At Home Learning Resources

Grade 8 - Week 6

Content	Time Suggestions
Independent Reading (Read books, watch books read aloud, listen to a book)	At least 20 minutes daily (Could be about science, social studies, etc)
ELA	45 minutes daily
Math	45 minutes daily
Science	45 minutes daily
Social Studies	45 minutes daily
Arts, Physical Education, or **Social Emotional Learning**	30 minutes daily

These are some time recommendations for each subject.
We know everyone's schedule is different, so do what you can.
These times do not need to be in a row/in order, but can be spread throughout the day.
Teachers will suggest which parts of the packet need to be completed or teachers may assign alternative tasks.

Grade 8 ELA Week 6

Your child can complete any of the activities in weeks 1-5. These can be found on the Lowell Public Schools website: https://www.lowell.k12.ma.us/site/Default.aspx?PageID=3804

This week continues the focus on poetry. Read the poems. Practice reading them so you could perform them. Answer the following question in writing. Finally, write your own poems and perform them; share with your family or friends. Enjoy!

Write about what the poem means. Include how the poet uses literary elements (such as mood, tone, point of view, personification, or symbolism) to create meaning.

Do not go gentle into that good night

Dylan Thomas - 1914-1953

Do not go gentle into that good night,
Old age should burn and rave at close of day;
Rage, rage against the dying of the light.

Though wise men at their end know dark is right,
Because their words had forked no lightning they
Do not go gentle into that good night.

Good men, the last wave by, crying how bright
Their frail deeds might have danced in a green bay,
Rage, rage against the dying of the light.

Wild men who caught and sang the sun in flight,
And learn, too late, they grieved it on its way,
Do not go gentle into that good night.

Grave men, near death, who see with blinding sight
Blind eyes could blaze like meteors and be gay,
Rage, rage against the dying of the light.

And you, my father, there on the sad height,
Curse, bless, me now with your fierce tears, I pray.
Do not go gentle into that good night.
Rage, rage against the dying of the light.

Nothing Gold Can Stay

Robert Frost

Nature’s first green is gold,
Her hardest hue to hold,
Her early leaf’s a flower,
But only so an hour.
The leaf subsides to leaf
So Eden sank to grief,
So dawn goes down to day.
Nothing gold can stay.

Fifteen

by William Stafford

South of the bridge on Seventeenth I found back of the willows one summer day a motorcycle with engine running as it lay on its side, ticking over slowly in the high grass. I was fifteen.

I admired all that pulsing gleam, the shiny flanks, the demure headlights fringed where it lay; I led it gently to the road and stood with that companion, ready and friendly. I was fifteen.

We could find the end of a road, meet the sky on out Seventeenth. I thought about hills, and patting the handle got back a confident opinion. On the bridge we indulged a forward feeling, a tremble. I was fifteen.

Thinking, back farther in the grass I found the owner, just coming to, where he had flipped over the rail. He had blood on his hand, was pale— I helped him walk to his machine. He ran his hand over it, called me good man, roared away. I stood there, fifteen.

You Know Who You Are
By Naomi Shihab Nye

Why do your poems comfort me, I ask myself.
Because they are upright, like straight-backed chairs.
I can sit in them and study the world as if it too
were simple and upright.

Because sometimes I live in a hurricane of words
and not one of them can save me.
Your poems come in like a raft, logs tied together,
they float.
I want to tell you about the afternoon
I floated on your poems
all the way from Durango Street to Broadway.

Fathers were paddling on the river with their small sons.
Three Mexican boys chased each other outside the library.
Everyone seemed to have some task, some occupation,
while I wandered uselessly in the streets I claim to love.

Suddenly I felt the precise body of your poems beneath me,
like a raft, I felt words as something portable again,
a cup, a newspaper, a pin.
Everything happening had a light around it,
not the light of Catholic miracles,
the blunt light of a Saturday afternoon.
Light in a world that rushes forward with us or without us.
I wanted to stop and gather up the blocks behind me
in this light, but it doesn't work.
You keep walking, lifting one foot, then the other,
saying "This is what I need to remember"
and then hoping you can.

from: "Words Under the Words" by Naomi Shihab Nye, page 22

An Afternoon in the Stacks
William Stafford

Closing the book, I find I have left my head
inside. It is dark in here, but the chapters open
their beautiful spaces and give a rustling sound,
words adjusting themselves to their meaning.
Long passages open at successive pages. An echo,
continuous from the title onward, hums
behind me. From in here the world looms,
a jungle redeemed by these linked sentences
carved out when an author traveled and a reader
kept the way open. When this book ends
I will pull it inside-out like a sock
and throw it back in the library. But the rumor
of it will haunt all that follows in my life.
A candleflame in Tibet leans when I move.

A Poem for My Librarian, Mrs. Long
By Nikki Giovanni

A Poem for My Librarian, Mrs. Long
(You never know what troubled little girl needs a book)…..

There was a bookstore uptown on Gay Street
Which I visited and inhaled that wonderful odor
Of new books
Even today I read hardcover as a preference paperback only
As a last resort

And up the hill on vine street
(The main black corridor) sat our Carnegie library
Mrs. Long always glad to see you
The stereoscope always ready to show you faraway
Places to dream about

Mrs. Long asking what are you looking for today
When I wanted Leaves of Grass or Alfred North Whitehead
She would go to the big library uptown and i now know
Hat in hand to ask to borrow so that I might borrow

Probably they said something humiliating since southern
Whites like to humiliate southern blacks

But she nonetheless brought the books
Back and I held them to my chest
Close to my heart
And happily skipped back to grandmother's house
Where I would sit on the front porch
In a gray glider and dream of a world
Far away

I love the world where I was
I was safe and warm and grandmother gave me neck kisses
When I was on my way to bed

But there was a world
Somewhere
Out there
And Mrs. Long opened the wardrobe
But not lions or witches scared me
I went through
Knowing there would be
Spring

