

8th Grade Final Review

1. How are atoms related to molecules?

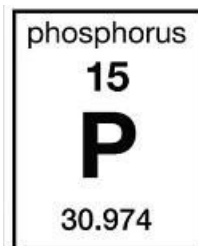
a. Molecules are made of atoms

2. Has our theory of atomic structure ever changed? If so, why?

a. It has changed several times. As our understanding of atoms has evolved, so has our theory of atomic structure. This is largely due to better scientific equipment and the ability to measure more accurately.

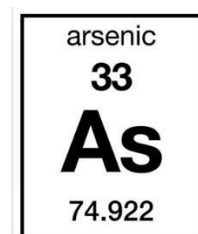
3. How many protons, neutrons, and electrons does phosphorus have?

Protons: 15 Neutrons: 16 Electrons: 15



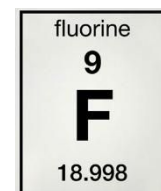
4. How many protons, neutrons, and electrons does arsenic have?

Protons: 33 Neutrons: 42 Electrons: 33



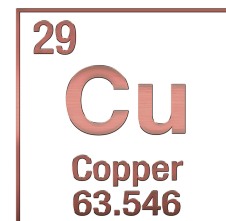
5. How many protons, neutrons, and electrons does fluorine have?

Protons: 9 Neutrons: 10 Electrons: 9



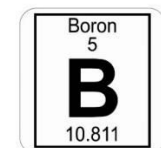
6. How many protons, neutrons, and electrons does copper have?

Protons: 29 Neutrons: 35 Electrons: 29



7. How many protons, neutrons, and electrons does boron have?

Protons: 5 Neutrons: 6 Electrons: 5



8. How do we decide which substances to use for a particular function?

a. We choose substances based on their unique properties that make them more suitable for a particular function.

9. Why do we use rubber for tires?

a. It has a large amount of friction with the road, it is durable, it is long lasting, it is relatively inexpensive to obtain.

10. Why do we use diamonds for drill bits?
- Because they are the hardest substance known and they can cut/scratch through many materials without being damaged.
11. Why do we use helium and not hydrogen in balloons?
- Hydrogen is flammable
12. How could you change a solid to a gas?
- Add heat
13. How could you change a gas to a liquid?
- Remove heat
14. How could you change a liquid to a solid?
- Remove heat
15. How could you change a liquid to a gas?
- Add heat
16. How are temperature and density related?
- They have an inverse relationship. The higher the temperature, the lower the density. The lower the temperature, the higher the density.
17. If you heat up a balloon, what happens to its density?
- It will decrease
18. What are 4 phenomena could indicate that a chemical reaction has taken place?
- Bubbles/fizzing, color change, heat/light/sound energy released, a precipitate forms
19. What natural resource did your synthetic substance come from?
- Many answers here, but you need to know that all synthetic materials can be traced back to natural resources
20. Why is your synthetic material better than the natural material?
- Again, many answers here but you need to know that synthetic materials are often better suited for a function than its natural predecessors because of its unique properties.

21. Draw what a solid, liquid, and gas would look like in a beaker.
- Solid- molecules packed closely together, very dense
 - Liquid- molecules packed less tightly than solid
 - Gas- molecules are not packed tightly, they are moving about freely
22. Which state is generally the most dense and why?
- Solid- because the molecules are so close together
23. 9,756 grams of a substance occupy 35,000 cubic centimeters of space. Calculate the density of the substance.
- $\text{mass} / \text{volume} - 9,756 / 35,000 = 0.278$ grams per cubic centimeter
24. What advantage does a synthetic sweetener like Splenda have over a natural sweetener like sugar?
- Splenda has no calories
25. Draw a model of a chemical reaction that obeys the law of conservation of mass.
- You need to have a drawing that shows that the amount of molecules before the reaction is equal to the amount of molecules after the reaction though they may be rearranged.
26. If you start out with 100 kilograms of wood and burn it, the ashes only weigh 1.5 kilograms. Where did the other 98.5 kilograms go?
- The missing mass was released to the atmosphere as a gas, mostly carbon dioxide.
27. Are phase changes chemical changes? Why?
- No. No new substance was formed.
28. How would changing the amplitude change how you see light?
- Amplitude determines how bright or dim the light is.
29. How would changing the amplitude change how you hear sound?
- Amplitude determines how loud or soft the sound is.
30. How would changing the frequency change how you see light?
- Frequency determines the color of light you see

