Suggested Learning Activities for Grade 8 students during the COVID-19 school closure.

Seattle Public Schools is committed to making its online information accessible and usable to all people, regardless of ability or technology. Meeting web accessibility guidelines and standards is an ongoing process that we are consistently working to improve.

While Seattle Public Schools endeavors to only post documents optimized for accessibility, due to the nature and complexity of some documents, an accessible version of the document may not be available. In these limited circumstances, the District will provide equally effective alternate access.

Due to the COVID-19 closure, teachers were asked to provide packets of home activities. This is not intended to take the place of regular classroom instruction but will help supplement student learning and provide opportunities for student learning while they are absent from school. Assignments are not required or graded. Because of the unprecedented nature of this health crisis and the District’s swift closure, some home activities may not be accessible.

If you have difficulty accessing the material or have any questions, please contact your student’s teacher.
## Week of May 4 – 8
### Grade Level: 8th Grade

<table>
<thead>
<tr>
<th><strong>8th Broadcast Schedule</strong></th>
<th><strong>የትምህርት እርነት ይግለጠ</strong></th>
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<tr>
<td><strong>Jadwalka Warbaahinta</strong></td>
<td><strong>Programa de Transmisión</strong></td>
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### Tuesday, May 5th

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<tr>
<td>12:30pm</td>
<td>8th Science</td>
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### Wednesday, May 6th

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<tbody>
<tr>
<td>10:15am</td>
<td>WA State Tribal History</td>
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<td>Taariikhda qabilooyinka Gobolka WA</td>
<td>Historia Tribal del estado de WA</td>
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<tbody>
<tr>
<td>12:30pm</td>
<td>8th Science</td>
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<td>Ciencia</td>
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### Friday, May 8th

<table>
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- **SPS-TV Channels in the City of Seattle:** Comcast 26 and 319, Wave 26 and 695, Century Link 8008 and 8508.
- **ስፋስ-ፋኬ ከታማወቅ ያስቶበታ ዳናውያ እንደት እኔ መብት Seattle:** Comcast 26 እና 319, Wave 26 እና 695, Century Link 8008 እና 8508.
- **西雅图市政府的SPS电视频道:** Comcast 26 频道和 319 频道，Wave 26 和 695，Century Link 8008 和 8508。
- **Mawjadaha aad ka heli karto telefishanka dugsiyada dadwaynaha Seattle waa:** Comcast 26 iyo 319, Wave 26 iyo 695, Century Link 8008 iyo 8508.
- **Los canales SPS-TV en la ciudad de Seattle son:** Comcast 26 y 319, Wave 26 y 695, Century Link 8008 y 8508.
- **SPS-TV Channels trong thành phố Seattle:** Comcast 26 và 319, Wave 26 và 695, Century Link 8008 và 8508.
Grade 8 Science Instructional Materials
Week of May 4-8, 2020

- Natural Selection Unit Lesson 8 (Amplify Chapter 3, 3.2-3.3)
- Evolutionary History Unit Lesson 1 (Amplify Chapter 1, 1.2)

Amplify Science

Natural Selection Unit, Lesson 8

Evolutionary History Unit, Lesson 1

Name ___________________________________ School ______________________________________
Class Period _____________________________ Teacher _________________________________

Evolutionary History, Lesson 1 Student Packet, SPS Science, 4-2020
Hello Families,

We hope you and your family are well and safe during this time. During this unprecedented out-of-school time, the SPS middle school science team will be offering instructional opportunities for students that align with the district’s adopted middle school science instructional materials.

This investigation packet is part of a series of district-aligned lessons for middle school science developed by AmplifyScience and adopted by SPS in 2019. While Amplify Science lessons are designed to be done in the classroom with peers, there are some activities that students can complete at home.

In this packet you will find activities to accompany the lesson videos being aired this week through Seattle’s Public television programming on SPS TV (local channel 26). The videos and packets are also posted to the, SPS Science webpage under their corresponding grade level. These lesson videos, developed in collaboration between SPS teachers, Denver Public Schools teachers, and Amplify Science, feature teachers going through the information in the lessons. The work in this packet is intended to be completed alongside the viewing of the video of the corresponding videos.

Closed captioning for the videos is available many home languages if this helpful to your family.

- Click CC (bottom right of video)
- Click Setting (the gear next to CC)
- Click Subtitles/CC
- Click Auto-translate
- Choose your language

For students who have access to the internet and the following devices and browsers may wish to log-in to their AmplifyScience account from home are welcome to do so. Chrome and Safari are the recommended browsers to use for full functionality of the Amplify digital tools and features.

Sincerely,

Seattle Public Schools Science Department
Hello Families of Secundaria of the Seattle Public Schools,

SPANISH

Hola Familias de Secundaria de las Escuelas Públicas de Seattle,

Esperamos que usted y su familia estén bien y seguros durante esta temporada. Durante este tiempo sin precedentes fuera de la escuela, el equipo de ciencias de la escuela secundaria de SPS ofrecerá oportunidades de instrucción para los estudiantes, que se alinean con los materiales de instrucción de ciencias de la escuela secundaria adoptados por el distrito.

Este paquete de investigación es parte de una serie de lecciones extraescolares remotas alineadas con el distrito, desarrolladas por AmplifyScience. Si bien las lecciones de Amplify Science están diseñadas para realizarse en el aula con sus compañeros, hay algunas actividades que los estudiantes pueden completar en casa. En este paquete encontrará actividades para acompañar los videos de las lecciones de la serie.