Oranges by Gary Soto

The first time I walked
With a girl, I was twelve,
Cold, and weighted down
With two oranges in my jacket.
December. Frost cracking
Beneath my steps, my breath
Before me, then gone,
As I walked toward
Her house, the one whose
Porch light burned yellow
Night and day, in any weather.
A dog barked at me, until
She came out pulling
At her gloves, face bright
With rouge. I smiled,
Touched her shoulder, and led
Her down the street, across
A used car lot and a line
Of newly planted trees,
Until we were breathing
Before a drugstore. We
Entered, the tiny bell
Bringing a saleslady
Down a narrow aisle of goods.
I turned to the candies
Tiered like bleachers,
And asked what she wanted -
Light in her eyes, a smile
Starting at the corners
Of her mouth. I fingered
A nickel in my pocket,
And when she lifted a chocolate
That cost a dime,
I didn't say anything.
I took the nickel from
My pocket, then an orange,
And set them quietly on
The counter. When I looked up,
The lady's eyes met mine,
And held them, knowing
Very well what it was all
About.

“The Weary Blues” Langston Hughes

Droning a drowsy syncopated tune,

Rocking back and forth to a mellow croon,

I heard a Negro play.

Down on Lenox Avenue the other night

By the pale dull pallor of an old gas light

He did a lazy sway ....

He did a lazy sway ....

To the tune o' those Weary Blues.

With his ebony hands on each ivory key

He made that poor piano moan with melody.

O Blues!

Swaying to and fro on his rickety stool

He played that sad raggy tune like a musical fool.

Sweet Blues!

Coming from a black man's soul.

O Blues!

In a deep song voice with a melancholy tone

I heard that Negro sing, that old piano moan--

"Ain't got nobody in all this world,

Ain't got nobody but ma self.

I's g’wine to quit ma frownin'

And put ma troubles on the shelf."

Thump, thump, thump, went his foot on the floor.

He played a few chords then he sang some more--

"I got the Weary Blues

And I can't be satisfied.

Got the Weary Blues

And can't be satisfied--

I ain't happy no mo'

And I wish that I had died."

And far into the night he crooned that tune.

The stars went out and so did the moon.

The singer stopped playing and went to bed

While the Weary Blues echoed through his head.

He slept like a rock or a man that's dead.

Illustrative Mathematics

8.EE Choosing appropriate units

Task

a. A computer has 128 gigabytes of memory. One gigabyte is 1×10^9 bytes. A floppy disk, used for storage by computers in the 1970's, holds about 80 kilobytes. There are 1000 bytes in a kilobyte. How many kilobytes of memory does a modern computer have? How many gigabytes of memory does a floppy disk have? Express your answers both as decimals and using scientific notation.

b. George told his teacher that he spent over 21,000 seconds working on his homework. Express this amount using scientific notation. What would be a more appropriate unit of time for George to use? Explain and convert to your new units.

c. A certain swimming pool contains about 3×10^7 teaspoons of water. Choose a more appropriate unit for reporting the volume of water in this swimming pool and convert from teaspoons to your chosen units.

d. A helium atom has a diameter of about 62 picometers. There are one trillion picometers in a meter. The diameter of the sun is about 1,400,000 km. Express the diameter of a helium atom and of the sun in meters using scientific notation. About many times larger is the diameter of the sun than the diameter of a helium atom?

Illustrative Mathematics

8.EE Giantburgers

Task

This headline appeared in a newspaper.

Every day 7% of Americans eat at Giantburger restaurants

Decide whether this headline is true using the following information.

- There are about 8×10^3 Giantburger restaurants in America.
- Each restaurant serves on average 2.5×10^3 people every day.
- There are about 3×10^8 Americans.

Explain your reasons and show clearly how you figured it out.

The average mass of an adult human is about 65 kilograms while the average mass of an ant is approximately 4×10^{-3} grams. The total human population in the world is approximately 6.84 billion, and it is estimated there are currently about 10,000 trillion ants alive.

Based on the information above, how does the total mass of all living ants compare to the total mass of all living humans?

Choose one problem below and explain what was done wrong and how to do it correctly.

Tamara:
$3(4)^2=24$

Yoli:
$3^3 \times 3^{-5} = 3^{-2} = -9$

WIlma:
$20x^8/5x^2=4x^4$

Using the digits 1 to 9, at most one time each, fill in the boxes to make a product that equals 800,000,000.

$$(\square \times 10^{\square})(\square \times 10^{\square})$$

9.6b Scientific Notation

Check It Out
Lesson Tutorials
BigIdeasMath.com

To add or subtract numbers written in scientific notation with the same power of 10, add or subtract the factors.

EXAMPLE 1 Adding Numbers Written in Scientific Notation

Find $(4.6 \times 10^3) + (8.72 \times 10^3)$. Write your answer in scientific notation.

$(4.6 \times 10^3) + (8.72 \times 10^3)$

$= (4.6 + 8.72) \times 10^3$ — Distributive Property

$= 13.32 \times 10^3$ — Add.

$= (1.332 \times 10^1) \times 10^3$ — Write 13.32 in scientific notation.

$= 1.332 \times 10^4$ — Product of Powers Property

To add or subtract numbers written in scientific notation with different powers of 10, first rewrite the numbers so they have the same power of 10.

EXAMPLE 2 Subtracting Numbers Written in Scientific Notation

Find $(3.5 \times 10^{-2}) - (6.6 \times 10^{-3})$. Write your answer in scientific notation.

The numbers do not have the same power of 10. Rewrite 6.6×10^{-3} so that it has the same power of 10 as 3.5×10^{-2}.

$6.6 \times 10^{-3} = 6.6 \times 10^{-1} \times 10^{-2}$ — Rewrite 10^{-3} as $10^{-1} \times 10^{-2}$.

$= 0.66 \times 10^{-2}$ — Rewrite 6.6×10^{-1} as 0.66.

Subtract the factors.

$(3.5 \times 10^{-2}) - (0.66 \times 10^{-2})$

$= (3.5 - 0.66) \times 10^{-2}$ — Distributive Property

$= 2.84 \times 10^{-2}$ — Subtract.

