

GRADE 8 REVIEW

TERM 1 - 2024 - 2025

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Students will use models to observe time phenomena and analyze and interpret rock strata and the fossil record to provide relative dates.

The Present is the Key to The Past

p10 Unit-1

INVESTIGATION

The Present Is the Key to the Past

Compare the images of erosion below.



1. Do you think the processes that form and shape the small stream bed are similar to those that form and shape the Grand Canyon? Why or why not?

Yes. The water erosion that is wearing away the banks of the stream is the same as the erosion that is carving the Grand Canyon.

2. How long do you think it would take to create a canyon as deep as the Grand Canyon? Explain your reasoning.

Millions of years. Much longer than the lifetimes of humans or the entire history of humanity.

James Hutton observed how the landscape on his farm gradually changed over the years. He thought that erosion caused by streams on his farm could also wear down mountains or carve deep canyons, as seen in the figure below.

What is the principle that Hutton used to understand Earth's past?



Uniformitarianism

Absolut age

Superposition

Lateral continuity

Students will use models to observe time phenomena and analyze and interpret rock strata and the fossil record to provide relative dates.	Three-Dimensional Thinking	p11 Unit-1
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THREE-DIMENSIONAL THINKING

Scientists use the principle of uniformitarianism to **interpret** Earth's history. Suppose you discover a rock from an ancient beach. Now imagine you are standing on that ancient beach. What do you think you would see? **Explain** how your answer relates to the principle of uniformitarianism.



Uniformitarianism states that geological processes that occur today are similar to those that have occurred in the past.

The ancient beach would like look similar to a beach today

Students will explore the sequencing of events preserved in the geologic record. They will use models to observe time phenomena and analyze and interpret rock strata and the fossil record to provide relative dates.

Investigation
(Relatively Speaking)

p14 Unit-1

INVESTIGATION

Relatively Speaking

Analyze the image below.



1. Do you think all of the rock layers in the picture formed at the same time? Why or why not?

No. sedimentary rock forms slowly over time. The sediments must be compressed and lithified before they turn into rock layers. The colors of the layers also indicate differences between the rocks.

2. If you think the rocks formed at different times, which layers are the oldest and which are the youngest? Explain.

The rock layers at the bottom of the formation are the oldest. The rock layers get younger as you go up. Each layer had to form on top of the last one deposited, making each layer younger than the one before.

Students will explore how geologists use correlation, evidence of Earth's major events, and the fossil record to build a time line of Earth's history.

Investigation
(Relatively Speaking)

p16 Unit-1

Now, try to interpret this image.



5. Notice the large fault cutting across the rock layers. Do you think the fault and the rock layers are the same age? Why or why not?

No. The rock layers formed slowly over time. The fault cuts across all of the layers. This could not have occurred while the rock layers were forming.

6. If you think the fault and the rock formed at different times, which is oldest—the fault or the rocks? Explain.

The rocks are older than the fault. The rock layers had to form first. Sometime after that, a fault

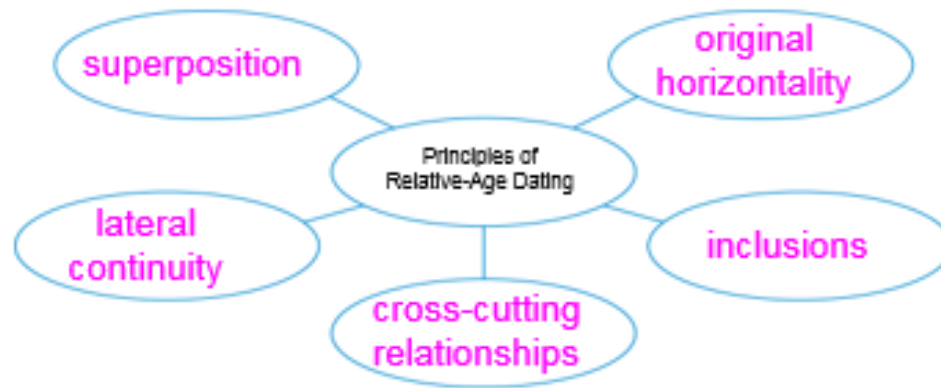
Students will construct scientific explanations based on evidence gathered and an understanding of the principles of relative-age dating.

Go Online Question 7

p17 Unit-1

GO ONLINE Finally, watch the animation *Relative-Age Dating*. Then answer the questions that follow.

7. What are the principles of relative-age dating?



8. Which principle did you apply in Step 2 of the investigation?

superposition

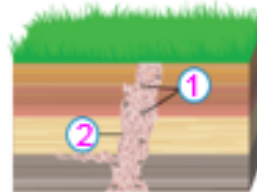
Using this principle, assign the rock layers in the diagram to the right their relative ages from oldest (1) to youngest (4).



9. Which principle did you apply in Step 4 of the investigation?

inclusions

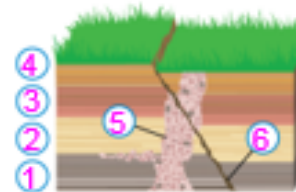
Using this principle, label the older feature 1, and the younger feature 2 on the diagram to the right.



10. Which principle did you use in Step 6 of the investigation?

cross-cutting relationships

Using this principle, label the rock layers and features from oldest (1) to youngest (6).



Students will explore how geologists use correlation, evidence of Earth's major events, and the fossil record to build a time line of Earth's history.

Three-Dimensional Thinking

p25 Unit-1

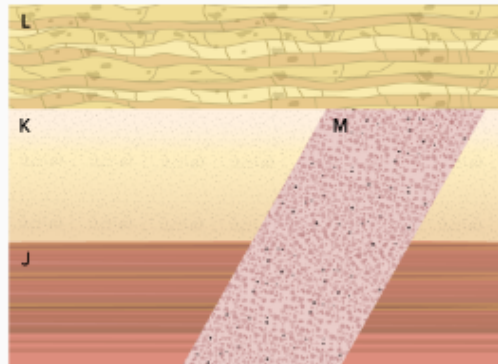


THREE-DIMENSIONAL THINKING

Imagine you are a geologist. You have been asked to analyze and interpret the rock sequence below. Your task is to determine the relative ages of the rocks.

2. Order the features in the illustration from oldest to youngest.

- | |
|---|
| <input type="radio"/> A JKLM |
| <input type="radio"/> B MJKL |
| <input checked="" type="radio"/> C JKML |
| <input type="radio"/> D MLKJ |



3. Which geologic principle must be assumed to determine the relative age of M?

- | |
|--|
| <input checked="" type="radio"/> A cross-cutting relationships |
| <input type="radio"/> B superposition |
| <input type="radio"/> C original horizontality |
| <input type="radio"/> D inclusions |

Students will create a scale model of the geologic time scale and construct scientific explanations to enhance their understanding of how the geologic time scale is interpreted from rock strata and used to organize Earth's history.

Investigation- Gaps in the Rock Record (2-unconformities)

p33 Unit-1

INVESTIGATION

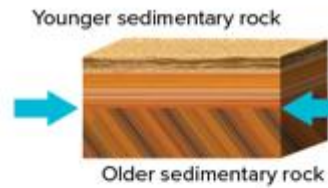
Gaps in the Rock Record

1. Analyze the three photos below. Notice how the arrows point to a line between different rocks. How would you describe the rock below the arrows versus the rock above? Write your descriptions next to each image.

A

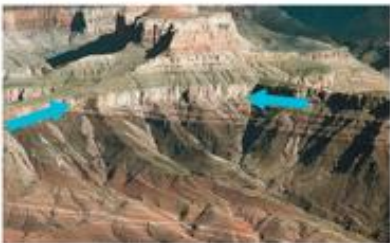


horizontal sedimentary layer
overlies horizontal sedimentary layer

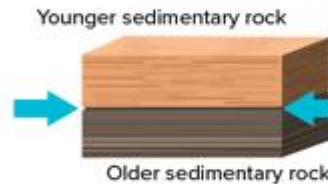


B

B



horizontal sedimentary layer
overlies tilted sedimentary layer

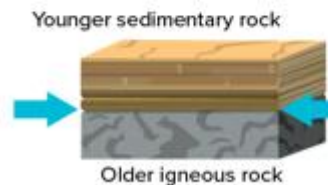


A

C



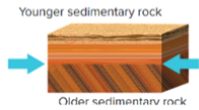
horizontal sedimentary layer
overlies nonsedimentary layer



C

unconformities - breaks, or gaps, in the rock record

Which type of unconformity is shown in the figure below?



