

Margaret White Elementary School
7th Grade Learning Packet May 11-22, 2020

7th Grade - ELA Assignments (Extra Credit)

Activity One:

Writing Prompt (Activity) Instructions - Respond to a writing prompt that gives you an opportunity to express yourself and reflect on current events and issues. Reflections are usually opinions or descriptions of your feelings about something you have experienced. Writing prompt responses should be recorded on a separate sheet of paper and returned with this packet. Each activity is designed to require 1-4 days to complete, including edits and revisions.

Blast - Read the following Blast Background:

There are over 7 billion people currently living on our planet, and that number keeps growing. Interacting with others is a part of life, for better or worse. Humans are not solitary creature—we crave companionship. But interacting with our fellow humans isn't always easy. Human interaction can be fraught with all kinds of challenges. In fact, there is a field of psychology devoted to studying all aspects of human interaction: It is called social psychology. Social psychologists are scientists who study the behavior of individuals in social situations. They study both verbal and nonverbal communication. Their goal is to understand the differences between the way people behave in groups and the way they behave on their own. They study how group environments can influence our actions, choices, and perceptions. Several interesting experiments have been conducted by social psychologists, including one by Solomon Asch in the 1950s. Asch wanted to study conformity, or how people act when exposed to peer pressure. Each subject of his experiment was told that he or she would be put in a group of nine people and asked to work together to answer a simple question. What the test subjects didn't know was that the eight other people in the groups were actors hired by Asch. The actors were told beforehand to decide on a wrong answer to the question. Asch wanted to find out if the real test subject would insist on the right answer, or if he or she would go along with the group despite knowing the group's answer was incorrect. Surprisingly, Asch found that most people were willing to quash their own ideas in the interest of group harmony. Many of them second-guessed themselves, thinking that they must somehow be wrong if eight other people thought so. Social conformity is just one challenge of human interaction that scientists study.

Answer the question in 250 characters or less.

What are other challenges of human interaction?

Activity Two: (Read and annotate the text as you would in class. Note new vocabulary words.)

Reading Text for the Week:

First Read: The Teacher Who Changed My Life

Read

The person who set the course of my life in the new land entered as a young war refugee—who, in fact, nearly dragged me on to the path that would bring all the blessings I've received in America—was a salty-tongued, no-nonsense schoolteacher named Marjorie Hurd. When I entered her classroom in 1953, I had been to six schools in five years, starting in the Greek village where I was born in 1939.

When I stepped off a ship in New York Harbor on a gray March day in 1949, I was an undersized 9-year-old in short pants who had lost his mother and was coming to live with the father he didn't know. My mother, Eleni Gatzoyiannis, had been imprisoned, tortured, and shot by Communist **guerrillas** for sending me and three of my four sisters to freedom. She died so that her children could go to their father in the United States.

The portly, bald, well-dressed man who met me and my sisters seemed a foreign, authoritarian figure. I secretly resented him for not getting the whole family out of Greece early enough to save my mother. Ultimately, I would grow to love him and appreciate how he dealt with becoming a single parent at the age of 56, but at first our relationship was prickly, full of hostility.

As Father drove us to our new home—a tenement in Worcester, Mass.—and pointed out the huge brick building that would be our first school in America, I clutched my Greek notebooks from the refugee camp, hoping that my few years of schooling would impress my teachers in this cold, crowded country. They didn't. When my father led me and my 11-year-old sister to Greendale Elementary School, the grim-faced Yankee principal put the two of us in a class for the mentally retarded. There was no facility in those days for non-English-speaking children.

By the time I met Marjorie Hurd four years later, I had learned English, been placed in a normal, graded class, and had even been chosen for the college preparatory track in the Worcester public school system. I was 13 years old when our father moved us yet again, and I entered Chandler Junior High shortly after the beginning of the seventh grade. I found myself surrounded by richer, smarter, and better-dressed classmates who looked askance at my strange clothes and heavy accent. Shortly after I arrived, we were told to select a hobby to pursue during “club hour” on Fridays. The idea of hobbies and clubs made no sense to my immigrant ears, but I decided to follow the prettiest girl in my class—the blue-eyed daughter of the local Lutheran minister. She led me through the door marked “Newspaper Club” and into the presence of Miss Hurd, the newspaper adviser and English teacher who would become my **mentor** and my **muse**.

A formidable, solidly built woman with salt-and-pepper hair, a steely eye, and a flat Boston accent, Miss Hurd had no patience with layabouts. “What are all you goof-offs doing here?” she bellowed at the would-be journalists. “This is the Newspaper Club! We're going to put out a newspaper. So if there's anybody in this room who doesn't like work, I suggest you go across to the Glee Club now, because you're going to work your tails off here!”

I was soon under Miss Hurd's spell. She did indeed teach us to put out a newspaper, skills I honed during my next 25 years as a journalist. Soon I asked the principal to transfer me to her English class as well.

There, she drilled us on grammar until I finally began to understand the logic and structure of the English language. She assigned stories for us to read and discuss; not tales of heroes, like the Greek myths I knew, but stories of underdogs—poor people, even immigrants, who seemed ordinary until a crisis drove them to do something extraordinary. She also introduced us to the literary wealth of Greece—giving me a new perspective on my war-ravaged, impoverished homeland. I began to be proud of my origins.

One day, after discussing how writers should write about what they know, she assigned us to compose an essay from our own experience. Fixing me with a stern look, she added, "Nick, I want you to write about what happened to your family in Greece." I had been trying to put those painful memories behind me and left the assignment until the last moment. Then, on a warm spring afternoon, I sat in my room with a yellow pad and pencil and stared out the window at the buds on the trees. I wrote that the coming of spring always reminded me of the last time I said goodbye to my mother on a green and gold day in 1948.

I kept writing, one line after another, telling how the Communist guerrillas occupied our village, took our home and food, how my mother started planning our escape when she learned the children were to be sent to reeducation camps behind the Iron Curtain and how, at the last moment, she couldn't escape with us because the guerrillas sent her with a group of women to thresh wheat in a distant village. She promised she would try to get away on her own, she told me to be brave and hung a silver cross around my neck, and then she kissed me. I watched the line of women being led down into the ravine and up the other side, until they disappeared around the bend—my mother a tiny brown figure at the end who stopped for an instant to raise her hand in one last farewell.

I wrote about our nighttime escape down the mountain, across the minefields and into the lines of the Nationalist soldiers, who sent us to a refugee camp. It was there that we learned of our mother's execution. I felt very lucky to have come to America, I concluded, but every year, the coming of spring made me feel sad because it reminded me of the last time I saw my mother.

I handed in the essay, hoping never to see it again, but Miss Hurd had it published in the school paper. This **mortified** me at first, until I saw that my classmates reacted with sympathy and tact to my family's story. Without telling me, Miss Hurd also submitted the essay to a contest sponsored by the Freedoms Foundation at Valley Forge, Pa., and it won a medal. The Worcester paper wrote about the award and quoted my essay at length. My father, by then a "five-and-dime-store chef," as the paper described him, was ecstatic with pride, and the Worcester Greek community celebrated the honor to one of its own.

For the first time I began to understand the power of the written word. A secret ambition took root in me.

One day, I vowed, I would go back to Greece, find out the details of my mother's death and write about her life, so her grandchildren would know of her courage. Perhaps I would even track down the men who killed her and write of their crimes. Fulfilling that ambition would take me 30 years.

