NTI DAY #5

(weather-closed school day)

PACKET FIVE

(Science)

General Directions:
Due to weather, Harrison County Schools are closed. In an effort to utilize this day on the school calendar, your child is assigned and should work on this "packet" of school work today. It will count as a grade for this subject. The work attached is specific to the subject listed above. Please contact your child's teacher of this subject at 234-7123 in the event you/your student have questions on this packet. Staff and teachers reported to HCMS today and are available should you have questions.
While this is DUE no later than the last school day before the 3rd nine-weeks ends, we ***strongly encourage*** students to turn it in to their teacher as soon as it's complete (soon after the NTI day) to avoid it being lost, eaten by the family pet, burned to keep warm, etc

Please select one assignment from 2 of the 3 sections!!

Section 1:

☐ Physical Science Motion: Complete and 5 of the 13 speed, velocity, and acceleration problems on the paper provided. You must show your work but a calculator is permitted.

☐ Create a song, rap, or poem that teaches at least one of Newton's 3 Laws of Motion. The song, rap, or poem should state the law and include examples. You can turn in a written copy or submit a YouTube/Cell Phone video of your song or poem to your science teacher.
Johnny.dawson@harrison.kyschools.us
tiffany.thornsbury@harrison.kyschools.us

Section 2:

☐ ReadWorks: Famous Scientists: Sir Isaac Newton

☐ ReadWorks: How Soccer Can Help Us Understand Physics

Section 3:

☐ Periodic Table Scavenger Hunt: Use the periodic table found in your agenda to complete 10 of the 20 questions on this assignment.

☐ Element Wanted Poster: Use the Internet to research any element and create a wanted poster using the handouts provided. Your completed project may be submitted by email to Mr. Dawson (johnny.dawson@harrison.kyschools.us) or Mrs. Thornsbury (tiffany.thornnsbury@harrison.kyschools.us).

Physical Science Motion

Speed, Velocity, and Acceleration

EQUATIONS:

Speed:	Velocity:	Acceleration:
S = d / t	V= d / t with direction	a = (Vf – Vi) / t

Sample Problems:

A girl travels 20 miles on her bicycle. The trip takes 2 hours. Express her speed in miles/hr.
First, we identify the variables in our problem:

- distance (d) = 20 miles
- time (t) = 2 hours

We place the variables in their correct position in the speed formula

- S = d/t
- S = 20 mi/2 hour

Perform the calculation and express the resulting speed value with the appropriate unit:

- S = 10 mi/hr

A car starts from a stoplight and is traveling with a velocity of 10 m/sec east in 20 seconds. What is the acceleration of the car?
First we identify the information that we are given in the problem:

- vf - 10 m/sec
- vo - 0 m/sec
- time - 20 seconds

Then we insert the given information into the acceleration formula:

- a = (vf - vo)/t
- a = (10 m/sec - 0 m/sec)/20 sec

Solving the problem gives an acceleration value of 0.5 m/sec2.
Now try on your own: You may use a calculator.

1. What is the speed of a rocket that travels 9000 meters in 12.12 seconds?

2. What is the speed of a jet plane that travels 528 meters in 4 seconds?

3. How long will your trip take (in hours) if you travel 320 km at an average speed of 80 km/hr?

4. How far (in meters) will you travel in 3 minutes running at a rate of 6 m/s?

5. A trip to Cape Canaveral, Florida takes 10 hours. The distance is 816 km. Calculate the average speed.

6. How many seconds will it take for a satellite to travel 360 km at a rate of 120 m/s?

7. What is the speed of a walking person in m/s if the person travels 1000 m in 20 minutes?

8. A ball rolls down a ramp for 15 seconds. If the initial velocity of the ball was 0.8 m/sec and the final velocity was 7 m/sec, what was the acceleration of the ball ?

9. A meteoroid changed velocity from 1.0 km/s to 1.8 km/s in 0.03 seconds. What is the acceleration of the meteoroid?

10. A car going 50mph accelerates to pass a truck. Five seconds later the car is going 80mph. Calculate the acceleration of the car.

11. The space shuttle releases a space telescope into orbit around the earth. The telescope goes from being stationary to traveling at a speed of 1700 m/s in 25 seconds. What is the acceleration of the satellite?

12. A ball is rolled at a velocity of 12 m/sec. After 36 seconds, it comes to a stop. What is the acceleration of the ball?

13. A dragster in a race accelerated from stop to 60 m/s by the time it reached the finish line. The dragster moved in a straight line and traveled from the starting line to the finish line in 8.0 sec. What was the acceleration of the dragster?

How Soccer Can Help Us Understand Physics

by ReadWorks

Sports provide a great way to understand some concepts in physics. Physics, after all, is the study of matter, motion, force, and energy. And since sports like soccer, swimming and cycling involve bodies moving through space, they can help us understand how the principles of physics work.