Evolutionary History, Lesson 1 Student Packet, SPS Science, 4-2020
lecciones que se transmiten esta semana a través de la programación de televisión pública de Seattle en SPS TV (canal local 26). Los videos y paquetes también se publican en la página web de SPS, https://www.seattleschools.org/academics/curriculum/science. Los subtítulos para los videos están disponibles en muchos idiomas caseros si esto es útil para su familia.

- Presione CC (abajo a la derecha del video)
- Presione Setting (el engrane cercano a CC)
- Presione Subtitles/CC
- Presione Auto-translate
- Escoja su lenguaje

Los estudiantes que tienen acceso a Internet y a los siguientes dispositivos y navegadores pueden iniciar sesión en su cuenta AmplifyScience desde casa.

- Computadoras de Escritorio y Laptops (Chrome y Safari)
- Chromebooks
- iPads con iOS11.3+ (iPad5+) – Navegador sugerido: Safari

Sinceramente,
Departamento de Ciencias de las Escuelas Públicas de Seattle

**SOMALI**

Qoysaska Dugsiga Dhexe SPS,

Waxaan rajeyneynaa adiga iyo qoyskaaada in aad caafimaad iiiyo nabadgelyo qabtaan waqtigaan lagu jireen. Dg Inta lagu jireen waqtigaan aan caadiga ahayn ee dugsiiga dhibaiisaa, kooxda sayniska ee dugsiiga dhaxse ee SPS waxay soo bandhigayaan fursado waxbaridaa isla maraabta ardayda oo la waajinaysaa agabka tacliinta sayniska ee dugsiga dhexe ee degmadu qaadatay xirrada ah dheexeed dan casharada muqaalaha ah waxaad ka heleysaan sitimaanka barnaamiyka tafeelxinka Dugsiyaad Dugsiyada Seattle SPS TV (kanaalka gudaha 26). Xirrada warqadaha iyo fidliyowga waxa aad heleysaa shabakada SPS websaydhka, https://www.seattleschools.org/academics/curriculum/science.

Waxa ahaan keli kartaa sawiiryo qaar iyoo luqado hadli ay tahay mid ku caawinaysa qoyskaadaha.

- guji CC (bottom right of video)
- guji Setting (the gear next to CC)
- guji Subtitles/CC
- guji Auto-translate
- Dooro luqadaada

Ardayga heysta Khadka internet raacana tilmanta isticmaalka ka dibna ay galaan koontadda oo dugsiiga dhexe SPS.

- Desktops and Laptops (Chrome & Safari)
- Chromebooks
- iPads that support iOS11.3+ (iPad5+) – talo isticmaal : Safari

Mahadsanid,
Dugsiyaad Dugsiyada Seattle Waaxda Sayniska

**VIETNAMESE**

Kính gửi các gia đình của học sinh cấp 2 SPS,

Chúng tôi hy vọng quý vị và gia đình đều được khỏe mạnh và an toàn trong thời gian này. Trong thời gian nghỉ học chung tãm xây ra này, nhóm khoa học của các trường cấp 2 SPS sẽ mang đến cho các em học sinh cơ hội học tập phù hợp với tài liệu giảng dạy khoa học dành cho cấp 2.


Phù d'u cho các video có sẵn qua nhiều ngôn ngữ nếu điều này giúp ích cho gia đình của quý vị.

- Nhập CC (đặt cùng bên phải của video)
- Nhập vào Setting (biểu tượng hình bánh răng bên cạnh CC)
- Nhập vào Subtitles/CC
- Nhập vào Auto-translate
- Chọn ngôn ngữ của quý vị

Evolutionary History, Lesson 1 Student Packet, SPS Science, 4-2020
Học sinh nào truy cập vào internet và các thiết bị và trình duyệt sau có thể đăng nhập vào tài khoản AmplifyScience của các em từ nhà.

- Desktops and Laptops (Chrome & Safari)
- Chromebooks
- iPads that support iOS11.3+ (iPad5+) - Suggested browser: Safari

Trân trọng,
Seattle Public Schools Science Department
Suggested materials to accompany the broadcast or video:

- This packet
- A piece of paper and something to write with
- A person to share ideas with
- Optional: Computer logged into Amplify

3.2 Mutations in a Population (Part 2)

Observing Mutations in the Natural Selection Simulation

You will investigate a low-fur population of ostrilopes with the trait distribution shown in the histogram below.

- In the Sim or through observing your teacher’s results, you will observe ostrilopes that can mutate new traits.
- The environment for this population is changing to cold.
- The starting population only has ostrilopes with fur trait 2 (low fur)

Part 1: Making a Prediction

Think about which new traits would be adaptive and non-adaptive in a cold environment. Label any traits that would be adaptive with an A. Label any traits that would be non-adaptive with an NA.

Are all traits that are introduced by mutations adaptive? Do you think non-adaptive traits can be introduced into a population through mutations? Why or why not?
Part 2: Testing Predictions in the Natural Selection Simulation

**Goal:** Perform tests in the Sim to see if mutations can introduce both adaptive and non-adaptive traits into the population.

**Do:**

- Open the Natural Selection Simulation and open the mode: Mutations and Traits.
- Change the temperature of the environment to cold (Level 1) by moving the Temperature slider.
- Turn ostrilope fur-trait mutations on by pressing the Ostrilope icon and pressing the Mutations toggle.
- Press RUN and observe the population for at least 50 generations.
- Press ANALYZE and use the Generations slider to carefully observe new traits in the population.
- Answer the questions below.