Meanwhile, I followed the literary path that Miss Hurd had so forcefully set me on. After junior high, I became the editor of my school paper at Classical High School and got a part-time job at the Worcester Telegram and Gazette. Although my father could only give me \$50 and encouragement toward a college education, I managed to finance four years at Boston University with scholarships and part-time jobs in journalism. During my last year of college, an article I wrote about a friend who had died in the Philippines—the first person to lose his life working for the Peace Corps—led to my winning the Hearst Award for College Journalism. And the plaque was given to me in the White House by President John F. Kennedy.

For a refugee who had never seen a motorized vehicle or indoor plumbing until he was 9, this was an unimaginable honor. When the Worcester paper ran a picture of me standing next to President Kennedy, my father rushed out to buy a new suit in order to properly receive the congratulations of the Worcester Greeks. He clipped out the photograph, had it laminated in plastic and carried it in his breast pocket for the rest of his life to show everyone he met. I found the much-worn photo in his pocket on the day he died 20 years later.

In our isolated Greek village, my mother had bribed a cousin to teach her to read, for girls were not supposed to attend school beyond a certain age. She had always dreamed of her children receiving an education. She couldn't be there when I graduated from Boston University, but the person who came with my father and shared our joy was my former teacher, Marjorie Hurd. We celebrated not only my bachelor's degree but also the scholarships that paid my way to Columbia's Graduate School of Journalism. There, I met the woman who would eventually become my wife. At our wedding and at the baptisms of our three children, Marjorie Hurd was always there, dancing alongside the Greeks.

By then, she was Mrs. Rabidou, for she had married a widower when she was in her early 40s. That didn't distract her from her vocation of introducing young minds to English literature, however. She taught for a total of 41 years and continually would make a "project" of some balky student in whom she spied a spark of potential. Often these were students from the most troubled homes, yet she would alternately bully and charm each one with her own special brand of tough love until the spark caught fire. She retired in 1981 at the age of 62 but still avidly follows the lives and careers of former students while overseeing her adult stepchildren and driving her husband on camping trips to New Hampshire.

Miss Hurd was one of the first to call me on Dec. 10, 1987, when President Reagan, in his television address after the summit meetings with Gorbachev, told the nation that Eleni Gatzoyiannis' dying cry, "My children!" had helped inspire him to seek an arms agreement "for all the children of the world."

"I can't imagine a better monument for your mother," Miss Hurd said with an uncharacteristic catch in her voice.

Use the following Annotation Guidelines to help you annotate the excerpt of *A Place for Us*. Be sure to make annotations or highlights to the text to complete each line.

1. Highlight at least two sentences or passages that you have questions about. Enter your questions as annotations.
2. Highlight at least one passage that connects with something you already know and use the annotation tool to explain the connection.
3. Highlight three important details and annotate their relevance to the excerpt. For example, "When I entered her classroom in 1953, I had been to six schools in five years, starting in the Greek village where I was born in 1939." Annotation: Gage explains that when he was 13, he first met Marjorie Hurd, the person who set the course of his life, after he had been to six schools in five years.
4. Highlight vocabulary words and explain what you think the words mean based on how they are used in the text.
5. Highlight at least two examples of how Marjorie Hurd directly influenced Gage's journalistic career.
6. Highlight at least two turning points in Gage's life that positively impacted his efforts to become a journalist. Explain these impacts in your own words using the annotation tool.

Vocabulary for Activity 2:

Think about the meaning of each word in the box as it's used in "The Teacher Who Changed My Life."

Use the meaning of the word to answer the question.

Write your answer in the blank.

Vocabulary Words

mentor muse guerrillas catalyst mortified

1. It wasn't the army causing problems for the general, but rather the _____ who were separated into different units, spread across the forest.
2. My _____ for the past six months has helped me reach my goal of finishing a comprehensive book report.
3. Her _____ arrived at the same park, every day at noon; so that's when she would set up her easel and begin to paint.
4. My little sister's singing at the family reunion completely _____ me this afternoon.
5. The teacher-led student political club's report was a _____ for convincing the school board to approve the budget for the upcoming year.

Comprehension Activity for Activity 2:

1. Gage is just 9 years old when he first arrives in _____ to _____.
Gage's _____ had sent him and three of his four _____ from war-torn Greece.
When he first came to school, he struggled because _____, but after
only _____ years he had learned to speak _____ and had
even been chosen for the _____ in the Worcester Public School System.
2. Gage describes himself following the prettiest girl into the "_____"; here, he
meets _____ for the first time. He describes her as a
"_____ woman" who had "no patience with _____." Gage
said he was soon "_____."
3. One day, Miss Hurd asks Gage to write about what happened to _____. Gage admits
putting off the assignment until the last minute, but is prompted to write, realizing that
at _____, he becomes sad because it was _____. Miss Hurd
publishes the essay and Gage is surprised to see his _____, react
with _____ and _____.
4. The award the essay wins plus reactions to his story within the school begins to help Gage
understand _____. This starts Gage down a _____ toward
college at Boston University and later graduate school at _____.
5. Gage notes that his mother had always dreamed of _____. Even though she was not
there to celebrate Gage's graduation from Boston University, both his father
and _____ attended the ceremony. Since then, she has attended many of Gage's major
life moments, including the _____ of his three children and celebrating
his _____ picnic.

Writing Prompts - Respond to what you have read on a separate sheet of paper.

1. How does the author show the reader that Miss Hurd "set the course of [Gage's] life"? What major events provide evidence of this?
2. Gage explains to the reader how his mother always dreamed of her children receiving an education. How did Miss Hurd promote this goal in Gage's life while he was in school and even afterward?
3. What does the reader learn about Eleni Gatzoyiannis? How does Gage's experience with his mother and his experience in Miss Hurd's classroom help the reader understand the impact the two women had in shaping Gage's life?

Activity Three: (Read and annotate the text as you would in class. Note new vocabulary words.)

Reading Text for the Week: *The Miracle Worker*

The Miracle Worker by William Gibson (1914–2008) was not only an award-winning Broadway play, but also an Academy Award-winning film. Based on the autobiography of Helen Keller, *The Story of My Life*, “The Miracle Worker” presents an emotional account of Keller’s early life, after an illness caused her to lose her sight and hearing. The excerpt here comes from Act III of the play, and illustrates the unflagging efforts of teacher Annie Sullivan to break through Helen’s walls of darkness and silence. In sharing the story of Helen Keller, who went on to become a world-famous author and political activist, Gibson provides a powerful portrait of two strong-willed females guided by the spirit of determination.

CHARACTERS:

ANNIE SULLIVAN: young teacher trained to work with the blind and deaf; in her early twenties

HELEN KELLER: child who has been blind and deaf since infancy; now seven years old

KATE KELLER: Helen’s mother; in her early thirties

CAPTAIN KELLER: Helen’s father; middle-aged

JAMES KELLER: Captain Keller’s grown son by a previous marriage; in his early twenties

AUNT EV: Captain Keller’s sister; middle-aged

VINEY: Keller family servant

TIME: The 1880’s.

PLACE: In and around the Keller homestead in Tuscumbia, Alabama.

[Now in the family room the rear door opens, and *HELEN* seeps in. She sands a moment, then sniffs in one deep grateful breath, and her hands go out vigorously to familiar things, over the door panels, and to the chairs around the table, and over the silverware on the table, until she meets *VINEY*; she pats her flank approvingly.]

VINEY: Oh, we glad to have you back too, prob’ly.

[*HELEN* hurries groping to the front door, opens and closes it, removes its key, opens and closes it again to be sure it is unlocked, gropes back to the rear door and repeats the procedure, removing its key and hugging herself gleefully. *AUNT EV* is next in by the rear door, with a relish tray; she bends to kiss *HELEN’S* cheek. *HELEN* finds *KATE* behind her, and thrusts the keys at her.]