Practice

Add or subtract. Write your answer in scientific notation.

1. $(3 \times 10^7) + (2.4 \times 10^7)$
2. $(7.2 \times 10^{-6}) + (5.44 \times 10^{-6})$
3. $(9.2 \times 10^8) - (4 \times 10^8)$
4. $(7.8 \times 10^{-5}) - (4.5 \times 10^{-5})$
5. $(9.7 \times 10^6) + (6.7 \times 10^5)$
6. $(8.2 \times 10^2) + (3.41 \times 10^{-1})$
7. $(1.1 \times 10^5) - (4.3 \times 10^4)$
8. $(2.4 \times 10^{-1}) - (5.5 \times 10^{-2})$

English Spanish

To divide numbers written in scientific notation, divide the factors and powers of 10 separately.

EXAMPLE 3 Dividing Numbers Written in Scientific Notation

Find $\frac{1.5 \times 10^{-8}}{6 \times 10^{7}}$. Write your answer in scientific notation.

$$\frac{1.5 \times 10^{-8}}{6 \times 10^{7}} = \frac{1.5}{6} \times \frac{10^{-8}}{10^{7}}$$ Rewrite as a product of fractions.

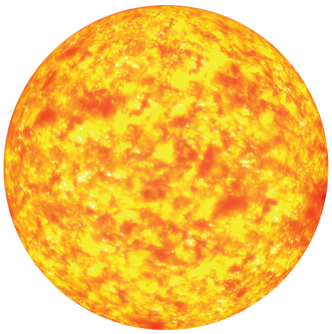
$$= 0.25 \times \frac{10^{-8}}{10^{7}}$$ Divide 1.5 by 6.

$$= 0.25 \times 10^{-15}$$ Quotient of Powers Property

$$= 2.5 \times 10^{-1} \times 10^{-15}$$ Write 0.25 in scientific notation.

$$= 2.5 \times 10^{-16}$$ Product of Powers Property

EXAMPLE 4 Real-Life Application



Diameter $= 1.4 \times 10^{6}$ km

How many times greater is the diameter of the Sun than the diameter of Earth?

Diameter $= 1.28 \times 10^{4}$ km

Divide the diameter of the Sun by the diameter of Earth.

$$\frac{1.4 \times 10^{6}}{1.28 \times 10^{4}} = \frac{1.4}{1.28} \times \frac{10^{6}}{10^{4}}$$ Rewrite as a product of fractions.

$$= 1.09375 \times 10^{2}$$ Divide and use Quotient of Powers Property.

$$= 109.375$$ Write in standard form.

The diameter of the Sun is about 109 times greater than the diameter of Earth.

Practice

Divide. Write your answer in scientific notation.

9. $(6 \times 10^{4}) \div (3 \times 10^{4})$

10. $(2.3 \times 10^{7}) \div (9.2 \times 10^{7})$

11. $(1.5 \times 10^{-3}) \div (7.5 \times 10^{2})$

12. $(5.8 \times 10^{-6}) \div (2 \times 10^{-3})$

13. **MONEY** How many times greater is the thickness of a dime than the thickness of a dollar bill?

Thickness $= 1.35 \times 10^{-1}$ cm

Thickness $= 1.0922 \times 10^{-2}$ cm

Name : ______________________ Score : __________________

Scientific Notation

Add/Sub: ES1

Simplify and express in scientific notation:

Example 1

$(2 \times 10^4) + (3 \times 10^5)$

$= (2 \times 10^4) + (3 \times 10^4) \times 10$

$= (2 \times 10^4) + (30 \times 10^4)$

$= 32 \times 10^4$

$= \mathbf{3.2 \times 10^5}$

Example 2

$(7 \times 10^8) - (4 \times 10^6)$

$= (7 \times 10^6) \times 10^2 - (4 \times 10^6)$

$= (700 \times 10^6) - (4 \times 10^6)$

$= 696 \times 10^6$

$= \mathbf{6.96 \times 10^8}$

Simplify each problem and express the answer in scientific notation.

1) $(2 \times 10^3) + (5 \times 10^5)$

Answer : ____________________

2) $(4 \times 10^8) - (9 \times 10^7)$

Answer : ____________________

3) $(8 \times 10^9) - (3 \times 10^7)$

Answer : ____________________

4) $(5 \times 10^7) + (1 \times 10^6)$

Answer : ____________________

5) $(4 \times 10^2) + (7 \times 10^3)$

Answer : ____________________

6) $(9 \times 10^5) - (6 \times 10^4)$

Answer : ____________________

7) $(1 \times 10^6) - (8 \times 10^4)$

Answer : ____________________

8) $(5 \times 10^9) + (3 \times 10^8)$

Answer : ____________________

Name : ____________________ Score : ____________________

Scientific Notation

Mul/Div: ES1

Simplify and express in scientific notation:

Example 1

$(6 \times 10^3)(2 \times 10^5)$

$(6 \times 10^3)(2 \times 10^5) = 12 \times 10^3 \times 10^5$

$= 12 \times 10^8$

$= \mathbf{1.2 \times 10^9}$

Example 2

$\frac{18 \times 10^6}{4 \times 10^4} = \frac{18}{4} \times 10^6 \times 10^{-4}$

$= \mathbf{4.5 \times 10^2}$

Simplify each problem and express the answer in scientific notation.

1) $(7 \times 10^8)(9 \times 10^6)$

Answer : ____________________

2) $\frac{3 \times 10^4}{8 \times 10}$

Answer : ____________________

3) $\frac{4 \times 10^9}{5 \times 10^7}$

Answer : ____________________

4) $(2 \times 10^3)(3 \times 10^4)$

Answer : ____________________

5) $(3 \times 10^7)(9 \times 10^6)$

Answer : ____________________

6) $\frac{4 \times 10^5}{16 \times 10^2}$

Answer : ____________________

7) $\frac{9 \times 10^5}{10 \times 10^3}$

Answer : ____________________

8) $(11 \times 10^4)(7 \times 10^2)$

Answer : ____________________

Name : ____________________ Score : ________________

Scientific Notation

Mixed operations: ES1

Simplify each problem and express the answer in scientific notation.