**Tips:**

- Press the Histogram icon in the lower-left corner of Run to observe the introduction of traits into the population.
- Look for the red indicator above the heads of ostrilopes that are born with mutant traits.
This is an example of the results for ostrilope fur-trait from Generation 50 or above.

- Label all traits in the population 50 generations later that are Adaptive with A.
- Label all traits in the population 50 generations later that are Non-Adaptive with NA.
- Label all mutated traits (the ones that weren’t in the starting population histogram) with M.

How do you know the traits you identified in the histogram were adaptive?

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This is an example of the ostrilope fur-trait histogram from Generation 5

- Label all traits in the population 50 generations later that are Adaptive with A.
- Label all traits in the population 50 generations later that are Non-Adaptive with NA.
- Label all mutated traits (the ones that weren’t in the starting population histogram) with M.

How do you know the traits you identified in the histogram were non-adaptive?

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Your earlier answer to these questions: Are all traits that are introduced by mutations adaptive? Do you think non-adaptive traits can be introduced into a population through mutations? Why or why not?

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Key Concept

• Mutations are changes to genes that can lead to changes to protein molecules, which can result in changes to traits.

• Mutations to genes can sometimes introduce new traits into a population.

Reflecting on Mutations

Read each of the statements below.

If the statement is true, write “T” on the line before the statement. If the statement is false, write “F” on the line before the statement.

_________ Mutations sometimes result in an adaptive trait.

_________ Mutations sometimes result in a non-adaptive trait.

_________ Traits introduced by mutation will always become more common in a population.

_________ Traits introduced by mutation will sometimes become more common in a population.
1. Complete the explanation to Sherman. **Well, no Sherman, mutation does not work like that, here’s how it really works . . .**

____________________________________________________________________________
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2. If there had been a mutation that led to no fur, what would have happened? (check one)
   - The trait would have been adaptive.
   - The trait would have been non-adaptive.
   - The trait would have become more common over time.
   - The trait would have become less common over time.
3.3 Wrapping Up the Mystery

Warm Up

3. Look back at Sherman’s story on the previous page. Why did the mutation that resulted in a long-hair trait in these rabbits become more common in the population?

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Key Concept

A new trait will only become more common in a population if it is adaptive.
Write and Share - Discussing How Mutations Change Trait Distribution

Antarctic eelpouts are a type of fish that can be up to three-feet long and that look like eels. They can range in color from yellow to brown. They are found in very cold water, such as in the water near Antarctica.

There are three histograms on your sheet. At Time 1, Antarctic eelpouts used to live in warmer water. When land masses moved millions of years ago, the water became much colder. Time 2 represents some time after the environment changed. Time 3 represents many generations after the environment changed.

You will consider a two different data sets that shows possible changes in a population, given these conditions to answer:

Did mutations affect which trait was the most common at Time 3? Why or why not?

Follow the instructions below to participate in the Write and Share routine.

1. Carefully read and annotate the information you are given.
2. Answer your prompt, using the vocabulary words listed.
3. After you had a chance to write, share your responses with a family member or friend.
At Time 1, the Antarctic eelpout lived in warmer water. When land masses moved millions of years ago, the water became colder. Time 2 represents some time after the environment changed. Time 3 represents many generations after the environment changed. Review the histograms above and answer the question:

**Did mutations affect which trait was the most common at Time 3? Why or why not?**

Add annotations to the histograms to help you answer this question. Then, write an explanation about your annotations below. Use all of these words in your explanation:

- adaptive trait
- environment
- mutation
- non-adaptive trait
At Time 1, the Antarctic eelpout lived in warmer water. When land masses moved millions of years ago, the water became colder. Time 2 represents some time after the environment changed. Time 3 represents many generations after the environment changed. Review the histograms above and answer the question:

Did mutations affect which trait was the most common at Time 3? Why or why not?

Add annotations to the histograms to help you answer this question. Then, write an explanation about your annotations below. Use all of these words in your explanation:

- adaptive trait
- environment
- mutation
- non-adaptive trait

Preparing Your Final Report for Alex Young

Evolutionary History, Lesson 1 Student Packet, SPS Science, 4-2020
Goal: Show what caused there to be some extremely poisonous newts in today’s newt population when there were none in the newt population 200 generations ago.

Do:
• Analyze all four histograms on the next page and environment descriptions.
• Label Histogram 3 with any Trait labels that apply.

Tips:
• You can add multiple Trait labels to a single trait.
• You can use Trait labels more than once, and you do not have to use all of them.

Complete your Newt Mystery Explanation histogram model on the next page first! Then explain how your model answers the question:

How did a poison-level trait that wasn’t always present in the newt population become the most common trait?

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**NewtMysteryExplanation**

**Goal:** Show what caused there to be some extremely poisonous newts in today’s newt population when there were none in the newt population 200 generations ago.