KATE: What? Oh. [To *EV*]

Keys.

[*She pockets them, lets HELEN feel them.*]

Yes, I’ll keep the keys. I think we’ve had enough of locked doors, too.

[*JAMES, having earlier put ANNIE’S suitcase inside her door upstairs and taken himself out of view around the*

corner, now reappears and comes down the stairs as ANNIE and KELLER mount the porch steps. Following them into the family room, he pats ANNIE'S hair in passing, rather to her surprise.]

JAMES: Evening, general.

[He takes his own chair opposite. VINEY bears the empty water pitcher out to the porch. The remaining suggestion of garden house is gone now, and the water pump is unobstructed; VINEY pumps water into the pitcher. KATE surveying the table breaks the silence.]

KATE: Will you say grace, Jimmie?

[They bow their heads, except for HELEN, who palms her empty plate and then reaches to be sure her mother is there. JAMES considers a moment, glances across at ANNIE, lowers his head again, and obliges.]

JAMES [*Lightly*]: And Jacob was left alone, and wrestled with an angel until the breaking of the day; and the hollow of Jacob's thigh was out of joint, as he wrestled with him; and the angel said, Let me go, for the day breaketh. And Jacob said, I will not let thee go, except thou bless me. Amen.

[ANNIE has lifted her eyes suspiciously at JAMES, who winks expressionlessly and inclines his head to HELEN.]

Oh, you angel.

[The others lift their faces; VINEY returns with the pitcher, setting it down near KATE, then goes out the rear door; and ANNIE puts a napkin around HELEN.]

AUNT EV: That's a very strange grace, James.

KELLER: Will you start the muffins, Ev?

JAMES: It's from the Good Book, isn't it?

AUNT EV [*Passing a plate*]: Well, of course it is. Didn't you know?

JAMES: Yes, I knew.

KELLER [*Serving*]: Ham, Miss Annie?

ANNIE: Please.

AUNT EV: Then why ask?

JAMES: I meant it *is* from the Good Book, and therefore a fitting grace.

AUNT EV: Well, I don't know about *that*.

KATE [*With the pitcher*]: Miss Annie?

ANNIE: Thank you.

AUNT EV: There's an awful *lot* of things in the Good Book that I wouldn't care to hear jus before eating.

[When ANNIE reaches for the pitcher, HELEN removes her napkin and drops it to the floor. ANNIE is flinging HELEN'S glass when she notices it; she considers HELEN'S bland expression a moment, then bends, retrieves it, and tucks it around HELEN'S neck again.]

JAMES: Well, fitting in the sense that Jacob's thigh was out of joint, and so is this piggie's.

AUNT EV: I declare, James—

KATE: Pickles, Aunt Ev?

AUNT EV: Oh, I should say so, you know my opinion of your pickles—

KATE: This is the end of them, I'm afraid. I didn't put up nearly enough last summer, this year I intend to— *[She interrupts herself, seeing HELEN deliberately lift of her napkin and drop it again to the floor. She bends to retrieve it, but ANNIE sops her arm.]*

KELLER *[Not noticing]*: Reverend looked in at the office today to complain his hens have sopped laying. Poor fellow, he was out of joint, all he could— *[He sops too, to frown down the table at KATE, HELEN, and ANNIE in turn, all suspended in mid-motion.]*

JAMES *[Not noticing]*: *I've always suspected those hens.*

AUNT EV: Of what?

JAMES: *I think they're Papis. Has he tried—* *[He stops, too, following KELLER'S eyes. ANNIE now sops to pick the napkin up.]*

AUNT EV: James, now you're pulling my—lower extremity, the first thing you know we'll be—

[She stops, too, hearing herself in the silence. ANNIE, with everyone now watching, for the third time puts the napkin on HELEN. HELEN yanks it off, and throws it down. ANNIE rises, lifts HELEN'S plate, and bears it away. HELEN, feeling it gone, slides down and commences to kick up under the table; the dishes jump. ANNIE contemplates this for a moment, then coming back takes HELEN'S wrists firmly and swings her off the chair. HELEN struggling gets one hand free, and catches at her mother's skirt; when KATE takes her by the shoulders, HELEN hangs quiet.]

KATE: Miss Annie.

ANNIE: *No.*

KATE *[A pause]*: *It's a very special day.*

ANNIE *[Grimly]*: It will be, when I give in to that.

[She tries to disengage HELEN'S hand; KATE lays hers on ANNIE'S.]

ANNIE: Captain Keller.

KELLER *[Embarrassed]*: *Oh, Katie, we—had a little talk, Miss Annie feels that if we indulge Helen in these—*

AUNT EV: *But what's the child done?*

ANNIE: She's learned not to throw things on the floor and kick. It took us the best part of two weeks and—

AUNT EV: But only a napkin, it's not as if it were breakable!

ANNIE: And everything she's learned *is*? Mrs. Keller, I don't think we should—play tug-of-war for her, either give her to me or you keep her from kicking.

KATE: What do you wish to do?

ANNIE: Let me take her from the table.

AUNT EV: Oh, let her say, my goodness, she's only a child, she doesn't have to wear a napkin if she doesn't

want to her first evening—

ANNIE [*Level*]: And ask outsiders not to interfere.

AUNT EV [*Astonished*]: Out—outsider—I'm the child's *aunt*!

KATE [*Distressed*]: Will once hurt so much, Miss Annie? I've—made all Helen's favorite foods, tonight.

[*A pause.*]

KELLER [*Gently*]: It's a homecoming party, Miss Annie.

[ANNIE after a moment releases HELEN. But she cannot accept it, at her own chair she shakes her head and turns back, intent on KATE .]

ANNIE: She's testing you. You realize?

JAMES [*To ANNIE*]: She's testing you.

KELLER: Jimmie, be quiet.

[JAMES sits, tense.]

Now she's home, naturally she—

ANNIE: And wants to see what will happen. At your hands. I said it was my main worry, is this what you promised me not half an hour ago?

KELLER [*Reasonably*]: But she's *not* kicking, now—

ANNIE: And not learning not to. Mrs. Keller, teaching her is bound to be painful, to everyone. I know it hurts to watch, but she'll live up to just what you demand of her, and no more.

JAMES [*Palely*]: She's testing *you*.

KELLER [*Testily*]:] Jimmie.

JAMES: I have an opinion, I think I should—

KELLER: No one's interested in hearing your opinion.

ANNIE: *I'm* interested, of course she's testing me. Let me keep her to what she's learned and she'll go on learning from me. Take her out of my hands and it all comes apart.

Annotation Guide for Activity 3:

Use the following annotation guidelines to help you annotate the excerpt from *The Miracle Worker*. Be sure to make annotations or highlights to the text to complete each line.

1. Highlight at least two sentences or passages that you have questions about. Enter your questions as annotations.
2. Highlight at least one passage that connects with something you already know and use the annotation tool to explain the connection.
3. Highlight how the characters influence the plot. Then use the annotation tool to record your response.
4. Highlight evidence in the dialogue and stage directions to illustrate how the setting affects the characters or events of the plot and also suggests a theme. Use the annotation tool to record specific textual evidence to support your answer.

5. Highlight vocabulary words and explain what you think the words mean based on how they are used in the text.

6. Highlight any additional unfamiliar vocabulary. Use the annotation tool to make predictions about the meaning of these unfamiliar terms.

7. Highlight a place in the dinner scene where the plot shapes the characters and their interactions with one another. Use the annotation tool to explain your reasoning.

