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1. Vocabulary to know:
* matter
* mass
* density
* weight
* volume
* newton
* water displacement
* physical property
* physical change
* chemical property
* chemical change
* law of conservation of mass
* atom
* element
* compound
* mixture
* pure substance
* heterogeneous
* homogeneous
* solution
* colloid
* suspension
* kinetic energy of matter
* changes of state
* melting
* freezing
* evaporation
* boiling
* condensation
* sublimation
* deposition
* thermal energy
* heat
* calorie
* conduction
* conductor
* insulator
* convection
* radiation
* energy source
* renewable resource
* nonrenewable resource
* fossil fuels
1. Two things that are NOT examples of matter: light and sound
2. Objects can be same size but made up of different amounts of matter (brick, sponge)
3. The greater the mass the greater the weight
4. Objects weight can change depending on location
5. Mass can’t change unless matter in object does
6. Objects with similar volume don’t always have same mass (balloon, bowling ball)
7. Formulas
	1. Volume of regular shape: L x W x H
	2. Volume of irregular shape: use water displacement… new volume – original volume
	3. Density = mass ÷ volume
8. Objects containing same amount of mass can take up different amounts of space (pile of feathers, small tomato)
9. Density remains the same no matter how much you have of substance (half of a clay block has same as whole one)
10. Anything greater than the density of water (1 g/cm3) will sink, anything less than it will float
11. Physical property examples:
* color
* shape
* size
* texture
* mass
* volume
* states of matter
* electrical conductivity
* density
* thermal conductivity
* solubility
* malleability
* luster
* magnetic attraction
* melting point
* boiling point
1. Types of chemical properties:
* Ripening
* Rusting/Tarnishing
* Flammability
* Reactivity
1. Chemical properties result in changing into new substance, physical properties don’t
2. Characteristics properties- properties that are unique to a substance
3. Examples of physical changes: stretching rubber band, ice melting, water freezing, dissolving sugar in water, melting butter, cutting hair, bending paper clip, crushing a can
4. Examples of chemical changes: wood turning into ash, cooking cake batter to make a cake
5. Chemical changes and properties aren’t the same: wood is flammable which is the property and the process of it burning is the change
6. Higher temperatures usually mean chemical reactions occur more quickly (ex. baking cake)
7. If you observe 2 or more of the below a chemical change may have occurred:
* New odor
* Produces gas
* Forms precipitate
* Change in energy
* Changes color
1. In chemical changes mass can change (wood turning to ash is it decreasing, plants growing is it increasing)
2. Conservation of mass in physical changes- same mass but may have different appearance (legos)
3. Conservation of mass in chemical changes- mass looks like it disappears but really changes form (into a gas)
4. Elements and compounds are pure substances
5. Pure substances- identical throughout, can’t be formed or broken down by physical changes, no longer one if goes through chemical change
6. Mixtures are not chemically bound like compounds but can be physically (Ex. pizza with toppings), they contain more than one substance and each one has same chemical make up as it did before becoming mixture, can be separated with physical changes (Ex. picking off pizza toppings, salt being left behind after water evaporates)
7. Heterogeneous example is soil, homogeneous example is sugar water
8. Suspension example is snow globe or salad dressing, solution example is tea, colloid example is jello
9. Solids- definite shape and volume, particles close together and vibrate b/c can’t move freely
10. Liquids- definite volume but shape changes to fit container, particles slide past each other, more energy than solid
11. Gases- no definite shape or volume, most energy, particles move freely, adding more air to container makes the particles closer together but still move freely but opening that container makes them spread out into atmosphere
12. Melting- particles get more energy and break apart to make liquid
13. Freezing- particles lose energy and becoming attracted to each other
14. Freezing and melting points not same for all substances
15. Only one of the following can occur at a time: change in temperature or change of state (Ex. ice melting will stay at 0 degrees Celsius until it changes completely to liquid then the temperature will rise)