1) $(8 \times 10^5) + (5 \times 10^4)$

Answer : ________________

2) $\dfrac{7 \times 10^6}{2 \times 10^3}$

Answer : ________________

3) $(3 \times 10^4) - (5 \times 10^2)$

Answer : ________________

4) $(4 \times 10)\ (2 \times 10^3)$

Answer : ________________

5) $\dfrac{9 \times 10^3}{2 \times 10}$

Answer : ________________

6) $(8 \times 10^3)\ (3 \times 10^4)$

Answer : ________________

7) $(5 \times 10^8) - (3 \times 10^6)$

Answer : ________________

8) $(7 \times 10^5) + (6 \times 10^7)$

Answer : ________________

9) $(4 \times 10^2) + (9 \times 10^4)$

Answer : ________________

10) $(2 \times 10^3)\ (5 \times 10^4)$

Answer : ________________

Scientific Notation (A)

Write each number in either standard form or scientific notation.

2.71×10^{9} =	________	4.4296×10^{3} =	________
2.1×10^{6} =	________	1×10^{-4} =	________
5.6×10^{-5} =	________	2.68×10^{2} =	________
4.4×10^{-9} =	________	8.26×10^{0} =	________
3.77185×10^{1} =	________	3.054×10^{-9} =	________
7.8903×10^{-1} =	________	5.73×10^{6} =	________
________ =	600	________ =	0.000000991
________ =	0.24	________ =	19,000
________ =	4.07369	________ =	2,399.1
________ =	816.3	________ =	36,683
________ =	0.077	________ =	0.000059
________ =	0.0033	________ =	0.63338

Scientific Notation (B)

Write each number in either standard form or scientific notation.

2×10^{-7}	=	________	5×10^{-9}	=	________
9.6866×10^{2}	=	________	1.088×10^{-4}	=	________
3.867×10^{-5}	=	________	9.6×10^{-1}	=	________
4.5×10^{1}	=	________	4.33984×10^{-4}	=	________
7.9947×10^{-6}	=	________	6.84×10^{-8}	=	________
5.2×10^{9}	=	________	9.773×10^{-7}	=	________
________	=	0.009194	________	=	520
________	=	0.182	________	=	0.00000003
________	=	0.00098673	________	=	0.004875
________	=	0.01	________	=	0.6456
________	=	999.78	________	=	0.0549
________	=	0.000000167	________	=	44,000

Optional STEM Challenge

PAPER TABLE

as built on TV
pbs.org/designsquad

YOUR CHALLENGE

Design and build a table out of newspaper tubes. Make it at least eight inches tall and strong enough to hold a heavy book.

BRAINSTORM & DESIGN

Look at your materials and think about the questions below. Then sketch your ideas on a piece of paper or in your design notebook.

1. How can you make a strong tube out of a piece of newspaper? (This challenge uses tubes because it takes more force to crumple paper when it's shaped as a tube.)

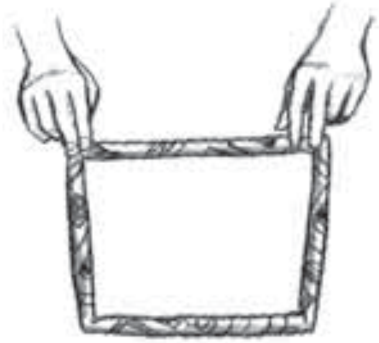
2. How can you arrange the tubes to make a strong, stable table?
3. How can you support the table legs to keep them from tilting or twisting?
4. How level and big does the table's top need to be to support a heavy book?

BUILD, TEST, EVALUATE & REDESIGN

Use the materials to build your table. Then test it by carefully setting a heavy book on it. When you test, your design may not work as planned. If things don't work out, it's an opportunity—not a mistake! When engineers solve a problem, they try different ideas, learn from mistakes, and try again. Study the problems and then redesign. For example, if:

- the tubes start to unroll—*Re-roll them so they are tighter. A tube shape lets the load (i.e., the book) push on every part of the paper, not just one section of it. Whether they're building tables, buildings, or bridges,* **load distribution** *is a feature engineers think carefully about.*
- the legs tilt or twist—*Find a way to stabilize and support them. Also check if the table is lopsided, too high, or has legs that are damaged or not well braced.*
- a tube buckles when you add weight—*Support or reinforce the weak area, use a wider or thicker-walled tube, or replace the tube if it's badly damaged. Changing the shape of a material affects its strength. Shapes that spread a load well are strong. Dents, creases, and wrinkles that put stress on some areas more than others make a material weaker.*
- the table collapses—*Make its base as sturdy as possible. Also, a table with a lot of triangular supports tends to be quite strong. A* **truss** *is a large, strong support beam. It is built from short boards or metal rods that are arranged as a series of triangles. Engineers often use trusses in bridges, buildings, and towers.*

MATERIALS (per person)
- 1 piece of cardboard or chipboard (approximately 8 ½ x 11 inches)
- heavy book (e.g., a textbook or telephone book)
- masking tape
- 8 sheets of newspaper



TAKE IT TO THE NEXT LEVEL

- If a little is good, a lot is better! Build a table that can hold two or more heavy books.
- The sky's the limit. Build a table that can hold a heavy book 16 inches above the ground.
- Matching furniture! Build a chair out of newspaper.

MAKE IT ONLINE

Paper guitar?
Build a great-sounding guitar out of a box, string, wood, and wire. See how on Make Magazine's project page at makezine.com/designsquad.

ENGINEERING IN ACTION

A paper house? Better leave your matches outside! Check out these items that engineers made out of paper. Then choose from the list and see if you can figure out the year each item was invented.

Years these items were invented: 1922; 1931; 1967; 1995; 2004; 2007

_______ **A. Paper Church**
After a big earthquake in Japan, engineers quickly made a building by stretching a paper "skin" across 58 paper tubes, each over 16 feet long. The church was only meant to be a temporary place of worship. But it's still standing today.