Vocabulary for Activity 3:

Think about the meaning of each word in the box as it's used in the The Miracle Worker Library item. Use the meaning of the word to answer the question.

Write your answer in the blank.

Vocabulary Words

unobstructed retrieves deliberately contemplates indulge

1. My grandmother says that she doesn't _____ my grandfather's want for chocolate every day.
2. Because the road was _____ by traffic, it had cleared so that I could make it home.
3. My brother pretends to forget his lunch money but he does it _____.
4. My dog Spike _____ his ball in the field after I throw it each time.
5. The artist _____, or thinks deeply about how to sketch the landscape.

Comprehension Activity for Activity 3:

Summarize and Analyze the Text

Complete the sentences below using information from the text. Then use these completed sentences to help you annotate the text.

1. After Annie spends two weeks teaching how to behave properly, the family falls back into the habit of Helen and making excuses for her behavior. When Helen throws her on the floor, Aunt Ev says, "But what's the done?" It may be true that Helen hasn't broken anything, but she is _____ everyone to see what she can get away with. By indulging Helen, the Keller family is also undermining Annie's _____.
2. Helen continues to deliberately throw her napkin on the floor throughout the dinner. The characters at

the dinner have different _____, though. Because Helen has misbehaved, Annie removes Helen's _____, which causes Helen to throw a temper tantrum. When Annie tries to remove Helen from the _____, Kate is upset. Even tries to convince Annie to let Helen stay at the table.

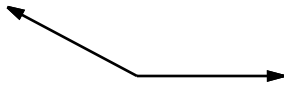
3. Based on the stage directions and the dialogue, Annie is a strong-willed woman. She truly believes that her way of _____ will help Helen to _____. Annie even states that if Helen is taken out of her _____, everything that Helen has _____ will fall _____.
4. James is resentful and bitter toward his half-sister, _____. He repeatedly claims that Helen is _____ Annie. He tries to provide his _____ Helen's teaching; however, his father interrupts him and dismisses his opinion. Other than _____, James is the only character who tries challenging _____.
5. Annie tells the Kellers that teaching Helen "is bound to be _____, to everyone. I know it hurts to watch, but she'll live up to just what you _____ of her, and no more." In other words, Helen will only do what her _____ demand or expect of her. This idea relates to another theme in the play, which is that people rise to meet the expectations place on them.

Responding in Writing:

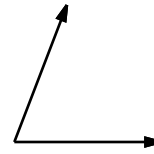
1. How does character affect plot in *The Miracle Worker*?
2. What parts of the plot connect directly with the major theme(s) in the play?
3. How do the play's conflicts relate to the major theme(s)?

Respond to the above prompts using complete sentences on a separate sheet of paper.

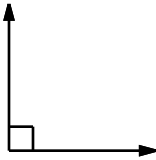
Name: _____



What kind of angle is this?



What kind of angle is this?



What kind of angle is this?

Sketch 2 lines \overleftrightarrow{JK} and \overleftrightarrow{VW} that are perpendicular.

Sketch an acute angle named $\angle CDE$.

Sketch a right angle named $\angle ABC$.

An angle measures 14° .
What would you call this angle?

Use a protractor to draw a 50° angle.

Write the angle that is the supplement of 115° .

Use a protractor to draw an 85° angle.

An angle measures 80° .
What would you call this angle?

What kind of angle has a measure of between 90° and 180° ?

Sketch an acute angle named $\angle ABC$.



Name: _____

Get a fidget spinner! Spin it.

I needed to spin _____ time(s) to finish.

$$7 \times 7 \times 7 = x^3$$

What is the value of x ?

$$3 \times 3 = 3^x$$

What is the value of x ?

$$0.6 (0.2 (0.6 \times 7)) =$$

The letter p is used to represent power points in a game, which can range from 784 to 2,097 points. Express this as an inequality.

At the dive meet Nathan received scores of 5.6, 5.4, 5.6, 5.2, and 3.9. The largest and smallest scores were dropped and the rest were averaged for a final score. What is the final score Nathan received?

If $w = 7$, $b = -6$, and $j = 7$ then what is $w + b + j$?

What is the greatest common factor of the numbers 96 and 60?

Circle the greatest amount:

48%

0.34

$\frac{2}{5}$

If $g = -6$ and $h = 32$ then what is $4g + 9h - 2h = ?$

What is the remainder of 27 divided by 8?

Rewrite $\frac{4}{25}$ as a decimal.

$$8p - 12.3 = 19.7$$

$p =$

Name: _____

Kevin made some wooden blocks for a game he was designing. The blocks were pretty close to being cubes measuring 25 mm on a side. His brother, Adam, actually measured some of the blocks to see how much alike they were. He obtained measurements of 24.5, 25.5, 23.3, 25.3, 26.3, and 24.2 mm. What was the average side length of a block? Round your answer to the nearest tenth.

The National Fern Lovers Society was having its annual meeting in Bigtown. There was a field trip scheduled to go to the national forest on Wednesday, and two buses were reserved for the trip. Each bus held 60 people. Eighty-four people had signed up for the trip. Assuming the people were distributed equally on both the buses, how many empty seats would there be on each bus?

$$|-15| - t = 23$$

$$t =$$

Simplify.

$$\frac{56}{64} =$$

The letter V has an unknown value. If you multiply V by six, the product is three. What value does V have?

Hunter had two nickels, four dimes, and five quarters when he left for school. He bought a candy bar for 60¢ on the way. How much money did he have when he arrived at school?

Let z represent the cost of a widget. If you order widgets from the Universal Widget Company, you will pay z dollars per widget plus a \$18 set up fee for manufacturing them. If $z = \$1.75$, how much would you pay for an order of 120 widgets?

A school play (with three acts) started at 6:00 p.m. and lasted until 7:21 p.m. Half the time was spent on Act 1 and $\frac{1}{4}$ of the time was spent on Act 2. How many minutes were spent on Act 3?

Name: _____

If Jordan had six more nickels and six fewer dimes, she would have the same number of nickels, dimes, and quarters. Jordan has a total of \$9.10. How many of each coin does she have?

Eric has a total of fifty-one nickels and quarters. The quarters come to \$6.75 more than the nickels. How many of each coin does he have?

Jasmine has a total of one hundred fifty-five pennies, dimes, and quarters. She has a total of \$15.80. She has twenty more pennies than quarters and ten more dimes than pennies. How many of each coin does she have?

Kevin has a total of forty-five nickels and quarters. The nickels come to \$5.55 less than the quarters. How much money does he have?

Name: _____

Mr. Fleep had a new flying disk design. He made some calculations and decided if he could make a flying disk that had a perimeter exactly two times the diameter that it would be more aerodynamically stable than a "standard" flying disk and thus fly further. Is his design possible? Why or why not?

There was a 100 mile race at the Megalopolis Race Track. The winning driver had a time of 65 minutes. The next four drivers in order of finish had times (relative to the winning time) of +2, +3.3, +3.6, and +4.5 minutes. The sixth place driver had a time that was 2 minutes slower than the driver ahead of him. What was the sixth place driver's time? Express your answer in hours, minutes, and seconds.

Anne ran the 100 meters in 15.02 seconds. Her archrival Emily ran it in $\frac{23}{100}$ of a second less. What was Emily's time?

Mr. Bloop is playing a mini bowling game at an arcade. He has three rolls of a small ball. Each time he tries to knock down all the pins (nine pins each time). On the first try, he knocks down all nine. On the second try, he knocks down 4. On the third try, nine pins remain standing after he rolled the small ball. How many did he knock down in all?

A third of the students in James' class in Perth are immigrants. If there are eighteen people in the class, how many students are not immigrants?

