sun and other stars
D. To explain the location of the solar system in the universe

---

4 Another name for Mars is–

A. the Great Red Spot.
B. the Dwarf Planet.
C. the Red Planet.
D. Vulcan.

Reading Science

5 What is the only object in the solar system besides Earth that humans have visited?

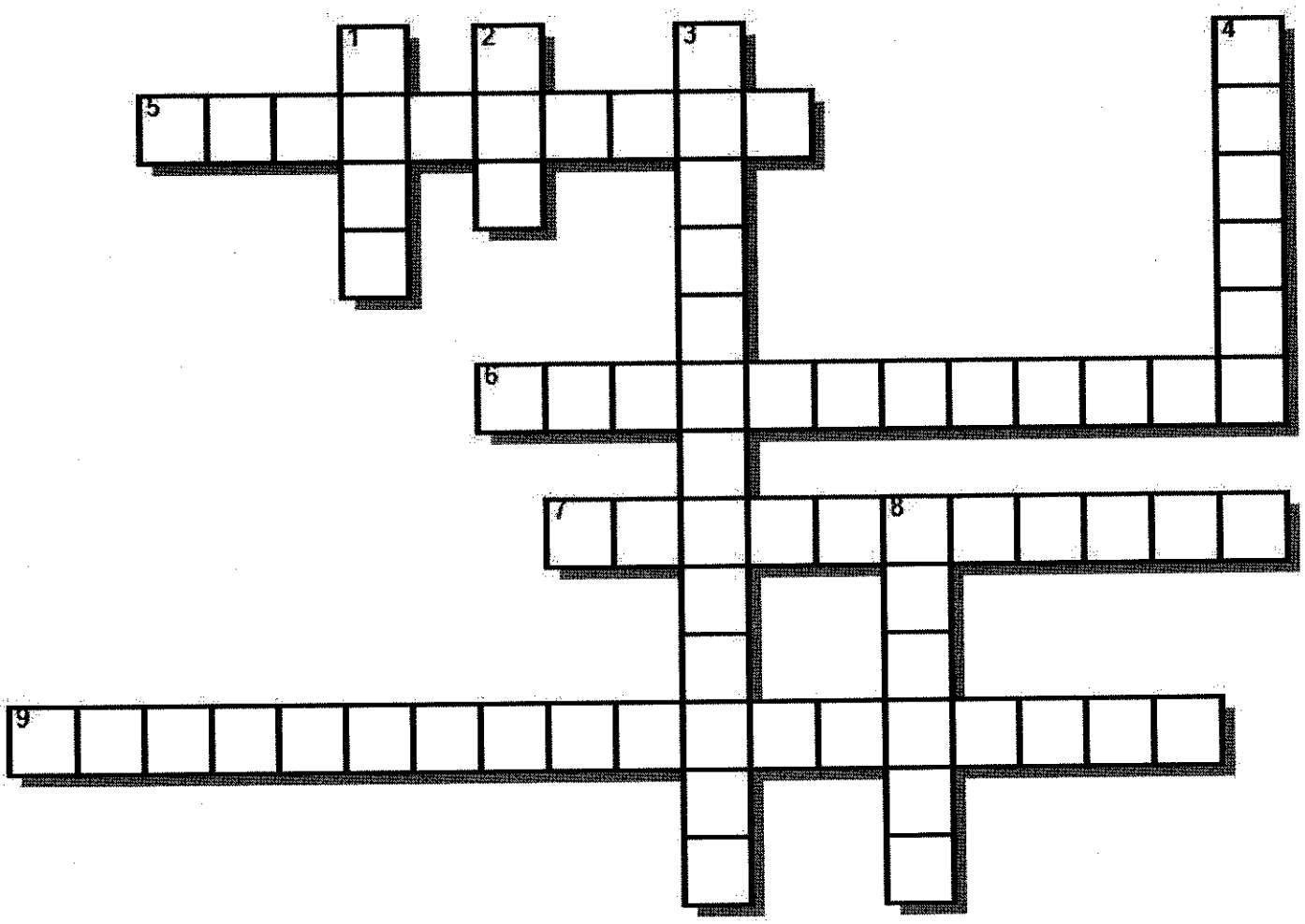
A. Venus
B. The Moon
C. Asteroids
D. Mars

Independent Practice

Name: _____ Date: _____

Part I: Crossword

Directions: Use the clues to fill in the crossword puzzle with the correct words.



Across

5. Making a complete turn around a center
6. Located between Mars and Jupiter
7. The Sun, Moon, planets, comets, asteroids, and everything else that moves around the Sun
9. How a star looks from Earth

Down

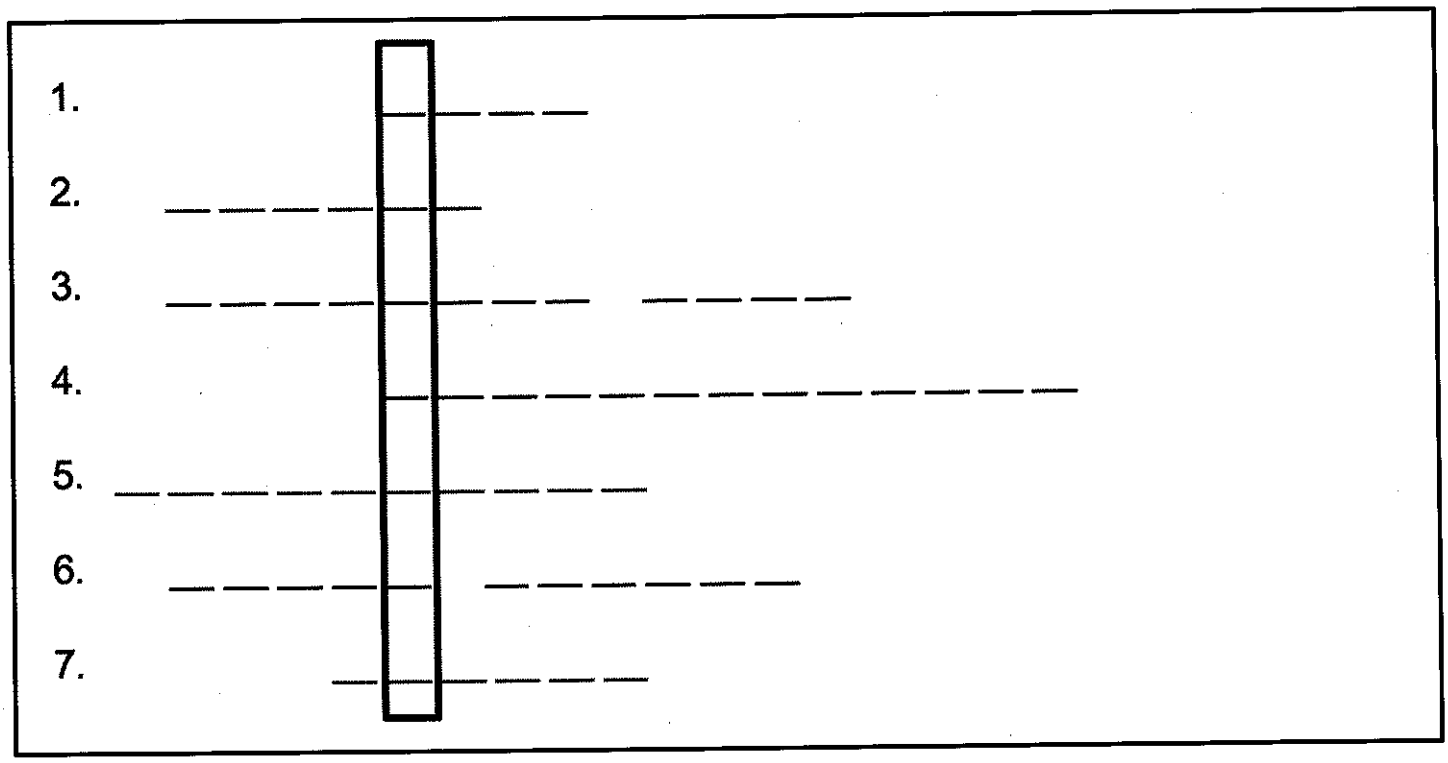
1. Earth's natural satellite
2. The center of the solar system
3. A pattern formed by stars
4. A round object that revolves around the Sun
8. A group of independent or interacting parts that form a complex whole

Independent Practice

Part II: Secret Word

Directions: Use the clues to complete the puzzle and find the secret word.

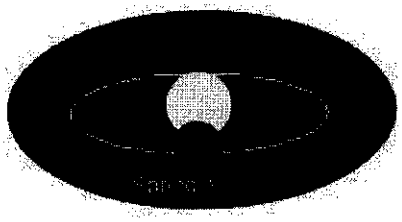
1. Can be seen as it revolves around Earth
2. A round object that revolves around a star in a solar system
3. A group of many rocks; found mostly between Mars and Jupiter
4. A pattern formed by stars; used to tell stories from ancient civilizations
5. Making a complete turn around a center
6. The Sun and all the objects that move around it
7. Parts working together to make a functioning whole



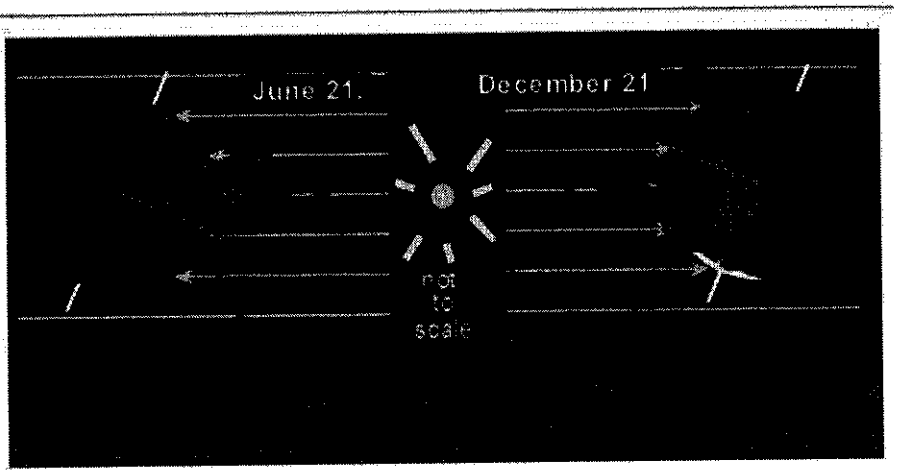
SOL 4.8 -- SUN, MOON, EARTH S O L pass

Key concepts include:

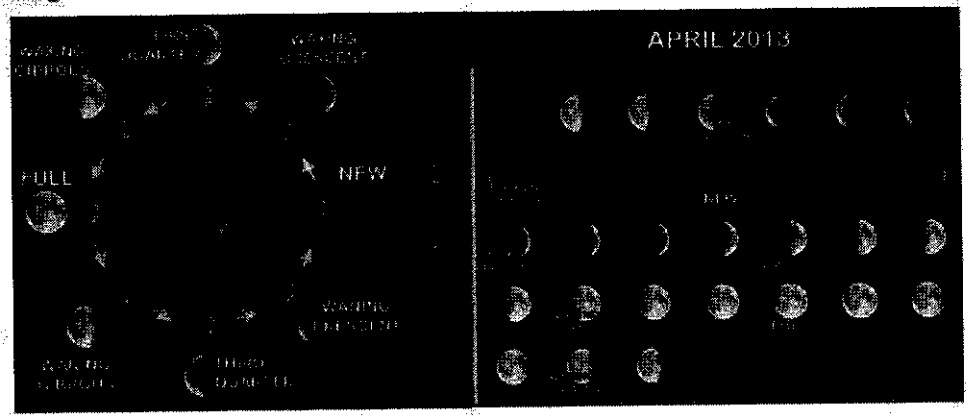
a. the motions of Earth, the moon, and the sun;
b. the causes for Earth's seasons;
c. the causes for the phases of the moon;
d. the relative size, position, age, and makeup of Earth, the moon, and the sun; and
e. historical contributions in understanding the Earth-moon-sun system.