_______ **B. Paper Video Disc**
This disc holds more than three times as much data as a standard DVD and is much better for the environment. But you'll have to stay tuned—there's no release date set.

_______ **C. Paper House**
An engineer built a vacation home out of newspaper. He glued newspapers into one-inch-thick slabs and then used them to make the walls. It's still standing!

_______ **D. Paper Towels**
By mistake, a factory made rolls of paper that were too thick for toilet paper but too weak for most other uses. But where others see problems, engineers see possibilities. The paper was sold as "Sani-Towels," which soon became known as paper towels.

_______ **E. Paper Batteries**
They're smaller than a postage stamp but can power a light bulb! And they decompose in landfills. Engineers are still figuring out how to get them to work with all our gadgets.

_______ **F. Paper Dresses**
Engineers created paper outfits that could be printed with designs. They were sold in boutiques and in stationery stores, where you could get a tablecloth to match!

(Answers: A: 1995; B: 2004; C: 1922; D: 1931; E: 2007; F: 1967)

Watch the DESIGN SQUAD Cardboard Furniture episode on PBS or online at pbs.org/designsquad.

Major funding for *Design Squad* is provided by the Corporation for Public Broadcasting and the Intel Foundation. Additional funding is provided by the National Council of Examiners for Engineering and Surveying, United Engineering Foundation (ASCE, ASME, AIChE, IEEE, AIME), Noyce Foundation, Northrop Grumman Foundation, the IEEE, and the Intel Corporation.

FOSS COVID-19 5-day Lesson Plan

Student Instructions

Day 1 - What is a virus?

- Task 1: By now you have heard about the novel **coronavirus** , called SARS-CoV-2, that can infect people and cause a disease named COVID-19. A coronavirus is a virus named for its shape, which looks a little like a crown (*corona* is Latin for crown). What is a virus? Read the article "What Is A Virus?" and respond to the questions at the end.

- Task 2: SARS-CoV-2 has caused a global **pandemic** , infecting people all over the world with COVID-19. SARS-CoV-2 is an entirely new virus to the human population. Watch the following video to learn the answer to the question: where did it come from?

Why Do Bats Carry So Many Diseases? (like Coronavirus)
https://www.youtube.com/watch?v=Ao0dqJvH4a0

Respond to these questions:

- Why don't bats get sick like humans from the same viruses?
- How are bats important for healthy ecosystems?

- Task 3: Respond to this question:
  - How has the COVID-19 pandemic affected you, your family, and your community so far?

What Is A Virus?

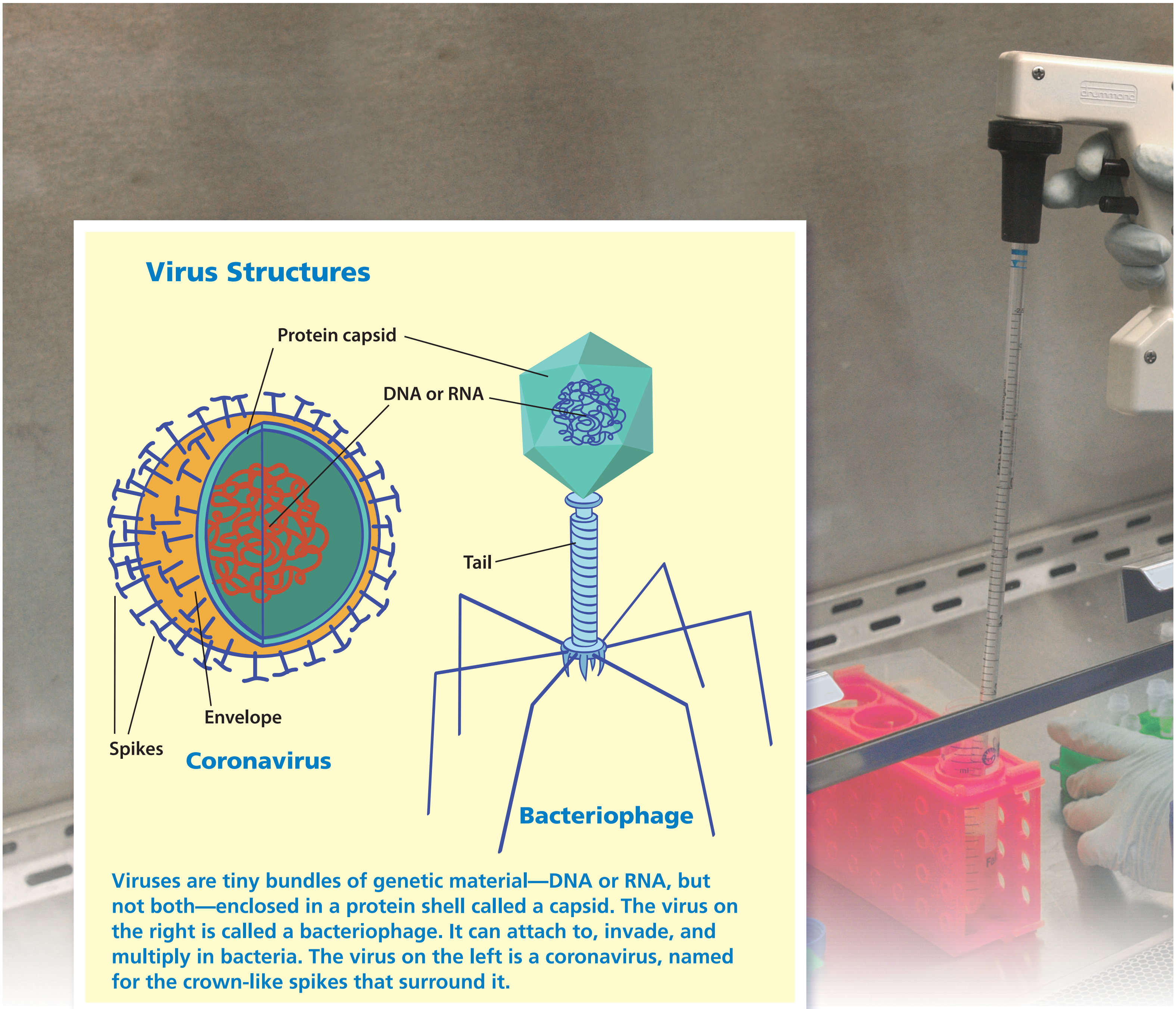
Right now, we are living through a global pandemic. A virus, SARS-CoV-2, has disrupted human lives all over the planet by causing a disease called COVID-19. One of these viruses is about 700 times smaller than a human hair. How can such a tiny virus cause such big problems? What is a virus?