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<thead>
<tr>
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<tbody>
<tr>
<td>Number of Newts</td>
<td>Number of Newts</td>
<td>Number of Newts</td>
<td>Number of Newts</td>
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<tr>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Poison Level</td>
<td>Poison Level</td>
<td>Poison Level</td>
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</tr>
<tr>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Environment: <strong>no snakes</strong></td>
<td>Environment: <strong>no snakes</strong></td>
<td>Environment: changing from <strong>no snakes</strong> to <strong>snakes</strong></td>
<td>Environment: <strong>snakes</strong></td>
</tr>
</tbody>
</table>

**Trait Labels**

+ $S$ = more likely to survive

- $S$ = less likely to survive

+ $O$ = likely to have more offspring

- $O$ = likely to have fewer offspring

$m = \uparrow$ reduced by mutation
Check Your Understanding

This is a chance for you to reflect on your learning so far. This is not a test. Be open and truthful when you respond to the questions below.

Scientists investigate in order to figure things out. You have been investigating why the newt population in Oregon State Park became more poisonous over time in order to share your ideas with biologist Dr. Alex Young. Are you getting closer to figuring out why the trait for high-poison level became more common in the newt population over time?

1. I understand how a histogram can be used to represent and describe the traits in the newt population. (check one)
   - [ ] yes
   - [ ] not yet

   Explain your choice above.
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

2. I understand why high-poison levels are adaptive in one environment but not adaptive in another. (check one)
   - [ ] yes
   - [ ] not yet

   Explain your choice above.
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

3. I understand how the number of newts with high-poison levels increased over time. (check one)
   - [ ] yes
   - [ ] not yet

   Explain your choice above.
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

4. I understand why a new trait may or may not become more common in a population. (check one)
☐ yes  ☐ not yet

Explain your choice above.

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

5. What do you still wonder about how the trait for high-poison level became more common in the newt population over time?

____________________________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

That’s a wrap for Natural Selection! On behalf of all your teachers, thank you for joining us!
Grade 8 Science Instructional Materials
Week of May 4-8, 2020
Evolutionary History Unit Lesson 1 (Amplify Chapter 1, 1.2)

AmplifyScience

Name __________________________ School __________________________
Class Period ________________________ Teacher _______________________
Why do species, both living and extinct, share similarities and have differences?

Below is a drawing of a fossil that is millions of years old. This fossil was just taken out of the ground, and no one knows what kind of organism it is. One way scientists identify a fossil of an animal with bones is to compare the bones of the fossil to the bones of other animals.

**Question 1**
Do any of this fossil’s bones look like bones of other animals? Describe your thinking.
Paleontologist: A scientist who studies fossils in order to understand the ancient history of life on Earth

To: Student Paleontologists  
From: Andre Mosley, Natural History Museum Director  
Subject: First Thoughts About Mystery Fossil

We want to make sure to place the Mystery Fossil in the museum with a group of other species that it makes the most sense for the fossil to be with. To make this decision, you will need to do the work of making careful observations and spending time comparing the bones of the Mystery Fossil to the bones and body structures of other organisms.

We asked our intern paleontologists at the museum to quickly examine the Mystery Fossil bones and give us some initial ideas about what species in the museum the Mystery Fossil might be most similar to. Their first examination of the Mystery Fossil tells us that there are three main types of organisms that the Mystery Fossil could be grouped with:

• whales
• wolves
• crocodiles
Where in the museum does this new fossil belong?

The work of a paleontologist very often involves the study of fossils. Fossils are the remains of an ancient organism that has been preserved in some manner. Their work is in the finding of fossils (like in the video) and the identification of fossils. In this unit, we will be looking to identify a newly discovered fossil skeleton. This fossil needs to be identified so it can be placed on display in a Natural History museum. This museum groups fossils together by similar organisms, so we will have to identify what type of organism the fossil was before it can be placed on display.

The paleontologist looking at this fossil thinks that it is likely an ancestor to one of these types of organisms:
- Whale (Order: Artiodactyla, Infraorder: Cetacea)
- Wolf (Order: Carnivora)
- Crocodile (Order: Crocodilia)

Species: A group of organisms of the same kind (in one or more populations) that do not reproduce with organisms from any other group.

Body Structure: A part of an organism (for example, one or more bones)
Activity:

- Read each species card
- For each set of organisms, make two high quality, detailed observations:
  - Observe the size (thickness and length) of bones within body structures
  - Observe the position of body structures
  - Count the number of bones in a body structures
- Group the species into at least 2 groups based on similarities
- Explain your groupings!

Should any of these species be grouped together?

**Titanotylopus**

This plant-eating animal was a type of giant camel—3.5 meters tall! The oldest fossil is about 10 million years old. Titanotylopus went extinct about 300,000 years ago. It walked on four legs on land and could store fat in its hump. Titanotylopus often had to walk long distances in search of food. Its environment varied but could include rocks, mountains, and flat, grassy areas. This animal's feet were a lot like the feet of the camels that are alive today.

**Camel**

Camels are plant-eating animals that live today in Africa and the Middle East. They walk on four legs on land and can store fat in their humps. They can walk long distances, often in hot, sandy environments that can make it difficult to walk. Their legs are strong.

**Pakicetus**

Paleontologists believe that this small animal lived on land but hunted in swamplike water. It had long legs, considering that its size was pretty small—1 m (3.3 ft) to 2 m (6.6 ft) long. Pakicetus had a small, narrow jaw with teeth that were good for eating meat (both land animals and fish). The oldest fossil is about 50 million years old. They went extinct about 34 million years ago.
Finding Similarities Between Species
Paleontologists typically use three general sources of evidence to make decisions about how closely organisms are related: information about the organism's environment and how it survived in its environment (figured out by the principles we learned in our Natural Selection unit), information gained by observing fossil structures, and genetic information. Since genetic information can be difficult to analyze, we will focus on using evidence from an organism's environment, how the organism survives in its environment, and what we can see from its fossil. Read about the following organisms to understand their environment and the organism survived in its environment. Make close, careful observations about their skeletal structures. You will see an object next to the fossil (e.g., soccer ball, apple, etc.). This is there to give you an idea about how big the fossil is (the scale of the fossil).