ROTATION, REVOLUTION, TILT



- Earth completes one revolution around the sun every 365 ¼ days.
- The moon revolves around Earth about once every month.
- Due to its axial tilt, Earth experiences seasons during its revolution around the sun.
- The phases of the moon are caused by its position relative to Earth and the sun. The phases of the moon include the new, waxing crescent, first quarter, waxing gibbous, full, waning gibbous, last (third) quarter, and waning crescent.

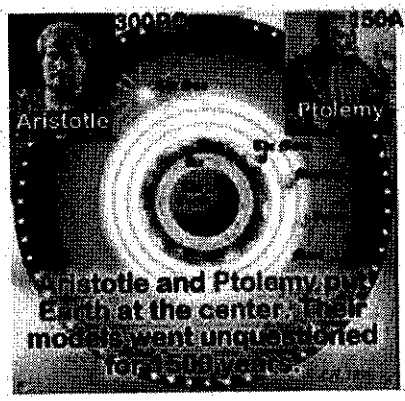


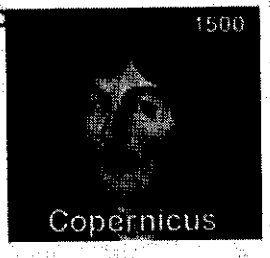
SUN, MOON, EARTH -- SIZE & MAKEUP

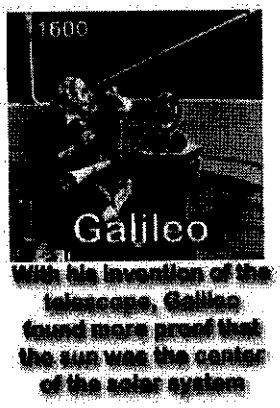
- The sun is an average-sized yellow star, about 110 times the diameter of Earth. The sun is approximately 4.6 billion years old.
- Our moon is a small rocky satellite, having about one-quarter the diameter of Earth and one-eightieth its mass. It has extremes of temperature, virtually no atmosphere or life, and very little water.
- Earth is one of eight planets that revolve around the sun and comprise the solar system. Earth, the third planet from the sun, is one of the four terrestrial inner planets. It is about 150 million kilometers from the sun.
- Earth is a geologically active planet with a surface that is constantly changing. Unlike the other three inner planets (Mercury, Venus, and Mars), it has large amounts of life-supporting water and an oxygen-rich atmosphere. Earth's protective atmosphere blocks out most of the sun's damaging rays.

HISTORICAL CONTRIBUTIONS

- Our understanding of the solar system has changed from an Earth-centered model of Aristotle and Ptolemy to the sun-centered model of Copernicus and Galileo.







- The NASA Apollo missions added greatly to our understanding of the moon.
- Our understanding of the sun, moon, and the solar system continues to change with new scientific discoveries.

EARTH, SUN, MOON

Key concepts include

a. **the motions of Earth, the moon, and the sun;**
b. **the causes for Earth's seasons;**
c. **the causes for the phases of the moon;**
d. **the relative size, position, age, and makeup of Earth, the moon, and the sun; and**
e. **historical contributions in understanding the Earth-moon-sun system.**

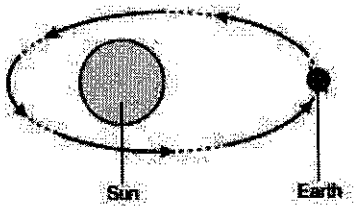
MOTION - ROTATION, REVOLUTION, SEASONS

1. Which of these is the most responsible for the changes of the seasons on Earth?
(2010 test – question -25)
   a. Position of the Moon
   b. Tilt of Earth on its axis
   c. Temperature of the Sun
   d. Distance to Mars

2. Which of these takes about one year to complete?
(2010 test – question 32)
   a. Earth to orbit the Sun
   b. The Sun to orbit Earth
   c. Earth to rotate on its axis
   d. The Moon to orbit Earth

3. Earth makes a complete revolution around the Sun about once every —
(2008 test – question 9)
   a. day
   b. year
   c. season
   d. minute

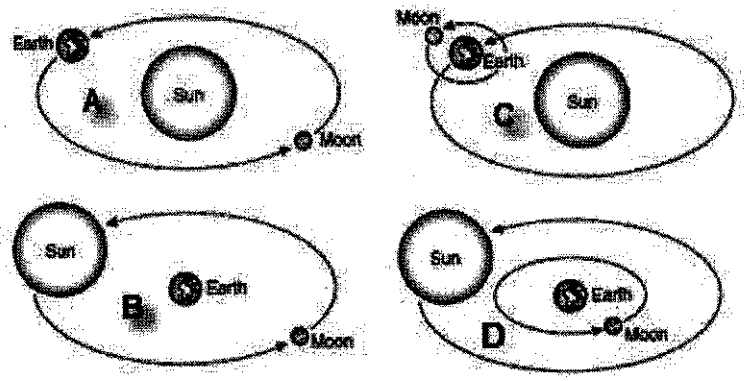
4. Which of these describes rotation?
(2009 test – question 22)
   a. Mercury goes around the Sun every 88 days.
   b. The Moon goes around Earth every 28 days.
   c. Earth orbits the Sun about every 365 days.
   d. Earth makes one turn on its axis every 24 hours.



5. The motion of Earth around the Sun most affects the —
(2007 test – question 14)
   a. timing of tides
   b. length of a month
   c. cycle of the seasons
   d. phases of the Moon

6. The time between today's sunrise and tomorrow's sunrise would be about —
(2003 test – question 4)
   a. 12 hours
   b. 24 hours
   c. 36 hours
   d. 48 hours

7. Which of these best shows that the Earth revolves around the sun as the moon revolves around the Earth?
(2004 test – question 30)

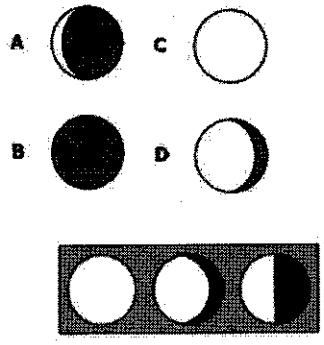


8. The rotation of the Earth on its axis causes —
(2002 test – question 21)
   a. seasons
   b. years
   c. months
   d. days

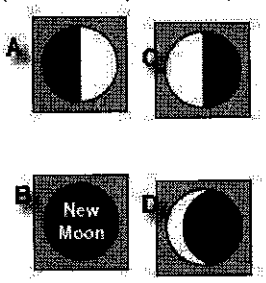
9. The moon revolves around —
(2001 test – question 8)
   a. itself
   b. the Earth
   c. the sun
   d. the solar system

MOON PHASES

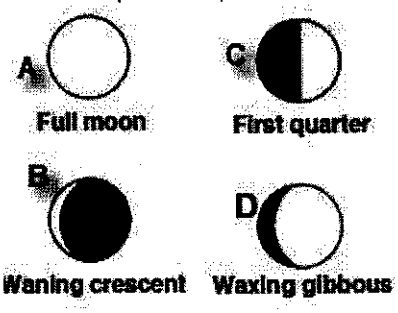
10. The phases of the Moon occur in a certain order. Three phases are shown here. Which is the next phase in the sequence?
(2008 test – question 17)



11. Which of the following is the next phase of the moon?
(2004 test – question 26)



12. Which of these is the next phase of the moon?
(2002 test – question 14)



CHARACTERISTICS OF EARTH, MOON

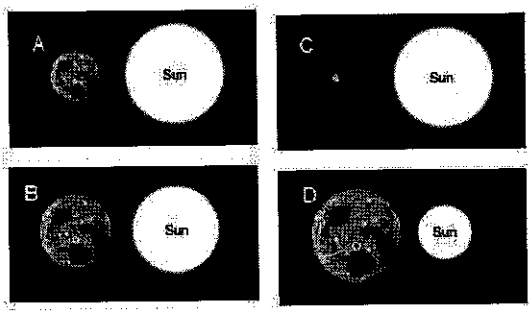
13. The surface of the ***Moon*** is made up of —
(2011 test – question 35)

a. craters, highlands, and flat areas
b. swirling gases
c. large bodies of water
d. a mixture of gases and water

14. Which of these best describes the Moon?
(2009 test – question 8)

a. Older than Earth
b. Smaller than Earth
c. Having the same climate as Earth
d. Having the same atmosphere as Earth

15. Sometimes you can see the moon during the daytime. The moon looks the same size as the sun, but the moon is 1/400 the size of the sun. Which of these best shows the size of the moon relative to the sun?
(2006 test – question 40)



16. If the Earth moved farther away from the sun, which of these would probably happen?
(2005 test – question 1)

a. There would be no moon.
b. There would be more solar eclipses.
c. There would be colder weather.
d. There would be more seasons.

17. How is the Earth different from all of the other planets?
(2005 test – question 15)

a. It has a breathable atmosphere.
b. It has a rocky surface.
c. It is warmed by the sun.
d. It rotates on its axis.

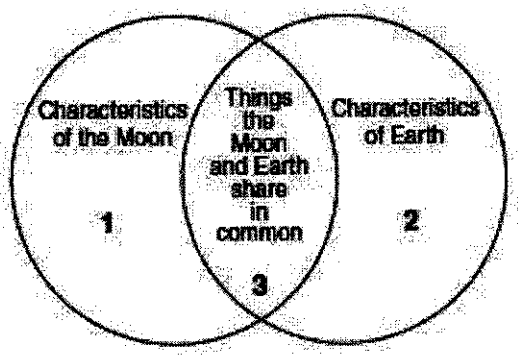
18. The Earth is very different from other planets in the solar system because it has the most —
(2003 test – question 39)

a. solid rock

b. volcanoes

c. liquid water

d. high winds



19. Which of these would fit best in area 3 of this Venn diagram?
(2007 test – question 32)

a. Rocky surface

b. Active volcanoes

c. Liquid water present

d. Oxygen in atmosphere

20. The distance between which of these is the shortest?
(2003 test – question 30)

a. Earth and sun

b. Moon and sun

c. Earth and Mars

d. Earth and moon

HISTORICAL CONTRIBUTIONS

21. About 400 years ago, Galileo became the first person to record what the moon looked like through a telescope. He was able to tell that the moon had —
(2006 test – question 35)

a. many craters

b. plants but no animals

c. active volcanoes

d. polar ice caps

22. The Apollo 11 mission was able to retrieve samples of the Moon's surface because it was the first mission to have astronauts —
(2009 test – question 3)

a. land on the Moon

b. orbit a planet

c. return to Earth

d. walk in space

23. Which of these objects in the solar system has been visited by people from Earth?
(2010 test – question 10)

a. Moon

b. Sun

c. Mars

d. Asteroid

Independent Practice

Name: _____ Date: _____

Part I: Word Find

Directions: Read the clue and find the correct word in the box. The first letter of the word is shaded..

E	C	I	D
S	T	T	S
E	S	O	L
I	C	U	R

1. The beginning of winter and summer

T	D	R	C
N	E	C	S
P	I	L	T
S	E	E	I

2. A shadow created by a celestial object

S	N	A	S
T	L	A	E
A	O	S	R
G	N	N	O

3. Caused by the tilt of Earth during revolution

E	T	I	L
R	A	O	N
O	T	R	T
V	D	S	A

4. Causes day and night on Earth

Independent Practice

Part II: That Is a Lie!

Directions: Each statement below contains something that makes it untrue. Rewrite the statement to make it accurate, and explain the change needed.