Discovering Viruses

Scientists first observed viruses only after the electron microscope was invented in the 1930s.

Viruses have probably been around for billions of years. Their origins are still debated by scientists. Did they appear with and evolve with bacteria and other ancient cells? Did they appear before? Did they evolve from single-celled organisms? We do know that there are a lot of viruses, more than 10^{31} (10 billion trillion trillion). That is more than all known life-forms combined, including bacteria, archaea, protists, fungi, plants, and animals!

Viruses cannot perform basic life functions unless they are inside another organism's cells. Some viruses, including coronaviruses like the one shown here, are studded with spikes that attach to receptors on host cells. (This is a computer-generated 3D image, not an actual photo.)



Viruses are tiny bundles of genetic material—DNA or RNA, but not both—enclosed in a protein shell called a capsid. The virus on the right is called a bacteriophage. It can attach to, invade, and multiply in bacteria. The virus on the left is a coronavirus, named for the crown-like spikes that surround it.

Portrait of a Virus

Viruses come in many shapes and sizes. They are not made of cells. Instead, they are genetic material in the form of DNA or RNA. The genetic material is surrounded by a protective protein shell called the capsid.

Because a virus is not a cell, it cannot reproduce on its own. The virus has to enter a cell, called a host cell, in order to reproduce. Many viruses, including coronaviruses, have an envelope with spikes covering the capsid. The spikes are protein molecules that stick out to attach the virus to the host cell. Other viruses have a protein tail that attaches to the host. Once the virus attaches to a host cell, it can inject its genetic material into the host.

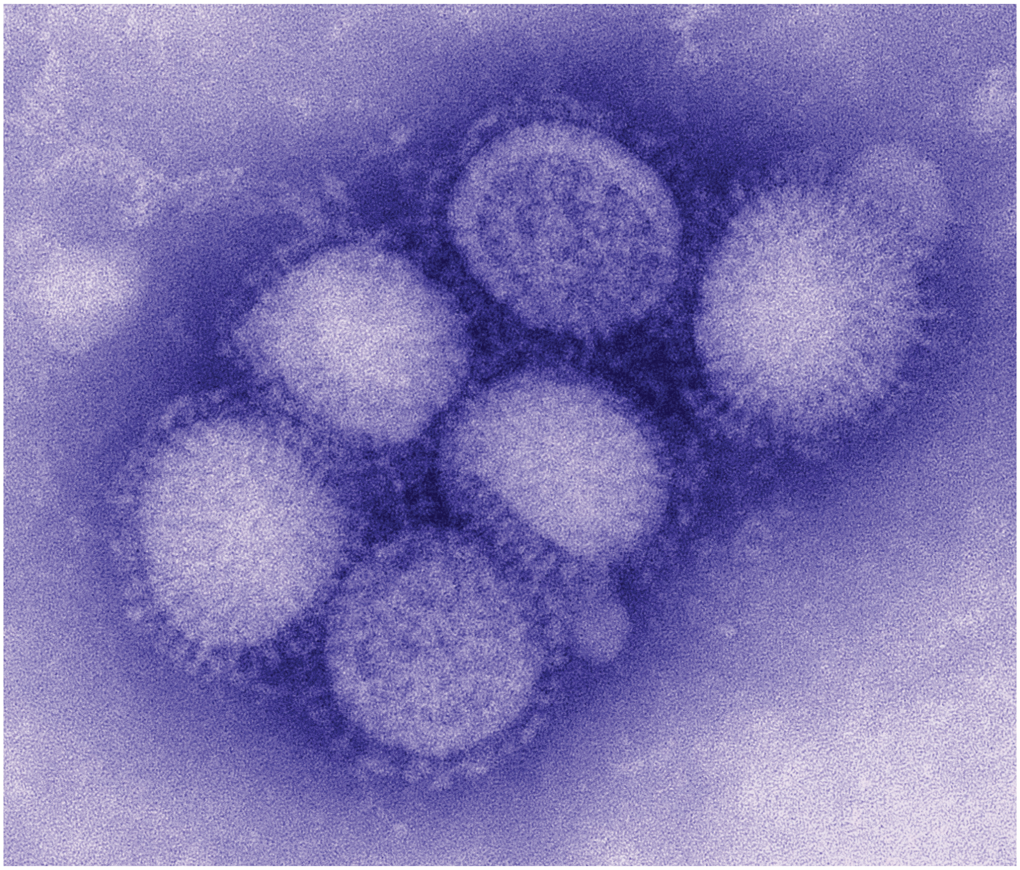
A scientist uses a pipette to transfer a virus into vials for sharing with other laboratories for medical research. She follows very important safety procedures and wears personal protective equipment (PPE) to protect herself from exposure to the virus.

SARS-CoV-2

In December 2019, doctors in China realized that patients were getting sick with a new disease. Doctors, scientists, and other researchers worked quickly to understand the new disease, which we now call COVID-19.

COVID-19 is caused when a virus called SARS-CoV-2 enters a host cell and begins to reproduce. SARS-CoV-2 is a coronavirus, a virus with crown-shaped spikes. Other coronaviruses cause a severe disease called severe acute respiratory syndrome (SARS). And other coronaviruses even cause common colds. But SARS-CoV-2 is a newly-discovered virus that we are just beginning to understand.