**Dire Wolf**

The dire wolf is an ancient species that went extinct approximately 10,000 years ago. It lived on land. Paleontologists used many kinds of evidence, including the size and shape of its bones, to determine that it was a predator that needed to run and attack large organisms for food.

**Ammonite**

Ammonites were mollusks with spiral shells that lived underwater in the ocean. They had no bones inside their bodies, but their shells could range in size from 1 cm to 1 m. The oldest ammonite fossil is from about 200 million years ago. They went extinct about 66 million years ago.
Fruit Bat

This bat species is alive today. These organisms fly from their homes in caves and trees to catch their prey of insects, which they either grab with their feet or in their mouths. Long, thin bones in their front limbs make it possible for them to fly.

Evolutionary History—Species Concepts—Lesson 1.2
© The Regents of the University of California. All rights reserved.
**Meganeura**

Meganeura was a type of insect that lived 290 million years ago and went extinct about 200 million years ago. These insects were very similar to dragonflies today, but much bigger. Fossils show individuals with wing spans of 69 cm (27 inches). Like current dragonflies, Meganeura had no bones inside their bodies. They flew through the air, hunting smaller flying insects to eat.

**Camel**

Camels are plant-eating animals that live today in Africa and the Middle East. They walk on four legs on land and can stow flat on their humps. They can walk long distances often in hot, sandy environments that can make it difficult to walk. Their legs are strong.

**Eusthenopteron**

An ancient fish that had both lungs and gills (almost all fish alive today have only gills). Eusthenopteron could both breathe air and get oxygen underwater. They grew to 1.8 m (~6 feet) long. The oldest fossil is about 385 million years old. They went extinct about 360 million years ago.
**Titanotylopus**

This plant-eating animal was a type of giant camel—3.5 meters tall! The oldest fossil is about 10 million years old. Titanotylopus were extinct about 300,000 years ago. It walked on four legs on land and could store fat in its hump. Titanotylopus often had to walk long distances in search of food. Its environment varied but could include rocks, mountains, and flat, grassy areas. This animal’s feet were a lot like the feet of the camels that are alive today.

**Pakicetus**

Paleontologists believe that this small animal lived on land but hunted in swampland water. It had long legs, considering that its size was pretty small—1 m (3.3 ft) to 2 m (6.6 ft) long. Pakicetus had a small, narrow jaw with teeth that were good for eating meat (both land animals and fish). The oldest fossil is about 50 million years old. They went extinct about 34 million years ago.

**Great White Shark**

This animal is alive today. It is one of the top predators in the ocean, with teeth that are excellent for ripping flesh and eating meat. Sharks have no bones in their bodies. A shark’s skeleton is made of a more flexible material called cartilage. They can grow up to 6 m (19 feet) long. Sharks have gills for breathing underwater and cannot live on land.
2. **Stop and Jot:**

List the organisms in your **first** group. Why did you put these organisms in a group?

3. **Stop and Jot:**

List the organisms in your **second** group. Why did you put these organisms in a group?

4. **Stop and Jot:** *Use ONLY if you made three groups! It’s okay if you just made two.*

List the organisms in your **third** group. Why did you put these organisms together?

- **Claim 1:** The Mystery Fossil belongs with the whales, in the Whale (Cetacea) exhibit.

- **Claim 2:** The Mystery Fossil belongs with the wolves, in the Carnivore (Carnivora) exhibit.

- **Claim 3:** The Mystery Fossil belongs with the crocodiles, in the Reptile (Reptilia) exhibit.
Making careful observations
When making observations about organisms, you must be as detailed as possible! We will be focusing in on a few key body structures. A body structure is a part of an organism that we can make observations on. Soft structures, like muscle or most organs don't usually fossilize well because they tend to decay before something like rock, ash, lava flow, or tree sap can fully preserve them. Hard body structures like bone and shell are well preserved in fossils because they don't decay easily. This means most fossils we observe are usually from hard body structures, though scientists do sometimes find soft structures preserved too! A paleontologist must make careful observations based on the body structures they find fossilized.

In this unit, we will often focus in on skeletal (bone) body structures since they are fairly common to find fossilized, but we'll also see some organisms that had a soft structure that left behind an excellent fossil.

You probably noticed many of the organisms we just looked at had particular bone body structures noted:

- Nostril (passage way for breathing found on the skull)
- Pelvis (connection between legs and mid-body)
- Radius (one of two lower arm bones that connects the elbow to distal bones)
- Ulna (one of two lower arm bones that connects the elbow to distal bones)
- Distal Bones (many bones connected to the end of an arm or leg structure, for this unit we will concentrate on distal bones connected to arm structures)

The object for scale (like the soccer ball below) is important information in observing how large the organism and their body structures are!
Question 6 (1 point)
Vague, non-specific observations simply aren't helpful. Sherman looked at an organism and said "It has legs" as an observation on an organism. Which of the two organisms below was Sherman referring to?

- a) Sherman was referring to Pakicetus.
- b) Sherman was referring to Titanotylopus.
- c) I have no idea which one Sherman meant because they both have legs. His observation wasn't specific enough to be helpful.