Learning Outcomes Covered

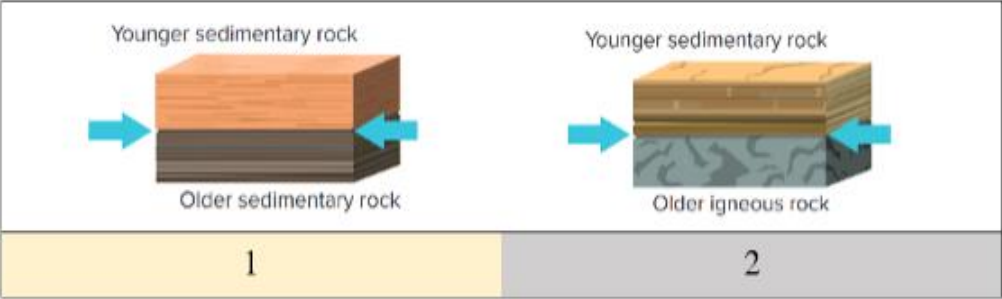
- يشرح كيف أن طبقات الصخور يمكن أن تكون غير أفقية في البداية
- يشرح أن طبقات الصخور يمكن أن تكون أفقية في البداية

Correct

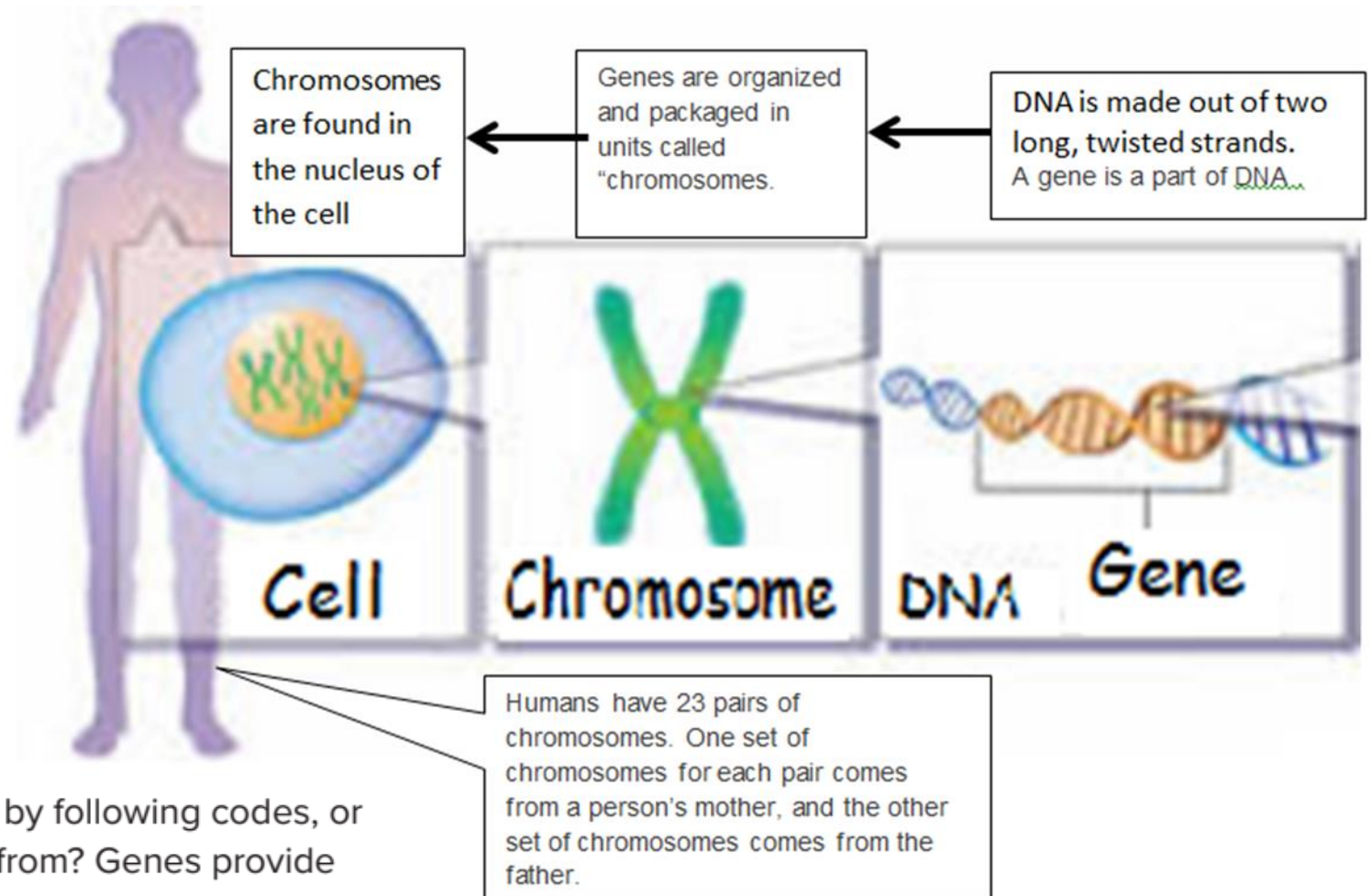
No Feedback available

- a. Angular unconformity
- b. Disconformity
- c. Nonconformity
- d. Perpendicular unconformity

Which of the following is correct about the types of Unconformities in figures 1 and 2 in the table below?



1	1 is nonconformity, and 2 is disconformity
2	1 is nonconformity, and 2 unconformity
3	1 is disconformity, and 2 is nonconformity
4	1 is disconformity, and 2 is angular unconformity



What is the importance of DNA?

The Structure of DNA Cells put molecules together by following codes, or a set of directions. Where do those directions come from? Genes provide directions for a cell to assemble molecules that express traits. You might recall that a gene is a section of a chromosome. Chromosomes are made of proteins and **DNA**—an organism's genetic material. A gene is a segment of DNA on a chromosome.

Which of the following is **NOT** correct regarding the structure of DNA?



Learning Outcomes Covered

- يذكر أن الجينات موجودة في كروموسومات الخلايا
- يستخدم رموز العناصر المعروفة في كتابة صيغ بعض المركبات

Correct

--No Feedback available--

- a. A gene is a segment of DNA on a chromosome ☐
- b. Chromosomes are made of proteins and DNA ☐
- c. DNA in a chromosome is tightly coiled ☐
- d. DNA is a single-standard helix and has the nitrogen base uracil (U) ☒

Students will learn that chromosomes consist of proteins and DNA, which makes up genes, and come to understand the role of DNA, as well as RNA, in protein production.

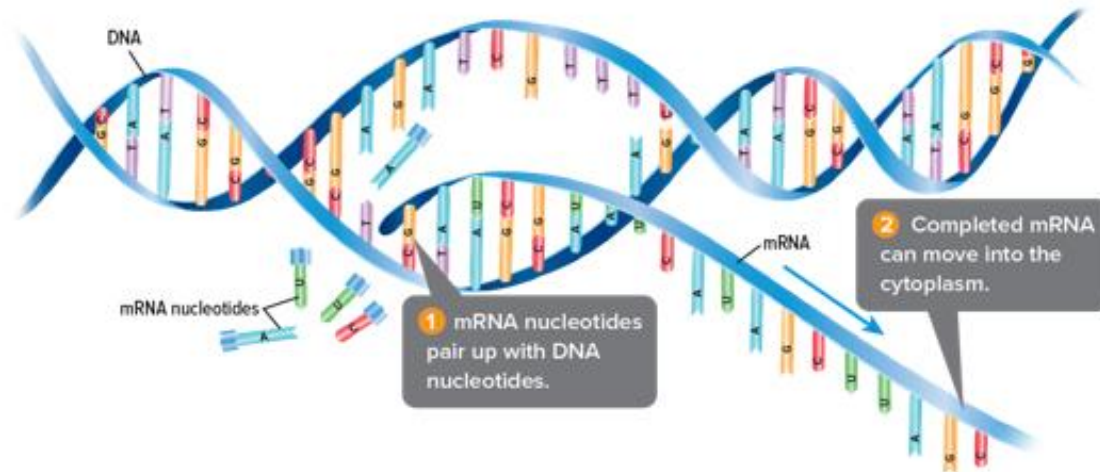
Transcription and
Types of RNA

p68-Unit 1,
p69-Unit 1

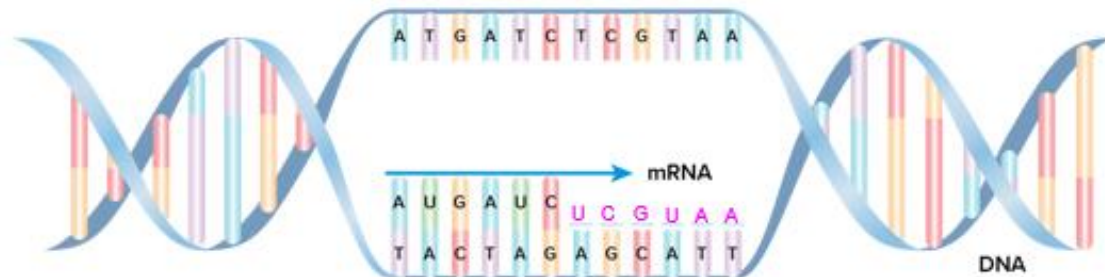
INVESTIGATION

Transcription

GO ONLINE Watch the animation *Transcription*. Then examine the figure below.