31. How would changing the frequency change how you hear sound?

a. Frequency determines the pitch of sound you hear

32. What factors determine the amount of mechanical kinetic energy a moving object has?

a. Mass and velocity

33. What factors determine the amount of gravitational potential energy an object has?

a. Mass and height

34. Why do you see a red car as red?

a. The red paint absorbs all colors of light except for red, which it reflects

35. Why do you see a blue car as blue?

a. The blue paint absorbs all colors of light except for blue, which it reflects

36. How is energy transferred in collisions?

a. Kinetic energy can be transferred from one object to another

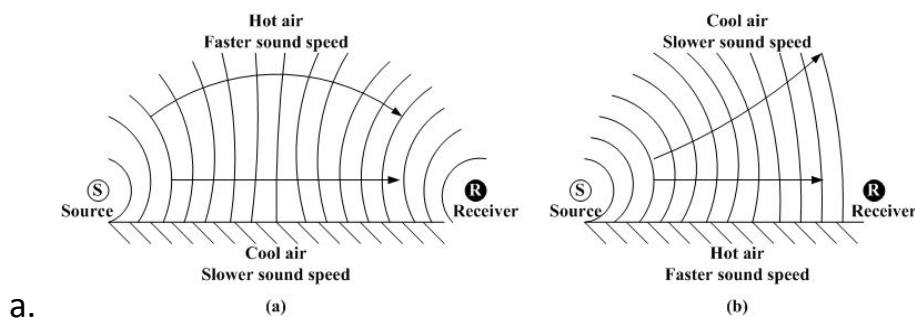
37. How are s waves different than p waves?

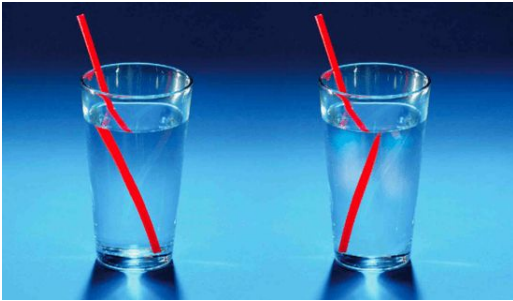
a. S waves are absorbed by liquids while p waves will be transmitted but refracted.

38. What does waves refracting mean?

a. Refracting means that waves are transmitted through a substance but they will bend as they go through.

39. What is an example of refraction? (include an example using both sound and light waves)





b.

40. What does waves being transmitted mean?

a. It means they go through a substance

41. What is an example of waves being transmitted? (include an example using both sound and light waves)

a. When sound is transmitted through the air and you hear it.

b. When light is transmitted through a window and you see it.

42. What does waves being absorbed mean?

a. They will stop when they hit the substance and will not bounce back.

43. What is an example of waves being absorbed? (include an example using both sound and light waves)

a. A sound proof room has materials on the wall that absorb sound so it does not reflect or transmit.

b. Wearing a black shirt in the summer will make you feel hotter because it absorbs light waves that hit it and turn that energy into heat.

44. What does waves reflected mean?

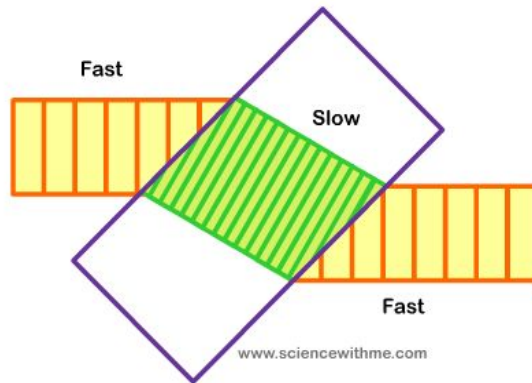
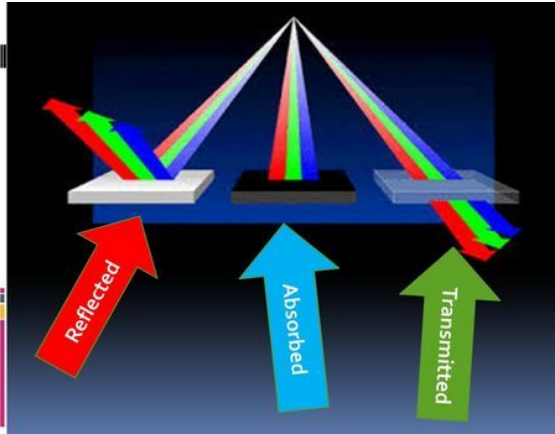
a. Waves hit a substance and bounce off.

45. What is an example of waves reflecting? (include an example using both sound and light waves)

a. Sound reflects off of a cliff and you hear an echo.

b. Sunlight reflects off of snow which is why you would want to wear sunglasses during the winter.

46. Draw a diagram showing how a light wave would look being reflected, refracted, absorbed, or transmitted when it hits a wall.