Mr. Quirk had approximately 48% of the tests graded. (a) Written as a fraction with thirty-one as a denominator, approximately what fraction of the tests did he have graded? (b) What was the approximate graded test:ungraded test ratio?

Name: _____

Emma is doing research on lemurs. On Monday, she spent two and a half hours on the Internet looking for materials. On Tuesday, she browsed encyclopedias online for two and a half hours. On Wednesday, she made note cards and read a book about lemurs. She worked on the report for three and two-thirds hours. Thursday she didn't feel well, but she still looked through some online journals for 36 minutes. Friday she didn't work at all. How many minutes of time did she spend on the Internet during the week?

If two-fifths of all type-Y organisms are bristly, and seven-eighths of all type-Y organisms are wrinkly, what is the maximum number of type-Y organisms that are neither bristly nor wrinkly out of a sample population of 775?

In a creek bed, $\frac{1}{6}$ of the gravel is less than 5 mm in diameter and $\frac{2}{3}$ of it is between 5 and 10 mm in diameter. What fraction of the gravel is greater than one centimeter in diameter?

In a population of 769,015 cells, some are undergoing division and some are not. Assume that while some of the cells are dividing, no other cells will begin to divide until the group that is dividing is finished. Let's say the ratio of dividing to not dividing cells is 8 to 5. What will the cell population be after the cells that are dividing have completed the division process?

Joe's Triangle Hut is having a sale. All triangles are priced at \$0.93 per square inch. At this price, how much would a triangle cost if it has a base of eleven inches and a height of eight inches?

Emma has six skirts and four shirts. How many different combinations of shirts and skirts can she create using these two sets of clothes?

Name: _____

Mary rode her bike for 30 minutes. She went 5.15 miles. What is her speed in miles per hour?

Write the number that when
multiplied by 8 is -48.

When you take some number and subtract -72 from it,
the difference is 105. What is the number?

Name: _____

Seven times a number, decreased by sixty-four, equals six. What is the number?

Twenty exceeds one-twelfth of a number by 12. What is the number?

Two-sixths of a number equals 488. What is the number?

Ten times a number is $46\frac{2}{3}$. What is the number?

Thirty-two more than three-sixths of a number equals 140. What is the number?

1,212 exceeds twelve times a number by 72. What is the number?

Name: _____

Ready to draw a face? First draw the eyes by drawing two isosceles triangles. Now for the mouth. Draw a trapezoid for the mouth. Draw a hexagon for the nose. Now have fun and finish the face!

The area of a square is 8.41 square inches. What is its perimeter?



Name: _____

Get a fidget spinner! Spin it.

I needed to spin _____ time(s) to finish.

$p - \$63 = \23
What is the value of p ?

$$\frac{2}{4} \div \frac{6}{8} =$$

What is the remainder of 69 divided by 15?

Rewrite as an algebraic expression or equation.

Two thousand, five hundred sixty-three minus the product of j and 23.2.

Find the least common denominator for the fractions $\frac{23}{24}$ and $\frac{4}{32}$.

Convert $59\frac{10}{11}$ to an improper fraction.

$$7 + 70 \div 7 - 72 \div 9 =$$

If $n = 7$ and $m = -49$ then what is $6n - 11m - 2m = ?$

$$0.5 \cdot 7 =$$

What is the mode of the following number set?

87, 94, 81, 91, 83, 97, 84, 99, 86, 92, 93, 82, 98, 96

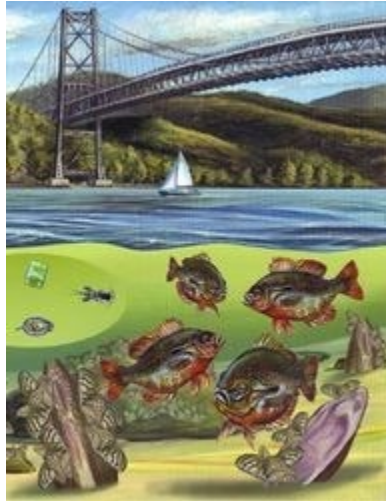
The angles in a quadrilateral measure 103° , 112° , 82° , and h° . What is the value of h ?

A circle graph has five sections. Only four sections are labeled. The labels are 21%, 19%, 18%, and 7%. What should the missing section be?

Activity 1)

A puzzling reversal

In 2005, 14 years after the first sighting of zebra mussels in the Hudson River, Cary Institute scientists noticed an unexpected change in the river: zooplankton had returned to the same levels as before the invasion. Why weren't the zebra mussels eating as much zooplankton?



WHAT HAPPENS NEXT? What's the future of the Hudson River ecosystem now that zebra mussels have arrived? Only time and observation will tell.

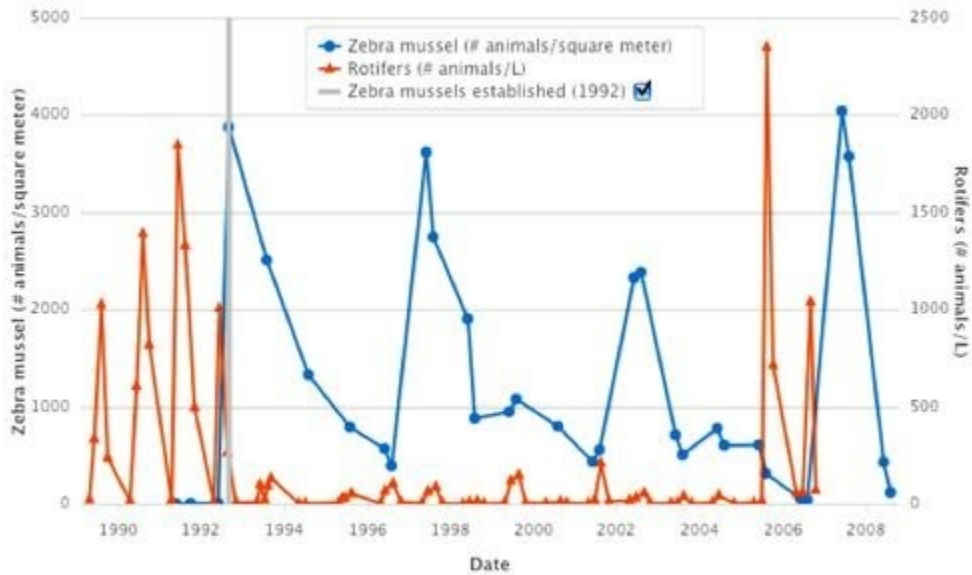
Then the scientists observed a change in the zebra mussels they were collecting from the river. Zebra mussels are grouped into three sizes: small (less than 10 mm), medium (10–20 mm), and large (more than 20 mm). While there were still many zebra mussels in the Hudson River, the overall number of zebra mussels was slightly declining, and they were on average much smaller. Populations of the largest — or oldest mussels — were declining greatly. Zebra mussels can live six or seven years, but now it seemed that most were dying after only one or two years. Adult zebra mussels had less than one percent chance of surviving a given year. The impact of the zebra mussel invasion was changing.

If there were fewer large zebra mussels, it made sense that there was more zooplankton. That's because large zebra mussels feed on bigger food particles like zooplankton. Smaller zebra mussels can eat only smaller particles like phytoplankton and bacteria.



