

ACTIVITY IDEA: How safe is my house?

What you will need:

- Wire coils/springs x 4
- 10 cm x 10 cm x 2 cm wooden block x 2
- House blocks 3 cm x 3 cm x 3 cm x 4
- Isolators of different textures and properties (jelly/jubes, marshmallows, rubber stoppers, polystyrene, water in zip lock bag, ball bearings or marbles in zip lock bag)
- Blu-Tack

Experimental conditions:

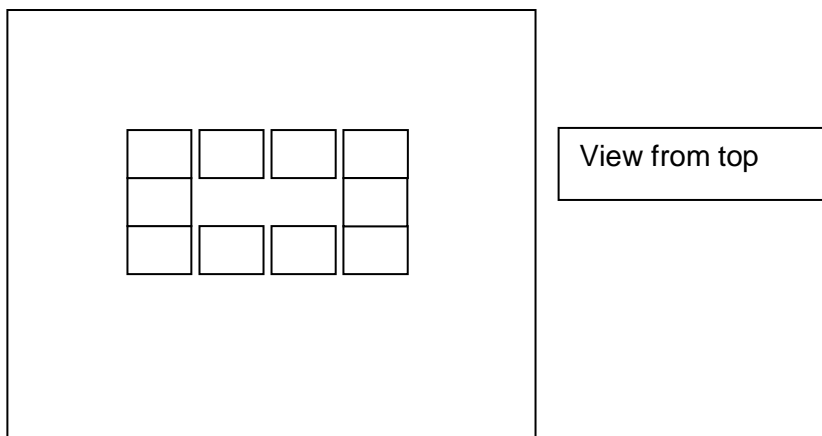
- 1 – no isolators (control)
- 2 – hard isolators
- 3 – flexible isolators

Hypothesis:

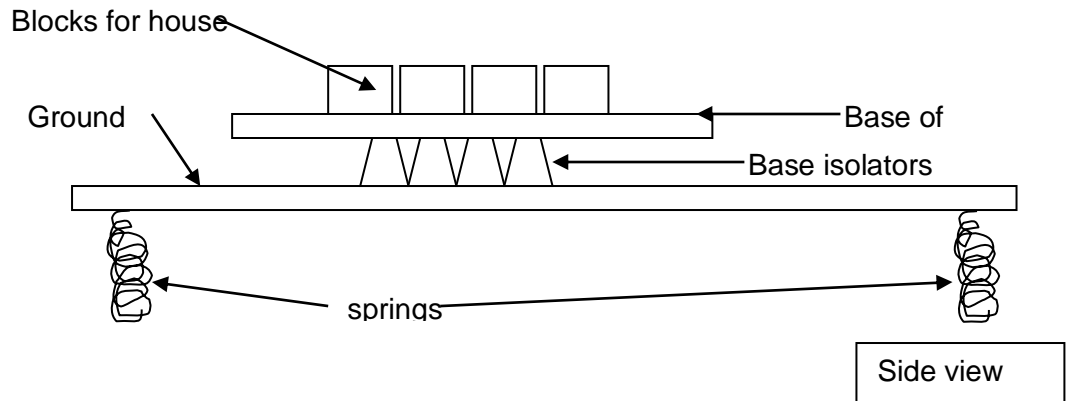
Predict how long it will take for the house to fall off the base for the different experimental conditions.

Instructions:

1. Build a model house on a wooden block (or paper plate the same size – plastic is too slippery). The house should consist of outer walls only. Use 3 cm³ blocks or empty matchboxes. The wooden block represents the floor of the house.



2. Make four wire coils or springs (coils need to be large – wind the wire around a whiteboard marker about 16 times). Attach the coils with Blu-Tack to the underside of the second wooden block or paper plate. If using a paper plate, cut it to size. This wooden block represents the ground under the house.
3. Select a suitable material for base isolators e.g., marshmallows, jubes, rubbers, wooden blocks, polystyrene, water in plastic bag, ball bearings in plastic bag.
4. Place at least four base isolators on the centre of the wooden block representing the ground.
5. Mount the house onto the base isolators. You will need to use Blu-Tack to give some grip.



6. Push the ground block backwards and forwards gently to simulate earthquake motion. The force used must be consistent each time this is repeated.
7. Time in seconds how long it takes for the house blocks to fall off the floor of the house. Record this time in a table (see Results).
8. Repeat steps 4 to 7 but use different materials as base isolators each time, or omit them altogether (control condition).

Results:

BASE ISOLATOR MATERIAL	PROPERTIES OF MATERIAL	PREDICTED TIME FOR HOUSE TO FALL (s)	ACTUAL TIME FOR HOUSE TO FALL (s)
Hard jubes			Trial 1: Trial 2: Trial 3: Average:
marshmallows			Trial 1: Trial 2: Trial 3: Average:
rubber			Trial 1: Trial 2: Trial 3: Average:
Polystyrene			Trial 1: Trial 2: Trial 3: Average:
Water			Trial 1: Trial 2: Trial 3: Average:
Ball bearings			Trial 1: Trial 2: Trial 3: Average:

Conclusion:

Which material provided most protection against earthquakes?

Discussion:

1. What property gave the best protection against earthquake damage?
2. How could you improve this investigation?
3. What would happen if your house was two or three storeys high?
4. What effect would base isolators have if the ground was loose or sandy, rather than solid?