Christina School District Instructional Board

Student's First & Last Name_____ Student ID/Lunch # _____ School _____ Grade_____

Grade Level: 11th

Week of May 18th, 2020

	Day 1	Day 2	Day 3	Day 4	Day 5
ELA	This week's focus is to build upon your prior knowledge, giving you experience in reading real-world informational texts, note-taking, critical thinking, and metacognitive skills. --- Evaluate the Political Cartoons And answer the questions	Read the article **"Young People Are Seriously Ill**…" Follow the instructions on the article.	Answer the **Digging Deep Questions.**	**Analyzing Writer's Craft**	Write a 1-2 paragraph response to the article. Utilize 1-2 of the writer's techniques in your response **OR** Choose one of the cartoons from Day 1 and explain in a paragraph how it connects to the main idea of the article.
Math (IM3)	*Reasoning with Similarity Conditions* Answer "Which One Doesn't Belong?" and justify your choice. (attached) Review Concept Summary from last week on Triangle Similarity Theorems and this week's Concept Summary: Similar Right Triangles. (attached) Complete	Complete Similarity in Right Triangles Worksheet 2 #1-3. (attached) Reference Concept Summary if needed.	Complete Similarity in Right Triangles Worksheet 3 #1-7. (attached) Reference Concept Summary if needed.	Complete Similarity in Right Triangles Worksheet 4 #1-4. (attached) Reference Concept Summary if needed.	Complete CC Standards Practice Week 7 Worksheet #1-3. (attached)

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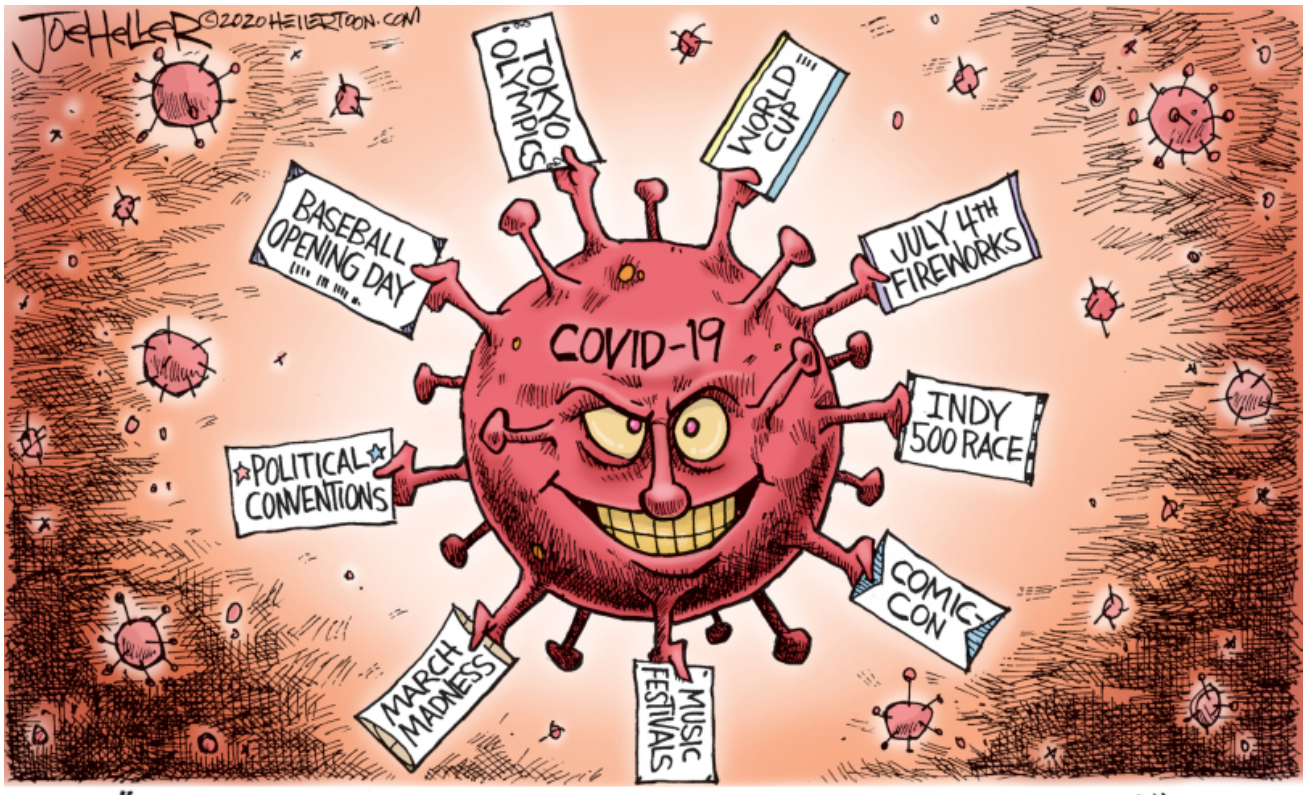
	Similarity in Right Triangles Worksheet 1 #1-5. (attached)				
Science	**The Periodic Table: A Classic Design (part 1):** Read first ½ of article. Highlight, underline and/or annotate for understanding.	**The Periodic Table: A Classic Design (part 2):** Read second ½ of article. Complete highlighting, underlining and/or annotating for understanding. Write your best answers to the following: a) What is the IUPAC? b) What are s, p, d, and f? c) Why do elements in the same column have similar properties? d) Why don't noble gases react much with other elements?	**The Periodic Table: A Classic Design (part 3):** Reread notes as necessary. Write your best answer to the following: What information can you tell about an element based on its position in the periodic table? Explain using at least 3 examples.	**Deadly and Life-Giving Elements of the Periodic Table (part 1):** Read article. Highlight, underline and/or annotate for understanding.	**Deadly and Life-Giving Elements of the Periodic Table (part 2):** Reread article as needed. Make a claim that answers this question: How might some chemicals affect the growth of organisms? Support your claim with evidence from the article. Then, explain why the evidence supports your claim.
Social Studies	Complete Activity 5 from the document titled, "Drafting America" NOTE: You have this document from last week.	Complete Activity 1, 2, and 3 from the document titled, "The Dust Bowl"	Complete Activity 4 from the document titled, "The Dust Bowl"	Complete Activity 5 from the document titled, "The Dust Bowl"	Complete Activity 6 from the document titled, "The Dust Bowl"