ZEBRA MUSSEL AVERAGE SIZES

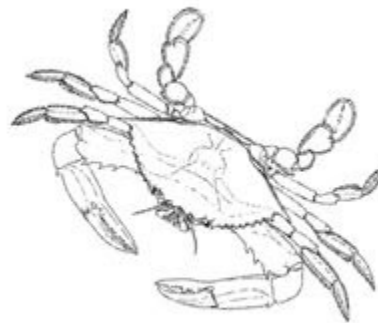
These new effects rippled through the food web. As zooplankton rebounded, so did native mussels and clams. Scientists anticipate some fish species will rebound too as their food supply increases. Scientists don't know exactly what caused the decline in large zebra mussels, but they do know blue crabs were eating some of them.



ANALYZE THIS This graph shows the amounts of rotifers (or zooplankton, shown with an orange line and triangles) and zebra mussels (shown with a blue line and circles) in the Hudson River over 20 years. Look at what happens in the last five years of the graphed data: what do you think is happening to the ecosystem?

More time, more data, more answers... and more questions

By monitoring several aspects of the Hudson River over many years, Cary Institute scientists are beginning to answer their original question: How might a zebra mussel invasion affect the Hudson River ecosystem? Early on during the invasion, zebra mussels survived, thrived, and had a huge impact on the ecosystem's food web — just as scientists had predicted.



Blue crabs are a bottom-dwelling predator and a chief consumer of bivalves and other crustaceans, including zebra mussels.

Almost 20 years later, the number of zebra mussels has declined overall. And parts of the ecosystem, such as the number of zooplankton, native mussels, and clams, have started to increase. But is this the end of the story? Or have we just seen the first two stages of an invasion that might have three or four stages, or more?

As their data grows, the scientists are able to track changes in the river — whether from pollution, weather, sea level rise, invasive species, or human activity — and to pose new questions. This broad approach also puts Cary scientists in a unique position to investigate future changes to the Hudson River ecosystem.

Comprehension Questions

1. What unexpected change did scientists notice in the Hudson River in 2005?

- A. Zooplankton had returned to the same levels as before the zebra mussel invasion.
- B. The total number of zebra mussels in the Hudson River had returned to almost zero.
- C. The zebra mussels in the Hudson River had stopped eating all types of plankton.
- D. The average size of the plankton in the Hudson River was decreasing.

2. What caused the number of zooplankton in the Hudson River to increase?

- A. the decline in the number of phytoplankton
- B. the decline in the number of native mussels and clams
- C. the decline in the number of small zebra mussels
- D. the decline in the number of large zebra mussels

3. Read these sentences from the text.

“As zooplankton rebounded, so did native mussels and clams. Scientists anticipate some fish species will rebound too as their food supply increases.”

What conclusion can you draw about zooplankton based on this evidence?

- A. Zooplankton eat native mussels, clams, and some fish species.
- B. Zooplankton are similar organisms to certain mussels and clams.
- C. Zooplankton are an important food source for native mussels, clams, and fish.
- D. Zooplankton are a more important food source for most species than phytoplankton.

4. What relationship could scientists track in order to see whether or not blue crabs were the main reason that large zebra mussels have declined?

- A. the relationship between the size of zebra mussels and the size of blue crabs over one year
- B. the relationship between the average numbers of large zebra mussels and blue crabs over time
- C. the relationship between the average numbers of blue crabs and phytoplankton over time
- D. the relationship between the size of blue crabs and the size of zooplankton over one year

5. What is the main idea of this text?

- A. The number of large zebra mussels in the Hudson River has gone down in recent years, but scientists predicted that change and are not surprised by it.
- B. The number of small zebra mussels in the Hudson River has unexpectedly gone down in recent years, so scientists have decided to change the focus of their studies on the Hudson River.
- C. The number of zooplankton in the Hudson River has unexpectedly gone up in recent years, so scientists expect the number of zebra mussels to increase as well.

D. The number of large zebra mussels in the Hudson River has unexpectedly gone down in recent years, but scientists will continue to study the river to understand the invasion's changing impact.

6. Read these sentences from the text.

“These new effects rippled through the food web. As zooplankton rebounded, so did native mussels and clams. Scientists anticipate some fish species will rebound too as their food supply increases.”

What does the author mean by the phrase “rippled through the food web”?

- A. did not impact other parts of the food web
- B. had effects on other parts of the food web
- C. caused harm to other species in the food web
- D. completely changed the relationships in the food web

7. Choose the answer that best completes the sentence.

_____ zebra mussels can live six or seven years, now it seemed that most were dying after only one or two years.

- A. Since
- B. Because
- C. Although
- D. For example

Short Answer

8. What happened to different living things in the Hudson River ecosystem almost 20 years after the zebra mussel invasion? Make sure to mention the changes in at least three populations in your answer.

9. What does the number of zooplankton in the Hudson River show about the large zebra mussels in the river? Use evidence from the text to support your answer.

10. One question that scientists have not yet answered is what caused the number of large zebra mussels to decline. How might tracking different parts of the ecosystem over a long time help scientists to answer this question?

Activity 2)

Sir Isaac Newton and LeBron James



The English physicist and mathematician Sir Isaac Newton discovered three basic laws of motion. The First Law says that objects at rest and objects in motion will remain at rest or in motion, unless they are acted upon by an “unbalanced force.” The Second Law says that when a force acts on a mass, acceleration is produced. The greater an object’s mass is, the more force is needed to accelerate it.

Newton’s laws of motion have become known throughout the world, including his Third Law of Motion. It reads: “For every action, there is an equal and opposite reaction.” A simpler way of saying this might be: “When you push an object, it pushes back.” For every force, in other words, there is a reaction force equal in size.

There are many ways to describe how the Third Law of Motion works in the world of sports. One of the more interesting examples is the way that LeBron James dunks a basketball.

In order for LeBron James to score a slam-dunk, he must exert a certain amount of force against the surface of the basketball court. LeBron James is a big man. He is 6 feet, 8 inches tall. He weighs 245 pounds. When he is standing upright, with his arms raised above his head, his reach extends to 8 feet and 10 ¼ inches.

The rim of the basketball hoop is exactly 10 feet high. For LeBron James to slam the ball, he must propel himself high enough that he can force the basketball, which is approximately 9.39 inches in diameter, into

the hoop. This requires that he reach well above the height of the rim, which he does fairly often. In photographs and slow-motion replays of LeBron James dunking the basketball, his elbow is often equal to the height of the rim!

LeBron James may be tall, strong, and fast. He may be extremely mobile and flexible. But it is no easy feat to dunk a basketball, especially when you weigh 245 pounds. His vertical leap—that is, the maximum height he can reach when he jumps—is around 44 inches. The average vertical leap in the National Basketball Association, or NBA, is about 27 inches. That means that LeBron James, despite his large size, can jump more than 10 inches higher than most players in the NBA! This is a serious benefit in basketball, a game of inches in which how high someone can jump often means the difference between scoring and missing the shot.

Why can LeBron James jump higher than other basketball players? The answer has to do with Newton's Third Law of Motion. When LeBron James jumps, he is driving force into the court. That force is created by the energy stored inside his muscles. And how high he jumps depends not just on how much energy he forces into the surface of the court, but also on how well he does it.

When LeBron James jumps, he pushes down on the surface of the court. This is the "action" that Newton mentions in his Third Law. The "reaction" comes when the floor pushes back using an equal amount of force.

It may seem strange to think of the floor exerting force on an object, especially a basketball player. But this concept is what Sir Isaac Newton understood way back in 1687, when he published his most famous book, *Mathematical Principles of Natural Philosophy*.

Newton would have been fascinated by LeBron James's jumping ability. But he would also have understood that it is not simply the strength of James's legs that enables him to jump so high. The stability of his body, located in his core and his torso, also contributes to the energy that he forces into the surface of the court. The energy and strength of LeBron James's *entire body* is what enables him to reach such fantastic heights.