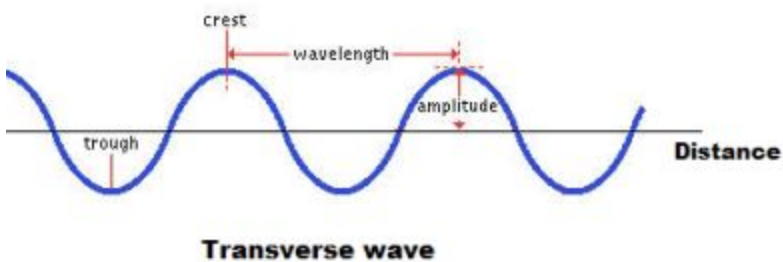
47. What is the law of conservation of energy?

- a. Energy cannot be created or destroyed, it can only change forms.

48. Explain 2 examples that illustrate the law of conservation of energy.

- a. A car on the freeway has kinetic energy. When it stops, its kinetic energy is converted to heat but it still has the same amount of energy.
- b. When sunlight hits a black substance, the light is absorbed but the energy of the light is still there, it has just been transformed into heat.

49. Draw and label a wave with all of its parts.



50. What factor determines the amount of energy in a wave?

- a. The amplitude (frequency also plays a role here but for our purposes, the correct answer is amplitude)

51. What is analog technology?

- a. Something that stores data in an analog way- that is it makes an analogy of the data. For example, a circular clock with hands is an analog technology because the hands make an analogy of the time. The hands don't directly tell you the time but by examining their positions in front of the clock face, we can deduce the time.

52. What is digital technology?

- a. A technology that stores data as 1's and 0's that can then be converted by a computer into data.

53. What are some pros and cons about analog and digital technologies?

- a. Analog is often times more accurate and more rich in data. Analog is often more difficult to duplicate and analog signals are more susceptible to interference.
- b. Digital is much more convenient (i.e. digital cameras vs. film cameras) but may not be as information rich. Analog is usually more accurate. Digital technology is dependent on electricity and technology where analog is less dependent on those things.

54. What is the formula for photosynthesis?

- a. Carbon dioxide + Water + Sunlight = Sugar + Oxygen

55. What is the formula for cellular respiration?

- a. Sugar + Oxygen = Carbon Dioxide + Water + Energy

56. Explain in your own words what photosynthesis is and how it transforms matter.

- a. Photosynthesis done by plants uses the energy from light to transform matter (carbon dioxide and water) into sugar and oxygen.

57. Explain in your own words what cellular respiration is and how it transforms matter.

- a. Cellular respiration is when cells transform matter (sugar and oxygen) into carbon dioxide and water and energy that the organism can use to live.

58. What is the relationship between photosynthesis and cellular respiration?

- a. They are dependent on each other. Each puts out what the other needs to operate.

59. How has photosynthesis changed the Earth?

- a. It has provided an oxygen rich atmosphere that can support life.

60. What factors affect the rate of photosynthesis on Earth?

- a. The amount of carbon dioxide, the amount of water, and the amount of sunlight.

61. How do **all** organisms rely on photosynthesis? Cellular respiration?

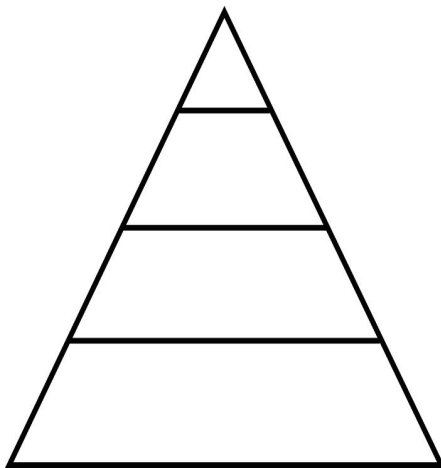
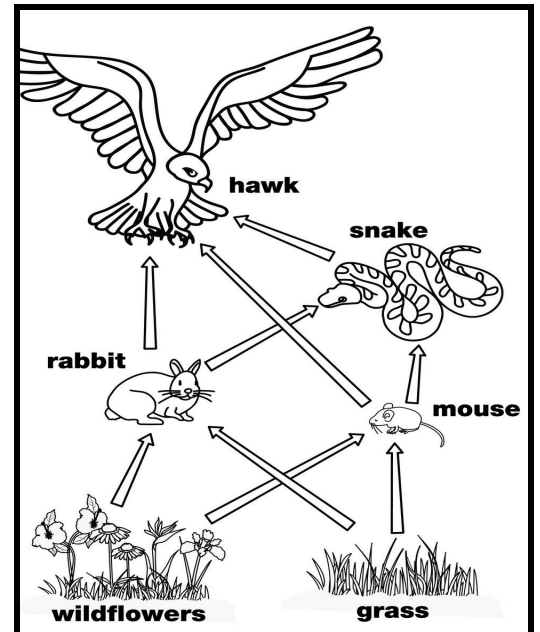
- a. Plants need photosynthesis to produce the sugar and oxygen they need to be able to do cellular respiration. Animals need photosynthesis to obtain the oxygen they need as well as the food they need to survive.
- b. Plants need cellular respiration to be able to grow and keep themselves warm. Animals need cellular respiration to produce energy they need to live.