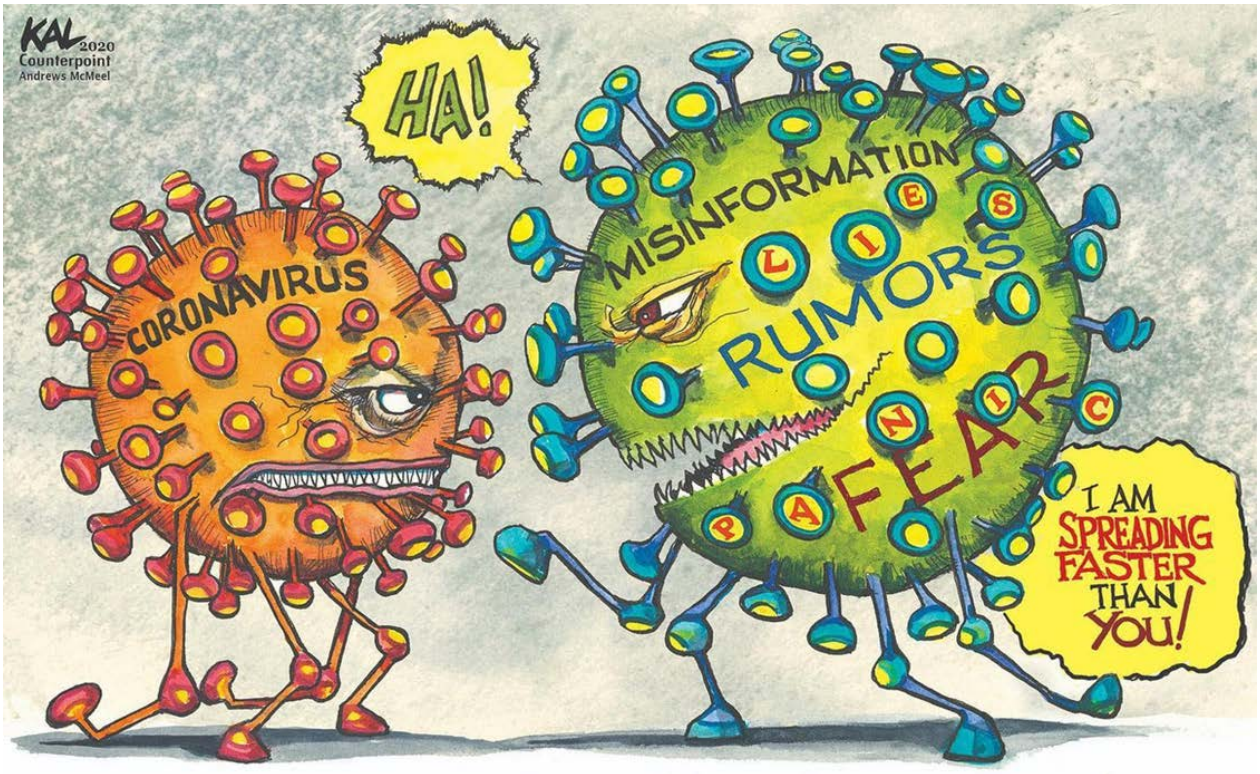
Evaluate this Political Cartoons:

1



"I HAVE TICKETS TO ALL THE MAJOR EVENTS THIS YEAR!"

2



	What does this cartoon mean?	What does it mean for Americans? Explain in detail – based on your evaluation of all parts of the cartoon:
Cartoon 1		
Cartoon 2		

1. Referring to cartoon 2, explain the following; misinformation, rumors, fear.
   _____
   _____
   _____

2. Explain why misinformation, rumors, and fear are spreading faster than COVID-19
   _____
   _____
   _____

Instructions

Step 1: Number the paragraphs
Step 2: Skim the article using these symbols as you read:
(+) agree, (-) disagree, (*) important, (!) surprising, (?) wondering
Step 3: Read the article now carefully and make notes in the margin. Try to mark each paragraph with an important note, idea or question.
Step 4: Answer the following.

1. What surprised you as you read?
2. What did the author think you already knew?
3. What challenged, changed or confirmed what you knew?

Step 5: Write a 1-2 sentence summary of the article.

Yes, Young People Are Falling Seriously Ill From Covid-19 the U.S., 705 of first 2,500 cases range in age from 20 to 44.

By Michelle Fay Cortez, Angelica LaVito, and Robert Langreth
Bloomberg March 18, 2020, 7:09 PM

Prognosis

New evidence from Europe and the U.S. suggests that younger adults aren't as impervious to the novel coronavirus that's circulating worldwide as originally thought.

Despite initial data from China that showed elderly people and those with other health conditions were most vulnerable, young people — from twenty-somethings to those in their early forties — are falling seriously ill. Many require intensive care, according to reports from Italy and France. The risk is particularly dire for those with ailments that haven't yet been diagnosed.

"It may have been that the millennial generation, our largest generation, our future generation that will carry us through for the next multiple decades, here may be a disproportional number of infections among that group," Deborah Birx, the White House coronavirus response coordinator, said in a press conference on Wednesday, citing the reports.

The data bears out that concern. In Italy, the hardest hit country in Europe, almost a quarter of the nearly 28,000 coronavirus patients are between the ages of 19 and 50, according to data website Statista.

Similar trends have been seen in the U.S. Among nearly 2,500 of the first coronavirus cases in the U.S., 705 were aged 20 to 44, according to the Centers for Disease Control and Prevention. Between 15% and 20% eventually ended up in the hospital, including as many as 4% who needed intensive care. Few died.

One of those younger adults is Clement Chow, an assistant professor of genetics at the University of Utah. "I'm young and not high risk, yet I am in the ICU with a very severe case," Chow said in a March 15 tweet. "We really don't know much about this virus."

According to his Twitter posts, Chow had a low-grade fever for a few days and then a bad cough that led to respiratory failure. It turned out to be the coronavirus. He ended up on high flow oxygen in the ICU. When he arrived last Thursday, he was the first patient there. "Now there are many more," he tweeted.

Chow didn't give his age in the tweets, but his laboratory website indicates he graduated from college in 2003 and has two unruly children. He didn't respond to an email and Bloomberg was unable to independently confirm his status as a patient.

It's true that risk of death climbs precipitously with age. While there were only 144 patients over age 85, as many as 70% were hospitalized and 29% needed intensive care, according to the CDC report. One in four died, the agency said in the Morbidity and Mortality Weekly Report.

Yet emerging evidence suggests that infants and toddlers may also be at risk of severe complications. In a study of more than 2,000 young children with Covid-19 from China, published this week in Pediatrics, Chinese doctors found that about 11% of cases in infants were judged to be severe or critical, as were 7% of those in toddlers and preschoolers. While still a lower rate of severe disease than adults, it's hardly insignificant.

In the White House press conference Wednesday, President Donald Trump implored younger people to stop reckless behavior, such as partying, going to the beach and hanging out at bars. Yet, as college campuses across the country close down and require students to leave, even the most conscientious young adults face a difficult choice. Finding their academic years abbreviated and graduation plans shattered, many are driving or flying home, where they risk exposing their parents and grandparents to Covid-19.

The same concerns apply to young people starting out in big cities who suddenly find themselves under pressure to head back to their hometowns. Livia Calari's father has been begging her to come home for weeks. The 25-year-old and her boyfriend live in Brooklyn, New York, and have been nervously watching the warnings from officials intensify and the city they live in shut down. But they're staying put, for now at least.

The couple has two cats they'd have to move. If they did hunker down with Calari's father in Washington, D.C., they would be asked to self-quarantine on a separate floor for two weeks. Plus, the thought of accidentally bringing the virus worries them.

“I have a lot of anxiety, maybe irrationally, about bringing it to him,” Calari said of her father, who's 65. “I would feel awful.”

After days of thinking over their options, they decided to stay in New York and re-evaluate if a lockdown gets to the point where they can’t even leave their apartment to take walks.

Stay Home

Infection-fighting officials are willing to go to unusual lengths to get the word out to young people where they congregate, including on the Pardon My Take podcast from Barstool Sports – one of the most popular sports shows with younger listeners.

Anthony Fauci, the head of the National Institute on Allergy and Infectious Diseases, told the hosts how stressful the outbreak has been.

“You cannot imagine,’’ he said. “You see what happened in China, you see what’s happening in Italy. We have the virus in the United States, and we want to make sure by our efforts that we don’t have that degree of disease and suffering that we are seeing in other countries.’’

And he called on young people to embrace the effort to protect themselves and the broader population.

“No one is invulnerable, but even if you are doing very well, you have to be a very important part of our national effort to contain the outbreak,’’ Fauci said. “You are not a passive person in this. You are an important part of the active plan to contain this epidemic. We really do need you. This isn’t something that can be successful without you.”

Digging Deep- answers may be in phrases

1. What does this author want you to know about young people and COVID-19?

   _____

   _____

   _____

   _____

2. Using evidence from this text, should you be concerned about COVID-19? Explain you answer:

   _____

   _____

   _____

   _____

3. What should you be doing to protect yourself and your family from COVID-19?

   _____

   _____

   _____

   _____

4. Choose a word/line/passage form the article and respond to it.

   _____

   _____

Analyzing Author's Craft

Re-read the article a final time looking specifically for writer's craft.

