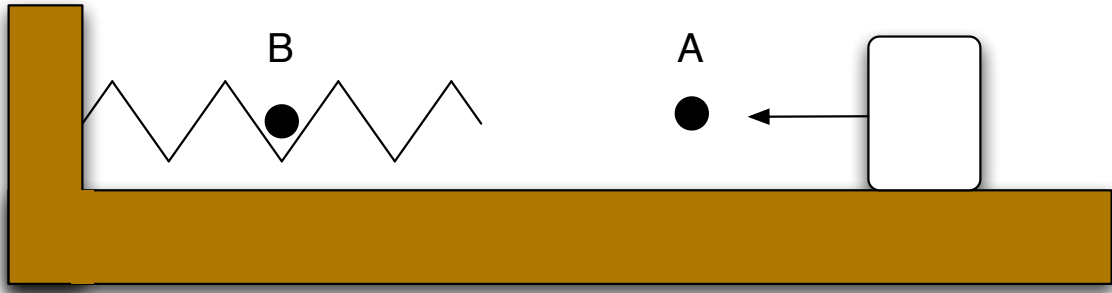


Quiz	DL Sec	Grading:	
Last 6 digits of student ID:		Name:	First three letters of your family name

1. A 2 kg block travels along a level floor at a constant speed of 4 m/s until it hits a spring mounted to the wall. The block compresses the spring until it comes momentarily to rest at the point labelled B and then bounces back the way it came. The spring constant k of the spring is 30 N/m. A diagram showing the block coming in is given below



- (a) Draw a force diagram for the block at point A *while the block is heading toward the spring.*

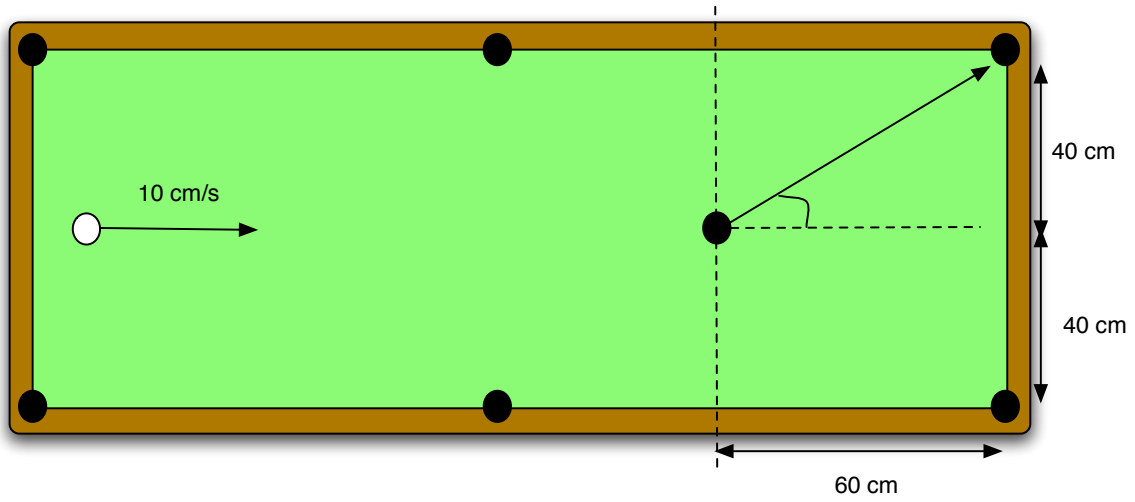
- (b) Draw a force diagram for the block at point B.

- (c) Draw a force diagram for the block at point A *while the block is heading away from the spring.*

- (d) In the force diagram for 1 a), is the force exerted by the floor on the block equal and opposite to the force of Earth on the block? If so, why? If not, how do you know?

- (e) What is the maximum compression of the spring? Show working.

2. Below is a pool table. The cue ball (white) is struck so that it travels in a horizontal direction (i.e. no vertical component) at a speed of 10 cm/s. The cue ball strikes the black ball, and the black ball moves off into the pocket shown.



For this problem, ignore any frictional forces between the balls and the pool table. (In reality, spin effects can change the direction the balls travel by $\mathbf{F}_{\text{table on ball}}$).

- (a) Is the cue ball an open or closed momentum system? Why?
- (b) If the cue ball goes into the lower right pocket without bouncing off any walls, what are the *speeds* of the two balls? (Note: both balls have the same mass)
- (c) Is this an elastic or inelastic collision?