1. A solar eclipse happens when the Moon passes into Earth's shadow and lasts for several minutes.

   New statement:_____

   _____

   Reasoning: _____

   _____

   _____

2. The lunar cycle takes a year and is due to light reflecting off Earth.

   New statement:_____

   _____

   Reasoning: _____

   _____

   _____

3. The seasons are a result of Earth being closer to the Sun or farther away during its rotation around the Sun.

   New statement:_____

   _____

   Reasoning: _____

   _____

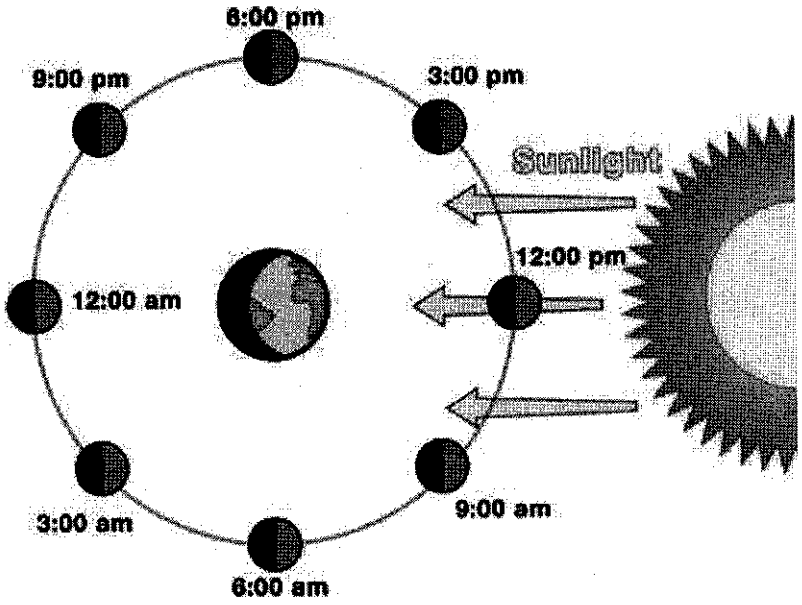
   _____

The Moon in Motion 1

Student Name:_____ Date: _____

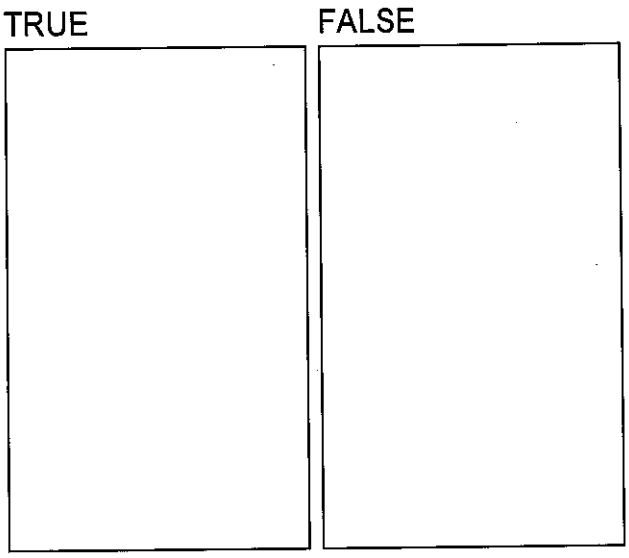
Score: _____

Listed in the Item Bank are key terms and expressions, each of which is associated with one of the columns. Write the number for each item into the correct column. Order does not matter.



Items:

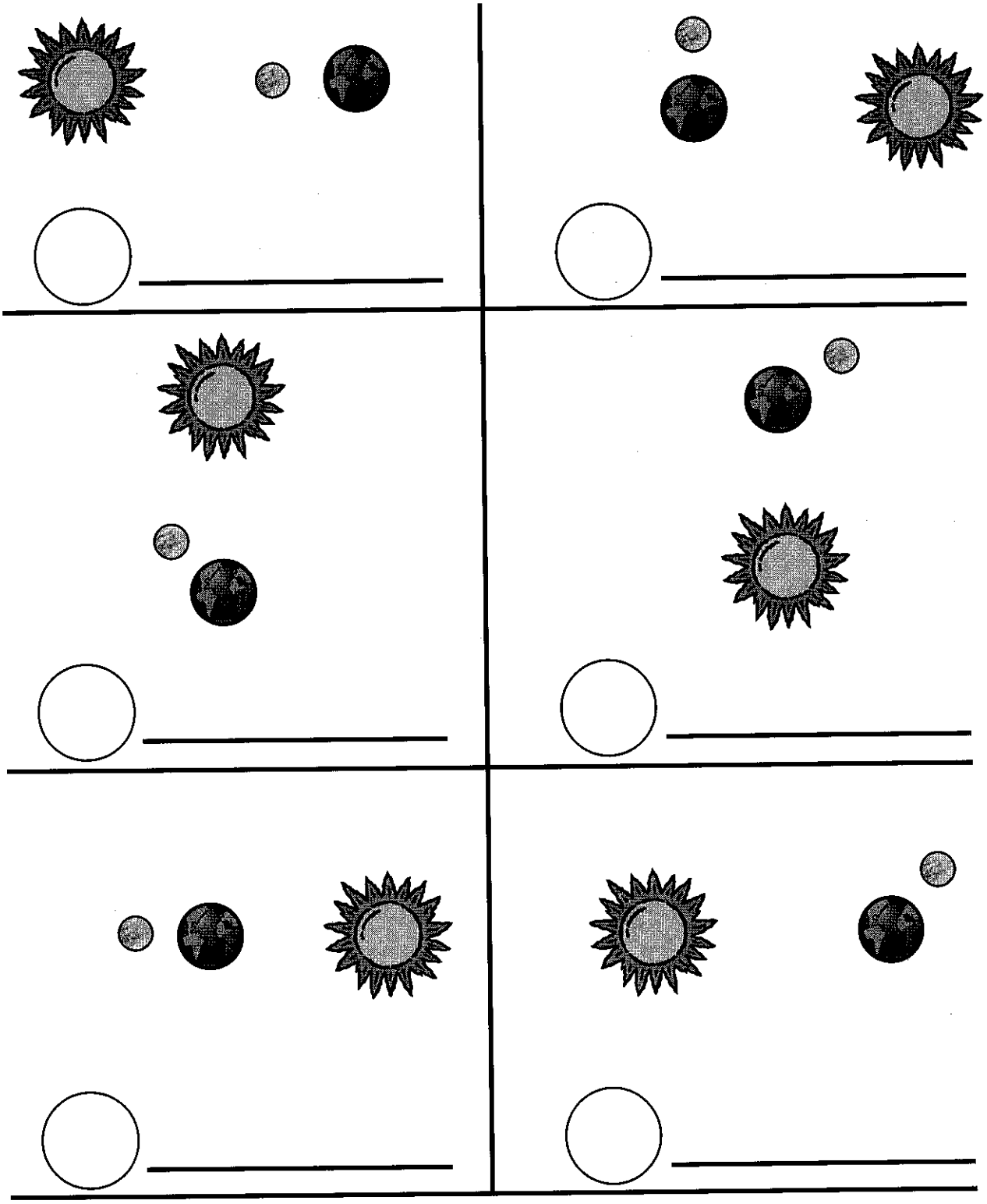
1 A New Moon cannot be seen from the Earth.
2 After a New Moon, the lighted side of the moon appears to grow bigger. This is called waning.
3 After the Full Moon, the lighted side of the moon appears to grow smaller. This is called waxing.
4 It takes about a month to see the moon phases.
5 Like the Earth, the moon rotates on its axis around the sun.
6 Sometimes you can see the moon during the day.
7 The Full Moon appears about two weeks after the New Moon.
8 The moon revolves around the Earth.
9 The same side of the moon always faces the Earth.


TRUE
FALSE

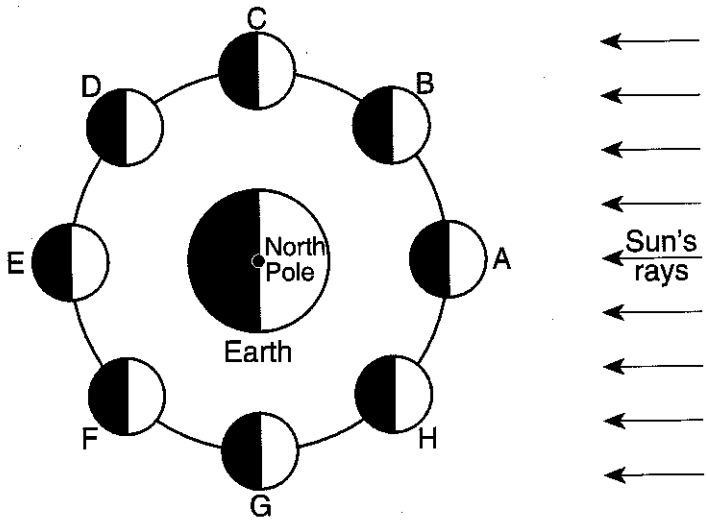
NAME: _____ Date:_____

MOON PHASES

In the blank circle, draw the moon phase we would see if we were on Earth in the diagram and then write the name of that moon phase on the blank line



Use the diagram below to fill in the name of the moon phases for the position indicated by the letter



(Not drawn to scale)

A: _____

C: _____

D: _____

E: _____

G: _____

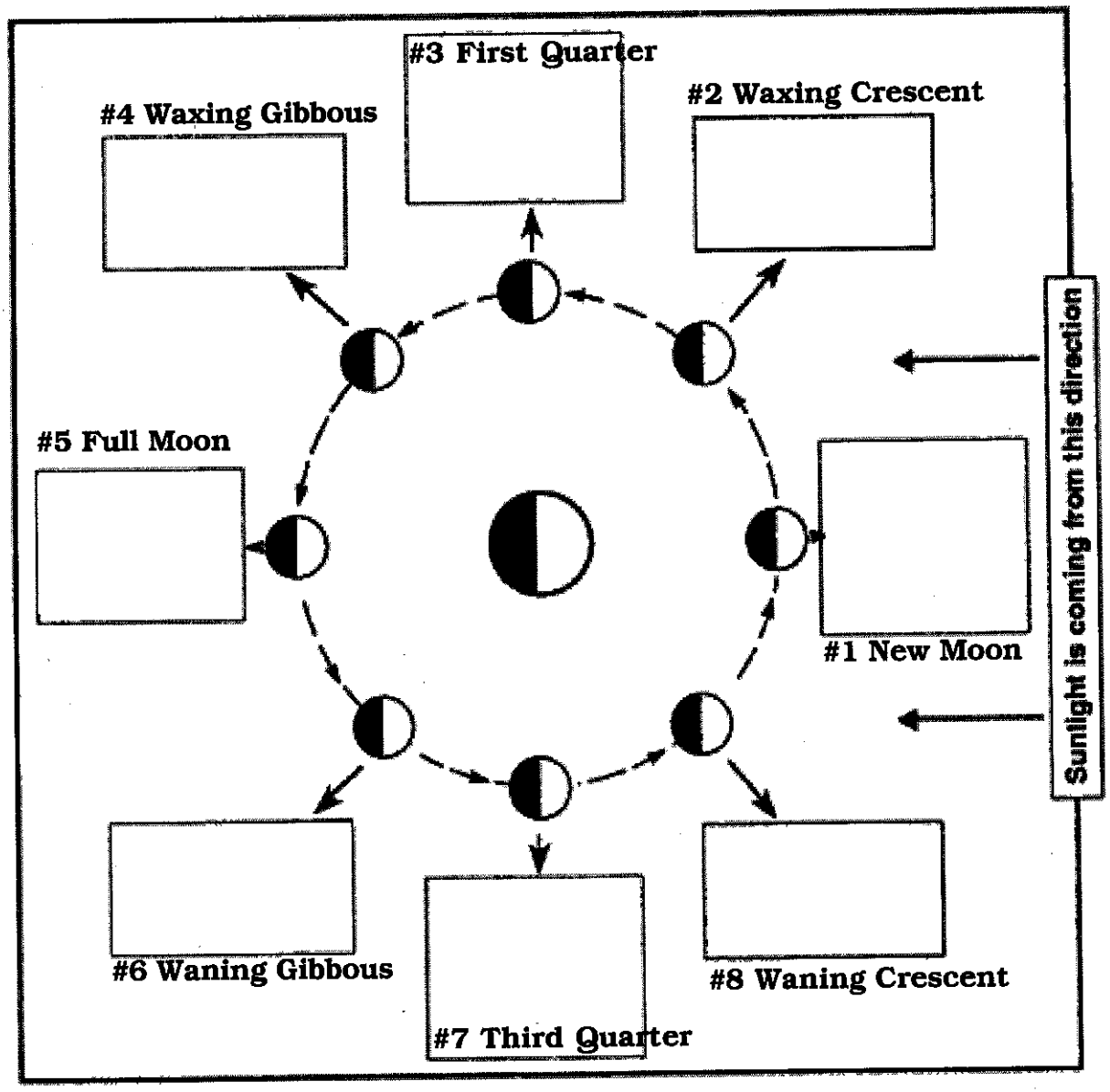
H: _____

In the space below, draw a diagram with the Sun on the right, so that if we were on Earth we would see a waning crescent moon.