Make notes about the kinds of ideas covered in the text, the type of evidence the writer uses to support his ideas, how the piece is organized and presented, and how the writer uses language/words to add layers of meaning.

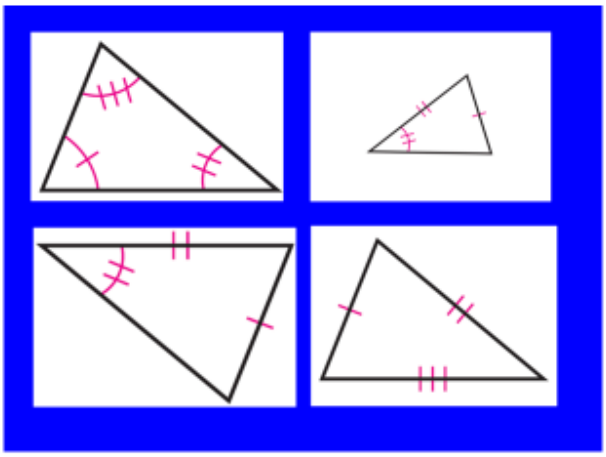
After you identify some of the techniques choose one of focus.

- Quote the example from the text.
- Identify where in the text the author uses the technique.
- How does the use of this technique support the main idea and impact the reader?
- Explain in 1- 2 paragraphs.

IM3 – Week of May 18th

Reasoning with Similarity Conditions

Which One Doesn't Belong? Why?



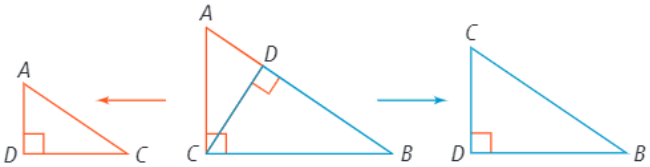
Concept Summary Assess

CONCEPT SUMMARY Similarity in Right Triangles

WORDS

- The altitude to the hypotenuse of a right triangle divides the triangle into two triangles that are similar to the original triangle and to each other.
- The length of the altitude is the geometric mean of the lengths of the segments of the hypotenuse.
- The length of each leg is the geometric mean of the length of the hypotenuse and the length of the segment adjacent to the leg.

DIAGRAMS

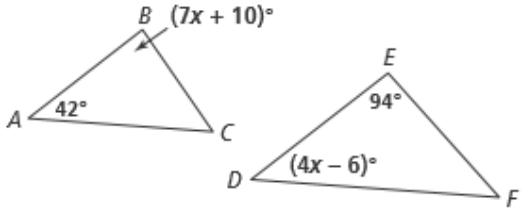


SYMBOLS $\triangle ACD \sim \triangle ABC \sim \triangle CBD$

$\frac{AB}{AC} = \frac{AC}{AD}$, $\frac{AD}{CD} = \frac{CD}{DB}$, and $\frac{AB}{CB} = \frac{CB}{DB}$

Similarity in Right Triangles Worksheet 1

1. For what value of x is $\triangle ABC \sim \triangle DEF$?



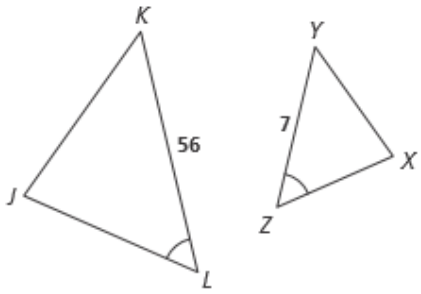
Ⓐ 12

Ⓑ 25

Ⓒ 44

Ⓓ 52

2. Which condition would prove $\triangle JKL \sim \triangle XYZ$?



Ⓐ $\frac{JK}{XY} = \frac{1}{8}$

Ⓑ $\frac{JL}{XZ} = \frac{1}{8}$

Ⓒ $\frac{KL}{YZ} = 8$

Ⓓ $\frac{JL}{XZ} = 8$

3. Given $\triangle FGH \sim \triangle LMN$, which must be true? Select all that apply.

Ⓐ $\frac{FG}{LM} = \frac{FH}{LN}$

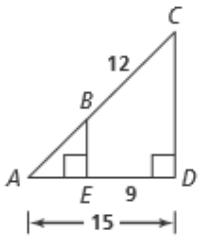
Ⓑ $FH \sim LN$

Ⓒ $\frac{m\angle F}{m\angle L} = \frac{m\angle G}{m\angle M}$

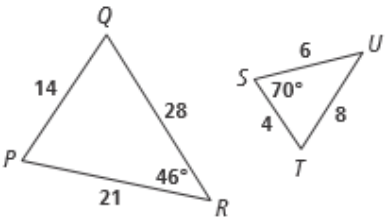
Ⓓ $GH \cong MN$

Ⓔ $m\angle H \cong m\angle N$

4. Given $\triangle ACD$ and $\triangle ABE$, what is AB?

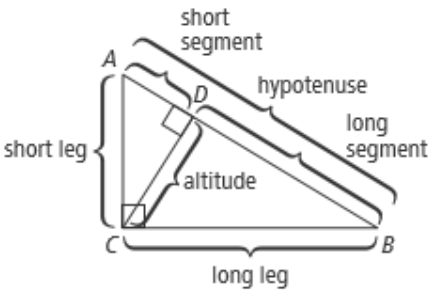


5. Given $\triangle PQR$ and $\triangle STU$, what is $m\angle Q$?



Similarity in Right Triangles Worksheet 2

1. Use the diagram to match each description to the appropriate equation.



$\frac{AB}{AC} = \frac{AC}{AD}$ $\frac{AB}{CB} = \frac{CB}{DB}$ $\frac{AD}{CD} = \frac{CD}{DB}$

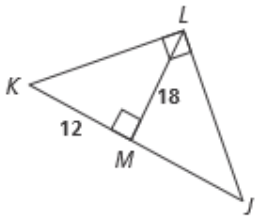
The length of the **altitude** is the **geometric mean** of the **hypotenuse segments**.

The length of the **short leg** is the **geometric mean** of the length of the **hypotenuse** and the length of the **short segment**.

The length of the **long leg** is the **geometric mean** of the length of the **hypotenuse** and the length of the **long segment**.

2. Given $\triangle JKL$, Jamie writes a proportion to find MJ.

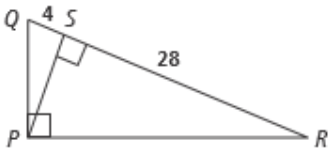
$\frac{12}{18} = \frac{18}{12 + MJ}$



Jamie's proportion is incorrect. Fill in the blanks to write the correct proportion.

$\frac{\quad}{\quad} = \frac{\quad}{\quad}$

3. Fill in the blanks and solve the proportion to find QP.



$\frac{\quad}{QP} = \frac{QP}{\quad}$

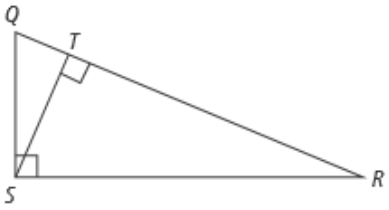
$\frac{\quad}{QP} = \frac{QP}{\quad}$

$(QP)^2 =$

$QP =$

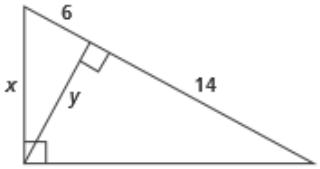
Similarity in Right Triangles Worksheet 3

1. Name the right triangles that are similar to $\triangle QRS$.

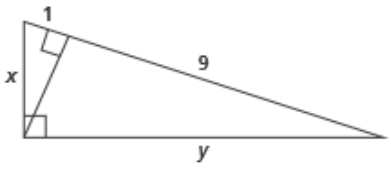


For Exercises 2–5, find the values of *x* and *y*.