Like other viruses, SARS-CoV-2 injects its genetic material into the human host cell and tricks the host cell into creating new copies of the virus. Each cell can create and release millions of new copies. These new virus copies move into nearby cells and start the process over again or can be passed to another human, infecting a new host. The virus triggers the host's immune response, making the person sick.



The H1N1 virus caused a worldwide pandemic of "swine flu" in 2009. The virus was not identified until after researchers had begun making that year's seasonal flu vaccine.

Are We Part Virus?

Scientists have discovered that humans are part virus. The genetic material of viruses makes up 8 percent of human genetic material. What do these embedded genes do? Most of the viral genes in the human genome have changed over time and no longer seem to have any effect. But one is responsible for making a protein that holds the placenta in place in a mother's uterus. Without this essential viral gene, you might never have been born!

It appears that viral genetic material became part of the human genome during thousands and thousands of years of infections. As viruses infected humans, they sometimes inserted their DNA into the egg or sperm and took over its genetic machinery. Some of those human cells survived to pass on the viral DNA to the next generation. In some cases, these genetic changes have been helpful.

Vaccines Fight Viral Diseases

COVID-19, influenza (the flu), smallpox, measles, AIDS, herpes, rabies, Ebola, warts, polio, the common cold, and chicken pox are just a few of the human diseases and infections caused by viruses. Some, like smallpox, have led to millions of deaths. Others, like chicken pox, can stay in your body for years, emerging later in life to cause a painful rash called shingles. Some, like the human papillomavirus that causes common warts, hardly bother us.

Antibiotics affect only bacteria, not viruses. That is why doctors do not prescribe antibiotics for the flu or a cold. Vaccines are the most powerful weapon we have against viral diseases. Vaccines are a form of prevention. Some are made of harmless bits of modified or dead virus pieces, which are injected into muscle or blood. The body recognizes these virus pieces as invaders.

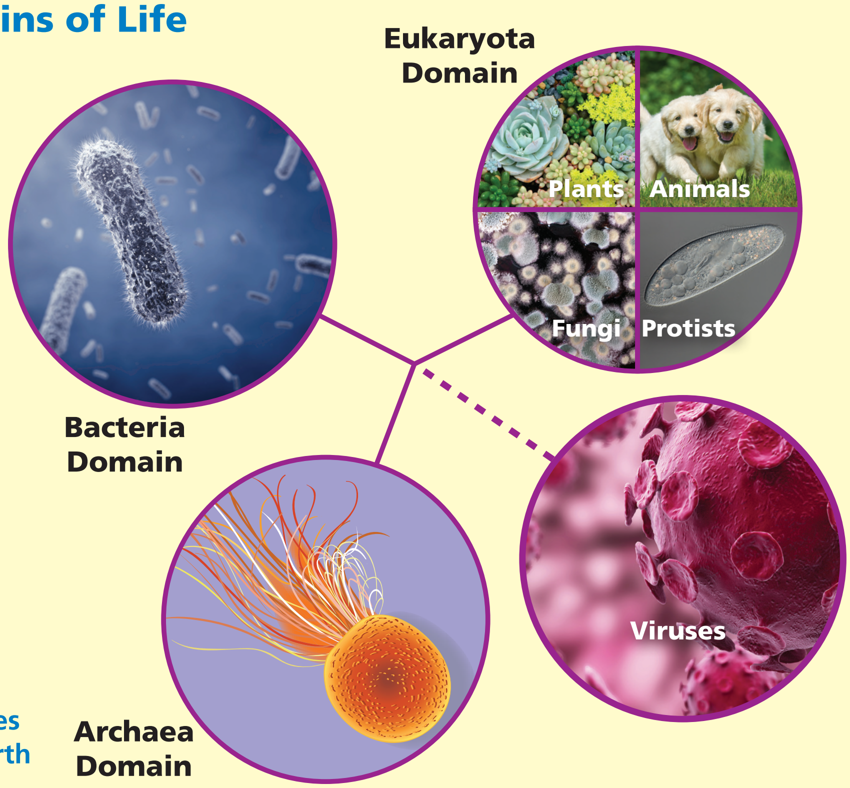
Even though these modified or dead virus pieces cannot make you sick, the immune system fights them. The immune system responds to the vaccine by building molecules called antibodies. When the real viral invaders show up, the antibodies respond quickly to kill them.

The first vaccine developed was for smallpox. Thanks to a global vaccination effort, humans have wiped out that killer disease. Polio is another viral disease that has nearly disappeared thanks to successful worldwide vaccination.

In spite of vaccination, measles kills about 200,000 people each year. It can also cause miscarriages. If we were to stop vaccinating for measles, it is estimated that about 2.7 million people would die each year.

The classic symptom of chicken pox is a skin rash that turns into itchy, fluid-filled blisters. The chicken pox vaccine has nearly eliminated this once-common childhood illness.