In the space below, draw a diagram with the sun on the left, so that if we were on Earth we would see a waxing quarter moon.

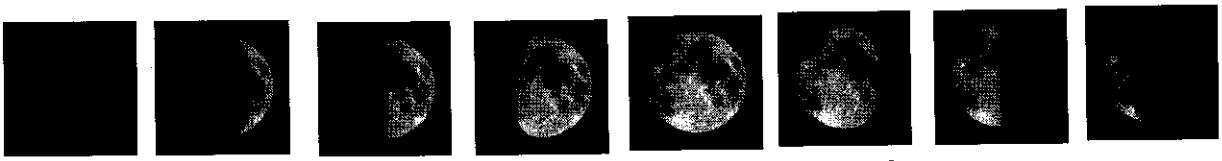
Cut & Paste Moon Phases Activity

Name_____ Class_____



Directions:

1. Cut out the eight moon phases below. Be careful not to cut off the Questions on the back of this page!
2. Paste in the correct position.
3. Answer the Questions on the back.



PHASES OF THE MOON QUESTIONS

1. Moonlight comes from:

2. When the moon passes between the sun and the Earth, the side that faces the Earth is in darkness:
   a. This phase is called (#1):
   b. Since the new moon rises with the sun, it will be directly overhead at:
   c. We CAN see the moon very faintly during this phase because:

3. As the moon begins its journey around the Earth, the lighted side begins to grow larger, or **wax**.
   a. Give the name for phase (#2).
   b. When will it be directly overhead?

4. The moon's cycle is approximately 28 days.
   a. How long will it take to go 1/4 of the way around the Earth?
   b. Name this phase (#3):
   c. When will it be directly overhead?

5. The moon continues around the Earth. The lighted side continues to grow.
   a. Give the name for phase (#4)
   b. When will it be directly overhead?

6. The moon, in 14 days, has moved 1/2 way around the Earth, and has gotten bigger,**waxed.** From the diagram, it looks like the moon would be in Earth's shadow, yet the moon's orbit is tilted just enough so this seldom happens.
   a. In this phase, (#5) what is the name?
   b. When is it directly overhead?

7. As the moon continues on its journey around the Earth, the portion we see will begin to grow smaller, or **wane**.
   a. Give the name for phase (#6).
   b. When is it directly overhead?

8. The moon is now 3/4 of the way around the Earth.
   a. What is this phase called (#7)?
   b. When is it directly overhead?
   c. How long has it taken for the moon to travel this far?

9. The moon continues to grow smaller, **wane**.
   a. What is the name of phase (#8)?
   b. When will it be directly overhead?

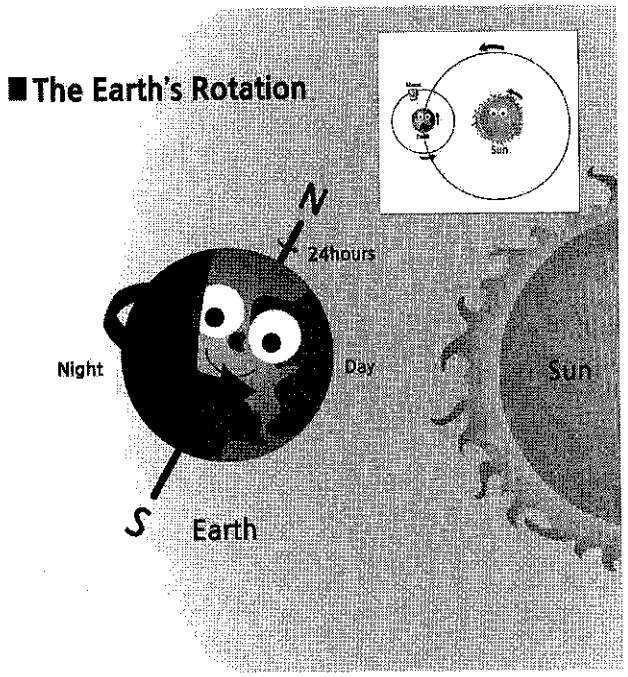
10. The moon now moves back into the new moon phase. (1)
    a. How long did it take for the moon to travel all the way around the Earth?
    b. If you were on the moon, would you see phases of the Earth?
    c. Would they be the same as moon phases?

Reading Science

Name: _____ Date: _____

Rotation and Revolution

1 As you are getting ready for bed, do you ever wonder what time it is on the other side of the world? Perhaps you think about what season it is in Australia as you sweat on a hot summer day. The constant spinning of Earth on its axis answers the first question. The tilt of Earth on its axis and Earth's position during its revolution around the Sun answer the second question.



2 First of all, let's discuss what an axis is. Picture an imaginary pole running from the North Pole through Earth's center all the way to the South Pole. This imaginary pole is called an axis. Earth rotates on its axis, turning different parts of Earth into the Sun's light. It takes about 24 hours to complete one entire spin. Thus, one complete rotation cycle results in 12 hours of daylight and 12 hours of night. Have you ever stood outside to watch the Sun sink below the horizon? You have actually been witnessing Earth's rotation. The Sun is not moving, although it appears to be. Earth is moving! The rotating Earth also makes the stars at night glide across the sky. In fact, it is the rotation of Earth on its axis that makes them seem to move. At any given time during the 24-hour rotation, half of Earth is in

Reading Science

sunlight, and half of Earth is in darkness. This means as you get ready for bed, someone on the other side of Earth is waking up.

3 Think of Earth as a ball with a rod through it, representing the axis. This makes it easier to picture Earth's orientation in space relative to the Sun. Now think of the Sun as another ball. Imagine the Sun located in the center of a disc, somewhat like a Frisbee. The planets in the solar system would all be positioned on the Frisbee. They are positioned at different distances from the Sun, however. The area we picture as a Frisbee is actually called the plane of the ecliptic. It is the plane of Earth's orbit around the Sun. Earth's axis is not oriented perpendicular to the plane of its orbit. Instead, it is tilted at 23.5 degrees from the perpendicular. Why is this important? This orientation in space, relative to the Sun, is the cause of Earth's seasonal changes.

4 Now to address our second question. What would cause it to be summer in North America and winter in Australia? We have just learned that rotation is the spinning of Earth on its axis. Rotation causes day and night. We also learned that Earth's axis is tilted 23.5 degrees from the perpendicular of the plane of the ecliptic. There is one more thing to think about. While Earth is rotating, it is also revolving around the Sun. It travels in a nearly circular path called an orbit. This revolution takes one year, or 365 days, to complete. During this one year, Earth goes through four different seasons. The seasons are summer, fall, winter, and spring. However, they do not happen at the same time in the Northern and Southern Hemispheres. In June, July, and August, Earth's tilt positions the Northern Hemisphere so that sunlight hits it more directly. The Northern Hemisphere has more daylight hours. This is the cause of the summer season. During that period of time, the Southern Hemisphere is tilted so that the sunlight

Reading Science

is less direct. Fewer daylight hours cause the opposite winter season. This explains why the Northern and Southern Hemispheres have different seasons.

5 The next time you watch a sunset or sunrise, think about the rotation of Earth. Remember that you are witnessing the same thing that is causing day and night. On the next hot summer day or cold winter night, think about the tilt of Earth on its axis. Remember how its position in Earth's revolution around the Sun causes the seasons.

Reading Science

1 In Paragraph 3, what word or phrase gives you a clue to what the word *perpendicular* means?

A. *Somewhat like a Frisbee*
B. *Relative to the Sun*
C. *Instead, it is tilted*
D. *Orientation in space*

---

2 Which of the following effectively summarizes Paragraph 2?

A. The orientation in space, relative to the Sun, is the cause of Earth's seasonal changes.
B. There is an imaginary pole running through the center of Earth from the North Pole to the South Pole, which is called an axis.
C. We also learned that Earth's axis is tilted 23.5 degrees from the perpendicular of the plane of the ecliptic.
D. The Northern Hemisphere has more daylight hours.

---

3 According to this passage, what is rotation?

A. The constant spinning of Earth on its axis
B. The movement of Earth through space around the Sun
C. An orbital path shaped more like a circle than an oval
D. The four seasons: summer, fall, winter, and spring

---

4 Which of the following statements best shows why it would be winter in the Southern Hemisphere when it is summer in the Northern Hemisphere?

A. Earth's tilt positions the Northern Hemisphere to receive more of the Sun's direct rays.
B. Earth's tilt positions the Southern Hemisphere to receive more of the Sun's direct rays.
C. Earth's tilt exposes the Northern Hemisphere to longer periods of daylight.
D. Both A and C are correct.

Reading Science

5 The rotation of Earth takes approximately _____ to complete, and the revolution of Earth takes approximately _____ to complete.

A. 1 day, 30 days
B. 12 hours, 24 hours
C. 365 days, 24 hours
D. 24 hours, 365 days

What Causes the Seasons?

The text and images are from NASA Space Place.

It's all about Earth's tilt!

Many people believe that Earth is closer to the sun in the summer and that is why it is hotter. And, likewise, they think Earth is farthest from the sun in the winter.

Although this idea makes sense, it is incorrect.

It is true that Earth's orbit is not a perfect circle. It is a bit lop-sided. During part of the year, Earth is closer to the sun than at other times. However, in the Northern Hemisphere, we are having winter when Earth is closest to the sun and summer when it is farthest away! Compared with how far away the sun is, this change in Earth's distance throughout the year does not make much difference to our weather.

There is a different reason for Earth's seasons.

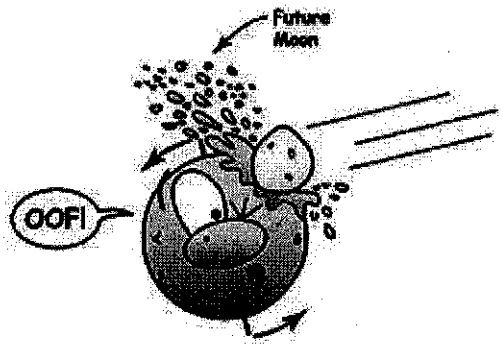
Earth's axis is an imaginary pole going right through the center of Earth from "top" to "bottom." Earth spins around this pole, making one complete turn each day. That is why we have day and night, and why every part of Earth's surface gets some of each.

Earth has seasons because its axis doesn't stand up straight.