62. What are the **producers** in this food web?

- a. Grass and wildflowers

63. What are the **consumers** in this food web?

- a. Mouse, rabbit, snake, hawk



64. Fill in the energy pyramid with the organisms from the food web.

Top layer - Hawk

Second layer - Snake and hawk

Third layer - Rabbit and mouse

Bottom layer - Wild flower and grass

65. What happens to the amount of energy as you travel from the bottom of the energy pyramid to the top?

- a. the amount of energy decreases the higher you go.

66. Which organism could you take away from the food web that would cause the biggest change? **Why?**

- a. The removal of producers (plants) would devastate the ecosystem because everything relies on plants to survive.

67. Which organism could you take away from the food web that would cause the smallest change? **Why?**

- a. Taking away the top predator would cause the smallest change because nothing relies on it for food.

68. What are some things that could happen if a new organism was introduced to this food web?

- a. You could change the food web and destroy the natural balance of the food web.

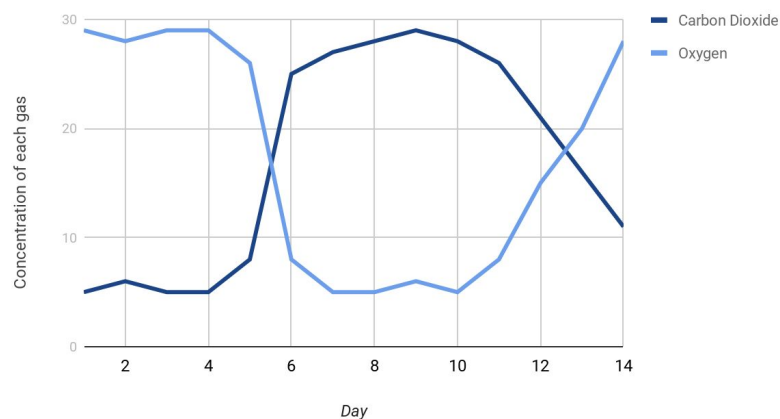
69. Why are ecosystems delicate?

- a. Even a small change to the ecosystem can cause large and far reaching effects.

70. Draw a graph that shows the levels of CO₂ in an ecosystem during the following events:

- a. There are many plants but no animals in the ecosystem for 4 days
- b. On day 5, 1 animal is introduced
- c. On day 6, 20 animals are introduced
- d. On day 10, all of the animals leave

Carbon dioxide and animals



71. What is the definition of a natural resource?

- a. Any naturally occurring substance/energy source that we can use for our benefit.

72. Give 10 examples of natural resources

- a. Sunlight, water, wind, soil, trees, land, gold, silver, copper, petroleum, rubber, iron, etc.

73. Are natural resources evenly distributed on the Earth?

- a. No

74. What makes natural resources more concentrated in some areas than others?

- a. Geologic processes (weathering and erosion, transport, uplift, volcanic activity etc.) are responsible for concentrating natural resources unevenly across the surface of the Earth.

75. Why is using natural resources a double edged sword? (Why can it be good and bad for us?)

- a. It is good because it can help us build better lives with conveniences but bad because our use of natural resources affects the Earth in negative ways.

76. What does the word mitigate mean?

- a. To make less severe or less harmful

77. What does it mean to mitigate the effects of our use of natural resources?

- a. It means that we try to minimize the effects of using natural resources. For example, if we mine metals out of the Earth, we try to put the land back just how we found it when we are done and protect water from being contaminated by our activities.

78. Why is mitigating natural resource use important?

- a. So we don't do unnecessary damage to our planet by obtaining natural resources.

79. What has our increased use of fossil fuels done to affect the Earth system?

- a. It has released large amounts of carbon dioxide into the atmosphere. Carbon dioxide is a greenhouse gas that traps heat and is likely responsible for raising global temperatures. This is causing ice caps to melt, sea levels to rise, animal migrations, etc.

80. What effect will rising global temperatures have on:

- a. The ocean: Oceans can become more acidic
- b. Global sea levels: Sea levels will rise
- c. Sea and land ice: Ice will melt

81. Where would you be most likely to encounter tornadoes?

- a. In the midwest, that is where you have warm moist air and cold dry air meeting

82. How would our knowledge about where tornadoes occur change our building practices?

- a. We build buildings stronger and more wind resistant in areas that have more tornadoes.

83. What factors make tornadoes more common in some areas?

- a. Topography of the landscape, prevailing winds, where warm and cold air meet often, etc.