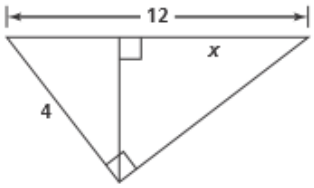
2.



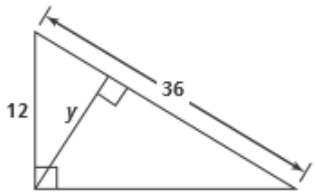
3.



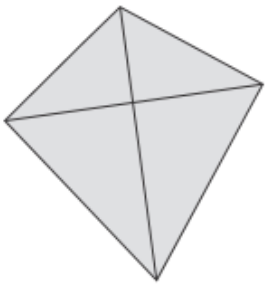
4.



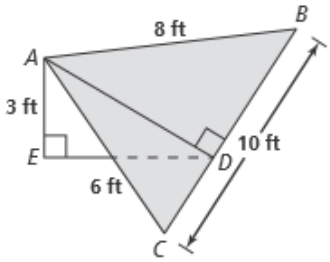
5.



6. Devin says that since the diagonals of the kite intersect at right angles, the small right triangles are similar to both the left half and the right half of the kite. Is he correct? Explain.



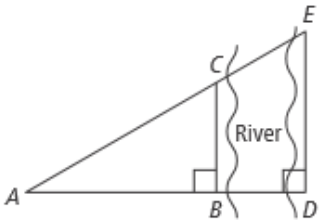
7. Isabel and Helena have built a frame and covered it with cloth. The frame is in the shape of a right triangle, $\triangle ABC$, with side lengths 6 ft, 8 ft, and 10 ft. They use a vertical pole $\overline{AE}$ to raise corner A 3 ft, as shown. What is the distance ED from the base of the pole to the edge of the frame? Round to the nearest foot.



Similarity in Right Triangles Worksheet 4

When you cannot measure a distance directly, you can use similar right triangles and indirect measurement to calculate the distance.

Suppose that you need to measure the distance across a wide river. How can you measure the distance indirectly?



1. Since $\triangle ABC$ and $\triangle ADE$ are right triangles and share $\angle A$, they are similar. You can measure all the sides of $\triangle ABC$ because it is on one side of the river. A friend on the other side of the river measures $\overline{DE}$. Write a proportion with lengths of the sides of $\triangle ABC$, DE, and the unknown distance across the river BD.

2. Solve for BD.

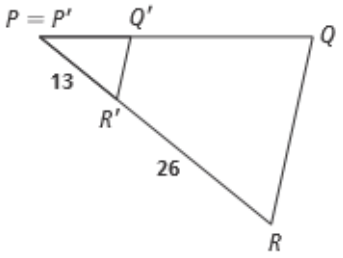
3. If $DE = 500$ m, $AB = 800$ m, and $BC = 400$ m, what is the distance across the river?

4. If $DE = 2{,}400$ ft, $AB = 3{,}000$ ft, and $BC = 2{,}000$ ft, what is the distance across the river?

CC Standards Practice Week 7

Selected Response

1. Is $D_{(n, P)}(\triangle PQR) = \triangle P'Q'R'$ an enlargement or reduction? What is the scale factor n of the dilation?



Ⓐ enlargement; $n = 2$

Ⓑ enlargement; $n = 3$

Ⓒ reduction; $n = \frac{1}{3}$

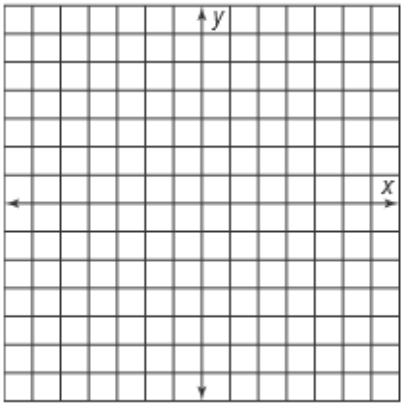
Ⓓ reduction; $n = \frac{1}{2}$

Constructed Response

2. Quadrilateral $ABCD$ has vertices $A(-2, 4)$, $B(1, 4)$, $C(4, -3)$, and $D(-1, -3)$.

a. Graph $ABCD$.

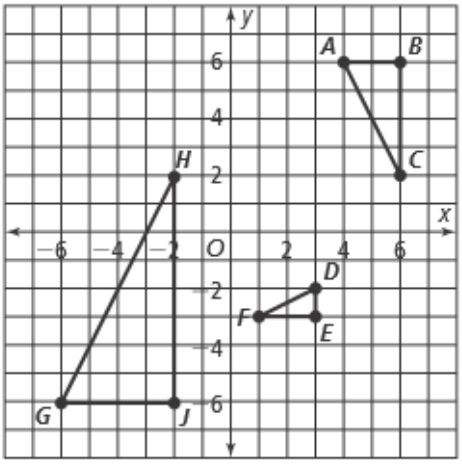
b. Graph $D_3(ABCD)$.



Extended Response

3. a. Is $\triangle ABC \sim \triangle DEF$? If so, describe a similarity transformation that maps $\triangle ABC$ to $\triangle DEF$. If not, explain.

b. Is $\triangle ABC \sim \triangle GJH$? If so, describe a similarity transformation that maps $\triangle ABC$ to $\triangle GJH$. If not, explain.



The periodic table: A classic design

By Mark Blaskovich, The Conversation on 01.02.18
Word Count **1,809**
Level **MAX**

Image 1. The periodic table made out of cupcakes. Photo by: Conrad Erb/Wikimedia.

The periodic table is one of those classic images that you find in many science labs and classrooms. It's an image almost everyone has seen at some time in their life.

You can also find the periodic table on t-shirts, mugs, beach towels, pillowcases and duvet covers, and plenty of other items. It even inspired a collection of short stories.

Who can forget the periodic table put to music by the American Tom Lehrer, a Harvard mathematics professor who was also a singer/songwriter and satirist. His song, The Elements, includes all the elements that were known at the time of writing in 1959.

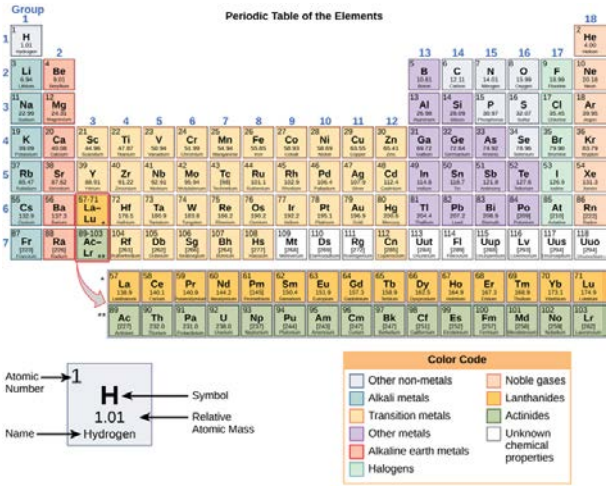
Since then, several new elements have been added to the periodic table, including the four that were formally approved last year by the International Union of Pure and Applied Chemistry (IUPAC).

But what exactly does the periodic table show?

In brief, it is an attempt to organise the collection of the elements – all of the known pure compounds made from a single type of atom.

There are two ways to look at how the periodic table is constructed, based on either the observed properties of the elements contained within it, or on the subatomic construction of the atoms that form each element.