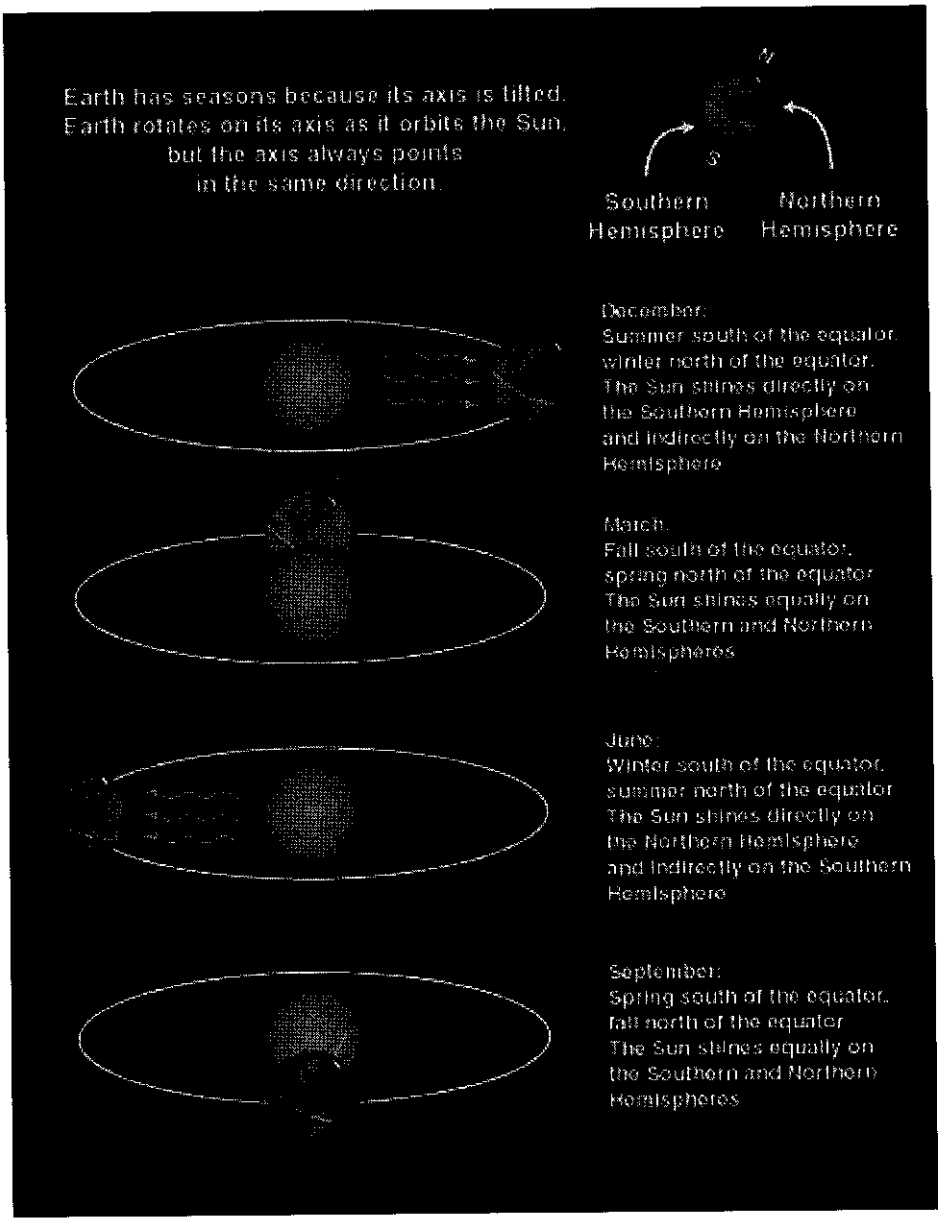
But what caused Earth to tilt?

Long, long ago, when Earth was young, it is thought that something big hit Earth and knocked it off-kilter. So instead of rotating with its axis straight up and down, it leans over a bit.

By the way, that big thing that hit Earth is called Theia. It also blasted a big hole in the surface. That big hit sent a huge amount of dust and rubble into orbit. Most scientists think that that rubble, in time, became our Moon.

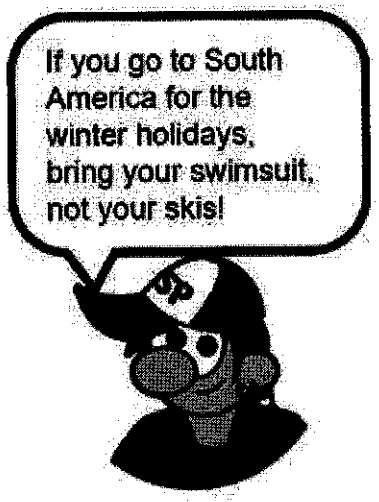


As Earth orbits the sun, its tilted axis always points in the same direction. So, throughout the year, different parts of Earth get the sun's direct rays.



Sometimes it is the North Pole tilting toward the sun (around June) and sometimes it is the South Pole tilting toward the sun (around December).

It is summer in June in the Northern Hemisphere because the sun's rays hit that part of Earth more directly than at any other time of the year. It is winter in December in the Northern Hemisphere, because that is when it is the South Pole's turn to be tilted toward the sun.



Name: _____ **Date:** _____

1. What is the Earth's axis?

A. an imaginary pole that passes through the center of the Earth

B. the path that the Earth travels around the sun

C. the object that hit young Earth long ago, causing it to lean over

D. the distance between the Earth and the sun

2. This text describes what causes us to have seasons at different times of the year on different parts of the Earth. What is one thing that causes seasons?

A. the shape of the Earth

B. the oval-shaped orbit of the Earth

C. the tilt of the Earth

D. the distance between the Earth and sun

3. The text says, although many people believe that we have summer when the Earth is closest to the hot sun, that we actually have summer when the Earth is farthest away from the sun. What conclusion can be drawn from this evidence?

A. Earth's orbit changes shape almost every year.

B. Scientists do not know for sure why we have seasons.

C. Earth's seasons are caused by the moon rather than the sun.

D. Earth's distance from the sun does not affect the seasons.

4. Based on the text, what causes a hemisphere on Earth to have summer?

A. direct sunshine from the sun hitting that hemisphere

B. indirect sunshine from the sun hitting that hemisphere

C. that hemisphere's closeness to the sun, relative to its closeness at other parts of the year

D. that hemisphere's natural climate and the warmth of the Earth's atmosphere in that area

5. What is the main idea of this text?

A. Earth's oval-shaped orbit causes the seasons.

B. Earth's tilted axis causes the seasons.

C. The shape of the Earth causes the seasons.

D. Earth's distance from the sun causes the seasons.

6. Please read the following sentences from the passage.

"But what caused the Earth to **tilt**? Long, long ago, when Earth was young, it is thought that something big hit Earth and knocked it off-kilter. So instead of rotating with its axis straight up and down, it leans over a bit."

What does the word **tilt** mean as used in these sentences?

A. skip

B. spin

C. move

D. lean

7. Please choose the answer that best completes the sentence below.

When the Northern Hemisphere is tilted towards the sun, the Southern Hermisphere does not receive direct sunshine, ___ it is winter in the south.

A. because

B. if

C. so

D. first

8. Why is the Earth's axis tilted?

9. Why does the Northern Hemisphere have summer in June? Use evidence from the text in your answer.

10. Imagine that the Earth's axis went straight up and down, instead of tilting. Explain whether or not the Earth would still have different seasons. Support your answer with evidence from the text.

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A. because

B. if

C. so

D. first

8. Why is the Earth's axis tilted?

People believe that long ago, something big hit the Earth, knocking it off-kilter.

9. Why does the Northern Hemisphere have summer in June? Use evidence from the text in your answer.

Answers may vary. Students should use evidence from the text. It is summer in June in the Northern Hemisphere because the Earth's slanted axis means that the Northern Hemisphere is tilted toward the sun in June. The sun's rays shine directly on the Northern Hemisphere at this time, making the weather there warm.

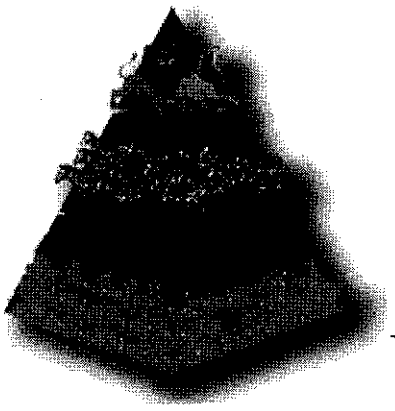
10. Imagine that the Earth's axis went straight up and down, instead of tilting. Explain whether or not the Earth would still have different seasons. Support your answer with evidence from the text.

Students should use evidence from the text. If the Earth's axis was vertical, the sun's rays would shine equally on the Northern and Southern hemispheres throughout the year. Therefore, there would be no seasons.

SOL 4.5 -- ADAPTATIONS, ECOSYSTEMS, FOOD CHAINS & NICHES

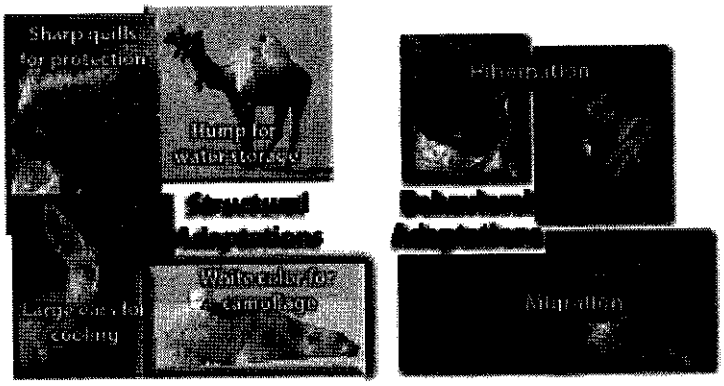
Key concepts include

a. **plant and animal adaptations**;
b. **organization of populations, communities, and ecosystems and how they interrelate**;
c. **flow of energy through food webs**;
d. **habitats and niches**;
e. **changes in an organism's niche at various stages in its life cycle**;
f. **influences of human activity on ecosystems**.



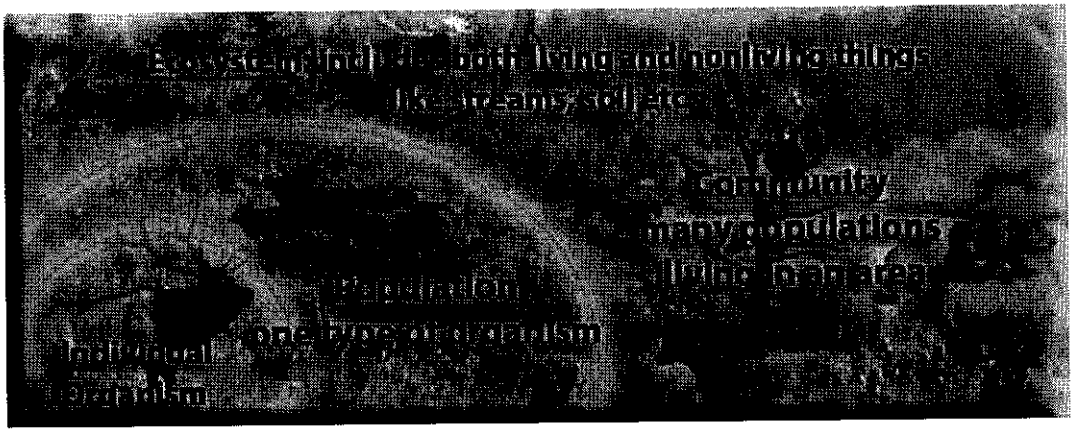
ADAPTATIONS

- Organisms have **structural adaptations** or physical attributes that help them meet a life need.
- Organisms also have **behavioral adaptations**, or certain types of activities they perform, which help them meet a life need.