Imagine that you're looking at a soccer ball on a grassy field. If you do nothing to the ball, it will stay motionless on the grass. If you kick the ball, it will roll along the grass before coming to rest again. Pretty simple, right?

For thousands of years, though, people thought that objects like this soccer ball come to rest because they have a natural tendency to stop. It took a famous physicist by the name of Sir Isaac Newton, who lived in the 1600s, to prove that this was not exactly correct.

Newton suggested that objects like the soccer ball have a natural tendency to keep moving. The only reason they stop, he believed, is because an unbalanced force acts on them. By an unbalanced force, Newton meant the force applied to the soccer ball by its environment. When kicked, the surface of the ball travels over the grass, creating friction. The taller the grass, and the rougher the surface of the ball, the more friction is created. And the more friction that exists between the ball and the grass, the less it will travel after being kicked.

Now, imagine that there is no grass. Instead, the ball is resting on a frozen lake. When you kick the ball on the ice, the ball will go much farther than it would have on the grass. This is because ice provides a lot less friction than the grass.

Even so, ice does cause some friction. The ball's interaction with the frozen water crystals on the surface of the lake eventually causes it to come to rest again. But now imagine that instead of ice, the ball is in a place where there's no friction at all. The ball is floating in a vacuum. If you remove friction

entirely, kicking the soccer ball would cause it to keep going and going at the same speed, until some force caused it to slow down and stop.

To paraphrase Sir Isaac Newton, a soccer ball on the grass will stay where it is unless acted on by a force. Similarly, once you kick the ball, it will remain in motion unless acted on by force. This, in so many words, is known as Newton's First Law of Motion.

The same principles apply for other sports. Take swimming. Olympic swimmers are in a constant battle with the force of water. Water slows them down. To increase their speed, swimmers often shave their entire bodies, reducing the amount of friction caused by hair. Since a swimming contest can be won or lost by a tenth of a second, anything they can do to remove friction will help-even if it means ridding their bodies of hair.

Recently, Olympic swimmers took to wearing full-body suits in the water, which made swimmers sleeker and reduced underwater friction. Swimmers wearing these suits began to break world records. They started winning all the races. Soon enough, Olympic officials, realizing that these suits posed an unfair advantage, banned the use of suits in Olympic competition. Swimmers had to fall back on their own, hairless skin.

The situation for professional cyclists is slightly different. Unlike the swimmer, who battles the water, the cyclist is confronted with forces from other sources that seek to slow him or her down: the force of the road and the force of the air. Like professional swimmers, pro cyclists are known to shave their body hair, to reduce the amount of friction caused by the wind. But the loss of body hair represents only a tiny reduction in surface friction compared to, say, wearing spandex shorts instead of baggy shorts with pockets that fill up with air as you ride.

To reduce friction and increase speed, cyclists adopt all kinds of techniques. They wear aerodynamic helmets. They crouch low over their bikes. They wear shirts and shorts that cling closely to their skin, preventing air from slipping inside and slowing them down. However, little can be done about the tires' interaction with the pavement. As in the case of the soccer ball, a bicycle wheel will eventually stop spinning if no force acts upon it to keep it moving. The rougher the road, the sooner that bike wheels will come to a stop.

For this reason, cyclists tend to have large, bulging thigh muscles. These muscles allow the cyclist to continue exerting force on the bicycle pedals, which cause the wheels to keep spinning despite their constant interaction with the road. Of course, other factors come into play, too. The heavier you are, the more work you have to do to keep the bike moving-that is, unless you're moving down a hill, in which case the gravitational force of your weight acts to your advantage.

Also, your ability to keep your legs pushing the pedals depends on how fit you are, not just how strong your legs are. Many people who are out of shape would run out of breath before they complete a mile-long bike ride, whereas a person who is fit and has a lot of stamina could travel two miles without much difficulty.

Whether you are in shape or not, what really matters when trying to kick a ball, swim a lap, or bicycle a 5 mile race are the forces of physics. Without them, every time you kicked a soccer ball, the ball would keep going, forever.

Name: _____ Date: _____

1. Once it is in motion, what does an object like a soccer ball have a natural tendency to do?

A. It has a natural tendency to keep moving.

B. It has a natural tendency to stop.

C. It has a natural tendency to change direction.

D. It has a natural tendency to slow down.

2. What does the author explain in this passage?

A. The author explains the force of friction, using different kinds of music as examples.

B. The author explains the sport of soccer, using examples of current teams and players.

C. The author explains the idea of motion, using different sports as examples.

D. The author explains the importance of bike safety, using helmets as an example.

3. Swimmers wearing full-body suits that reduced underwater friction were able to swim faster than other swimmers.

What evidence from the passage supports this statement?