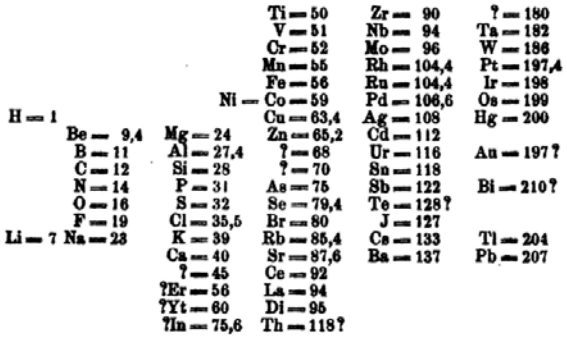
The Elements



When scientists began collecting elements in the 1700s and 1800s, slowly identifying new ones over decades of research, they began to notice patterns and similarities in their physical properties. Some were gases, some were shiny metals, some reacted violently with water, and so on.

At the time when elements were first being discovered, the structure of atoms was not known. Scientists began to look at ways to arrange them systematically so that similar properties could be grouped together, just as someone collecting seashells might try to organise them by shape or colour.

The task was made more difficult because not all of the elements were known. This left gaps, which made deciphering patterns a bit like trying to assemble a jigsaw puzzle with missing pieces.


H = 1
Li = 7 Na = 23
Be = 9,4 Mg = 24 Ca = 40 ?Er = 56 ?Yt = 60 ?In = 75,6
B = 11 Al = 27,4 ? = 45 Ce = 92 La = 94 Di = 95
C = 12 Si = 28 ? = 68 ? = 70 As = 75 Se = 79,4 Br = 80 Rb = 85,4 Sr = 87,6 Ce = 92 La = 94 Di = 95 Th = 118?
N = 14 P = 31 As = 75 Sb = 122 Te = 128? J = 127 Cs = 133 Ba = 137 Tl = 204 Pb = 207
O = 16 S = 32 Se = 79,4 Te = 128? J = 127
F = 19 Cl = 35,5 Br = 80 J = 127
K = 39 Rb = 85,4 Sr = 87,6 Ce = 92 La = 94 Di = 95 Th = 118?
Ti = 50 Zr = 90 ? = 180
V = 51 Nb = 94 Ta = 182
Cr = 52 Mo = 96 W = 186
Mn = 55 Rh = 104,4 Pt = 197,4
Fe = 56 Ru = 104,4 Ir = 198
Ni = Co = 59 Pd = 106,6 Os = 199
Cu = 63,4 Ag = 108 Hg = 200
Zn = 65,2 Cd = 112
? = 68 Ur = 116 Au = 197?
? = 70 Sn = 118
As = 75 Sb = 122 Bi = 210?
Se = 79,4 Te = 128?
Br = 80 J = 127
Rb = 85,4 Cs = 133 Tl = 204
Sr = 87,6 Ba = 137 Pb = 207
Ce = 92
La = 94
Di = 95
Th = 118?

Different scientists came up with different types of tables. The first version of the current table is generally attributed to Russian chemistry professor Dmitri Mendeleev in 1869, with an updated version in 1871.

Importantly, Mendeleev left gaps in the table where he thought missing elements should be placed. Over time, these gaps were filled in and the final version as we know it today emerged.

The Atoms

To really understand the final structure of the periodic table, we need to understand a bit about atoms and how they are constructed. Atoms have a central core (the nucleus) made up of smaller particles called protons and neutrons.

It is the number of protons that gives an element its atomic number – the number generally found in the top left corner of each box in the periodic table.

The periodic table is arranged in order of increasing atomic number (left to right, top to bottom). It ranges from element 1 (hydrogen H) in the top left, to the newly approved element 118 (oganesson Og) in the bottom right.

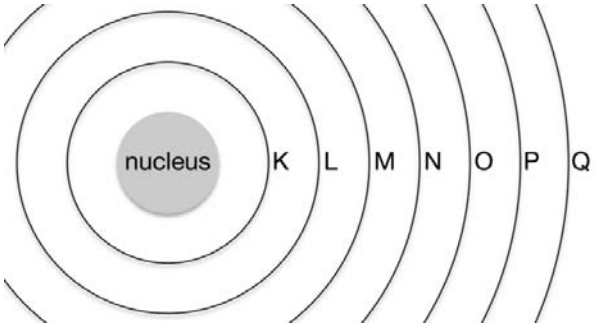
The number of neutrons in the nucleus can vary. This gives rise to different isotopes for every element.

For example, you may have heard of carbon-14 dating to determine the age of objects. This isotope is a radioactive version of normal carbon C (or carbon-12) that has two extra neutrons.

But why is there a separate box of elements below the main table, and why is the main table an odd shape, with a bite taken out of the top? That comes down to how the other component of the atom – the electrons – are arranged.

The Electrons

We tend to think of atoms as built a bit like onions, with seven layers of electrons called "shells," labelled K, L, M, N, O, P and Q, surrounding the core nucleus.



Each row in the periodic table sort of corresponds to filling up one of these shells with electrons. Each shell has subshells, and the order in which the shells/subshells get filled is based on the energy required, although it's a complicated process. We'll come back to these later.

In simple terms, the first element in each row starts a new shell containing one electron, while the last element in each row has two (or one for the first row) of the subshells in the outer shell fully occupied. These differences in electrons also account for some of the similarities in properties between elements.

With the one or two subshells in the outer layer full of electrons, the last elements of each row are quite unreactive, as there are no holes or gaps in the outer shell to interact with other atoms.

This is why elements in the last column, such as helium He, neon (Ne), argon (Ar) and so on, are called the noble gases (or inert gases). They are all gases and they are "noble" because they rarely associate with other elements.

In contrast, the elements of the first column, with the exception of hydrogen (just like English grammar, there's always an exception!), are called alkali metals. The first-column elements are metal-like in character, but with only one electron in the outer shell. They are very reactive as this lone electron is very easy to engage in chemical bonding. When added to water, they quickly react to form an alkaline (basic) solution.

Each shell can accommodate an increasing number of electrons. The first shell (K) only fits two, so the first row of the periodic table has only two elements: hydrogen (H) with one electron, and helium (He) with two.

The second shell (L) fits eight electrons. Thus, the second row of the periodic table contains eight elements, with a gap left between hydrogen and helium to accommodate the extra six.

The third shell (M) fits 18 electrons, but the third row still only has eight elements. This is because the extra 10 electrons don't get added to this layer until after the first two electrons are added to the fourth shell (N) (we'll get to why, later).

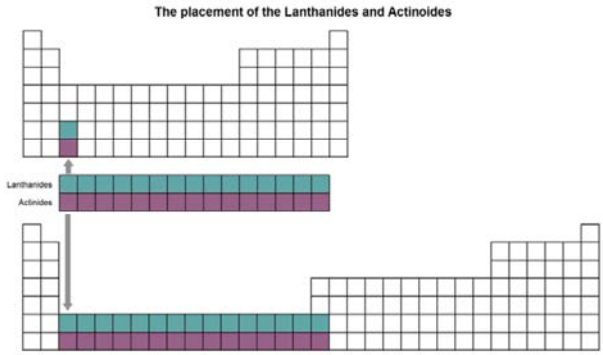
So the gap is expanded in the fourth row to accommodate the additional 10 elements, leading to the "bite" out of the top of the table. The extra 10 compounds in the middle section are called the

transition metals.

The fourth shell holds 32 electrons, but again the extra electrons are not added to this shell until some have also been added to the fifth (O) and sixth (P) shells, meaning that both the fourth and fifth rows hold 18 elements.

For the next two rows (sixth and seventh), rather than further expanding the table sideways to include these extra 14 elements, which would make it too wide to easily read, they have been inserted as a block of two rows, called the lanthanoids (elements 57 to 71) and actinoids (elements 89 to 103), below the main table.

You can see where they would fit in if the periodic table was widened, if you look at the bottom two squares in the third column of the table above.



Across The Columns

There is another complicating factor leading to the final shape of the table. As mentioned earlier, as the electrons are added to each layer, they go into different subshells (or orbitals), which describes locations around the nucleus where they are most likely to be found. These are known by the letters s, p, d and f.