Watching LeBron James dunk on television often causes people to think he is defying the force of gravity, which pulls us and other objects to the ground. In reality, no one can defy such force. LeBron James just happens to be so strong and agile that, when he jumps into the air, he *appears* to be defying the force of gravity. He seems almost capable of flying.

Naturally, smaller basketball players require less force to dunk a basketball. Since they are lighter, they don't have to combat the same gravitational pull. On the other hand, the fact that they are lighter means they do not have as much mass to store energy. The more muscles you have, the more energy you can force into the ground, and the higher you can go.

This is why professional basketball players appear to have no fat on their bodies at all. Fat does not store energy as effectively as muscle, but it still contributes to one's body weight. Fat on a basketball player is equal to wearing lead weights around their hips during a game. Obviously, this would hinder a player's performance, especially his ability to dunk.

Physicists have spent time thinking about the physics of dunking. To remain in the air for one second, they say, one would have to have a vertical leap of 4 feet, which is higher than pretty much any basketball player of all time. One exception is Michael Jordan, who is believed to have the highest vertical leap—48 inches, or 4 feet—of any professional basketball player. Michael Jordan was just 6 feet, 6 inches tall—average for an NBA player—but his vertical leap placed his head about 6 inches above the rim.

That one of the best basketball players in history also has the highest vertical leap is no coincidence. Michael Jordan's body was strong, stable, and proportioned in such a way that the force he pushed onto the ground placed him above the rest. He was one of the best overall athletes in the game, and his slam-dunking ability was an indication of his prowess.

From basketball players like LeBron James to Michael Jordan, it may seem like they are bending the rules of physics and gravity when they dunk a basketball. On the contrary, they are able to perform crowd-rousing dunks because of these rules.

Comprehension Questions

1. What is Sir Isaac Newton's Third Law of Motion?

- A. Objects at rest and objects in motion will remain at rest or in motion, unless they are acted upon by an unbalanced force.
- B. For every action there is an equal and opposite reaction.
- C. When a force acts on a mass, acceleration is produced.
- D. When a force acts on a mass, the mass increases.

2. What does the author describe in the passage?

- A. Sir Isaac Newton's most famous book, *Mathematical Principles of Natural Philosophy*
- B. how LeBron James developed his basketball dunking skills
- C. how Sir Isaac Newton came up with the three basic laws of motion
- D. how the way that LeBron James dunks a basketball illustrates Newton's Third Law of Motion

3. Read the following sentences from the passage: "When LeBron James jumps, he pushes down on the surface of the court. This is the 'action' that Newton mentions in his Third Law."

Based on this information, LeBron James jumping is an example of which part of Newton's Third Law?

- A. both the action and the equal and opposite reaction
- B. the equal and opposite reaction of an action
- C. the action which causes an equal and opposite reaction
- D. neither the action nor the equal and opposite reaction

4. The force created when the court pushes LeBron James upwards is equal to which force?

- A. the force LeBron James used to dunk the ball
- B. the force LeBron James drives into the court when he jumps
- C. the force LeBron James uses to throw the ball
- D. the force LeBron James drives into the court when he lands after jumping

5. What is the main idea of this passage?

- A. LeBron James and Michael Jordan are two of the best players in the history of professional basketball.
- B. Basketball players must have high vertical leaps in order to dunk basketballs.
- C. Newton's Third Law of Motion is related to the First and Second Laws of Motion.
- D. Newton's Third Law of Motion can be examined using the examples of basketball players jumping.

6. Read the following paragraph from the passage:

“LeBron James is a big man. He is 6 feet, 8 inches tall. He weighs 245 pounds. When he is standing upright, with his arms raised above his head, his reach extends to 8 feet and 10¼ inches.”

How can the tone of the author best be described in this paragraph?

- A. humorous
- B. angry
- C. disinterested
- D. factual

7. Choose the answer that best completes the sentence below.

_____ LeBron James has an impressive vertical leap of 44 inches, Michael Jordan holds the record with a vertical leap of 48 inches.

- A. In contrast
- B. For example
- C. Although
- D. Initially

8. According to the passage, in order for LeBron James to score a slam-dunk, what must he exert?
(written answer)

9. When LeBron James jumps, he is driving force into the court. How is this force created?
(written answer)

10. How does the example of LeBron James jumping to dunk a basketball illustrate Newton’s Third Law of Motion? Use information from the passage to support your answer.
(written answer)

Activity 3)

Roman Culture and influence

Importance of Fresh Water

In order for humans to live, they need access to fresh water. While nearly 70% of the earth’s surface is water, most of it is salt water, which humans cannot drink. Only a small percentage, about 3%, is fresh water. Of this, about 69% is currently frozen as ice caps and glaciers, while another 30% is held underground in the soil or in rock. This means that only one percent of the world’s fresh water—or .03% of the world’s total water—is surface water that humans can access to drink. The small amount of potable (suitable for drinking) water makes its conservation incredibly important so that water shortages already occurring in some regions do not spread any further. If they do spread, this may lead to conflicts over the right to use this water.

There are many ways in which humans can affect access to fresh water. For example, humans can pollute bodies of water, thereby making them undrinkable. In some cases, they may make physical changes to the land by building over wetlands or damming up rivers. While wealthy countries can afford to make the investments necessary to make sure their residents have access to fresh water, poorer countries often cannot. This means that poorer countries are at greater risk of devastating droughts, which can lead both to dehydration and starvation, as the country is unable to water its crops.

Droughts can also have a negative impact on the *biodiversity* of a region. Biodiversity refers to an abundance of different types of plant and animal species within a particular region. The prefix “bio” means living, while “diversity” refers to different types of things. Around the world, more than 125,000

animal species live entirely in freshwater habitats, including 15,000 species of fish, 4,300 species of amphibians, and 5,000 species of mollusks, such as clams and oysters. Millions of other species, including humans, depend on fresh water to drink. When an area loses a large percentage of its fresh water, many animals die off. In some cases, species go entirely extinct. This leads to a decrease in the region's biodiversity.

While droughts are natural and, in many places, a frequent occurrence, there are many things that humans do to increase the severity of these droughts. For one thing, the world's population has doubled in the last 50 years, so humans have been using much more fresh water to drink and grow crops than they did in the past. Humanity's increasing water consumption represents a growing threat to biodiversity.

In Africa, where droughts are common, they have been more prolonged than in the past. This is due in part to climate change, as well as a greater demand for water as the continent's population has increased. During a drought in Kenya that lasted from 2007 to 2009, over 60 elephants died—some of dehydration, others of starvation due to lack of vegetation to eat, and others of diseases that became fatal due to the elephants' weakened states. Some other endangered animals, such as the white rhinoceros, died too, which brought them closer to extinction.

When the biodiversity of a region declines, the human population suffers as well, in different ways. When a region experiences a significant drought, many animals may die from lack of water and food. If the region is one like Kenya, which depends on its wildlife to draw tourists, the effects of the drought can be devastating. If tourism declines due to high wildlife casualties, then the locals who depend on income from tourism will lose their livelihood. People may then turn to farming to earn money, but crops require water to grow. This can place further strain on the water supply and worsen the original problem of the drought. Sometimes, an imbalance in the system, such as a lack of water, can enter into a feedback loop where the situation only gets worse and worse.

Losses in biodiversity can also lead to problems with the availability of food. As we've discussed, a lack of water can prevent farmers from growing crops, which can lead to starvation. However, when a region loses its biodiversity, it disrupts the food chain in many ways. For example, if a species goes extinct, all the species used to feeding on it must find another source of food. Say a particular species of freshwater frog dies because its habitat has been depleted in a drought. This means the population of birds that feeds on this frog may decline as well, as it lacks sufficient food. Conversely, the insects that the frogs fed on may increase in number, as the frogs are no longer around to keep their population in check.