A. Some swimmers shaved their entire bodies to reduce friction caused by hair and increase their speed.

B. After losing contests by a tenth of a second, some swimmers started ridding their bodies of hair to reduce friction.

C. Swimmers wearing full-body suits swam at the same speed as swimmers wearing shirts and shorts that clung closely to their skin.

D. Swimmers wearing full-body suits began to break world records and started winning all the races.

4. Based on the information in the passage, how can friction be described?

A. Friction can be described as a force that acts on an object in motion and can cause the object to stop.

B. Friction can be described as a force that acts on an object in motion and can cause the object to speed up.

C. Friction can be described as the path an object takes after a force acts on it and causes it to move.

D. Friction can be described as the path an object takes when a force acts on it inside a vacuum.

5. What is the passage mainly about?

A. why swimmers and cyclists move at different speeds

B. the motion of bodies and objects

C. the movement of an object inside a vacuum

D. the scientific discoveries of Sir Isaac Newton

6. Read the following sentence: "Newton suggested that objects like the soccer ball have a natural **tendency** to keep moving. The only reason they stop, he believed, is because an unbalanced force acts on them."

What does the word **tendency** mean?

A. a very small chance of something happening

B. a fifty-fifty chance of something happening

C. the fear of doing something or acting in a certain way

D. the way something normally behaves or acts

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

Newton suggested that a ball has a natural tendency to keep moving _____ others believed that a ball has a natural tendency to stop.

A. although

B. because

C. before

D. later on

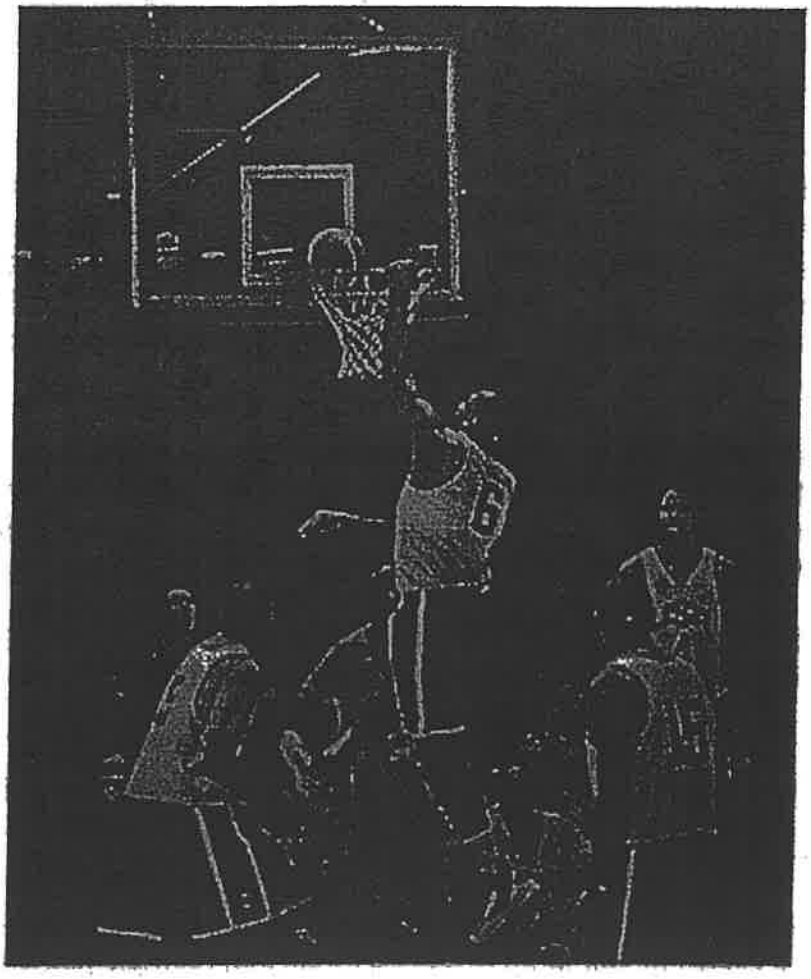
8. What are some things cyclists do to reduce friction?

9. According to Newton's First Law of Motion, what will happen to a soccer ball that is kicked?

10. The end of the passage states that without the forces of physics, every time you kicked a soccer ball or jumped on a bike, the ball and the bike would keep going, forever. Explain why the ball and bike would keep going, using evidence from the passage.

Sir Isaac Newton and LeBron James

by ReadWorks



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 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.

Name: _____ Date: _____

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?

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

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.

Name: _____ Date: _____

Periodic Table Scavenger Hunt

Search your periodic table for the answers to these questions.

_____ 1. Which element is number 14 on the periodic table?

_____ 2. What is the element symbol for californium?

_____ 3. How many protons are in an atom of bismuth?

_____ 4. To which element group does argon belong?

_____ 5. Which element would you expect to have a higher mass: cadmium or zinc?

_____ 6. What is the atomic mass of carbon?

_____ 7. What do you call the element series from atomic number 57-71?

_____ 8. Which element has a symbol that starts with a letter different from the first one in its name: aluminum, copper, gold, rhenium?

