Label each of the following examples as either positive or negative feedback and explain how it be positive or negative feedback using the hint given. A is given as the example

A. Inc temperatures leads to overall decrease in mean global temperatures *(hint: it involves snowfall)*	**E. Inc carbon dioxide leads to decrease in temperatures** *(hint: it involves algae)*
B. Inc temperatures leads to decrease in temperatures *(hint: it involves cloud cover)*	**F. Inc thawing of permafrost leads to more melting** *(hint: involves methane)*
C. Inc temperature leads to increased greenhouse effect *(hint: involves evaporation)*	**G. Inc carbon dioxide leads to increased greenhouse effect** *(hint: involves soil respiration)*
D. Inc temperature leads to increased temperature *(hint: involves ice)*	**H. Inc carbon dioxide leads to more carbon dioxide in the atmosphere** *(hint: involves corals)*

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A **Negative feedback** **Inc temperatures → Earth warms→ snowfall at high latitude melted→ icecaps enlarge→ albedo increase (more E is reflected)→ overall decrease in mean global temperatures**	**E**
B	**F**
C	**G**
D	**H**

Both natural and human systems are influenced by feedback mechanisms.
Generally, we wish to preserve the environment in its original state, so _____ feedback is usually helpful and -_____ feedback is usually undesirable. However there are other situations where change is needed and _____ feedback is advantageous. For example, if students enjoy their Environmental Systems lessons, they want to learn more, so attend classes regularly and complete assignments. Consequently they move to a new equilibrium of being better educated about the environment.

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Label each of the following examples as either positive or negative feedback

- Your body temperature rises as you walk around outside in Marvel City on a hot afternoon. The sensors in your skin detect the rise in your surface temperature so you start to sweat.
- In some developing countries poverty causes illness and contributes to poor standards of education. In the absence of knowledge of family planning methods and hygiene, this contributes to population growth and illness, adding further to the causes of poverty; "a vicious circle of poverty."
- A thermostat in a central heating system can determine the temperature of your living room. It switches the air conditioner on when the temperature increases to a predetermined level and shuts it off when it cools to another level. The room temperature remains within a comfortable level regardless of the temperature outside.
- Some organisms have internal feedback systems, physiological changes occurring prevent breeding when population densities are high and promote breeding when population densities are low.
- You are lost on a snowy mountain. When your body senses that it is cooling below 37°C, various mechanisms such as shivering help to raise your body core temperature again. However if these are insufficient to restore normal body temperature, our metabolic processes start to slow down, because the enzymes that control them do not work so well at lower temperatures. As a result, you become lethargic and sleepy and move around less and less, allowing your body to cool even further. Unless you are rescued at this point, your body will reach a new equilibrium; you will die of hypothermia.
- Higher temperatures cause more evaporation which leads to more water vapor in the atmosphere. Water vapor is a greenhouse gas so will trap more heat so the atmosphere will warm more.
- As carbon dioxide levels in the atmosphere rise, the temperature of the Earth rises. As the Earth warms the rate of photosynthesis in plants increases, more carbon dioxide is therefore removed from the atmosphere by plants, reducing the greenhouse effect and reducing global temperatures.
- As the Earth warms, ice cover melts, exposing soil or water. Albedo decreases (albedo is the fraction of light that is reflected by a body or surface). More energy is absorbed by the Earth's surface. Global temperature rises. More ice melts.
- As the Earth warms, upper layers of permafrost melt, producing waterlogged soil above frozen ground. Methane gas is released into the environment. The greenhouse effect is enhanced. The Earth warms, melting more permafrost.
- As the Earth warms, polar icecaps melt, releasing large numbers of icebergs into oceans. Warm ocean currents such as the Gulf Stream are disrupted by additional freshwater input into oceans. Reduced transfer of energy to the poles reduces temperature at high altitudes. Ice sheets reform and icebergs retreat. Warm currents are re-established.

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