Based on the animation and the figure, complete the DNA to mRNA transcription below. Use the blue lines to write your answer.



DNA	mRNA	tRNA
T	A	U
A	U	A
G	C	G
C	G	C

Which of the following sets of nucleotides would be found **ONLY** in **RNA**?

Adenine (A)

Uracil (U)

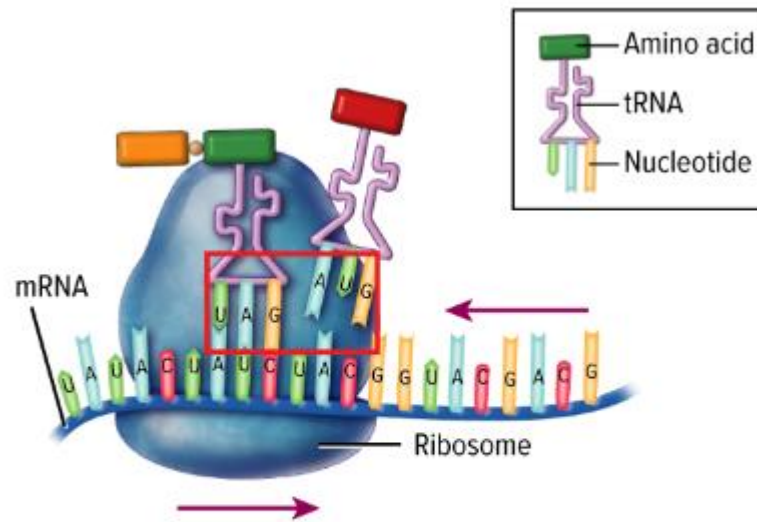
Cytosine (C)

Guanine (G)

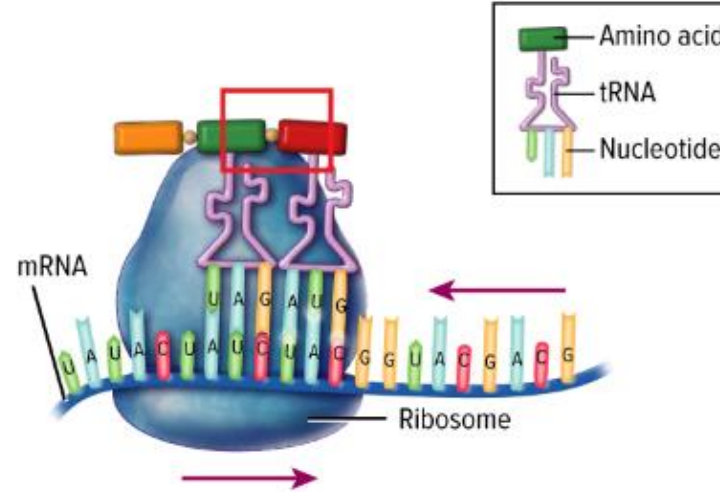
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Transcription and
Types of RNA

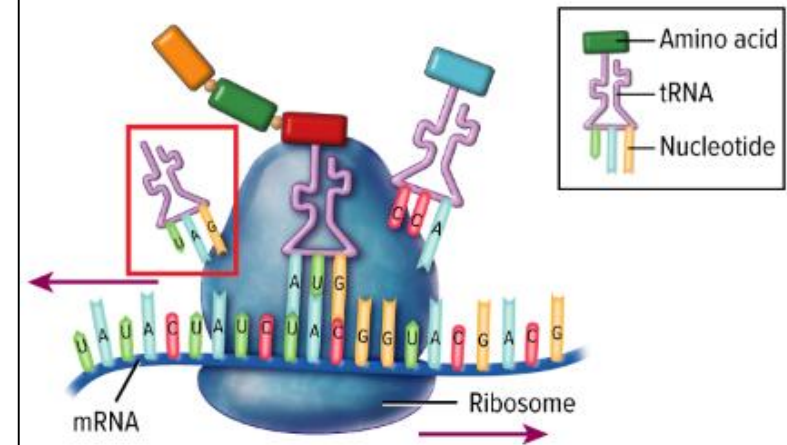
68-Unit 1,
69-Unit 1



tRNA carries amino acids to the ribosome.



rRNA helps form chemical bonds that attach one amino acid to the next.

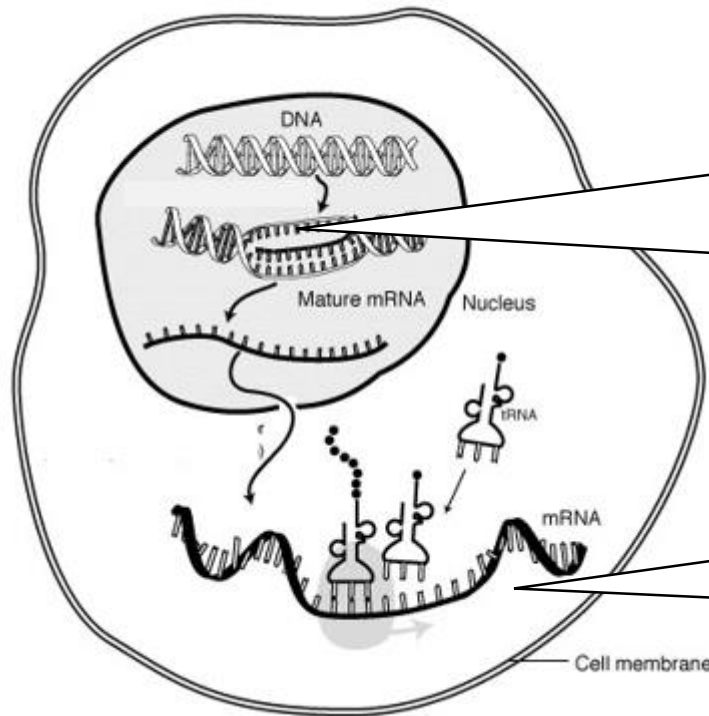


The first tRNA separates from its amino acid and from the mRNA. A third tRNA brings in another amino acid.

Students will learn that chromosomes consist of proteins and DNA, which makes up genes, and come to understand the role of DNA, as well as RNA, in protein production.

Transcription and
Types of RNA

p68-Unit 1,
p69-Unit 1



Step 1 - Transcription

- Happens in nucleus
- **mRNA** is made from DNA
- The bases of mRNA strands are called **codons**

Step 2 - Translation

- Happens in ribosome
- **tRNA** attaches the amino acids into a chain
- The bases of tRNA are called **anti-codons**

Students will explore the molecular nature of genetic material and how mutations occur.

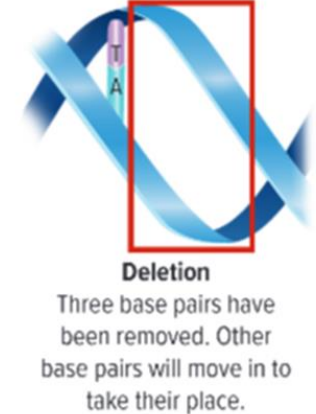
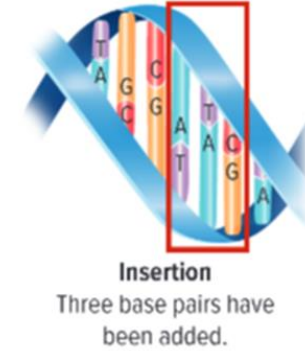
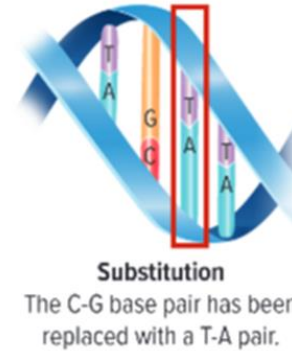
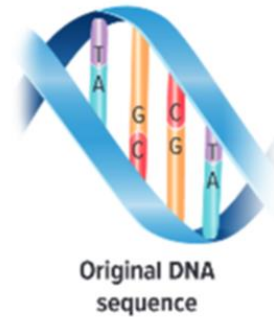
Types of Mutations

p71-Unit 1,

Deletion mutation, one or more nitrogen bases are left out of the DNA sequence.

Insertion mutation, one or more nitrogen bases are added to the DNA.

Substitution mutation, the nitrogen base is replaced by a different nitrogen base.



Students will explore how mutations may result in beneficial, harmful, or neutral changes to an organism.

Three-Dimensional Thinking

p77-Unit 1

THREE-DIMENSIONAL THINKING

Use the diagram below to answer the following questions.



2. The diagram above shows a segment of DNA before and after replication. Which could have occurred as a result of this change in structure?