POPULATIONS, COMMUNITIES, ECOSYSTEMS

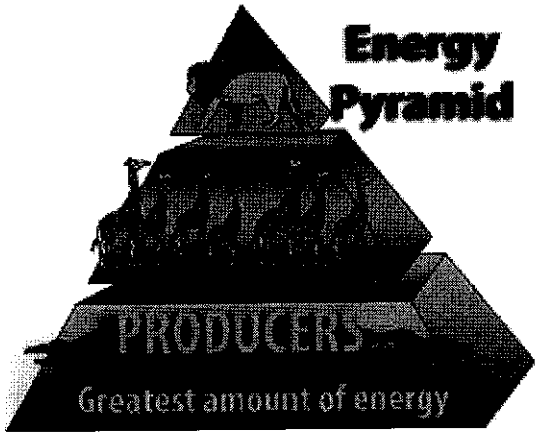
- All the organisms of the same species that live in the same place at the same time are a **population**.
- Populations of species that live in the same place at the same time together make up a **community**.



- All the populations and the nonliving components in an environment that interact with each other form an **ecosystem**.

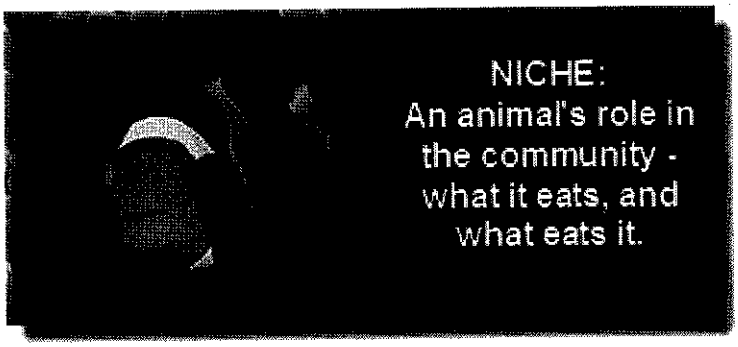
ENERGY PYRAMIDS; FOOD CHAINS

- The organization of communities is based on the utilization of the **energy from the sun** within a given **ecosystem**. The greatest amount of energy in a community is in the **producers.**
- Within a community, organisms are dependent on the survival of other organisms. **Energy is passed** from one organism to another.
- The sun's energy cycles through ecosystems from **producers** through **consumers** and back into the nutrient pool through **decomposers**.



HABITATS AND NICHES

- A **habitat** is the place or kind of place in which an animal or plant naturally lives. An organism's habitat provides food, water, shelter, and space. The size of the habitat depends on the organism's needs.
- A **niche** is the **function that an organism performs in the food web** of that community. A niche also includes everything else the organism does and needs in its environment. No two types of organisms occupy exactly the same niche in a community.



- The organization of a community is defined by the interrelated niches within it.
- During its life cycle, an organism's role in the community – its **niche – may change**. For example, what an animal eats, what eats it, and other relationships will change.
- Humans can have a major impact on ecosystems.

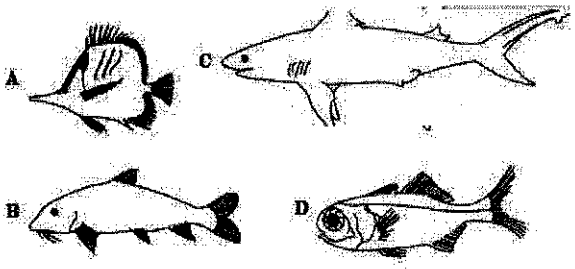
ECOSYSTEMS

The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem. Key concepts include

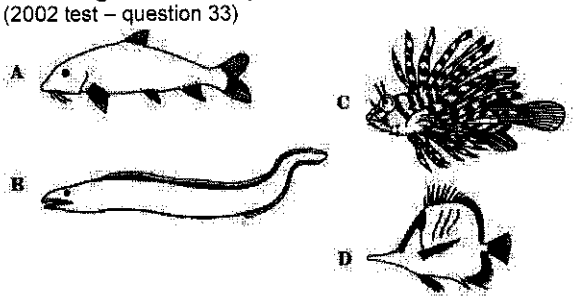
a. plant and animal adaptations;
b. organization of populations, communities, and ecosystems and how they interrelate;
c. flow of energy through food webs;
d. habitats and niches;
e. changes in an organism's niche at various stages in its life cycle; and
f. influences of human activity on ecosystems.

ADAPTATIONS

1. Which of these fish has a mouth shape that best allows it to find food hidden in the cracks of rocks and coral?
(2001 test – question 5)



2. Bright and unusual fish markings can warn other fish to stay away. Which of these fish probably is the most dangerous to its predators?
(2002 test – question 33)

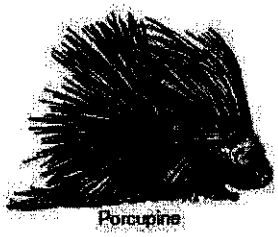


3. The picture shows some caddis fly larvae. These larvae cover themselves with small twigs and pebbles. What is the advantage of this behavior?

(2007 test – question 15)

a. They can eat the twigs.
b. They are hidden from predators.
c. They can crawl on the bottom of creeks.
d. They are able to keep warm.

4. A porcupine has sharp quills that protect it from predators. Which of these is a behavioral adaptation of porcupines that makes the quills more effective for protection?
(2006 test – question 1)


Porcupine

a. Using sharp teeth to cut twigs and leaves
b. Climbing to the very tops of trees to eat
c. Making an underground nest for young
d. Curling up into a ball when threatened

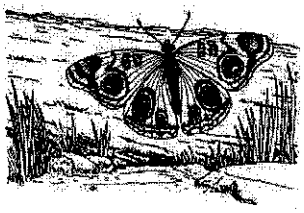
5. Blue whales have no teeth. Instead, they have rows of bristled strands that look like a broom, called baleen, which filters their food. Which sea creatures are their most common food?
(2006 test – question 30)

a. Seal and shark
b. Dolphin and porpoise
c. Turtle and penguin
d. Small fish and shrimp-sized krill

6. Barnacles and corals are two types of animals that live in the ocean. Both animals build a hard layer of calcium around their soft body parts. What is the most likely reason that they build these layers?
(2006 test – question 21)

a. Prepare them for reproduction
b. Protect them from predators
c. Help them capture food
d. Keep them from drying out

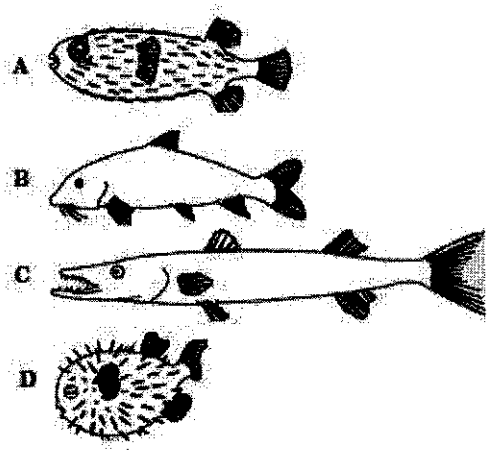
7. The eyespots on this butterfly's wings allow it to —



(2003 test – question 34)

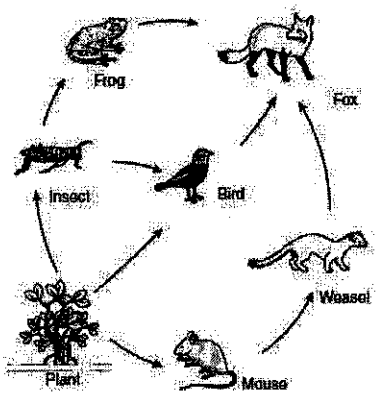
a. stay warm
b. locate nectar-filled flowers
c. fly away quickly
d. frighten or confuse enemies

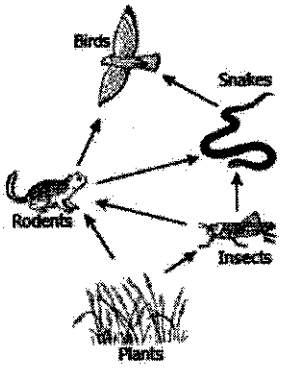
8. Some fish have a streamlined body shape that allows them to move swiftly in the water. Which of these fish is probably the fastest?
(2004 test – question 35)



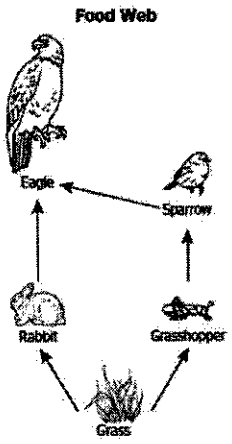
FOOD WEBS

19. Which of the following organisms provides energy for more than one organism in this food web?
(2007 test - question 33)
    a. Bird
    b. Plant
    c. Fox
    d. Mouse



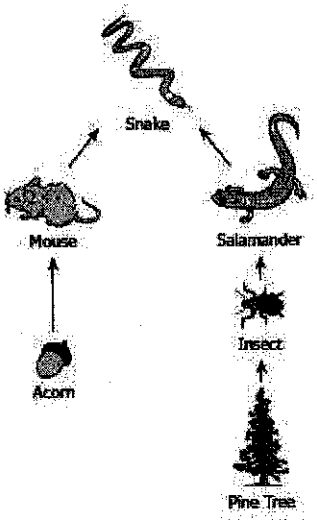


20. Which shows one way that energy flows to birds in this food web?
(2008 test – question 32)
    a. Rodents → insects → birds
    b. Insects → plants → birds c.
    Snakes → rodents → birds d.
    Plants → rodents → birds

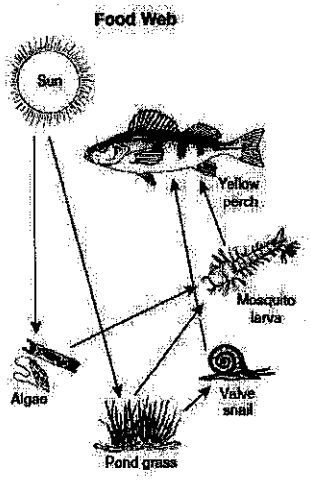


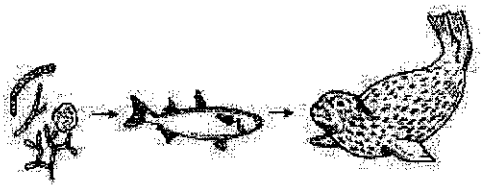
21. Based on the food web, which of these is a producer?
(2010 test – question 15)
    e. Eagle
    f. Grass
    g. Rabbit
    h. Sparrow

22. Which describes energy through this food web?
(2010 test – question 14)
    a. Salamanders get energy from snakes and mice.
    b. Acorns get energy from insects and pine trees.
    c. Mice get energy from salamanders and insects.
    d. Snakes get energy from salamanders and mice.

