

Activity

Chain Reactions

Lab Preview

Directions: Answer these questions before you begin the Activity.

1. Define a chain reaction.

2. How do you set up the dominoes in this activity?

In an uncontrolled nuclear chain reaction, the number of reactions increases as additional neutrons split more nuclei. In a controlled nuclear reaction, neutrons are absorbed, so the reaction continues at a constant rate. How could you model a controlled and an uncontrolled nuclear reaction in the classroom?

What You'll Investigate

How can you set up chain reactions with dominoes to model a controlled and an uncontrolled nuclear reaction?

Materials

dominoes
stopwatch

Goals

- **Model** a controlled and uncontrolled chain reaction.
- **Compare** the two types of chain reactions.

Procedure

1. Set up a single line of dominoes standing on end so that when the first domino is pushed over, it will knock over the second and each domino will knock over the one following it.
2. Using the stopwatch, time how long it takes from the moment the first domino is pushed over until the last domino falls over. Record the time in the Data and Observations section.
3. Using the same number of dominoes as in step 1, set up a series of dominoes in which at least one of the dominoes will knock down two others, so that two lines of dominoes will continue falling. In other words, the series should have at least one point that looks like the letter Y.
4. Repeat step 2.

Activity (continued)**Data and Observations**

Domino arrangement 1: _____

Domino arrangement 2: _____

Conclude and Apply

1. **Compare** the amount of time it took for all of the dominoes to fall in each of your two arrangements.

2. Were the same number of dominoes falling at a particular time in both domino arrangements? Explain.

3. Which of your domino arrangements represented a controlled nuclear reaction? Which represented an uncontrolled nuclear reaction?

4. **Describe** how the concept of critical mass was represented in your model of a controlled chain reaction.

5. Assuming that they had equal amounts of material, which would finish faster—a controlled or uncontrolled nuclear fission reaction? Explain.

_____**Communicating Your Data**

Explain to friends or members of your family how a controlled nuclear chain reaction can be used in nuclear power plants to generate electricity.