The Three Domains of Life



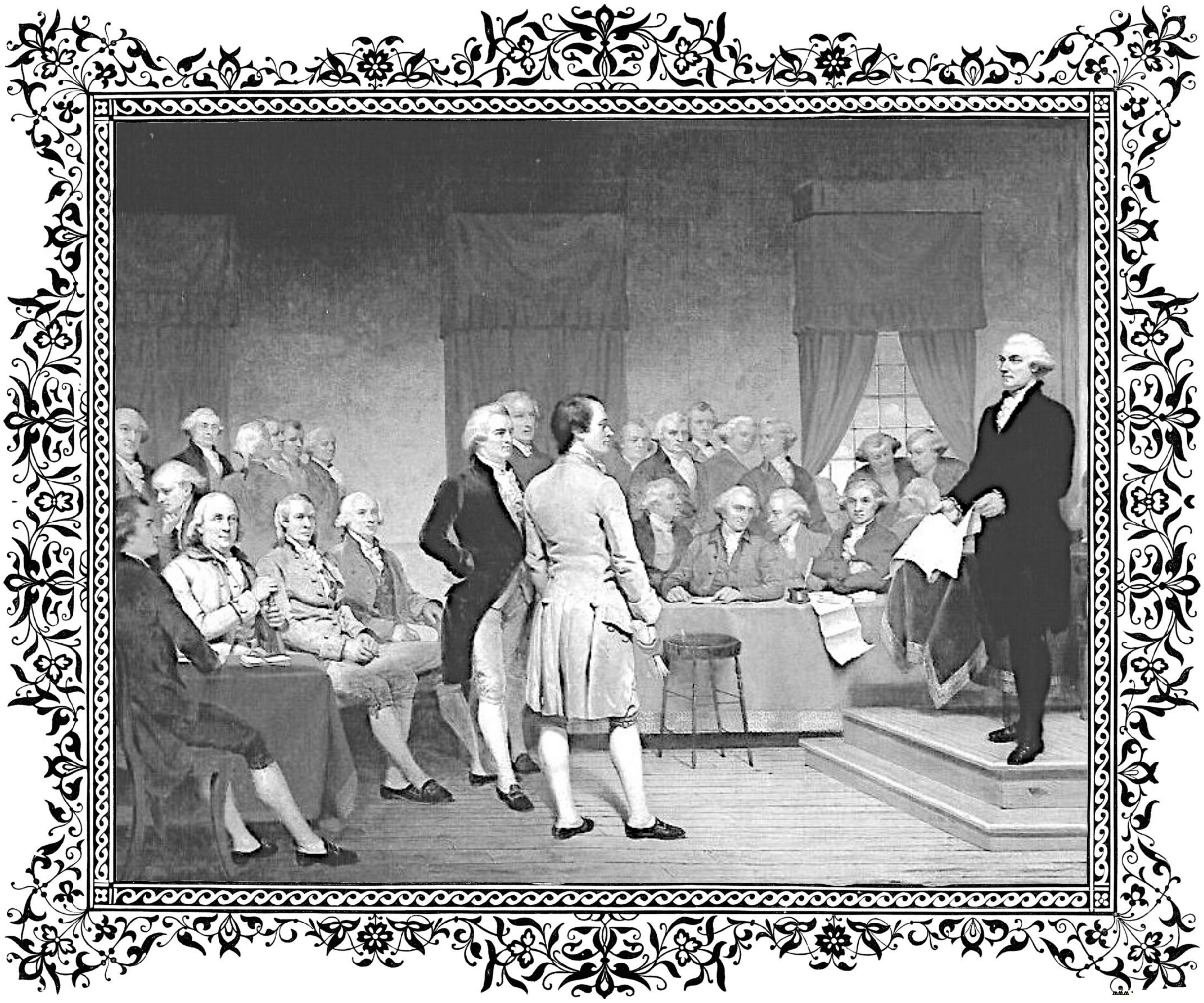
Given their vast variety and the huge number of newly discovered viruses, some scientists propose that viruses should be classified as a fourth domain of life.

Scientists have developed a few antiviral drugs, to treat HIV infections, flu, and herpes. Progress on antivirals is difficult because viruses live inside cells. It is hard to kill the virus without harming the host cell. Viruses' genetic material changes quickly, too. So a vaccine for this year's flu might not be effective next year. We need a flu shot every year to protect us against new forms of the virus.

Scientists, doctors, and other researchers are racing to develop a vaccine for SARS-CoV-2. But creating a new vaccine takes time. Scientists must be certain a vaccine is safe before giving it to billions of people, and that requires careful testing. Researchers around the world are working together to try to make a vaccine available as soon as possible.

Think Questions

1. How do viruses depend on cells?
2. How do you think virus genes became part of human genes?
3. How do humans protect themselves from viral diseases?
4. What questions do you have about SARS-CoV-2, the virus that causes COVID-19?



We the People of the United States,
in Order to form a more perfect Union,
establish Justice, insure domestic Tranquility,
provide for the common defence,
promote the general Welfare,
and secure the Blessings of Liberty
to ourselves and our Posterity,
do ordain and establish this Constitution
for the United States of America.

Preamble to the United States Constitution, September 17, 1787

Name: ________________________________ Grade: _____________ Date: __________

Preamble

The **Preamble** is the introduction to the U.S. Constitution. It says:

"We the People of the United States, in Order to form a more perfect Union, establish Justice, insure domestic Tranquility, provide for the common defense, promote the general Welfare, and secure the Blessings of Liberty to ourselves and our Posterity, do ordain and establish this Constitution for the United States of America."

Directions: *The above phrases from the Preamble describe purposes or functions of government. The founding fathers had six goals in mind when they set out to create the Constitution. Translate each of the six phrases below into everyday language that helps give a clearer understanding of what each means.*

1. To form a more perfect Union:

2. Establish Justice:

3. Insure domestic Tranquility:

4. Provide for the common defense:

5. Promote the general Welfare:

6. Secure the blessings of liberty to ourselves and our Posterity:

ESL at Home Gr. 6-8 Weeks 5-6

Use notebook paper to complete these activities. Do one each day!

Monday	Tuesday	Wednesday	Thursday	Friday
Who is your favorite book or movie character? Write or draw what would happen if you met them in real life.	Look at the food in your home. Create a pretend menu for lunch. **Example**: Pretzel and jelly sandwich with a side of tuna fish: $4.67 Chocolate chip scrambled eggs with salsa ice cream: $5.99	Unscramble these animal names, then draw the animal. caro rwmo cnaotu rumle	Make a t-chart of healthy and unhealthy foods in your home. 	Create your own superhero. Draw and label a costume and superpowers. Write about a time the superhero saved someone.
Monday	Tuesday	Wednesday	Thursday	Friday
Use boxes or books to create a ramp. Find five things to roll down the ramp. What rolls the farthest? What rolls the shortest?	Design a plan for your dream neighborhood. Draw and label a map of the homes, streets, and businesses you would have.	Create a commercial for your new neighborhood. Tell what makes it special and why people should move there.	Listen to any song. Write down any similes you hear. Ex: "I came in LIKE a wrecking ball." 	Choose two animals, like a horse and an alligator. Imagine what they would look like if they were put together. Draw it, and write about its ecosystem.