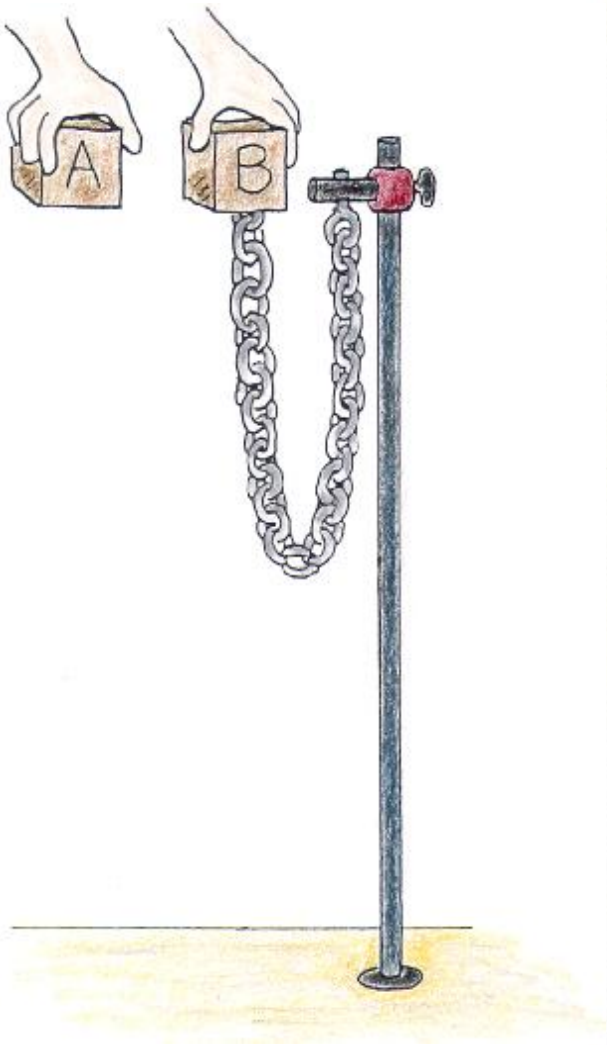
# NEXT-TIME QUESTION

CONCEPTUAL Physics

Consider the pair of identical blocks about to be simultaneously released from rest. Block A is completely free, and Block B is attached to one end of a massive chain, the other end held as shown. When dropped, both blocks hit the floor below—a vertical distance equal to the length of the chain.

Which block hits first?




thanx to Dave Kagan and Alan Kott



Hewitt Drew-it!

# NEXT-TIME QUESTION

Consider the pair of identical blocks about to be simultaneously released from rest. Block A is completely free, and Block B is attached to one end of a massive chain, the other end held as shown. When dropped, both blocks hit the floor below—a vertical distance equal to the length of the chain.


Which block hits first?

## Answer:

Block B hits the floor first. Notice that the race isn't between Blocks A and B, but between A and the end part of the B-chain system, which isn't in free-fall because one end is fastened to the post. So it doesn't accelerate at *g* like Block A. The B-chain's center of mass, initially closer to the floor, accelerates less than *g*. But acceleration of its "free" end increases in fall, surpassing *g*—like the tip of a falling pole accelerates more than *g* when it rotates to the ground.

So whereas the only downward force on Block A is due to gravity, Block B is additionally pulled downward by the chain.

The free end of a U-shaped chain is "whipped" as it falls, similar to the tip of an animal trainer's whip that reaches supersonic speed.

What a surprise this is to bungee jumpers! Read Kagan's and Knott's article, *The Greater-than-g Acceleration of a Bungee Jumper*. The Physics Teacher magazine, Sept. 1996, p 368.

Hewitt Drew it!

CONCEPTUAL Physics

ARBOR SCIENTIFIC
TOOLS THAT TEACH.