Electron shell	Subshell names	Number of electrons in each subshell	Total electrons in subshell
K	1s	2	2
L	2s	2	2 + 6 = 8
	2p	6	
M	3s	2	2 + 6 + 10 = 18
	3p	6	
	3d	10	
N	4s	2	2 + 6 + 10 + 14 = 32
	4p	6	
	4d	10	
	4f	14	
O*	5s	2	2 + 6 + 10 + 14 = 32
	5p	6	
	5d	10	
	5f	14	
P*	6s	2	2 + 6 + 10 = 18
	6p	6	
	6d	10	
Q*	7s	2	2 + 6 = 8
	7p	6	

* More subshells are possible (increasing alphabetically, g, h, etc) but are not needed for the periodic table.

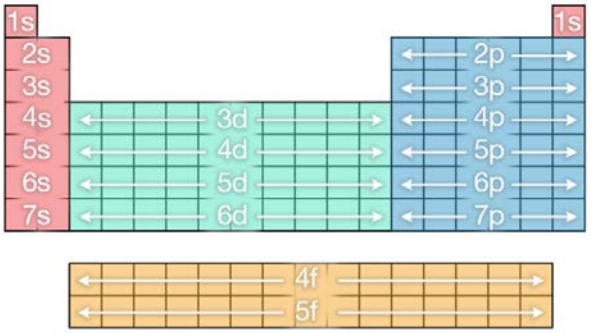
The letters used for the orbitals are actually derived from descriptions of the emission or absorption of light due to electrons moving between the orbitals: sharp, principal, diffuse and fundamental.

Each shell has its own configuration of subshells named from 1s through 7p, which gives the total number of electrons in each shell as we progress through the periodic table.

As mentioned earlier, the order in which the subshells fill with electrons is not so straightforward. You can see the order in which they fill from the image below. Just follow the order as you would read down from left to right.

Elements within a column generally have similar properties, but in some places elements side by side can also be similar. For example, in the transition metals, the cluster of precious metals around copper (Cu), silver (Ag), gold (Au), palladium (Pd) and platinum (Pt) are quite alike.

Most of the existing elements with high atomic numbers, including the four superheavy elements added last year, are very unstable and have never been detected in, or isolated from, nature.



Instead, they are created and analysed in minute quantities under highly artificial conditions. Theoretically, there could be further elements beyond the 118 now known (there are additional g, h and i suborbitals), but we don't know yet if any of these would be stable enough to be isolated.

A Classic Design

The periodic table has seen many colourful and informative versions created over the years.

One of my favourites is an artistic version with original artworks for each element commissioned by the Royal Australian Chemical Institute to celebrate the International Year of Chemistry in 2011.

Another favourite is an interactive version with pictures of the elements. The creators of this site have also published a coffee table book called The Elements, and an Apple app with videos of each element.

Interactive versions have also been created by the Royal Society of Chemistry (and can also be downloaded as an app) and ChemEd DL, among others.

The classic design of the periodic table can be used to play a version of the Battleship game.

There are also many fun versions created to help organise a multitude of objects, including food, iPad apps and birds.

As for Tom Lehrer's The Elements, the song has yet to be updated to include all the elements known today, but it has been covered by other people over the years.

There are other musical versions of the elements, but they, too, have yet to be updated to include all entries of the periodic table.

In summary, the periodic table is the chemist's taxonomy of all elements. Its triumph is that it is still highly relevant to scientists, while also becoming embedded in popular culture.

Mark Blaskovich is a Senior Research Officer at the University of Queensland, Australia.

Deadly and life-giving elements of the periodic table

By Julie Pollock, The Conversation on 12.02.19
Word Count **1,027**
Level **MAX**

Image 1. The red tip on these matches contains phosphorus, which ignites when in contact with oxygen. Photo by: C Levers via Shutterstock

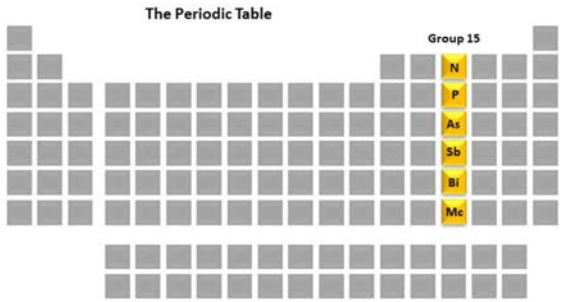
When you see the periodic table, what comes to mind? The pieces on a scrabble board? Maybe you think about your high school chemistry class. Maybe you think of the colorful table plastered on the wall of a lecture hall in college. Maybe you remember your favorite teacher setting something on fire in the front of the classroom. I am an assistant professor of chemistry at University of Richmond and when I hear the phrase "the periodic table," I think about life.

I think about how the molecules and chemicals that surround us and dictate our everyday activities are made up of the elements on that table – they sustain our life, they bring beauty to the world and they are vital in medicine.

Each column of the periodic table is called a group. Every member of the group has a similar arrangement of electrons which can result in similar chemical properties. The group 15 elements – nitrogen, phosphorus, arsenic, antimony, bismuth and moscovium – are interesting to me because of their pivotal role in life, as well as in my research lab. One element we study is phosphorus because of its integral role in the fate of cells.

But before we get into those details, let's take a brief look at each of the group 15 elements. They are a unique set in their history, uses and properties.

Group 15: Giving Life And Causing Death



Nitrogen (N) in its atmospheric form (N_2) makes up approximately 78 percent of the air we breathe. When bacteria living within plant roots convert it into a usable form through a process called nitrogen fixation, this elemental form of nitrogen gets incorporated into many compounds that are necessary for life – proteins and DNA, for example. At the bottom of the column is moscovium (Mc), which is interesting because it doesn't really exist in nature. It's a radioactive element that can only be generated in a laboratory and survives for less than a second.

Arsenic (As) may be familiar to you because of its association with poisonings. In 1494, Pico della Mirandola, an Italian humanist philosopher during the Renaissance, was poisoned by arsenic, although the details surrounding his early death are still debated. For a long time it was believed that Napoleon Bonaparte died of arsenic exposure in 1821, but after extensive comparisons of preserved hair samples from different stages of his life, researchers concluded the increased levels of arsenic were most likely due to preservation techniques of the time. More recently, the World Health Organization estimated arsenic-contaminated drinking water in Bangladesh resulted in over 9,000 deaths in 2001. How arsenic poisons and kills isn't completely understood, but there is no doubt that the element causes destruction of vital organs in the human body.

When the element antimony (Sb) is combined with three oxygen atoms to form antimony trioxide, it is used extensively as a flame retardant for furniture, carpets, drapes, rubber, plastics and adhesives. Quantities of this molecule in these household products tend to be very small, and these levels of antimony are regarded as safe.

Bismuth (Bi) is a metal found in the same row of the periodic table as a number of toxic metals; however, compounds containing bismuth are harmless. Bismuth compounds can be found in cosmetics due to their distinctive and desirable silvery shimmer. Even if you haven't used bismuth-containing personal care products, you have probably encountered it in the well-known antacid Peptobismol®, which is used to treat upset stomachs, or on the Fourth of July when you are watching fireworks. It is a bismuth compound that causes the crackling sounds of the dragon egg fireworks.

Last, but not least, of the group 15 elements is phosphorus (P). It was discovered in 1669, by the alchemist Hennig Brandt and named from the Greek word "phosphoros," meaning bringer of light. That's because when the elemental form interacts with atmospheric oxygen it produces a brilliant light. Chemists figured out how to harness the power of this reaction for the development of matches. The red tip on a match still contains a form of phosphorus today.

Phosphates: Regulating Cancer Cell Fate

In addition to sparks generated by the element, phosphorus is found in a compound known as a phosphate: phosphorus linked to four oxygen atoms. In cells, when a phosphate molecule is

attached to a protein, it can turn on, or activate, the protein so that it can perform its function in the cell – like stimulating growth.