- ☐ A changes to the genotype of the organism
- ☐ B changes to the traits of the organism
- ☐ C changes in the production of proteins
- ☒ D all of the above

3. The mutation shown above resulted in muscle degeneration. The effect of this mutation is that muscles become progressively weaker. What type of mutation is this?

- ☐ A positive
- ☐ B neutral
- ☒ C negative
- ☐ D none of the above

The diagram below shows a segment of DNA before and after replication.
which of the following could have occurred as a result of this change in structure?



- i. Changes to the genotype of the organism
- ii. Changes to the traits of the organism
- iii. Changes in the production of proteins

Learning Outcomes Covered

يستطيع أثر الاختلاف في الصفات الوراثية بين الآباء والأبناء الذي يحدث عن الاختلافات الوراثية التي تنجم عن المتحولات الجينية من الكروموسومات وبالتالي الصفات الوراثية أو بشكل أكثر دقة من الطفرات ويسمى ذلك في مجال تلم سجل حسب الأمثلة

Correct

--No Feedback available--

- a. i only
- b. i & ii only
- c. i & iii only
- d. i, ii & iii

Students will explore how mutations may result in beneficial, harmful, or neutral changes to an organism.

Real-World
Connection

p78-Unit 1

4. Write Your English teacher has asked you to write a short story about a superhero with a mutation that causes powers, using a real factor that causes mutations. Identify your character below, and describe the cause and effects of the mutation. Explain how your superhero models a negative, positive, or neutral mutation.

Positive

- A positive mutation will enhance an organism's ability to survive and reproduce
- Examples: lactose tolerance and drug-resistant bacteria

Negative

- A negative mutation will impair an organism's ability to survive and reproduce
- Examples: cystic fibrosis and color blindness

Neutral

- Is neither harmful or beneficial to the organism
- It may not appear in the phenotype

Students will explore how similar variations in a population due to inherited mutations can cause an adaptation over generations.

Collect
Evidence,

p96-Unit 1,
p97-Unit 1,
p99-Unit 1

Collect Evidence

How do adaptations affect organisms, such as orchid plants

- The orchid mimics a female bee
- The male bee land on the flower and picks up pollen, and transfers it to other flowers – orchid reproduce



THREE-DIMENSIONAL THINKING

2. No two tigers have the same stripe pattern. Such slight differences in inherited traits among individual members of a species occur through mutations. Which term best identifies these differences?

- ☐ A mimicry
- ☐ B natural selection
- ☐ C adaptation
- ☒ D variation

3. A bat's heart rate can fall dramatically during hibernation. Its breathing rate is also affected, and it may not breathe for an entire hour. Hibernation supports the bat's survival in its environment. What type of adaptation is hibernation?

- ☒ A functional
- ☐ B structural
- ☐ C behavioral
- ☐ D none of the above

4. Which structural genetic change in the finches can be identified as the one most influenced by feeding habits, as proposed by Charles Darwin?

- ☐ A ability to fly from island to island to find the food they prefer
- ☒ B beak size and shape to take advantage of the food they had
- ☐ C claw shapes for perching on limbs while catching insects in their beaks
- ☐ D cooperative behavior so they could share limited seeds and nectar

Students will learn how a species' interactions with its environment can lead to a predominance of certain traits and a suppression of others through natural selection.

Environmental
Interactions

p97-Unit 1



Snake is the same color as the leaves –
structural adaptation - camouflage



Caterpillar looks like a snake – scares predators
resemblance between species - mimicry



Pelican has a beak and mouth adapted to its food source – fish
structural adaptation

A type of orchid plant, called a bee orchid, produces the flowers seen in the figure below. and thus, to attract bees for pollination and deter predators. Which term best identifies this adaptation?



Mimicry

Camouflage

Zebra stripe pattern

No two zebras have the same stripe pattern. Such slight differences in inherited traits among individual members of a species occur through mutations. Which term best identifies these differences?



Learning Outcomes Covered

محتج أن الاختلافات الوراثية بين الأفراد من السكان تنجم عن طفرات. الاختلافات الوراثية بين الأفراد من السكان تنجم عن طفرات. الاختلاف الوراثي بين الأفراد من السكان تنجم عن طفرات. الاختلاف الوراثي بين الأفراد من السكان تنجم عن طفرات.

Mimicry

Natural selection

Adaptation

Variation

Students will learn how a species' interactions with its environment can lead to a predominance of certain traits and a suppression of others through natural selection.

Real-World
Connection

p100-Unit 1

5. Brainstorm Do you own clothes with a camouflage pattern? These are designed to help you blend in outdoors. What other organisms can you think of that use camouflage? Explain the benefit(s) that this provides the organism.



Benefits

As a prey – the organism is able to hide from its predators

As a predator, it allows them to stalk (watch) their prey without being seen.



Students will gather and synthesize information about selective breeding and other forms of technology that have changed the way humans influence the inheritance of desired traits in organisms

Lesson 3 Launch (Corn Connection), Three Dimensional Thinking, Writing Connection

p101-Unit 1,
p108 Unit 1,
p114-Unit 1

Corn Connection



Three friends were working on their history homework together when they noticed that the corn in an image in their textbook looked a lot different than what corn looks like today. Here are their thoughts:

Deidra: I think the corn from the history book is a different species than the corn we eat today.

Jayden: I think that the corn is the same species, but it has changed over time.

Natalia: It think the corn looks different because we grow it differently today. If we grew it the same way, it would look the same.

Circle the student you agree with most. Explain your choice.



THREE-DIMENSIONAL THINKING

Can traits of organisms always be predicted with selective breeding?
Explain how multiple **causes** can influence the traits of an organism.

Traits **cannot** always be predicted

Traits are influenced by:

- Genetic variation
- Environmental influences – climate, food
- Random mutations
- Dominant or recessive traits

Students will gather and synthesize information about selective breeding and other forms of technology that have changed the way humans influence the inheritance of desired traits in organisms

Lesson 3 Launch (Corn Connection), Three Dimensional Thinking, Writing Connection

p101-Unit 1,
p108 Unit 1,
p114-Unit 1

Summarize It!

WRITING Connection

1. Write a paragraph explaining how natural selection and artificial selection are related. Include a main idea, supporting details, and a concluding sentence.

- Both processes rely on variation within a population
- Both processes lead to changes in the genetic make-up of the organism
- Natural selection – organism adapt by itself in order to survive
- Artificial selection – humans do the selection for specific traits

Which of the following tables is **NOT** correct about the differences between **Natural selection** and **Artificial selection**?

1	<table><tr><th>Natural selection</th><th>Artificial selection</th></tr><tr><td>It is the process where organisms adapt to their environment naturally for their survival</td><td>It is process in which a breeder selects organisms with characteristics to produce offspring with desirable traits</td></tr></table>	Natural selection	Artificial selection	It is the process where organisms adapt to their environment naturally for their survival	It is process in which a breeder selects organisms with characteristics to produce offspring with desirable traits
Natural selection	Artificial selection				
It is the process where organisms adapt to their environment naturally for their survival	It is process in which a breeder selects organisms with characteristics to produce offspring with desirable traits				
2	<table><tr><th>Natural selection</th><th>Artificial selection</th></tr><tr><td>It is a slow process</td><td>It is a rapid process</td></tr></table>	Natural selection	Artificial selection	It is a slow process	It is a rapid process
Natural selection	Artificial selection				
It is a slow process	It is a rapid process				
3	<table><tr><th>Natural selection</th><th>Artificial selection</th></tr><tr><td>It helps in producing organisms with biological diversity.</td><td>It helps in producing organisms with selected desirable traits.</td></tr></table>	Natural selection	Artificial selection	It helps in producing organisms with biological diversity .	It helps in producing organisms with selected desirable traits .
Natural selection	Artificial selection				
It helps in producing organisms with biological diversity .	It helps in producing organisms with selected desirable traits .				
4	<table><tr><th>Natural selection</th><th>Artificial selection</th></tr><tr><td>It helps in the inheritance of a variety of desired selected traits to the successive generations</td><td>It helps in inheritance of only favorable characters to the successive generations.</td></tr></table>	Natural selection	Artificial selection	It helps in the inheritance of a variety of desired selected traits to the successive generations	It helps in inheritance of only favorable characters to the successive generations.
Natural selection	Artificial selection				
It helps in the inheritance of a variety of desired selected traits to the successive generations	It helps in inheritance of only favorable characters to the successive generations.				

Comparing the types of adaptations the Jackrabbit has, as seen below, which of the following statements is **correct**?

