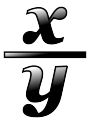
Name: _____

Teacher: _____

Date: _____

Fuel and Fractions

M.5.11.1, 5.11.2, 5.11.3, 5.11.4, 5.11.5, 5.11.6



1. NASA is designing a new rocket engine and needs your help with figuring out the right amount of energy for the job! Every rocket engine has a combustion chamber where oxygen and fuel are mixed together and ignited to make the rocket takeoff! However, it has to be the right amount of both sources or the rocket won't function properly. Add the fractions below and determine how much total fuel will be available to use in the rocket!

$$2\frac{3}{4} \quad + \quad 1\frac{2}{4} = \quad$$

lbs of Oxygen *lbs of Fuel* *Total lbs*

2. Onboard the rocket, NASA engineers need advice on a cubesat design. However, one of the engineers made a mistake and recorded the weights as improper fractions! The weight of the instruments is listed below, along with the weight of the frame. The weight limit is also listed below. First, add the weight of the instruments and the frame. Then find how much weight is left available by subtracting the combined weight from the first part, from the weight limit given. Remember, if needed, improper fractions can be broken into mixed numbers!

$$\frac{22}{6} \quad + \quad \frac{34}{6} = \quad$$

Weight of Instruments *Weight of cubesat frame* *Total weight of design (lbs)*

$$\frac{55}{5} \quad - \quad = \quad$$

Weight limit of design *Total weight of design* *Available weight left (lbs)*

3. In a warehouse, there are 14 different 6U cubesats. 5 of them are blue, 3 of them are green and the rest are red. First, write out the fraction of cubesats that are blue, green and red. Then, write what the combinations of cubesats fractions are (eg: blue and red, green and red, blue and green)

4. 6U means there are 6 units in each individual cubesat. As a bonus question, answer the questions that were asked in question three, but in terms of units! Write out the fractions of blue, green and red units and their combinations!

Name: _____

Teacher: _____

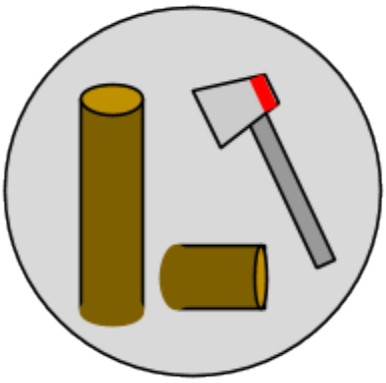
Date: _____

Property Changes and Physics

SCI.5.4.1, 5.4.2, 5.4.3, 5.4.4

In scientific theory, there are two types of changes: physical change and chemical change! A **physical change** is defined as a change in form but not a change in composition. A **chemical change** is when a substance mixes or reacts to create a different chemistry. These changes are brought about through different chemical reactions, solutions and mixtures. A **mixture** is when two or more substances are combined equally, while a **solution** is a mixture where one of the substances dissolves into another. Certain solutions or mixtures lead to **chemical reactions,** a transformation of one substance into another, leading to a chemical change.

Wood can be used as an example for both physical and chemical change. Chopping wood changes its shape or form and is therefore a **physical change.** Burning wood is done by a chemical reaction, making it a **chemical change.**



<u>Physical Change:</u>
Chopping Wood

<u>Chemical Change:</u>
Burning Wood

Other physical changes can involve matter changes but not chemical changes. Melting and freezing of ice is a physical change but the substance still remains H20 in both forms. Some other chemical changes include iron turning into rust or rocket fuel turning into exhaust.

Physical Change:
Ice Melting

Chemical Change:
Rusting Iron

Chemical Change:
Combustion Chamber

Take a look at the examples below and draw a line from the left side to the right, connecting each event with a change. Remember, physical change doesn't modify the chemicals of the substance.

1. Burning wood
2. Melting ice
3. Chopping wood
4. Rocket fuel burning
5. Freezing ice
6. Rotting banana
7. Iron rusting

Physical change

Chemical change

8. What are some physical changes that you can come up with? Try to think of three examples. Describe them in the space below!

9. How about chemical changes? Can you think of three examples of these?

10. Rocket engines generally use two types of fuel, solid or liquid fuel. When solid fuel is being used, it is being burned into rocket exhaust! Is this a chemical or physical change? Why or why not?

11. When liquid fuel is being used, it is pumped out of a fuel tank. When the liquid in the tank decreases, is this a chemical or physical change?

12. A CubeSat is rushing through the upper limits of the earth's atmosphere. Onboard, there is a gas detector that changes color based upon the gas it encounters. Is the gas detector going through a chemical change, a physical change, or both when it changes colors? Describe your thought process!