When the phosphate is no longer attached to the protein, the cells stop growing. You can think of it almost like the matches described above – when the phosphate is there, the match can ignite and business can proceed. When the phosphate is removed, the match is just a stick and no light is provided; not as much work can happen in the dark.

In cancerous cells, the phosphate status is out of control. Imagine a lot of lit matches and a very bright room that can result in a flurry of activity. This activity can have severe consequences for cells. For example, unregulated growth and migration can lead to cancer.

In my laboratory at the University of Richmond, we are interested in understanding these phosphates and one protein in particular that interacts with them. This protein, called MEMO1, is found in high quantities in breast cancer patients and helps the phosphates to always stay attached to proteins. We are trying to understand how MEMO1 interacts with these phosphates and are developing strategies to disrupt those interactions.

We hope that our work reveals a way to help remove the phosphates to stop the unchecked growth of cells; in other words, to blow out the matches.

So next time you hear the words "periodic table," please think of life. Think of the molecules that you encounter every moment of every day, think of the medicine that keeps you healthy and think of those of us who are working to understand how to keep you that way.

The Dust Bowl

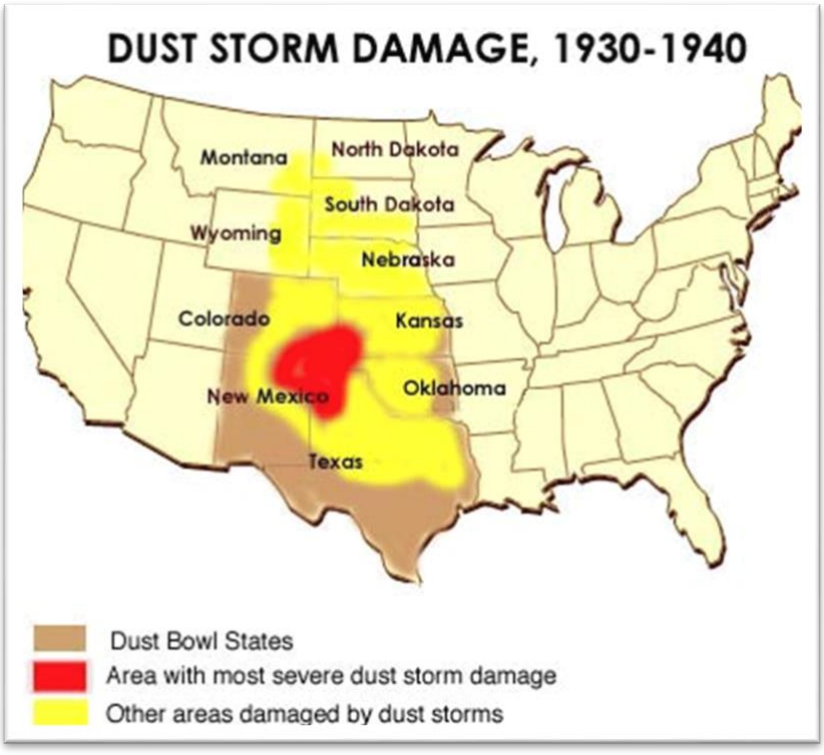
Benchmark Standard	History 3a: Students will compare competing historical narratives, by contrasting different historians' choice of questions, use and choice of sources, perspectives, beliefs, and points of view, in order to demonstrate how these factors contribute to different interpretations.
Grade Band	11-12
Vocabulary	In the documents

~This is a Stanford History Education Group (SHEG) lesson, modified by CSD for use at home~

ACTIVITY 1: Look at the photograph below and answer the questions that follow it.

1. Describe what you see in this picture.
2. When and where do you think this picture was taken? Explain your answer.

ACTIVITY 2: Observe the pictures and read the Dust Bowl information.



• The Dust Bowl refers to a period of severe dust storms and soil erosion in the Great Plains during the 1930s.
• This region included parts of Oklahoma, Texas, Kansas, Colorado, and smaller parts of New Mexico and Nebraska.

There were more than 300 dust storms, also known as "Black Blizzards," between 1933 and 1938. These storms often featured fast moving clouds of dust several miles wide that covered farms and homes, destroyed crops, and made people sick. One of the hardest hit areas was the Oklahoma Panhandle.

Migrant family in San Francisco, 1935

Farmer leveling dust hills in Texas, 1938

- Many people left the Dust Bowl region, abandoning their homes and to look for work in Western states, such as California. However, many stayed behind.
- Since the 1930s people have debated what caused the Dust Bowl. Historians continue to address this question: Was the Dust Bowl a natural disaster or was it caused by people's actions?
- Today we are going to analyze and compare a set of primary and secondary sources to better understand ***what caused the Dust Bowl.***
- You will now read and compare accounts of the Dust Bowl from two people who lived through it. The purpose and directions for reading the documents are:
    - to think about what life was like during the Dust Bowl
    - to compare the similarities and differences of these documents
    - to consider how the documents help you answer the Central Historical Question: What caused the Dust Bowl?

ACTIVITY 3: Read documents A & B. Answer the guiding questions for Documents A & B on a separate sheet of paper. Fill out the graphic organizer for Documents A & B.

ACTIVITY 4: Read document C. Answer the Guiding Questions for Document C. Fill out the Graphic Organizer for Document C.

ACTIVITY 5: Read Documents D & E. Answer the Guiding Questions for Documents D & E. Fill out the Graphic Organizer for Documents D & E.

ACTIVITY 6: Complete the final hypothesis on the Graphic Organizer, what caused the Dust Bowl?

Document A: Henderson Letter (Modified)

Caroline Henderson started homesteading in the Oklahoma Panhandle in 1907. She was a published writer who wrote for various magazines. The passage below is an excerpt of a letter she wrote to Secretary of Agriculture Henry Wallace in 1935 at the age of 58. Wallace would later credit her with helping America understand farmers' problems and the courage they exhibited.

For twenty-seven years this little spot on the vast expanses of the Great Plains has been the center of all our thought and hope and effort. And marvelous are the changes that we have seen . . . The almost unbroken buffalo grass sod has given way to cultivated fields. The old trails have become wide graded highways. Little towns have sprung up with attractive homes, trees, flowers, schools, churches, and hospitals. Automobiles and trucks, tractors and combines have revolutionized methods of farm work and manner of living. The wonderful crop of 1926 when our country alone produced 10,000,000 bushels of wheat – more it was said than any other equal area in the world – revealed the possibilities of our productive soil under modern methods of farming. It seemed as if at last our dreams were coming true. . . .

Yet now our daily physical torture, confusion of mind, and gradual wearing down of courage, seem to make that long continued hope look like a vanishing dream. For we are in the worst of the dust storm area where "dust to eat" is not merely a figure of speech, but the phrasing of a bitter reality. . . .

In this time of severe stress, credit must be given to the various activities of the federal government. Without such aid as has been furnished, it seems certain that large sections must have been virtually abandoned. Yet common sense suggests that the regions which are no longer entirely self-supporting cannot rely indefinitely upon government aid. So the problem remains and the one satisfactory solution is beyond all human control. Some of our neighbors with small children, fearing the effects upon their health, have left temporarily "until it rains." Others have left permanently, thinking doubtless that nothing could be worse.

Source: Caroline Henderson's letter to Henry A. Wallace, sent July 26, 1935

Document B: Svobida Account (Modified)

Lawrence Svobida was a young farmer who came to Oklahoma in 1929 and farmed there until 1939. He suffered seven crop failures in eight years. When he left, he wrote an account of his struggles. He wanted to share the story of the "average farmer without sugar coating it," as he claimed others had. Below are two excerpts from his account.

Excerpt 1: The **gales** chopped off the plants even with the ground, then proceeded to take the roots out. They did not stop there. They blew away the rich topsoil, leaving the subsoil exposed: and then kept sweeping away the "hard-pan," which is almost as hard as the concrete.