1	2
	
The jackrabbit's powerful legs help it run fast to escape from predators	The jackrabbit stays still during the hottest part of the day, helping it conserve energy

The adaptation in **1** is Structural while in **2** is Behavioral

The adaptation in **1** is Behavioral while in **2** is Structural

The adaptation in **1** is Structural while in **2** is Functional

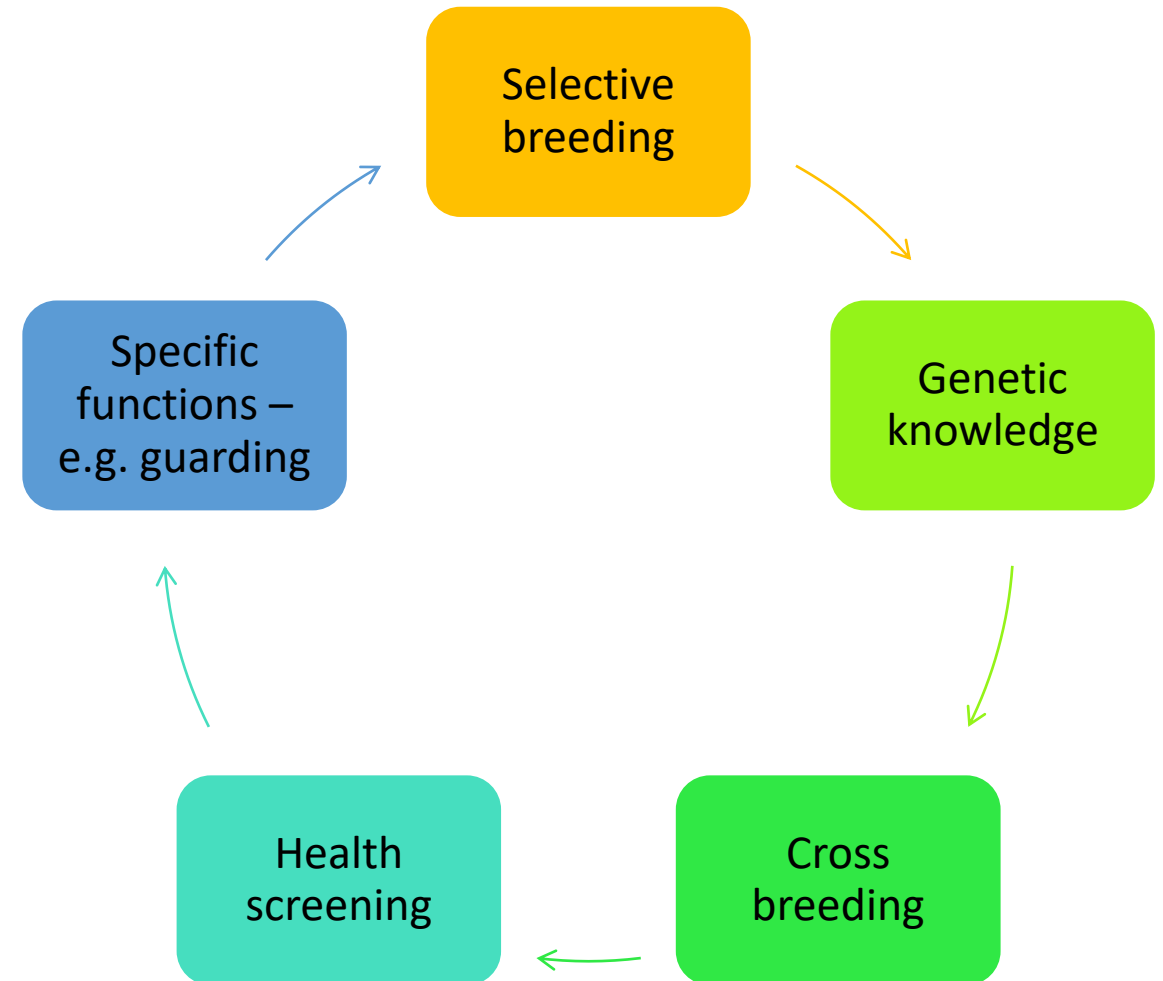
The adaptation in **1** is Functional while in **2** is Behavioral

Student will gather and synthesize information about selective breeding and other forms of technology that have changed the way humans influence the inheritance of desired traits in organisms.

Encounter the
Phenomenon

p103-Unit 1

What traits do you desire in a dog? Is there a way to get these traits? In the space below, brainstorm how you think humans can control the traits of dogs.



Student will gather and synthesize information about selective breeding and other forms of technology that have changed the way humans influence the inheritance of desired traits in organisms.

Collect Evidence

p108-Unit 1

Collect Evidence

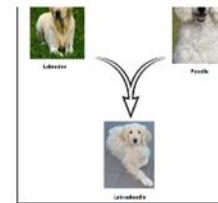
How can humans influence traits of organisms, such as dogs

- **Selective breeding** - Breeders select parent dogs with specific traits that they want to enhance or maintain in their offspring.
- **Genetic knowledge** – select dogs based on lineage
- **Health screening** – prevent disease inheritance
- **Specific purpose** – hunting , guardian, companion

Humans can influence traits in dogs by selective breeding to get a designed dog breed, see an example in the figure below.

Which of the following is correct?

Selective Breeding: Labradoodle dog breed



Learning Outcomes Covered

شرح كيف أن البشر قادرون بالانتخاب الاصطناعي على التأثير على صفات معينة للكائنات الحية من خلال التزاوج الانتقائي.

Correct

No feedback available

a. Genetic engineering has been used to produce the Labradoodle dog breed

b. The offspring (Labradoodle) has a completely different traits than the parents (Labrador and Poodle)

c. The offspring (Labradoodle) is an example of genetically modified organism (GMOs)

d. Artificial selection has been made to influence traits and produce the Labradoodle dog breed

Students will explore fossil evidence of evolution.

Lesson 1 Launch(Endless Fossilibilities),
Encounter the Phenomenon

p129-Unit 1,
p131 Unit 1

SCIENCE PROBES Endless Fossilibilities

Four friends were comparing their ideas about fossils.



This is what they said. With whom do you agree most?

- ☐ **A Emma:** I think fossils are pieces of dead animals and plants, and tell us little about the animal or plant.
- ☐ **B Aidan:** I think fossils only come from bones of extinct animals that lived millions of years ago.
- ☒ **C Ethan:** I think fossils are the evidence of the existence of organisms seen in the remains of bones, shells, or even impressions of rock layers.
- ☐ **D Madison:** Fossils are the remains of plants and animals that have recently died. Their remains cannot be preserved for very long.

Explain why you agree with that person.

A fossil is the preserved remains or evidence of ancient living things.

ENCOUNTER THE PHENOMENON

How do fossils, such as *Tiktaalik*, provide evidence of evolution?

Tiktaalik is considered a "transitional fossil" because it shows characteristics of both fish and tetrapods (four-legged animals). It has fins like a fish, but its structure also resembles limbs, which suggests that it could move onto land.



Students will recognize what fossils can tell us about time, and how fossils show change over time.

What can fossils tell us about time?

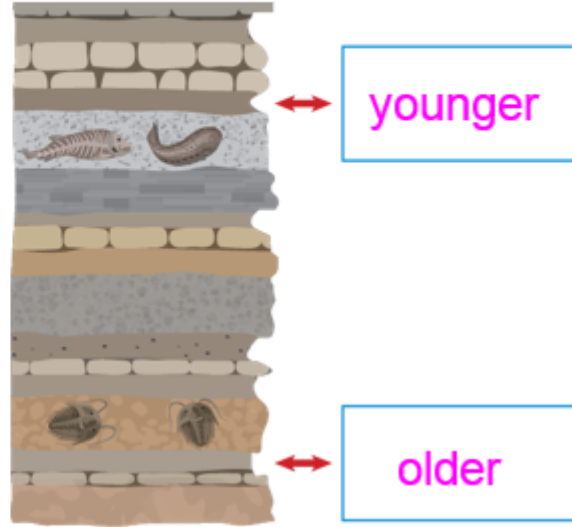
p136-Unit 1,

INVESTIGATION

Analyze the Age

In the image you can see fossils buried in rock layers. Examine the image and answer the questions below.

1. If the topmost rock layer of the image is present day, then what is the relative age of the areas that are indicated by the arrows to each other? Infer the age of the areas by writing *older* or *younger* in the boxes provided.
2. Why did you place the words *older* or *younger* in those locations?



I inferred that the top-most fossils existed more recently than those towards the bottom.

3. What do you think the placement of fossils in the rock layers above can tell us about time?

I think that the placement of fossils in the rock layers can tell us when they lived. They may also help tell us when other fossils lived, relative to their position.

Fossils evidence of evolution

What pattern can scientists use to interpret the information about the fossils shown in the rock layers?



Learning Outcomes Covered

- يفسر أن طبقات طبقات الصخور، وسجل الأعمار يتغير بمرور الوقت، وأنفس طبقات زمنية مختلفة.
- يوضح أن انتشار الكائنات الحية عبر الأزمنة الجيولوجية قد غير معدلات التغير والتغير لتسجل التغيرات. وتغيرت تركيبة الغلاف الجوي للأرض، وأنفس طبقات زمنية مختلفة.

