

RESISTING FORCE

Mass, color, melting point and ability to conduct heat are examples of physical properties. Elasticity, hardness and stiffness are examples of mechanical properties. Both physical and mechanical properties combine differently in various materials. Do you think that the quality of one property predicts the quality of another property? For example, does great mass indicate great elasticity?

EVIDENCE & PROOF

Materials:

3 to 4 pairs of wood boards of various thicknesses (1/8 to 3/8 in.) about 1 ft. long;
 4 bricks or wood blocks about brick size;
 heavy books or bricks or other compact heavy objects;
 masking tape;
 string;
 balance scale;
 2 yardsticks;
 safety glasses.

Process: Follow these steps. Compare your results with your predicted answers to the question.



Caution: Wear safety glasses.

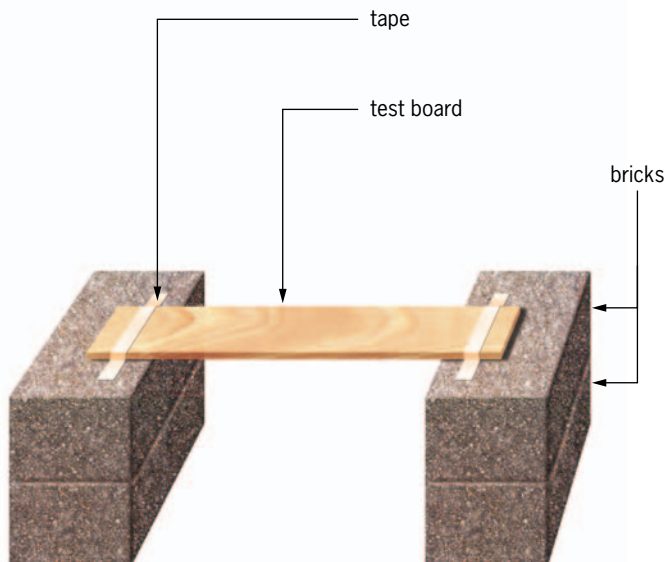


Fig. 1 Lay test board across brick and tape. On each side, allow only 1/4 inch of end of board to rest on bricks.

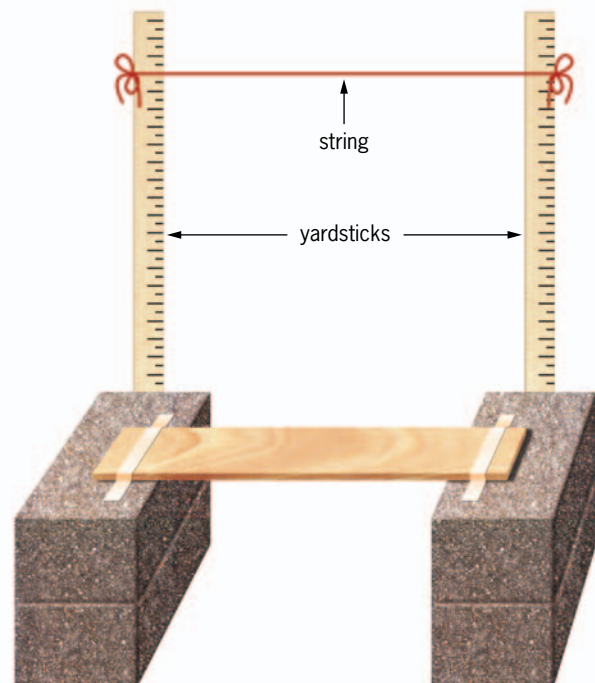


Fig. 2 Tape test board as in Fig.1. Align bottom of objects to be dropped with string.

CONCLUSIONS & INFERENCE

Tom wants to drive a large nail into a thick, hard board, but he doesn't have a hammer. Nearby, glass blocks are supporting shelves holding heavy books. Tom decides to use a block as a

Questions & Predictions Predict and record answers to these questions. Observe and measure for Evidence & Proof below.

Fig. 1 Can a wood board of greater mass resist a greater static load than a board of lesser mass can resist?

Fig. 2 Can a wood board that is able to resist a static load of a certain mass resist an impact of the same mass?

Fig. 1 Label the boards 1A, 1B, 2A, 2B, etc. Measure and record the mass of each board.

Fig. 2 Use the setup shown in Fig. 1 or devise your own method to test one board from each pair for resistance to static loads. Pile the board being tested with books, bricks, etc., until the board breaks or a maximum mass (19 lbs.) is supported. Measure the mass of the objects the test board supported without breaking. Record your data.

Fig. 3 Use the setup shown in Fig. 2 or devise your own method to test the remaining boards for resistance to impact loads. Drop the object with the least mass on the board. If the board does not break, tape a second object to the first and repeat. Continue until the board breaks or a maximum mass has been dropped. Record your data.

hammer. What assumptions about properties is Tom making? Do you agree with his assumptions? What evidence from your Evidence & Proof activity support your answer? Why?