1. Softballs are fired from two different pitching machines with the same initial speeds, but at two different initial angles, as shown. $\theta_A$ and $\theta_B$ are both less than 45°. Which softball spends more time in the air?

![Diagram A and B with initial velocities and angles]

A) Softball A spends more time in the air. B) Softball B spends more time in the air. C) Both softballs spend the same amount of time in the air. D) More information is required.

2. A small lens is placed between a candle and a dark card, so that a focused image appears on the card. The lens is removed and a larger lens with the same focal length is replaced at the exact location the small lens used to occupy. As a result the image on the card

A) Becomes larger B) Becomes less fuzzy C) Becomes brighter D) Does not change

3. The circuit shown uses two identical batteries and three identical bulbs. Initially, switch S is open. When the switch is closed,

A) Bulbs A and B become brighter. B) Bulbs A and B become dimmer. C) Bulb C becomes brighter, while A and B stay the same. D) All three bulbs stay the same.

![Diagram of a circuit with bulbs A, B, and C and a switch S]
4. A hunter pulls a sled across a snowy surface (as shown in the diagram). What is the reaction force to the force of friction exerted by the snow on the sled?

A) The force of the hunter pulling on the rope.
B) The force of the rope on the sled.
C) The force of friction exerted by the hunter on the snow.
D) The force of friction exerted by the sled on the snow.

5. At noon, a car is moving north at 100 km/h. An hour later, at 1:00 p.m., it is moving east at 100 km/h. Its average acceleration during this hour (from noon to 1:00 p.m.) is

A) a vector pointing northeast  B) a vector pointing southeast
C) a vector pointing southwest  D) zero

6. Two identical, but inverted, pulses on a string approach each other at speeds of 1 m/s.

What is the shape of the pulse 4 s later?

A

B

C

D
7. How many blades of grass are there in a soccer field in good condition?
   A) About $10^5$  B) About $10^9$  C) About $10^{12}$  D) About $10^{15}$

8. A hockey puck is passed across the goal (travelling east) with 30 J of kinetic energy. A player in front deflects it so that is travelling north (towards the goal) with 40 J of kinetic energy. The work done on the puck by the deflecting force of the hockey stick was:
   A) 10 J  B) 40 J  C) 50 J  D) 70 J

9. Standing in an open field with nothing but clear blue sky above you, you hold your compass out and the red-painted part of the needle points North. You move to stand below a 60 Hz power line running in the North-South direction and you hold your compass out again. Which way does the red-painted part of the needle point this time?
   A) East  B) West  C) North  D) South

10. Identical twins stand back-to-back in the centre of a motionless rail car, one facing east towards one end of the car, the other facing west towards the other end. The twins have equal masses, and can run at equal speeds. The rail car can roll without friction on the horizontal track. Now one twin runs east at top speed and jumps off the east end, while the other waits. After the first twin has jumped, the second begins to run west, and jumps at top speed off the west end of the car. After they both have jumped, how is the car moving?
   A) It is moving slowly west.
   B) It is moving slowly east.
   C) It is motionless again, but has shifted position to the west.
   D) It is motionless again, but has shifted position to the east.