Correct

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- a. Rock layers all contain different sets of fossils
- b. Older fossils are located closest to Earth's surface
- c. Fossils are younger the closer they are to the surface
- d. Each fossil is younger than the rock layer in which it is found

Which of the following is **correct** regarding fossils?



Learning Outcomes Covered

- يشرح كيف أن طبقات الصخور تصاح كمنهج لتاريخ الأحداث الهامة في تاريخ الأرض
- يذكر أن طبقات طبقات الصخور، وسجل الأحافير يحدد تواريخ تسمية فقط وليس تعاقبا زمنيا طويلا

Correct

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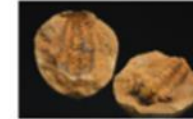
- a. Fossils found in the oldest layers of rock are more complex organisms
- b. Fossils of relatively simple organisms appear in younger layers of rock
- c. Sudden disappearance in the fossil record of many types of organisms marked as marine environment
- d. Fossils and the rocks they are within can be used to determine what the environment of an area was like long ago

Which of the following is the correct match between the **fossil type** and the **example figure** in front of it?

Original material



Carbonization



Molds and casts



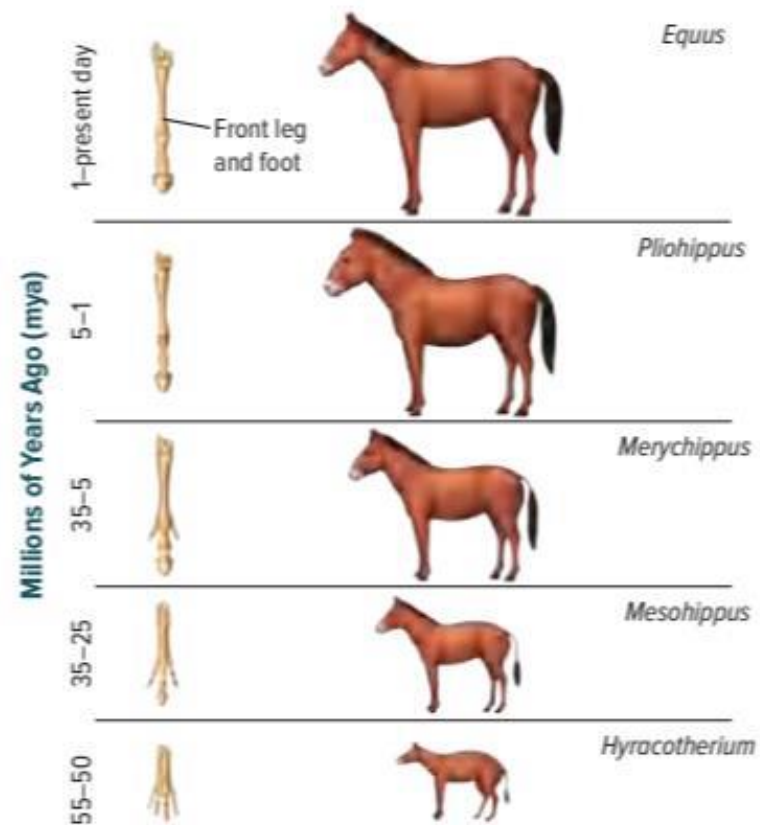
Trace fossils



Students will develop and use models to explore the structure of DNA.

Three-Dimensional
Thinking, Collect Evidence

p141-Unit 1,



THREE-DIMENSIONAL THINKING

Examine the chart of the evolution of horses above. What **patterns** of **change** have occurred over 55 million years?

- horses evolved to be much large
- Early horses had multiple toes, modern horse a single, strong hoof on each foot, enhanced their ability to run efficiently on hard ground

Collect Evidence

What can patterns in the fossil record tell us about evolution?

- Patterns in the fossil record suggest that different species, have similar body plans, and similar structures.
- It appears that these different species were related

They will recognize how fossils form, what fossils can tell us about time, and how fossils show change over time.

Three-Dimensional Thinking

p145-Unit 1,

2. What method can scientists use to analyze and interpret when the fossils in the bottom of the figure appeared on Earth?

☒ A relative-age dating

☐ B trace fossils

☐ C mineralization

☐ D carbonization



They will analyze and interpret data for patterns in the fossil record to enhance their understanding of these concepts

Three-Dimensional Thinking

p145-Unit 1,

3. What pattern can scientists use to interpret the information about the fossils shown in the rock layers?

- ☐ **A** Rock layers all contain different sets of fossils.
- ☐ **B** Older fossils are located closet to Earth's surface.
- ☒ **C** Fossils are younger the closer they are to the surface.
- ☐ **D** Each fossil is younger than the rock layer in which it is found.

Students will analyze and interpret data on anatomical similarities in living organisms and fossils to determine patterns that can lead them to infer lines of evolutionary descent.

Investigation (Evolving Your Knowledge)

p157-Unit 1,

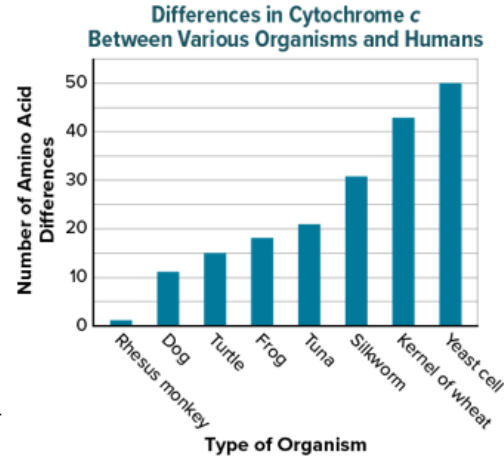
INVESTIGATION

Evolving Your Knowledge

Proteins, such as cytochrome c, are made from combinations of 20 amino acids. The graph to the right shows the number of amino acid differences in cytochrome c between humans and other organisms. Use the graph to answer the questions.

1. Which organisms do you think might be more closely related to each other: a dog and a turtle or a dog and a silkworm? Explain your answer.

A dog and a turtle are more closely related to each other than a dog and a silkworm. The dog and the turtle have more amino acids in common for cytochrome c than the dog and the silkworm do.



2. Which organism has the least differences in the number of amino acids in cytochrome c compared to humans? Which organism has the greatest difference?

The rhesus monkey has the least difference in the number of amino acids in cytochrome c compared to humans. The yeast cell has the most differences in the number of amino acids in cytochrome c compared to humans.

3. Notice the number of differences of amino acids in cytochrome c between each organism and humans. How might these differences explain the relatedness of each organism to humans?

Differences accumulate over time, so the more closely related two organisms are, the less time there has been for differences to arise.

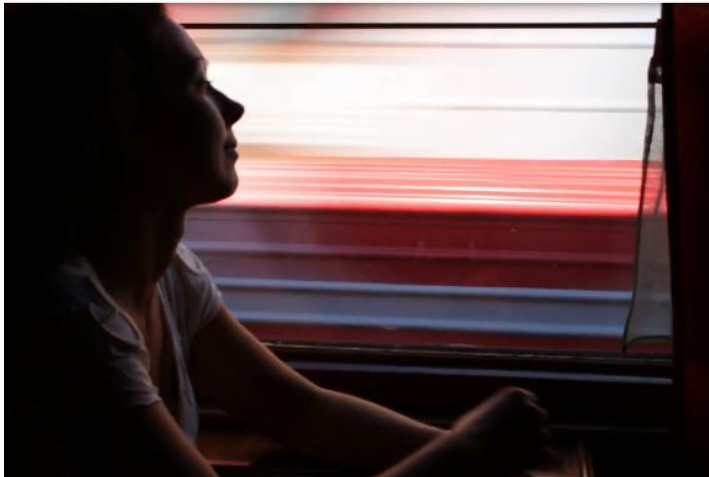
Students will explore how to describe the position and motion of an object.

Encounter the Phenomenon, The Reference Direction, Motion Using Reference Points

p7-Unit 2,
p12-Unit 2,
p18-Unit2

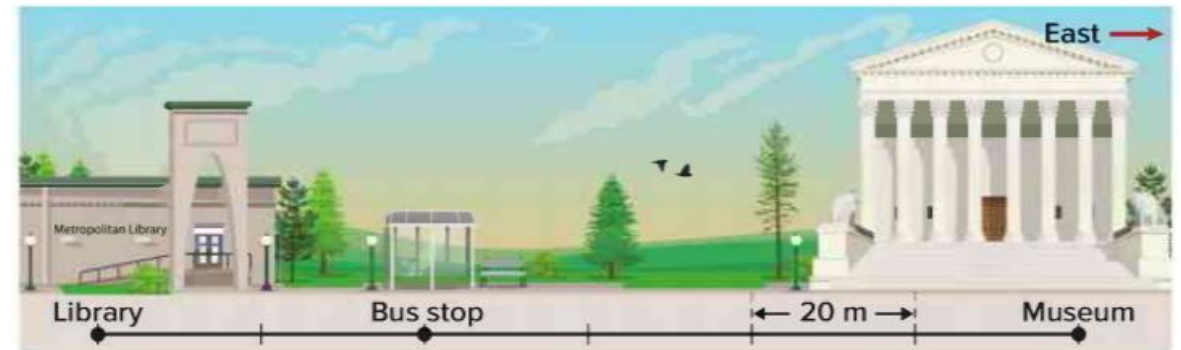
ENCOUNTER THE PHENOMENON

How can you describe the position and motion of the train outside the window?