One of the main advantages of biodiversity is that there are certain natural processes that plants and animals perform that humans simply cannot. The billions of bees in the world play a critical role in pollinating the world's flowers. If they did not do this, the food supply would dwindle and the human population would suffer greatly.

Biodiversity can play an important function in the cleaning of water. When water passes through lakes, wetlands, and streams, it often encounters different species of fungi, algae, and bacteria. Many of these microbes actually filter microscopic particles out of the water, making it safe for humans to drink. Even some larger species do similar work. For example, the caddisfly constructs nets underwater that filter out different kinds of particles, which it then eats. Wetlands rich with these filtering organisms act as natural water filtration systems. When the biodiversity of a region declines, many of the organisms critical to this filtering process can disappear. Therefore, pressures on the freshwater supply can cause biodiversity to decrease, which can cut the drinkable water supply even further.

While humans do have some water filtration plants, these plants are expensive and take a lot of energy to maintain. For centuries the water that flowed into New York City was naturally filtered by a northern

watershed. As the water flowed south, it was purified. However, as the watershed was polluted and diverted, the water flowing to New York City was no longer filtered. The city faced a choice of spending \$6 billion to \$8 billion to build a water filtration plant, or just \$1 billion to restore the natural watershed. The city wisely chose the latter option.

The Influence of the Arch

The lasting influence of ancient Rome is apparent in many areas of our contemporary society. Sophisticated elements of law, engineering, literature, philosophy, architecture, and art can all be traced back to the Roman Empire. But perhaps one of the most lasting contributions from Roman civilization is something we see nearly every day: The Roman arch.

An arch is a curved structure designed to support or strengthen a building. Arches are traditionally made of stone, brick, or concrete; some modern arches are made of steel or laminated wood. The wedge-shaped blocks that form the sides of an arch are called voussoirs, and the top center stone, called the keystone, is the last block to be inserted. During construction, the arch is supported from below before the keystone is put in. The curve of an arch may take different shapes, but it is often a rounded or pointed semicircle.

Although the Romans revolutionized the arch, the structure has been around since before them. The Assyrians used arches to construct vaulted chambers or underground drains. However, these early arches were only suitable for small structures. The designs weren't sophisticated enough to support larger edifices, like palaces or government buildings.

The Romans, however, improved the arch and made it strong enough for large-scale, widespread use. By developing an arch capable of supporting huge amounts of weight, they laid the groundwork for some of the most important advancements in architectural history. The arch became a vital feature of bridges, gates, sewers, and aqueducts, which in turn were integral to the modernization of cities.

So how did the Romans do it? With their vast knowledge of engineering and design, Roman architects developed a very strong type of concrete by mixing lime and volcanic sand. Arches made of this material could support extremely heavy weights. In most cases, the Romans didn't use mortar, but instead relied on the precision of their stonework to ensure the sidewalls of the arch could withstand the pressure from the keystone.

After the arch, Roman architecture continued to evolve with improvements on the vault. A vault is an arched overhead structure that provides a space with a ceiling or roof. Like the arch, the vault has been around since ancient times. But it was the Romans who created a rigid, solid structure that didn't need any external buttresses or supports. This advancement allowed the Romans to easily construct vaults over vast spaces to create amphitheaters and basilicas. The vault also led to the development of the cupola and the dome, proving just how far-reaching the arch's influence goes.

An arch is more supportive than a horizontal beam due to the downward pressure on an arch. The development of the arch and the vault were also crucial to the construction of what may be one of the most recognizable structures on earth: the Roman Coliseum. Its vaulted arches made the ceilings much stronger than a flat ceiling. In construction, there are many benefits to using arches instead of straight beams. Arches are advantageous to horizontal beams (known as lintels) because they're made of small blocks of brick or stone, and therefore can span wider openings.

It wasn't long before cultures around the world adopted the new and improved Roman arch. Muslims from the Arab world modified the Roman design and created pointed, scalloped and horseshoe arches in

their magnificent palaces and mosques. These unique arches came to be emblematic of Islamic art and architecture. In Europe, the pointed arch was used extensively in Gothic architecture. Not only did pointed arches increase a structure's strength and stability, but they also created the soaring, spacious feel characteristic of many Gothic churches. By the Middle Ages, more complex arch and vault structures were introduced.

The Roman Arch also set the foundation for the magnificent triumphal arch. These imposing structures are generally built over large thoroughfares to commemorate important military victories. They're often ornately decorated and detailed with inscriptions. It's estimated that at one time, Rome alone had over 50 triumphal arches. Today only a handful remain, and the Arch of Constantine in Rome and the Arc de Triomphe in Paris are two of the most recognizable triumphal arches.

Centuries after the fall of the Roman Empire, modern arches use the same basic blueprint. Over time, the arch has come to define some of the most impressive buildings around the world. From the Taj Mahal in India to the U.S. Capitol Building in Washington, D.C., the arch gives many buildings a sense of elegance, grandeur, and sophistication.

Comprehension Questions

1. What is the arch designed to do?

- A. improve the look of a building
- B. support or strengthen a building
- C. provide a foundation for a building
- D. protect the exterior of a building

2. How does the author compare the arch to the horizontal beam?

- A. The arch costs less money than the horizontal beam.
- B. The arch is heavier than the horizontal beam.
- C. The arch is less supportive than the horizontal beam.
- D. The arch is more supportive than the horizontal beam.

3. Read the following sentences: "The Assyrians used arches to construct vaulted chambers or underground drains. However, these early arches were only suitable for small structures. With their vast knowledge of engineering and design, Roman architects developed a very strong type of concrete by mixing lime and volcanic sand. Arches made of this material could support extremely heavy weights."

Based on this information, what can be concluded about the material the Assyrians used to make their arches?

- A. It was most likely not as strong as the material the Romans used.
- B. It was most likely stronger than the material the Romans used.
- C. It was most likely the same material the Romans used.
- D. It was most likely similar to the material the Romans used.

4. The ability of arches to support huge amounts of weight is due to improvements in what?

- A. the design of the arches only
- B. the material of the arches only
- C. neither the design nor the material of the arches
- D. both the design and the material of the arches

5. What is this passage mainly about?

- A. improvements and uses of the arch
- B. architectural designs of different societies

- C. the difference between Assyrian and Roman architecture
- D. famous buildings and stadiums

6. Read the following sentence: “The designs weren’t sophisticated enough to support larger edifices, like palaces or government buildings.”

As used in this sentence, what does the word “edifices” most nearly mean?

- A. civilizations
- B. innovations
- C. materials
- D. structures

7. Choose the answer that best completes the sentence below.

_____ the Romans improved the arch, the Muslims made modifications to the Roman design.

- A. Before
- B. However
- C. After
- D. Because

8. According to the passage, what are some of the structures that use arches?
(written answer)

9. According to the passage, how did the ancient Romans improve the arch?
(written answer)

10. Explain at least two ways improvements to the arch led to advancements in architecture. Use information from the passage to support your answer.
(written answer)

11. Identify examples of buildings that contain elements of Roman Architecture. You can use any source for research or examples. Make a list of these examples, are there any patterns that show up in the type of buildings or structures that have Roman influence?

12. Where Does our water come from and how does it get to our homes and businesses? What ways did the Romans uses to get water to their cities? Why is it important for a government to provide an abundance of fresh water to its cities people?