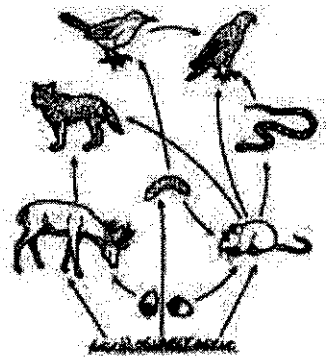


23. In order for energy to flow through this food web from the sun to the yellow perch, the perch must —
(2004 test – question 27)
    a. live in warmer areas of its habitat
    b. eat pond grass and algae
    c. go through the process of photosynthesis
    d. eat the valve snail or the mosquito larva





24. From where does the energy for this ocean food chain come?
(2002 test – question 15)
    a. Ocean waves
    b. The sun
    c. Whales
    d. Salt



25. In this food web, which two organisms could be harmed if the mouse population were to decline?
(2011 test – question 30)
    a. Deer and caterpillar
    b. Wolf and snake c.
    Oak and grass
    d. Hawk and songbird

26. All of these are consumers EXCEPT a —
(2005 test – question 6)
    a. butterfly
    b. wasp
    c. bullfrog
    d. tree

27. A bird that dies benefits a tree by providing it with —
(2005 test – question 22)
    a. minerals
    b. carbohydrates
    c. water
    d. oxygen

Characteristics of Types of Feeding

Carnivore	- Meat eaters - Live alone or in small groups - Preyed on only by other carnivores
Herbivore	- Strictly plant eaters - Can be large, hoofed mammals - Preyed on by carnivores
Omnivore	- Feed on both plants and animals - Can be both primary and secondary consumers in a food web

a. Golden eagle

28. Based on this chart, which of these animals would be considered a herbivore?
(2006- question 14)

a. Grizzly bear

b. Deer c. Lion

d. Human being

HUMAN INFLUENCE

32. Today, which human activity is responsible for endangering the greatest number of land animal species?
(2001 test - question 30)

a. Hunting for food and for sport
b. Destruction of habitats
c. Accidental starting of forest fires
d. Cutting wildflowers in national parks

33. A strip of land is cleared of trees and bushes to make space for a power line. What impact might this have on bird living in the area?
(2003 test – question 12)

a. The natural enemies of birds will be eliminated.
b. Weather conditions may change.
c. The rate of erosion will decrease.
d. There will be less food and shelter.

34. Which of these is most likely harmful to an ecosystem?
(2009 test - question 21)

a. Building new homes in a wetland
b. Taking away airplanes from an airport
c. Planting trees in an orchard
d. Adding floors to an office building

35. Which of these natural resources is a source of lumber for home building?
(2003 test – question 40)

a. Ores
b. Coal
c. Trees
d. Grasses

36. Which of these is a way the people of Virginia can help restore a natural ecosystem?
(2010 test – question 24)

a. Burn their trash
b. Plant native plants
c. Feed leftover meals to deer
d. Drain automobile oil into the grass

37. Which of these human activities in a forest has a positive effect on the ecosystem?
(2011 test – question 23)

a. Clearing the land to build new homes
b. Planting new trees where old ones were cut down
c. Building a new highway through the area
d. Cutting down trees to make farmland

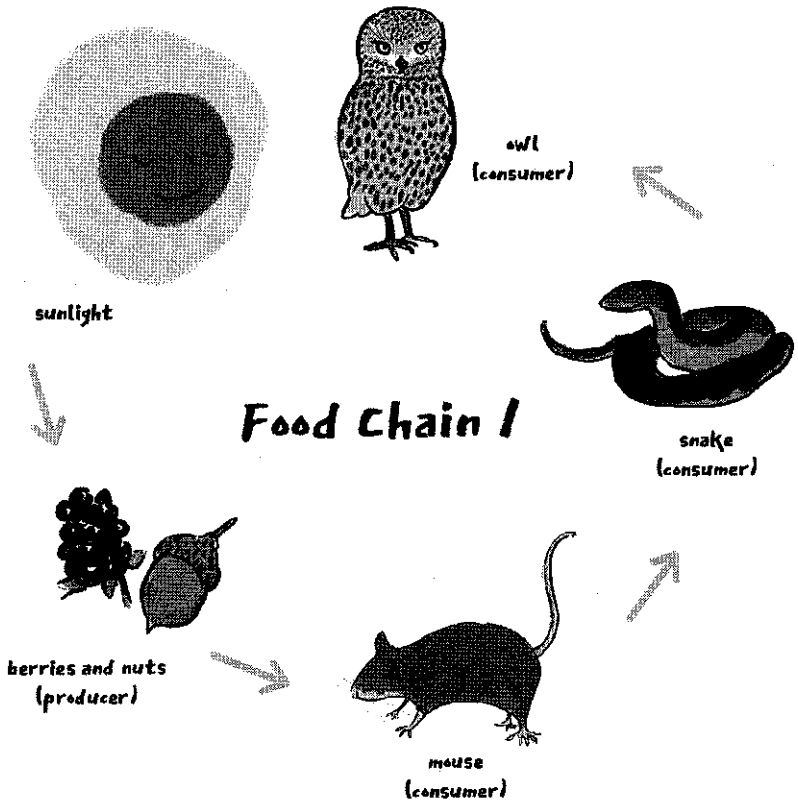
Name _____ Date _____

An Introduction to Food Chains

When learning about food chains, it's useful to keep the following facts in mind:

- The sun provides food for the producer, which uses light from the sun to produce its own food.
- A food chain describes the hierarchy whereby one organism depends on the next as a food source.
- There exist a wide variety of food chains, depending on the ecosystem.
- A food chain typically begins with plants, which exist at the bottom of a food chain.

Look at the food chains pictured below, then answer the accompanying questions.



