Date _____

Feedback Loops

Is the Situation Described a Positive or Negative Feedback Mechanism?
You Make the Call!

FEEDBACK LOOPS - how systems respond to change
outputs of a system are "fed back in" and cause a system to do more or less of what it was doing

1. **POSITIVE FEEDBACK LOOPS**
(reinforcing loops)

causes a system to change further in the same direction

If something is increasing, it will continue to increase.

If something is decreasing, it will continue to decrease.

2. **NEGATIVE FEEDBACK LOOPS**
(balancing loops)

causes a system to change in the opposite direction

1. As a snowball rolls down a hill, more snow grabs on to the ball's exposed surface area, causing it to increase in size. As the snowball grows larger, it gains even more surface area and is thus able to grab more snow and get even bigger. And so on …

2. Technological advances contribute to surplus wealth. This wealth can then be invested into the development of more machines and technology, which helps accumulate more wealth.

3. A rise in body temperature leads to sweating and beads of water form on the surface of the skin. The evaporation of this sweat from your skin cools your body and your temperature returns to normal.

4. When blood sugar rises, receptors in the body sense a change. In turn, the pancreas secretes insulin into the blood effectively lowering blood sugar levels. Once blood sugar levels reach homeostasis, the pancreas stops releasing insulin.

5. As global warming increases, more ice sheets melt. As a result the reflectivity of the Earth's surface decreases because more land is exposed which can absorb more sunlight causing more warming of the Earth as its surface and more ice melting.

6. Technological growth increases the carrying capacity of land for people, which leads to more population, and so more potential inventors in further technological growth.

7. A lack of rain during a drought decreases soil moisture, which kills plants and/or causes them to release less water back to the atmosphere through transpiration. Less water vapor in the air decreases the relative humidity in the atmosphere and therefore decreases cloud formation. Without clouds forming, there cannot be rain.

8. As interest is accrued in bank account, the principal will begin to grow (assuming money is not withdrawn). As the principal grows, even more interest will be accrued, quickening the rate of principal growth.

9. Ice sheets reflect more sunlight than vegetation, soil, or water. As ice sheets grow, more solar radiation is reflected to space, and less is absorbed by the surface. This leads to a temperature decrease measured at the Earth's surface. Cooler temperatures lead to more ice growth, more reflection of solar radiation back to space, and even cooler temperatures.

10. As Earth warms, organic matter in soil is decomposed faster. As a result of the decomposition, more CO_2 is released to the atmosphere enhancing the greenhouse effect. The Earth warms even more which contributes to higher rates of decomposition of organic matter.

11. Exponential population growth.

12. Oil prices increase leading to people driving less and therefore they purchase less gasoline. As a result, oil prices drop to entice people to buy gasoline and drive more again.

13. Then there is the circle of life … Think of the lion-antelope population. More lions lead to a reduction in the number of antelopes which leads to starvation for some lions. This leads to an equilibrium state. Less lions allows for the population growth for antelope leading to more food for lions helping their growth.

14. A rising temperature triggers the air conditioner to turn on, cooling the air.

15. Consumption of resources by a population leads to more industry which, in turn, will consume more resources itself to produce additional resources for the population to consume.