16. Solids🡪liquids🡪gases: gain energy
17. Gases🡪liquids🡪solids: lose energy
18. Energy is conserved in the environment… never lost
19. Examples: condensation🡪cold drink out in sun, sublimation🡪dry ice, deposition🡪ice crystals on window and frost
20. Mass doesn’t change when state of matter changes (number of particles stays same as long as they are trapped)
21. Thermal energy is measured in joules (J).
22. Temperature- average kinetic energy of particles, Thermal energy- total kinetic energy of all the particles. (EX. glass of water same temperature as a lake, but lake has more thermal energy because it has more water molecules.
23. Energy in the form of heat always flows from hot to cold.
24. Heat measured in calories (cal) and joules (j)
25. Adding or removing heat affects temperature and thermal energy… Heat not the same as thermal energy and temperature.
26. Thermal energy and temperature= properties of a substance. Heat = energy involved when these properties change.
27. 2 materials can have same temperature but different thermal energies
28. Thermal energy depends on how many particles are present in the object
29. The state of a substance depends on the speed of its particles.
30. Adding or removing energy in the form of heat= change of state.
31. Energy as heat can be transferred as conduction, convection, and radiation.
32. As long as two objects are in contact, conduction continues until the temperatures of the objects are equal.
33. Metals = good conductors.
34. Insulators: Wood, paper, and plastic foam are examples
35. When water is boiled, the water moves in roughly circular patterns because of convection. This motion (called convection current) is due to density differences that result from temperature differences.
36. All objects, including the sun and all living things, emit radiation.
37. When radiation is emitted from one object and is absorbed by another, the result is often a transfer of heat.
38. Radiation can travel through empty space.
39. Earth’s main energy source=sun.
40. Renewable resources- replaced at a rate equal to or greater than rate at which they are used. Ex: sunlight, wind, trees, and crops.
41. Nonrenewable resources can no longer be formed or could be formed over millions of years below Earth’s surface. Ex: minerals (like uranium), coal, petroleum, and natural gas.
42. Fossil fuels are nonrenewable because they take millions of years to form.
43. Burning fossil fuels produces carbon dioxide, a greenhouse gas, harmful acids and other forms of pollution.
44. Coal mining can involve removing soil and rocks or creating deep mines which can destroy landscapes and pollute water supplies.
45. Some fossil fuels are gases that became trapped in rock formations.
46. Methane is main component of natural gas.
47. Natural gas burns more cleanly than other fossil fuels but produces carbon dioxide when burned, and leaks can be dangerous
48. *Petroleum*- “rock oil,” used for fuels such as gasoline, diesel, and jet fuel.
49. Transporting oil can cause oil spill and burning petroleum produces pollutants.
50. Natural gas and petroleum are formed from buried organic matter
51. An alternative energy sourceis a resource that can be used in place of fossil fuels.
52. Solar energy is renewable energy from the sun that can be converted into electrical energy, it’s free and clean but not commonly used and sunlight does not fall evenly over Earth.
53. Nuclear energy is nonrenewable because minerals in Earth’s crust cannot be replaced.
54. Nuclear power plants do not produce carbon dioxide, but they produce harmful radioactive wastes that must be safely stored.
55. Hydroelectric energy is energy from fast-moving rivers or water flowing downhill through dams, powered by the water cycle, so it is a renewable resource, but too much water back up can destroy habitats, and dams can disrupt and lead to erosion.
56. Wind energy is renewable resource made when the blades of wind turbines turn, doesn’t produce any pollution, but it depends on strong winds and can harm birds that fly too close to the blades.
57. Geothermal energy is extracted from heat stored within Earth, available near hot springs, geysers, or active volcanoes, it is renewable, but found only in specific areas on Earth.
58. Biomass is a renewable resource that includes living or recently dead organic material that can be used as a fuel, Ex: trees, crops, and decaying organic matter but burning it releases carbon dioxide.