Food Chain 1

1. What do the arrows depict?

_____

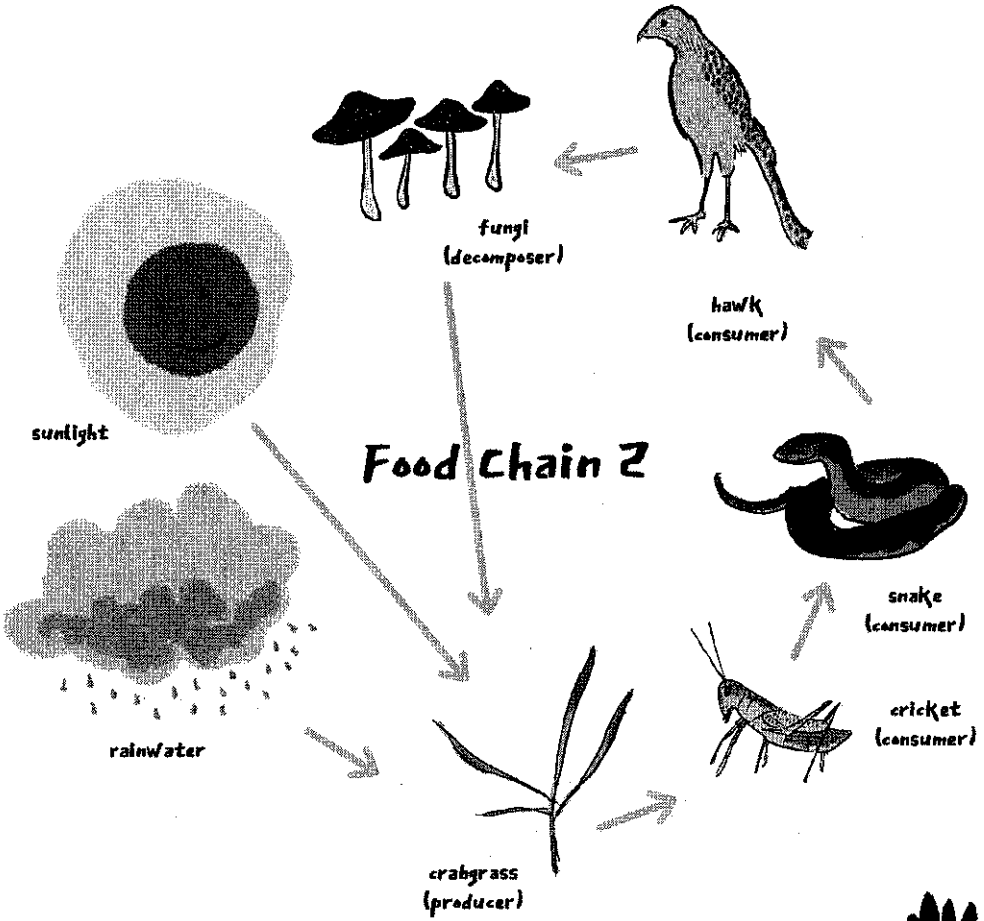
_____

2. Who is at the top of this food chain?

_____

_____

An Introduction to Food Chains



Food Chain 2

1. What does the hawk eat?

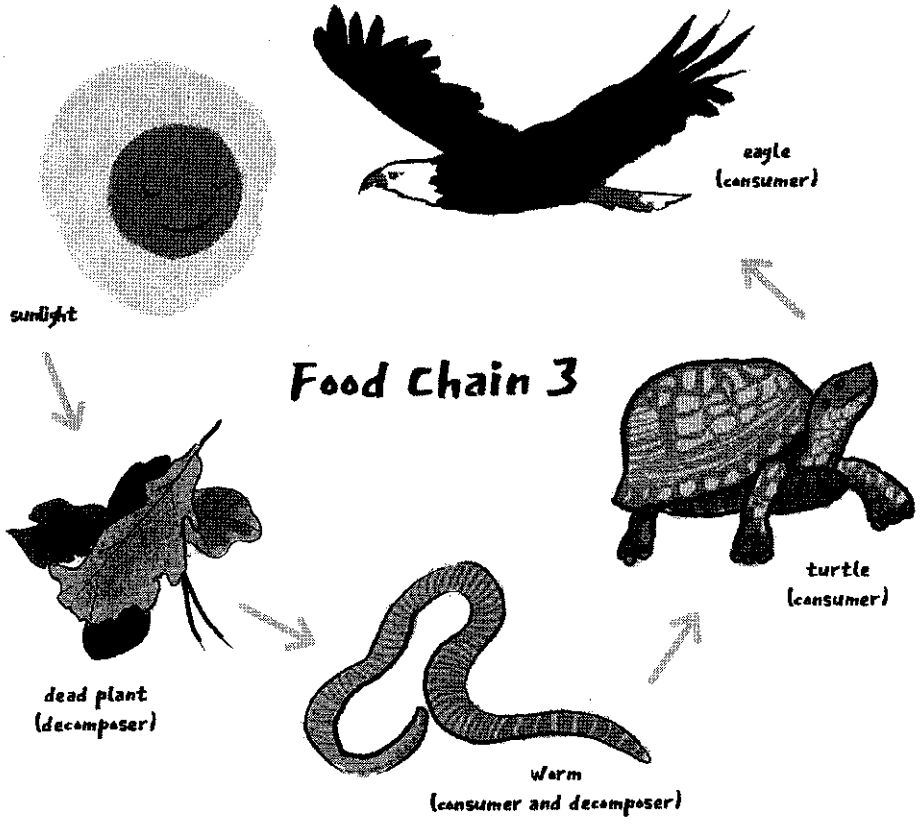
   _____

2. What three things does the grass need in order to survive?

   _____

   _____

   _____



Food Chain 3

1. What do worms eat?

   _____

2. Worms play two important roles in the food chain. What are they?

   _____

   _____

   _____

An Introduction to Food Chains

Food Chain 4

1. What is the last consumer in this picture?

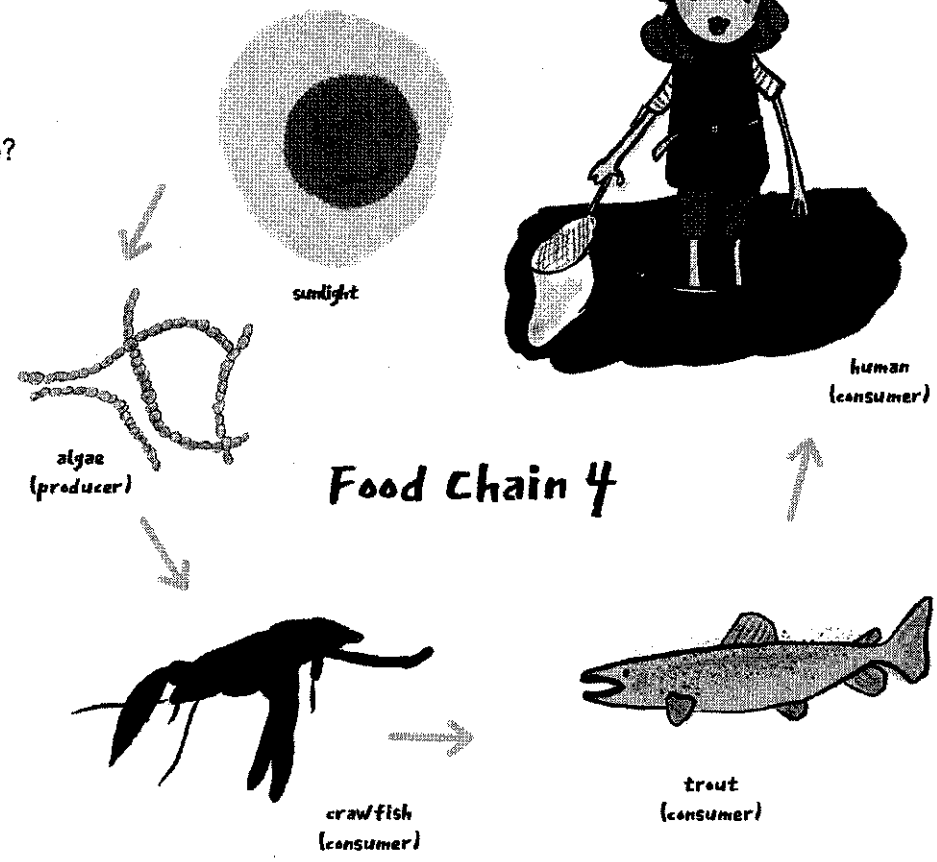
   _____

2. What does the human consumer eat in this picture? Is there anything else they could also eat?

   _____

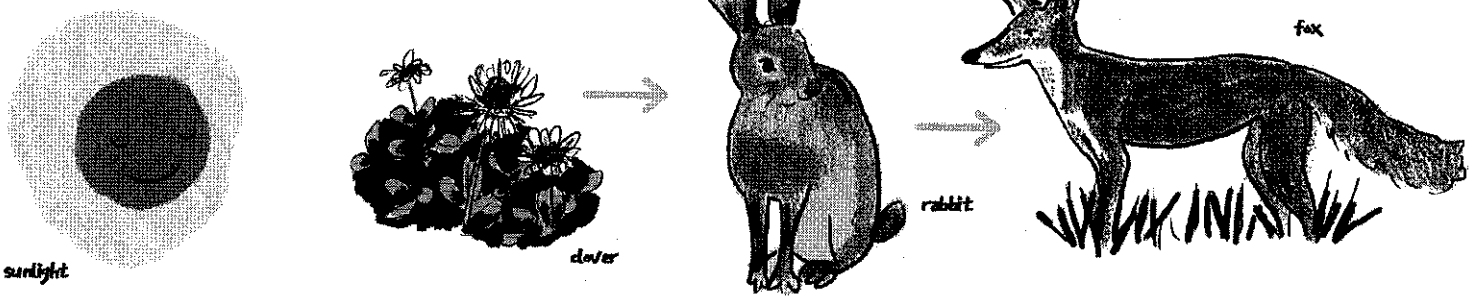
   _____

   _____



Food Chain 5

1. Label each organism or animal in the food chain below with "producer," "consumer," or "decomposer."

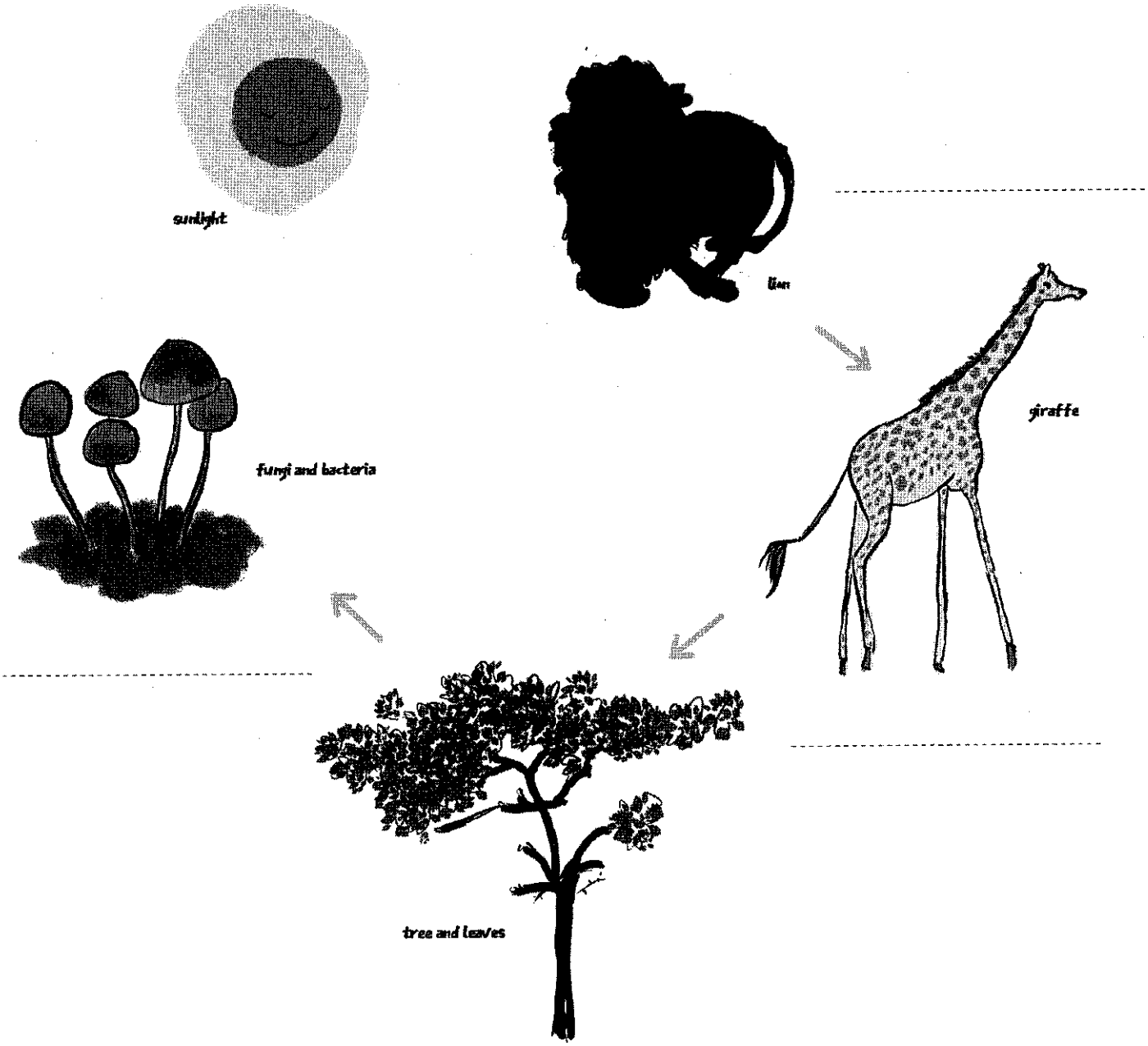


_____ _____ _____

An Introduction to Food Chains

Food Chain b

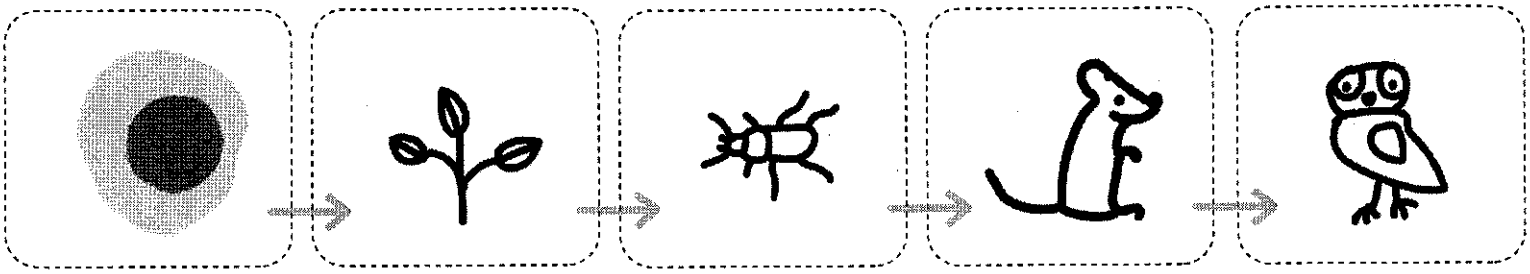
1. Label each organism or animal in the food chain below with "producer," "consumer," or "decomposer."



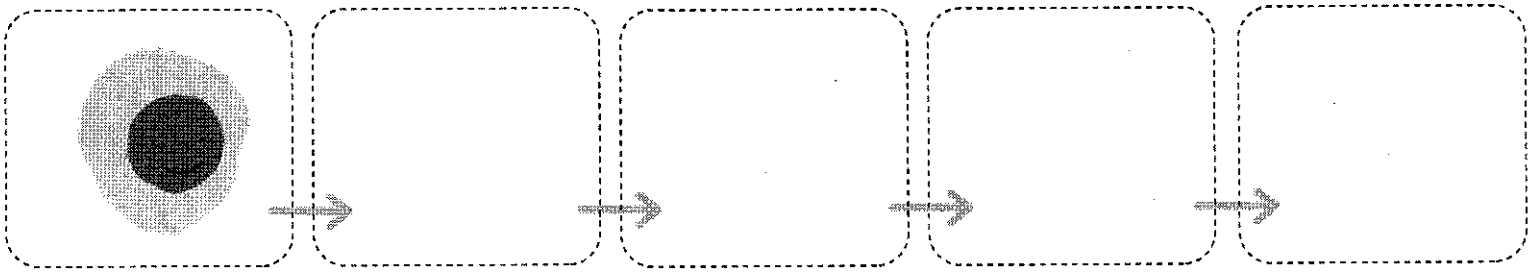
Create Your Own Food Chain

Draw pictures of the animals and organisms in each food chain in the spaces provided. Make sure you draw them in the correct order!

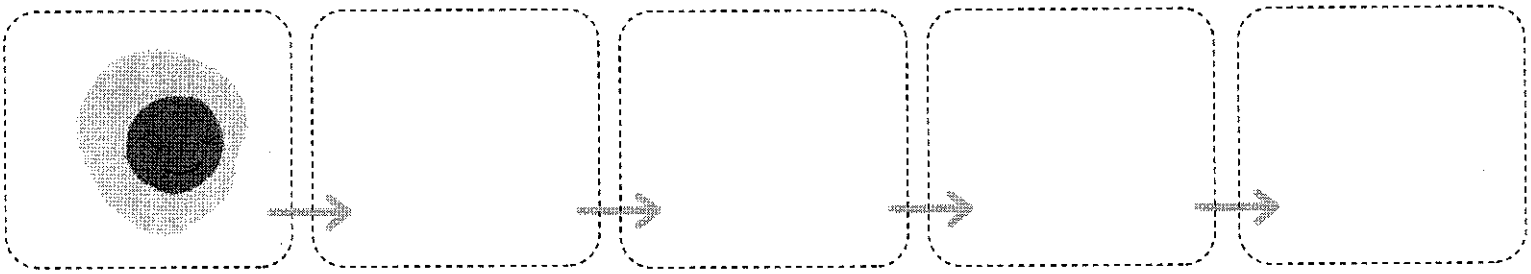
Example plant, insect, mouse, owl



1. deer, grass, wolf



2. corn, mouse, snake, hawk



3. algae, codfish, polar bear, seal, shrimp