Question 7 (1 point)
Detailed, specific observations are incredibly helpful. Rick looked at an organism and said "It has four legs. Each leg as at least two long bones in it. The legs seem to be about the length of 6 to 8 soccer balls" as an observation on an organism. Which of the two organisms below was Rick referring to?

- a) Pakicetus
- b) Titanotylopus
Paleontologists’ Observation Guidelines

1. Pay careful attention to body structures, especially how bones are grouped together.
   • Observe the size (thickness and length) of bones within body structures.
   • Observe the position of body structures.
   • Observe the same fossil evidence several times to see what you’ve missed.
2. Count the number of bones.
3. Use observations of fossil evidence to make careful comparisons to other fossils and living species.

TASK: Paleontological Observations:

What observations can you make about the body structures of these two fossils? __________________________
__________________________________________________________________________________________
__________________________________________________________________________________________

What is similar and what is different? __________________________________________________________

Evolutionary History, Lesson 1 Student Packet, SPS Science, 4-2020
What observations can you make about the body structures of these two fossils? ________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________

What is similar and what is different? ______________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
__________________________________________________________________________________
This image is based on a drawing the scientist made of the fossilized bones.

The Cat That Wasn’t a Cat at All

When it comes to fossils, cases of mistaken identity are not uncommon. Paleontologists might think that they have found a fossil from one species, when it actually turns out to be from different species. Often, these mistakes are corrected as paleontologists make closer and more careful observations.

One interesting case of mistaken fossil identity happened in 1796, when workers dug up a pile of strange-looking fossilized bones. A scientist observed the fossils and noticed long limbs and big claws. Without making careful comparisons to other fossils, the scientist guessed that the bones belonged to a huge cat, much bigger than a lion. He named it *Megalonyx* (“giant claw”), and believed it might still exist in the western part of North America at the time.

Years later, another scientist studied the fossils and made more careful observations. After making close comparisons with fossils from other species, this scientist determined that the animal often walked on its hind legs. Cats do not walk on their hind legs, so this discovery probably meant that the fossil was not a cat.

The scientist discovered that the fossils actually belonged to a giant sloth. This species had been extinct for a long time—since the last Ice Age, more than 10,000 years earlier. Even though the mistake became clear with time, the name of the giant sloth was never changed. The *Megalonyx*

Evolutionary History, Lesson 1 Student Packet, SPS Science, 4-2020
*Jeffersonii* (which isn’t a cat at all!) is a reminder that it is important to make careful and precise observations in science.

The scientist thought the fossilized bones he was studying came from a large cat, like this sabre-toothed cat.

Another scientist made more careful observations and realized that the bones actually came from a giant sloth.

A2  The Cat That Wasn’t a Cat at All
Homework: Reading “The Cat That Wasn’t a Cat at All”

Read and annotate the article “The Cat That Wasn’t a Cat at All.” When you are finished reading, use your annotations to answer the questions below.

The first scientist misidentified the fossil as that of a big cat. What body structure did he use to make his observations?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

What body structure did the second scientist use to determine that the first scientist had misidentified the fossil?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Active Reading Guidelines

1. Think carefully about what you read. Pay attention to your own understanding.

2. As you read, annotate the text to make a record of your thinking. Highlight challenging words and add notes to record questions and make connections to your own experience.

3. Examine all visual representations carefully. Consider how they go together with the text.

4. After you read, discuss what you have read with others to help you better understand the text.
Middle School Math
Grade 8
Topic 7
Lessons 7-3 & 7-4
Understand and Use the Pythagorean Theorem
How to Access & Use Pearson Bounce Pages

The Bounce Page app is a place where you can access Virtual Nerd videos. These are interactive tutorial videos that go over the fundamental math concepts of each lesson.

You can download Pearson Bounce Pages from your Android or Apple store.

**TIPS FOR USING BOUNCE PAGE**

1. **AIM** the camera so the FULL page is easily viewable on your screen. For best results, flatten the page, or if scanning a screen be sure the entire page is visible on your phone screen.

2. **TAP** the screen to scan the entire front of the page. Scan the ENTIRE page. Scanning a single problem will not work. Scan the page BEFORE students write on the page.

3. **BOUNCE** the page to life by clicking your Bounce Pages program icon.

4. Update the operating system on your device and the Bounce Pages app as needed.
What is the width of the garden shown in the diagram at the right?

Use the Pythagorean Theorem. Substitute $b = 24$ and $c = 25$.

\[ a^2 + b^2 = c^2 \]
\[ a^2 + 24^2 = 25^2 \]
\[ a^2 + 576 = 625 \]
\[ a^2 = 49 \]
\[ a = 7 \]

The width of the garden is 7 feet.

Romy walks 16 yards, the length of a rectangular field. He then turns right and walks 12 yards, the width of the field. How far does Romy walk back to his starting point if he walks along the field’s diagonal?

1. Label the diagram with the information given above.

2. Use the Pythagorean Theorem to find how far Romy walks along the field’s diagonal.

\[ a^2 + b^2 = c^2 \]
\[ 16^2 + 12^2 = c^2 \]
\[ 256 + 144 = c^2 \]
\[ c^2 = 400 \]
\[ c = 20 \]

Romy walks 20 yards.

On the Back!

