Benchmarks for Lesson Plan: Control Mechanisms (9-12)

CENTRAL BENCHMARK

11A Systems (9-12)#3
The successful operation of a designed system usually involves feedback. The feedback of output from some parts of a system to input of other parts can be used to encourage what is going on in a system, discourage it, or reduce its discrepancy from some desired value. The stability of a system can be greater when it includes appropriate feedback mechanisms.

RELATED BENCHMARKS

2A Patterns and Relationships (3-5)#2
Mathematical ideas can be represented concretely, graphically, and symbolically.

3B Design and Systems (6-8)#3
Almost all control systems have inputs, outputs, and feedback. The essence of control is comparing information about what is happening to what people want to happen and then making appropriate adjustments. This procedure requires sensing information, processing it, and making changes. In almost all modern machines, microprocessors serve as centers of performance control.

3B Design and Systems (9-12)#3
Complex systems have layers of controls. Some controls operate particular parts of the system and some control other controls. Even fully automatic systems require human control at some point.

9B Symbolic Relationships (6-8)#3
Graphs can show a variety of possible relationships between two variables. As one variable increases uniformly, the other may do one of the following: increase or decrease steadily, increase or decrease faster and faster, get closer and closer to some limiting value, reach some intermediate maximum or minimum, alternately increase and decrease indefinitely, increase or decrease in steps, or do something different from any of these.

11A Systems (6-8)#2
Thinking about things as systems means looking for how every part relates to others. The output from one part of a system (which can include material, energy, or information) can become the input to other parts. Such feedback can serve to control what goes on in the system as a whole.

11B Models (K-2)#2
A model of something is different from the real thing but can be used to learn something about the real thing.

11B Models (3-5)#1
Seeing how a model works after changes are made to it may suggest how the real thing would work if the same were done to it.

Control Mechanisms (9-12) *(continued)*

11B Models (6-8)#1
Models are often used to think about processes that happen too slowly, too quickly, or on too small a scale to observe directly, or that are too vast to be changed deliberately, or that are potentially dangerous.

11C Constancy and Change (9-12)#1
A system in equilibrium may return to the same state of equilibrium if the disturbances it experiences are small. But large disturbances may cause it to escape that equilibrium and eventually settle into some other state of equilibrium.

11C Constancy and Change (9-12)#4
Graphs and equations are useful (and often equivalent) ways for depicting and analyzing patterns of change.