_____ 9. Which element has the lowest atomic mass?

_____ 10. What is the first element with an atomic mass greater than 100?

_____ 11. What is the first basic metal on the periodic table?

_____ 12. True or false: Tin and antimony are in the same element group.

_____ 13. What is the heaviest alkali metal?

_____ 14. How many protons are in an atom of magnesium?

_____ 15. Which of the following is not a nonmetal: sulfur, oxygen, silicon, nitrogen?

_____ 16. What is the name of the element with the symbol W?

_____ 17. Which element has an atomic mass of 106.42?

_____ 18. Astatine belongs to which element group: nonmetal, halogen, noble gas?

_____ 19. What is the element with the symbol Ba?

_____ 20. Name a letter never used in any element symbol?

Element Wanted Poster

Name: _____

Your element is wanted by the police. Use the following guidelines to create a wanted poster to identify it for capture. Your poster can be submitted on a piece of white paper (included), printed, or a digital copy email to Mrs. Thornsbury/Mr. Dawson.

You may choose ANY element on the periodic table.

This element project is to be completed INDIVIDUALLY. Choose an element that is different from your friends, so that it will be easier for you to make your work your own.

Your poster should include the following parts:

1. HEADING - Wanted! Name of element and the chemical symbol for the element.

2. DESCRIPTION - This is valuable information!
Include:
   a. Pictures (at least 2): These may be drawn, printed, or inserted in a digital copy.
   b. Atomic number... ex. Hydrogen has an atomic number of 1
   c. Alias (A.K.A- Also Known As) - The chemical symbol or other names used for your element. Include historical names, common names, slang terms, etc.
   d. Physical properties - Describe at least 5 physical properties of the element (examples: color, odor, taste, clarity, texture, state, luster, density, malleability, ductility, hardness, viscosity, melting point, boiling point, solubility, etc.)

3. METHOD OF OPERATION: WANTED FOR - describe at least 3 uses of the element. (Examples: Life processes, industrial uses, be specific)

4. LAST KNOWN WHEREABOUTS
   a. Hangouts (Location where your element is found in nature)
   b. Buddies (Name another element your element reacts with and the compound that forms).

5. REPORT ON FIRST ARREST
   a. First Arresting Officer: Who discovered the element?
   b. Date arrested: When was it discovered?
   c. Particulars: How and where was it discovered?
   (Note: some elements have been around so long that it is unknown when they were discovered)

DO NOT COPY AND PASTE FROM THE INTERNET OR FROM A FRIEND. THIS IS PLAGIARISM.

Websites that may be helpful:

- www.lenntech.com/periodic-chart.htm
- www.webelements.com
- http://education.jlab.org/itselemental/index.html (or type in Jefferson Lab Periodic Table in Google and click on the first link)
  http://chemistry.about.com/library/blperiodictable.htm

Element Poster – Worksheet

Use the following websites to find information:

- www.lenntech.com/periodic-chart.htm
- www.webelements.com
- http://education.jlab.org/itselemental/index.html (or type in Jefferson Lab Periodic Table in Google and click on the first link)
- http://chemistry.about.com/library/blperiodictable.htm

Fill out the worksheet below as you do your research. All information should be included on the poster.

Element name:

_____

Atomic number: _____ **Atomic Mass number:** _____ **Chemical symbol** _____

Alias /AKA (Also Known As) (other names if given)

_____

_____

Physical Properties: (5 of the following - color, odor, taste, clarity, texture, state, luster, density, malleability, ductility, hardness, viscosity, melting point, boiling point, solubility, etc.)

_____

_____

_____

_____

_____

Method of Operation: What is this element **wanted for**? What are the important uses in industry and life processes?

_____

_____

_____

_____

Hangouts (where it is found in nature?)

_____

_____

_____

Buddies (other elements that your element reacts with and the compounds that form)

_____

_____

First arresting officer: (Who discovered the element?)

Date arrested: (When was it discovered?)

Particulars: (How and where was the element discovered? What part of the world or country was it discovered?)

If you finish the Wanted Poster and have time to spare, complete the following online games:

1. Go to Google and type in "element picture quiz". Click on the first link. Complete the multiple choice quiz to see how many different elements you can recognize! Don't worry if you don't know them all.
2. Go to Google and type in "element symbol matching quiz". Click on the first link. Match the symbol to the word and then click on "Check your score".
3. Go to the following website: http://www.funbrain.com/periodic/index.html. Click on "Name the Element (Hard)", and then click on "Most Common Elements (Easy)". Click on "Play Proton Don". In the text box at the top of the periodic table, type in the correct name for the highlighted element.