3. A rectangular hallway rug has a width of 9 feet, and the diagonal measures 41 feet. What is the rug’s length?
7-3 Additional Practice

Leveled Practice In 1 and 2, use the Pythagorean Theorem to solve.

1. A shipping company uses an inclined conveyor belt to load and unload packages. The dock is 15 feet above the ground. The base of the conveyor belt is 40 feet from the dock. What is the length of the conveyor belt? Round to the nearest tenth of a foot.

2. Find the missing lengths in the rectangular prism.

3. A square table in the cafeteria has the dimensions shown. What is the length of the diagonal of the table? Round to the nearest hundredth of a foot.

4. Reasoning What is the measurement of the longest line segment in a right rectangular prism that is 26 inches long, 2 inches wide, and 2 inches tall? Round to the nearest tenth of an inch. MP.2
5. **Make Use of Structure** Li needs to find the height of the rectangular prism, $x$. He knows that $d = 15$ mm. If he also knows the measure of line $a$, can he find the measure of $x$? Explain. $\text{MP.7}$

6. **Sasha is building a tree house.** The walls are 6.5 feet tall and she is using a brace to hold up the wall while she nails it to the floor. The brace is 8 feet long and she has positioned it 5 feet from the wall. Does her wall meet the floor at a right angle? Explain.

7. **Higher Order Thinking** An eight-sided game piece is shaped like two identical square pyramids attached at their bases. The perimeters of the square bases are 80 millimeters, and the slant height of each pyramid is 17 millimeters. What is the length of the game piece? Round to the nearest tenth of a millimeter.

---

**Assessment Practice**

8. Which measurements are the dimensions of the prism to the nearest whole number?

   - $5 \times 8 \times 8$
   - $5 \times 8 \times 9$
   - $5 \times 8 \times 10$
   - $5 \times 8 \times 11$

9. **Carlos is making a wood picture frame.** The picture frame is 11 inches by 14 inches. After nailing the frame together, Carlos measures the diagonal. If the diagonal is 19 inches long, does the frame have 90° corners? Explain.
What is the width of the garden shown in the diagram at the right?

Use the Pythagorean Theorem. Substitute \( b = 24 \) and \( c = 25 \).

\[
\begin{align*}
\quad & a^2 + b^2 = c^2 \\
\quad & a^2 + 24^2 = 25^2 \\
\quad & a^2 + 576 = 625 \\
\quad & a^2 = 49 \\
\quad & a = 7
\end{align*}
\]

The width of the garden is 7 feet.

Romy walks 16 yards, the length of a rectangular field. He then turns right and walks 12 yards, the width of the field. How far does Romy walk back to his starting point if he walks along the field's diagonal?

1. Label the diagram with the information given above.

Check students’ work.

2. Use the Pythagorean Theorem to find how far Romy walks along the field's diagonal.

\[
\begin{align*}
\quad & a^2 + b^2 = c^2 \\
\quad & 12^2 + 16^2 = c^2 \\
\quad & 144 + 256 = c^2 \\
\quad & 400 = c^2 \\
\quad & c = 20
\end{align*}
\]

Romy walks 20 yards.

3. A rectangular hallway rug has a width of 9 feet, and the diagonal measures 41 feet. What is the rug's length?

40 feet

5. Make Use of Structure. \( \square \) needs to find the weight of the rectangular prism, \( a \). He knows that \( d = 15 \text{ mm} \). If he also knows the measure of \( e \), he can find the measure of \( x \). Explain. \( \text{mr} \)

6. Saral is building a tree house. The wall is 8 feet tall and she is using a brace to hold it up the wall while she nails it to the floor. The brace is 8 feet long and she has positioned it 5 feet from the wall. Does her brace meet the floor at a right angle? Explain.

No; Sample answer: \( 8^2 = 64 \neq 5^2 + 8^2 \).

7. Higher Order Thinking. An eight-sided game piece is shaped like two identical square pyramids attached at their bases. The perimeters of the square bases are 80 millimeters, and the slant height of each pyramid is 17 millimeters. What is the length of the game piece? Round to the nearest tenth of a millimeter.

About 27.5 mm

Assessment Practice

8. Which measurements are the dimensions of the prism to the nearest whole number?

\[
\begin{align*}
\quad & 5 \times 8 \times 9 \\
\quad & 5 \times 8 \times 10 \\
\quad & 5 \times 8 \times 11 \\
\text{mr} & \quad 5 \times 8 \times 10
\end{align*}
\]

9. Carson is making a wood picture frame. The picture frame is 11 inches by 14 inches. After nailing the frame together, Carson measures the diagonal. If the diagonal is 19 inches long, does the frame have 90° corners? Explain.

No; Sample answer: \( 11^2 + 14^2 \neq 19^2 \).
To find the distance between the points (2, 5) and (5, 3), plot the points in the coordinate plane. Draw a right triangle whose hypotenuse is the segment between the points. Then use the Pythagorean Theorem to find the length of the hypotenuse.

\[ a^2 + b^2 = c^2 \]
\[ 2^2 + 3^2 = c^2 \]
\[ 4 + 9 = c^2 \]
\[ 13 = c^2 \]
\[ \sqrt{13} = c \]

The distance between the points is \( \sqrt{13} \) units.

On the map each unit represents 1 mile. What is the shortest distance from Jordan’s house to his school?

1. On the graph, draw a right triangle so that the segment from Jordan’s house to Jordan’s school is the hypotenuse. Label the length of the legs.