- The train's relative position is that it's moving parallel to the track on the other side
- The train's motion – moving fast

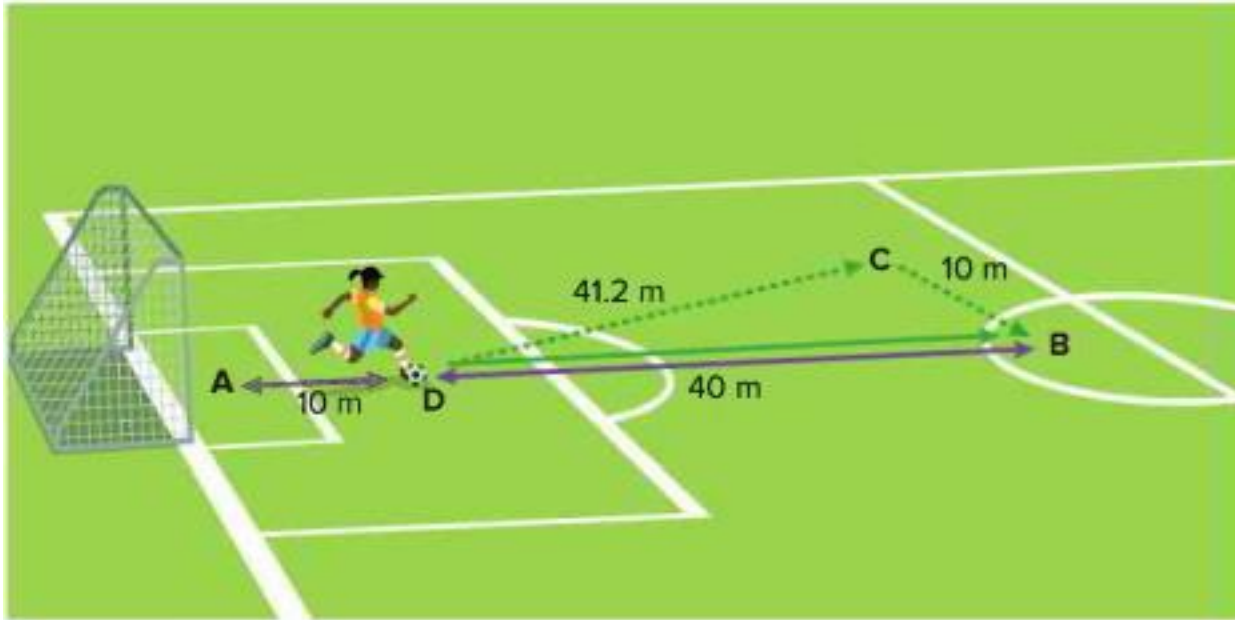
The reference point in the image is East.
Abdulrahman moves from the bus stop to the museum. Has he moved positive or negative to the reference point? **Positive**



Students will explore how to describe the position and motion of an object.

Encounter the Phenomenon, The Reference Direction, Motion Using Reference Points

p7-Unit 2,
p12-Unit 2,
p18-Unit2



What is the total distance covered by the player from points A to D to C to B? **101.2m**

What is the magnitude of the displacement of the player from A to B? **50m**

Which of the following statements is correct regarding the car motion from point A to point D on the racetrack model shown below?

***** BOUNS ***** Distance and Displacement



Learning Outcomes Covered

- يشرح أن المسافات موجودة في كل يومياتنا
- يستخدم رموز العناصر المصروفة في مكانة مسافة بعض الحركات

Incorrect

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a.

The car **distance** is equal to its **displacement**

b.

The car **distance** is 1200 m, and its **displacement** is 364.0 m

c.

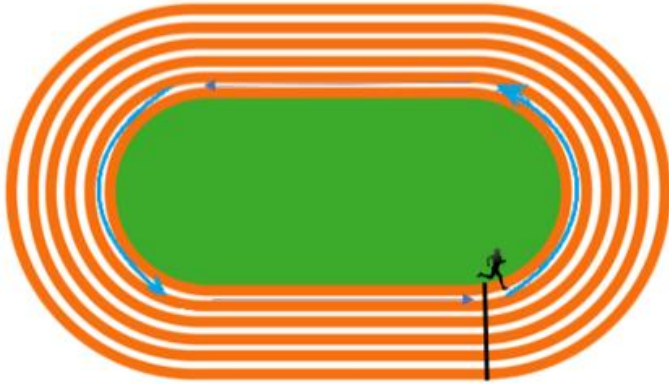
The car **distance** is 1200 m, and its **displacement** is 400.0 m

d.

The car **distance** is 800 m, and its **displacement** is 300.0 m

A runner at a track meet completes exactly one lap around a 400 m track.

Which of the following statements is correct?



The runner's traveled distance is 400 m, and his displacement is 0 m

The runner's traveled distance is 300 m, and his displacement is 100 m

The runner's traveled distance is 0 m, and his displacement is 400 m

The runner's traveled distance is 200 m, and his displacement is 200 m

Students will analyze data including graphs to help construct and present arguments about the changes over time in the motions of objects.

Math Connection

p23-Unit 2,

MATH Connection The motion of a person or object can be explained by examining how the position changes over time. Practice using the mathematical model, the average speed equation.

1. A truck driver makes a trip that covers 2,380 km in 28 hours. What is the driver's average speed in km/h?

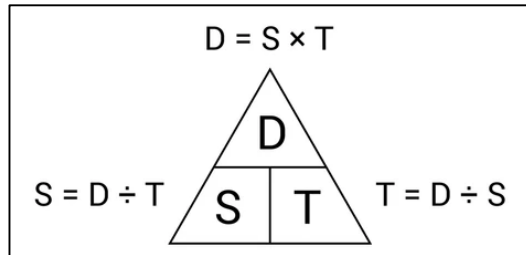
$$\text{Speed} = D/T = 2380/28 = 85\text{km/h}$$

2. What is the average speed of a soccer ball that travels 34 m in 2.0 s?

$$\text{Speed} = D/T = 34/2.0 = 17\text{m/s}$$

3. How long would it take a bus traveling at 52 km/h to travel 130 km?

$$\text{Time} = D/S = 130/52 = 2.5 \text{ hours}$$



THREE-DIMENSIONAL THINKING

Isaiah leaves one city at noon. He has to be at another city 186 km away at 3:00 PM. The speed limit the entire way is 65 km/h.

Can he arrive at the second city on time? Explain your reasoning using **mathematical evidence**.

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

Plugging in the values:

$$\text{Time} = \frac{186 \text{ km}}{65 \text{ km/h}} \approx 2.86 \text{ hours}$$

You will arrive in the other city at approximately **2:52 PM**, which is before the deadline of **3:00 PM**. Therefore, **you will arrive on time**.

Students will analyze data including graphs to help construct and present arguments about the changes over time in the motions of objects.

Math Connection,
Three Dimensional
Thinking

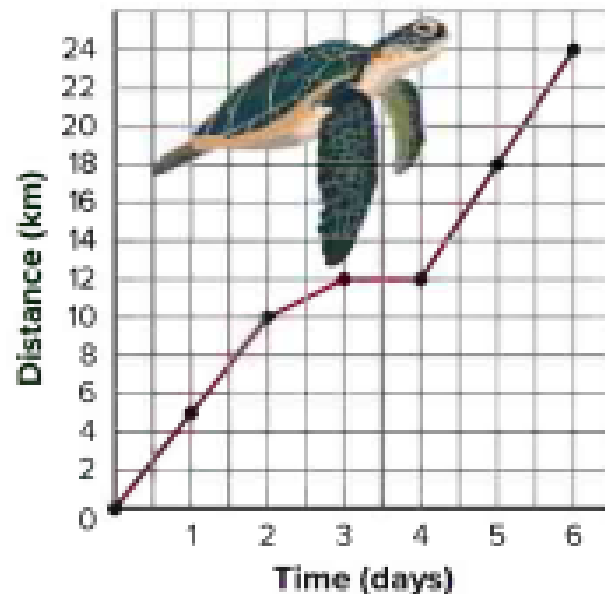
p23-Unit 2,
p29-Unit 2



THREE-DIMENSIONAL THINKING

Analyze the data on the plot below. Determine the speed of the hawksbill sea turtle during each interval listed below.

