kinetic karnival
forces & collisions

In this episode, Jearl proves his virility and masculinity by chopping concrete bricks with his bare hands and volunteering as the meat for a "nail sandwich."

Often we face the possibility of a force hurting or killing someone. The force might be in a car accident, a fall on slippery ice, or an absent-minded walk into the edge of a door. This show studies the size (or strength) of such forces in collisions. The show opens with several stories about people surviving tremendously long falls. I can injure myself with a fall in the bathtub [many people die this way each year], yet some people have managed to walk away unharmed from a fall of several thousand feet. How have they survived? In "street language," their collisions with the ground have somehow been cushioned, but what does that mean in scientific terms?

Karate is a beautiful blend of timing, strength, and an intuitive feel for the force in a collision. People skilled in karate can perform remarkable feats of strength, such as breaking boards and bricks. However, strength is really not essential. In the show I demonstrate how bricks are broken, but I am far from being strong.

The show ends with two demonstrations involving me sandwiched between two beds of nails. In the first demonstration, two people step up onto the sandwich. Although my skin is not pierced in this demonstration, the stress limit is close--if the people were to jump up and down, I would be skewered.

The second demonstration is the most dangerous stunt I ever do and I should caution that you should never attempt it. A concrete block on top of the bed is smashed by a sledge hammer. The impact of the sledge hammer is governed by the same relationship between change in momentum and time for collision that I introduced earlier in the show. The force in the collision between the sledge hammer and the block is somewhat lower than the value that can cause serious injury to me. Although one can easily calculate the stress on each nail during the smashing of the block, the effect of the shock wave sent through my body is somewhat more difficult to determine. It is the shock wave, not any puncturing by the nails, that could prove fatal.

Jearl Walker

PROFESSOR OF PHYSICS
CLEVELAND STATE UNIVERSITY

JEARL READS THE NEWSPAPER

1. Where did Ed Brown land?

A. On a trampoline **B. In a soft garden**

C. In a smokey bar **D. In a snowy ravine**

JEARL IS THE EGGMAN

2. The purpose of the Styrofoam Jearl wraps around the egg is to (circle all that apply)

A. increase the impulse **B. increase the impact time**

C. reduce the impulse **D. reduce the impact time**

SAMURAI JEARL

3. For an effective hit, you should

A. concentrate the force into a small area

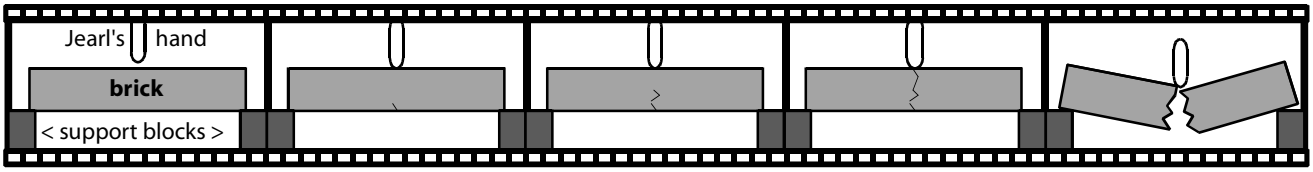
B. spread the force out over a large area

C. swing wildly like a cowboy

4. Exactly where should you focus a hit on your opponent?

5. If the brick does not break when Jearl strikes it, it will _____ and beat the &@#% out of Jearl's hand.

SLOW MOTION FILM OF BRICK BREAK:



6. What is the trick for setting up a break of multiple bricks?

ONE JEARL SANDWICH COMIN' UP!

>>>Watch the demonstrations; the questions apply to Jearl's post-demo explanations.<<<

7. The way the hammer decelerates when it hits the cinder block

A. increases the impact time; increases the impact force

B. increases the impact time; decreases the impact force

C. decreases the impact time; increases the impact force

D. decreases the impact time; decreases the impact force

8. The large mass of the cinder block works to Jearl's (advantage / disadvantage).

POST CREDIT EPILOGUE

9. When Jearl uses his new board holder, he (succeeds / fails) in breaking the board.

VIDEO REWIND CONTINUITY REVIEW

10. How many times did Jearl perform the cinder block trick?

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Jearl Walker

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CLEVELAND STATE UNIVERSITY

JEARL READS THE NEWSPAPER

1. Where did blacked-out parachutist land?

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C. In a smokey bar **D. In a snowy ravine**

JEARL IS THE EGGMAN

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A. increase the impulse **B. increase the impact time**

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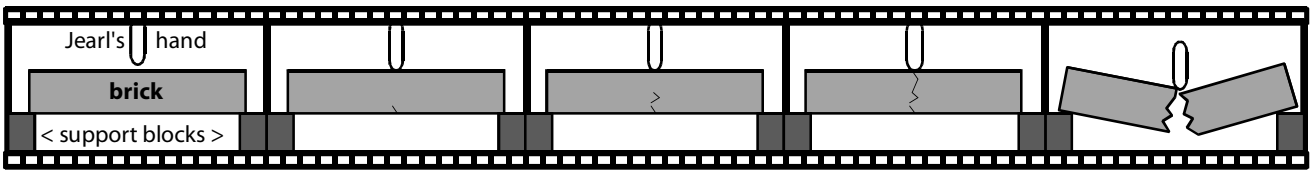

6. What is the trick for setting up a break of multiple bricks?

ONE JEARL SANDWICH COMIN' UP!

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7. When the hammer hits the cinder block, it

A. comes to a stop immediately

B. does not come to a stop immediately

8. The large mass of the cinder block works to Jearl's (advantage / disadvantage).

POST CREDIT EPILOGUE

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VIDEO REWIND CONTINUITY REVIEW

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