2. Use the Pythagorean Theorem.

\[ a^2 + b^2 = c^2 \]
\[ 2^2 + 3^2 = c^2 \]
\[ 2^2 + 3^2 = c^2 \]
\[ \sqrt{13} = c \]

3. What is the shortest distance from his house to school?

\[ \square \] miles

On the Back!

4. The movie theater is at (1, 6) and the park is at (5, 1). What is the shortest distance from the movie theater to the park?
1. **Leveled Practice**  Use the Pythagorean Theorem to find the distance between points \( P \) and \( Q \). Round to the nearest tenth.

Label the length, in units, of each leg of the right triangle.

\[
\begin{align*}
\text{c}^2 &= \text{a}^2 + \text{b}^2 \\
\text{c} &= \sqrt{\text{a}^2 + \text{b}^2}
\end{align*}
\]

The distance between point \( P \) and point \( Q \) is about ______ units.

2. Find the perimeter of triangle \( XYZ \). Round to the nearest hundredth.

3. Determine whether the triangle is equilateral, isosceles, or scalene.

4. A shopper drives from the mall at point \( M \) to the post office located at point \( P \). What distance does the shopper drive?

5. Is point \( K(10, 16) \) or point \( L(12, 12) \) closer to point \( J(6, 4) \)? Explain.
6. **Use Structure** Point $B$ has coordinates $(-4, -2)$. The $x$-coordinate of point $A$ is 5. The distance between point $A$ and point $B$ is 15 units. MP.7
   - **a.** What are the possible coordinates of point $A$?
   - **b.** Find the possible coordinates of point $A$ if point $B$ were moved to $(-7, -2)$.

7. The coordinates of triangle $EFG$ are $E(28, 24)$, $F(24, 27)$, and $G(0, 24)$.
   - **a.** What is the perimeter of triangle $EFG$? Round to the nearest tenth.
   - **b.** Is the triangle equilateral, isosceles, or scalene?

8. **Higher Order Thinking** There are points on a grid at $(0, 0)$ and $(3, 0)$.
   - **a.** What is a possible coordinate of the third vertex if the triangle has a perimeter of 11 units? Explain.
   - **b.** Is there another point that could be the third vertex? Explain.

9. Find the distance between $P$ and $Q$. Round to the nearest tenth.

10. Find the distance between $S(2.3, 4.8)$ and $T(6.4, 7.9)$. Round to the nearest tenth.
To find the distance between the points (2, 3) and (5, 3), plot the points in the coordinate plane. Draw a right triangle whose hypotenuse is the segment between the points. Then use the Pythagorean Theorem to find the length of the hypotenuse.

\[ a^2 + b^2 = c^2 \]
\[ 5^2 + 0^2 = c^2 \]
\[ 25 = c^2 \]
\[ c = \sqrt{25} \]

The distance between the points is 5 units.

On the map each unit represents 1 mile. What is the shortest distance from Jordan’s house to school?

1. On the graph, draw a right triangle so that the segment from Jordan’s house to Jordan’s school is the hypotenuse. Label the length of the legs.

   Check students’ responses.

2. Use the Pythagorean Theorem. Choices for \( a \) and \( b \) may be reversed.

\[ c^2 = a^2 + b^2 \]
\[ 5^2 + 4^2 = c^2 \]
\[ 25 + 16 = c^2 \]
\[ 41 = c^2 \]
\[ c = \sqrt{41} \approx 6.4 \text{ miles} \]

On the Back!

4. The movie theater is at (1, 6) and the park is at (5, 1). What is the shortest distance from the movie theater to the park?

\[ \sqrt{41} \approx 6.4 \text{ miles} \]

6. Use Structure. Point \( A \) has coordinates \((-4, -2).\) The x-coordinate of point \( A \) is 5. The distance between point \( A \) and point \( B \) is 15 units. \( \text{mm} \)

a. What are the possible coordinates of point \( A? \)
   
   \( (3, 10), (3, -14) \)

b. Find the possible coordinates of point \( A \) if point \( B \) were moved to \((-7, -2).\)

   \( (10, 1), (10, -15) \)

7. The coordinates of triangle \( \text{EFG} \) are \((0, 24), (24, 27),\) and \((60, 24).\)

a. What is the perimeter of triangle \( \text{EFG}\)? Round to the nearest tenth.

   About 60.2

b. Is the triangle equilateral, isosceles, or scalene?

   Scalene

8. Higher Order Thinking. There are points on a grid at \((0, 0), (0, 5), \) and \((5, 0).\)

a. What is a possible coordinate of the third vertex if the triangle has a perimeter of 11 units? Explain.

   Sample answer: \((1.5, 3.7); \) Suppose the triangle is an isosceles triangle with base 3 units. Then each of the other sides would measure 4 units. \((3 + 4 + 4 = 11). \) This isosceles triangle is made up of two triangles each with a base of 1.5 units and a height of 3 units. The height of the right triangle is approximately 3.7 units. So, the coordinates of the third vertex are \((1.5, 3.7).\)

b. Is there another point that could be the third vertex? Explain.

   Yes. Sample answer: If the third vertex were below the x-axis, it would have a negative y-coordinate and its coordinates would be \((-1.5, -3.7).\)

9. Find the distance between \( P \) and \( Q. \) Round to the nearest tenth.

   About 6.3 units

10. Find the distance between \((2, 3), (4, 8)\) and \((7, 6), (7, 8). \) Round to the nearest tenth.

   About 3.1 units