**Hawksbill Sea Turtle
Tracking Data**



Day 0 to day 2: $\text{Speed} = D/T = 10/2 = 5\text{km/d}$

Day 2 to day 3: $\text{Speed} = D/T = 12/1 = 12\text{km/d}$

Day 3 to day 4: $\text{Speed} = D/T = 12/1 = 12\text{km/d}$

Day 4 to day 6: $\text{Speed} = D/T = 12/2 = 6\text{km/d}$

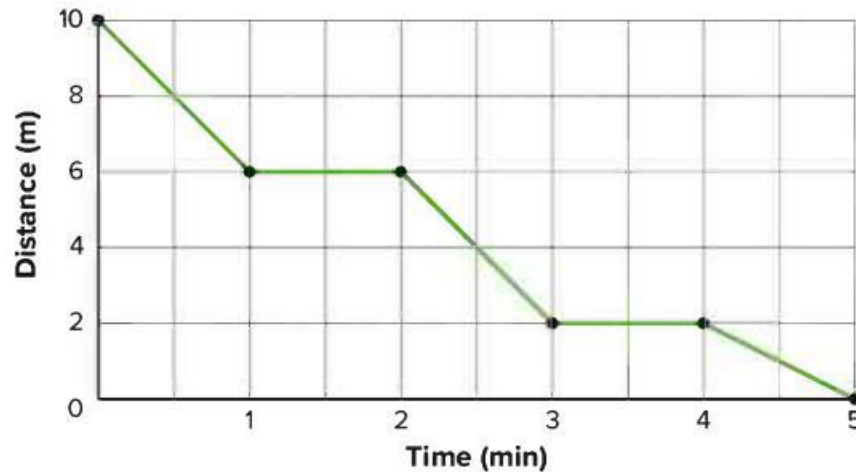
Students will analyze data including graphs to help construct and present arguments about the changes over time in the motions of objects.

Real-World
Connection

p32-Unit 2,

Real-World Connection

- 4. Interpret Data** The plot below shows the motion of an elevator. Explain its motion.



- The elevator went down 4m at a constant speed of 1 minute
- Stopped for 1 minute
- Went down 4m in 1 minute
- Stopped for 1 minute
- Went down 2m in 1 minute

- 5. Calculate** A driver travels 55 km in 1 hour. He then drives at a speed of 35 km/h for 2 hours. Next, he drives 175 km in 3 hours. What was his average speed?

1. Distance = 55km
Time = 1 hour
2. Speed = 35km/h
Time = 2 hours
Distance = $s \times t$ $35 \times 2 = 70\text{km}$
3. Distance = 175km
time = 3 hours

TOTAL DISTANCE: 55km + 35km + 175km = 300km

TOTAL TIME : 1h + 2h + 3h = 6 hours

SPEED = D/T = $300/6$ = 50km/h

ENCOUNTER THE PHENOMENON

What happens to the motion of the water tube when it's pushed or pulled?

when a water tube is pushed or pulled, its motion is influenced by the direction of the applied force

Pushing: If the tube is pushed, it will move in the direction of the push. For example, if you push it forward, the tube will slide forward.

Pulling: If the tube is pulled, it will move in the direction of the pull. For instance, pulling it toward you will cause the tube to move closer

Students will explore how the force exerted by one object on a second object is equal in strength and opposite in direction to the force that the second object exerts on the first.

Math
Connection

p44-Unit 2,

MATH Connection

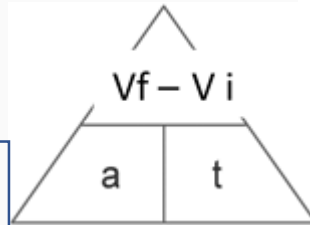
In the PhET interactive simulation, a force of 100 N is applied to the wrapped present, giving it an acceleration of 2 m/s^2 .

What is the mass of the object?

$$m = \frac{F}{a}$$

$$m = \frac{100 \text{ N}}{2 \text{ m/s}^2}$$

$$m = 50 \text{ kg}$$



What is the acceleration when a force of 2.0 N is applied to a ball that has a mass of 0.60 kg?

$$a = \frac{F}{m}$$

$$a = \frac{2.0 \text{ N}}{0.60 \text{ kg}}$$

$$a = \frac{2.0}{0.60} \approx 3.33 \text{ m/s}^2$$

Students will explore how force affects motion.

Collect evidence

p47-Unit 2,

COLLECT EVIDENCE

How does friction's effect on motion help explain what happens when you push or pull a water tube?



- When you push or pull the water tube, friction acts against the direction of the force you are applying.
- if you push the tube forward, friction between the tube and the surface it rests on tries to resist that forward motion.

Students will explore how the force exerted by one object on a second object is equal in strength and opposite in direction to the force that the second object exerts on the first.

Three-Dimensional Thinking
Collect Evidence

p64-Unit 2,
p67-Unit 2



THREE-DIMENSIONAL THINKING

What **patterns** exist between all forces that you apply to objects or **systems** of objects?

- **Newton's third law** of motion, for every action, there is an equal and opposite reaction.
- The **net force** acting on an object determines its motion. If the forces applied to an object are balanced (the net force is zero)
- **Friction** always acts to oppose the motion of objects
- The **acceleration** of an object is directly proportional to the net force applied and inversely proportional to its mass.



COLLECT EVIDENCE

How does modeling Newton's third law help explain what happens when an airboat pushes on the air?



- Newton's third law, for every action, there is an equal and opposite reaction.
- When the airboat's fan pushes air backward, it exerts a force on the air - action force.
- the air responds to this action force by exerting an equal and opposite force on the airboat - reaction force.
- As the air is pushed backward, the reaction force pushes the airboat forward.

Students will explore how the force exerted by one object on a second object is equal in strength and opposite in direction to the force that the second object exerts on the first.

Collect Evidence
Real world connection

p67-Unit 2,
p74-Unit 2

Real-World Connection

5. Explain When you run, your feet are pushing you forward. Friction keeps your foot in contact with the ground. According to Newton's third law, you are pushing the ground back. Construct an explanation for why Earth is not changing its motion.

when you push against the Earth while running, the reaction force propels you forward, the Earth does not accelerate away because its mass is so much greater.

Students will explore the attractive nature of gravitational force, the factors that affect it, and how it affects the motion of objects.

Collect Evidence
Real world connection

p86-Unit 2,
p94-Unit 2

COLLECT EVIDENCE

How does the relationship between mass and gravity and the relationship between distance and gravity explain why the skydiver fell as she did?

Gravitational force is small between objects that have small masses



FORCE
MASS



Gravitational force is large when the mass of both objects are large



FORCE
MASS



Gravitational force is strong when the distance between objects is small



FORCE
Distance



Gravitational force decrease if the distance between objects increase



FORCE
Distance



- A skydiver, having mass, experiences a gravitational force pulling them towards the Earth due to the Earth's large mass
- As the distance between Earth and the skydiver decrease, the gravitational force increase, acceleration increase

Students will explore the attractive nature of gravitational force, the factors that affect it, and how it affects the motion of objects.

Collect Evidence
Real world connection

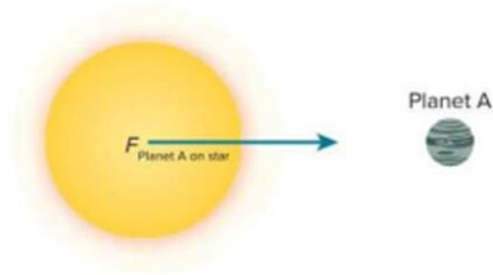
p86-Unit 2,
p94-Unit 2

Real-World Connection

5. Predict If an astronaut moved away from Earth in the direction of the Moon, how would the gravitational force between Earth and the astronaut change? How would the gravitational force between the Moon and the astronaut change?

- Gravitational force is a force that pulls all objects with mass, to the center of the Earth.
- As the Astronaut moves away from Earth the gravitational force becomes weaker.
- As the astronaut approaches the Moon, the gravitational force exerted by the Moon on the astronaut increases due to the decreasing distance.

The model below represents a star orbited by a planet – Planet A. Using this model which of the following is the correct way to represent the gravitational forces and the mass of the objects?



1	Gravitational forces: by an arrow from Planet A toward the star and same size of the blue arrow, Mass: by the size of the objects.
2	Gravitational forces: by an arrow from Planet A toward the star and shorter than the blue arrow, Mass: by the size of the objects.
3	Gravitational forces: by an arrow from Planet A toward the star and same size of the blue arrow, Mass: by the distance between objects.
4	Gravitational forces: by an arrow from Planet A toward the star and longer than the blue arrow, Mass: by the distance between objects.

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