This was something new and different from anything I had ever experienced before – a destroying force beyond my wildest imaginings. When some of my own fields started blowing, I was utterly **bewildered**. . . .

According to [my neighbors'] information, there was little hope of saving a crop once the wind had started blowing; and the only known method of checking the movement of the soil was the practice of strip listing. This meant running deep parallel **furrows** twenty or thirty feet apart, in an east and west direction, across the path of the prevailing winds. This tends to check the force of the wind along the ground and allows the fine silt-like dust to fall into the open furrows.

Excerpt 2: There had been **overgrazing** before the coming of the settlers and the invasion of barbed wire, but the **death knell** of the Plains was sounded and the birth of the Great American Desert was **inaugurated** with the introduction and rapid improvement of power farming. Tractors and **combines** made the Great Plains regions a new wheat empire, but in doing so they disturbed nature's balance, and nature is taking its revenge.

Source: Lawrence Svobida, Farming the Dust Bowl: A First-Hand Account from Kansas, first published in 1940.

VOCABULARY:	
Gales: strong winds, windstorms	Death knell: bell or signal announcing death
Bewildered: confused	Inaugurated: begun
Overgrazing: too much grass eaten by cattle	Combines: a machine that harvests crops

Document C: Government Report

The passage below is an excerpt from the Report on the Great Plains Drought Area Committee. This report was created by was a government committee set up to analyze the causes of the Dust Bowl. Morris Cooke, Administrator of the Rural Electrification Administration, chaired the committee, but the leaders of eight federal agencies, including the Department of Agriculture and Soil Conservation Service, signed it.

Personal and Confidential from Morris Cooke.

August 27, 1936

Dear Mr. President,

The Committee has made a **preliminary** study of drought conditions in the Great Plains area with the hope of outlining a long-term program which would **render** future droughts less disastrous. . .

The agricultural economy of the Great Plains will become increasingly unstable and unsafe, in view of the impossibility of permanent increase in the amount of rainfall, unless **overcropping**, overgrazing and improper farm methods are prevented. There is no reason to believe that the primary factors of climate temperature, precipitation and winds in the Great Plains region have undergone any fundamental change. The future of the region must depend, therefore, on the degree to which farming practices conform to natural conditions. Because the situation has now passed out of the individual farmer's control, the reorganization of farming practices demands the cooperation of many agencies, including the local, State, and Federal governments.

Mistaken public policies have been largely responsible for the situation now existing. The Federal Government must do its full share in **remedying** the damage caused by a mistaken homesteading policy, by the stimulation of war time demands which led to overcropping and overgrazing, and by encouragement of a system of agriculture which could not be both permanent and **prosperous**.

Source: Excerpt from the Report of the Great Plains Drought Area Committee, sent to President Roosevelt on August 27, 1936.

VOCABULARY:	
preliminary: first, introductory	overcropping: depleting soil by continually planting crops on it
render: to make	remedying: making right render: to make prosperous: financially successful

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Document D: Historian, Professor Donald Worster

Professor Donald Worster is a leader in the field of environmental history. He is a professor at the University of Kansas and has written several books on environmental topics. The excerpt below is from his book Dust Bowl: The Southern Plains in the 1930s.

The Dust Bowl took only 50 years to accomplish. . . . It came about because the culture was operating in precisely the way it was supposed to. Americans blazed their way across a richly endowed continent with a ruthless, devastating efficiency unmatched by any people anywhere. Some environmental catastrophes are nature's work, others are the slowly accumulating effects of ignorance or poverty. The Dust Bowl, in contrast, was the inevitable outcome of a culture that deliberately, self-consciously, set itself that task of dominating and exploiting the land for all it was worth.

The Dust Bowl . . . came about because the expansionary energy of the U.S. had finally encountered a volatile, marginal land, destroying the delicate ecological balance that had evolved there. We speak of farmers and plows on the plains and the damage they did, but the language is inadequate. What brought them to the region was a social system, a set of values, an economic order. . . . Capitalism, it is my contention, had been the decisive factor in this nation's use of nature.

Source: Excerpt from Professor Donald Worster's book titled, Dust Bowl: The Southern Plains in the 1930s, published in 1979.

VOCABULARY:	
endowed: gifted, resourced	inevitable: unavoidable, necessary
ruthless: cruel	expansionary: spreading out
efficiency: effectiveness	volatile: unstable, unpredictable
catastrophes: disasters, tragedies	marginal: of secondary importance

Document E: Historian, Professor R. Douglas Hurt

Professor R. Douglas Hurt is the head of the History Department at Purdue University. He has written numerous books on agricultural history. The excerpt below comes from his book The Dust Bowl: An Agricultural and Social History.

Dust storms in the southern Great Plains, and indeed, in the Plains as a whole, were not unique to the 1930s . . . Many factors contributed to the creation of the Dust Bowl – soils subject to wind erosion, drought which killed the soil-holding vegetation, the **incessant** wind, and technological improvements which facilitated the rapid breaking of the native sod. The nature of southern Plains soils and periodic influence of drought could not be changed, but the technological abuse of the land could have been stopped. This is not to say that mechanized agriculture **irreparably** damaged the land – it did not. New and improved **implements** such as tractors, one-way disk plows, grain drills, and combines reduced plowing, planting, and harvesting costs and increased agricultural productivity. Increased productivity caused prices to fall, and farmers **compensated** by breaking more sod for wheat. At the same time, farmers gave little thought to using their new technology in ways that would **conserve** the soil.

Source: Excerpt from Professor R. Douglas Hurt's book titled, The Dust Bowl: An Agricultural and Social History, published in 1981.

VOCABULARY:	implements: equipment, tools
incessant: nonstop, constant	compensated: adjusted, made do
irreparably: permanently	conserve: protect from harm or destruction

GUIDING QUESTIONS:

Document A: Henderson

1) What type of document is this? When was it written? Why was it written?
2) According to Henderson, what are three changes that happened in Oklahoma during the 1910s and 1920s? What is her attitude about these changes?
3) How does the author describe life in Oklahoma in 1935? What are two examples of how people experienced the Dust Bowl?
4) How does this document help you address the question: What caused the Dust Bowl?

Document B: Svobida

1) Who wrote this document? When was it written? Why was it written?
2) According to Svobida, how did the dust and wind affect crops?
3) What exactly does Svobida mean by the phrase "power farming"? What would be the difference between traditional farming and "power farming"?
4) What, according to this Svobida, were two causes of the Dust Bowl?
5) How is Svobida's account similar to and different from Henderson's letter?

Document C: Government Report

1) What kind of document is this? When was it written? Why was it written?
2) What problem is this report addressing?
3) What, according to this report, were three causes of the Dust Bowl?
4) Is this a reliable account? Why or why not?

Documents D and E: Professors Worster and Hurt

1) What kind of documents are these? When were they written? Why were they written?
2) What does Professor Worster identify as the primary cause of the Dust Bowl?
3) Do the other documents support this conclusion? Why or why not?
4) What are 4 causes of the Dust Bowl that Professor Hurt identifies?
5) In what ways are Worster and Hurt's accounts different?

Graphic Organizer

Initial hypothesis: What caused the Dust Bowl?

Round One:

Document	Reasons suggested by this document	Evidence from document to support these reasons
Henderson Letter		
Svobida Account		

Second hypothesis: What caused the Dust Bowl?

Round Two:

Document	Reasons Suggested by this Document	Evidence from document to support these reasons
Government Report		

Third hypothesis: What caused the Dust Bowl?

Round Three

Document	Reasons Suggested by this Document	Evidence from document to support these reasons
Worster Excerpt		
Hurt Excerpt		

Final Hypothesis: What caused the Dust Bowl? Explain and support your answer with evidence from the docs.
