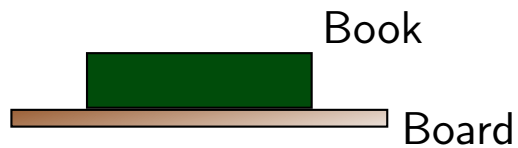# Question 1

A book, with mass m, sits on the surface of a horizontal board. The board is lowered with decreasing speed.

Book

Board

Which of the following is true regarding the magnitude of the normal force exerted by the board on the book?

1. $n = g$

2. $n = mg$

3. $n < mg$

4. $n > mg$

Question 2

Two ropes pull on a block of mass m that moves along a horizontal frictionless surface as illustrated.
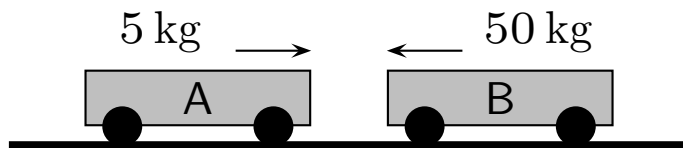

Which of the following is true regarding the normal force exerted by the horizontal surface on the block?

1. $n = mg$

2. $n < mg$

3. $n > mg$

Question 3

Two carts approach each other on a track. Let $\vec{F}_{\text{A on B}}$ be the force that A exerts on B and $\vec{F}_{\text{B on A}}$ be the force that B exerts on A while they are in contact.


5 kg → ← 50 kg
A B

Which of the following is true?

1. $F_{\text{A on B}} = F_{\text{B on A}}$ regardless the carts' motion.

2. $F_{\text{A on B}} > F_{\text{B on A}}$ whenever A approaches faster than B.

3. $F_{\text{A on B}} < F_{\text{B on A}}$ whenever A approaches slower than B.

4. $F_{\text{A on B}} > F_{\text{B on A}}$ whenever A approaches with speed at least 10 times that of B; otherwise $F_{\text{A on B}} < F_{\text{B on A}}$.

Question 4

Two arrangements of identical balls swing in horizontal circles with the same period. The distance from the "pivot" point to the outer ball is the same in each case.
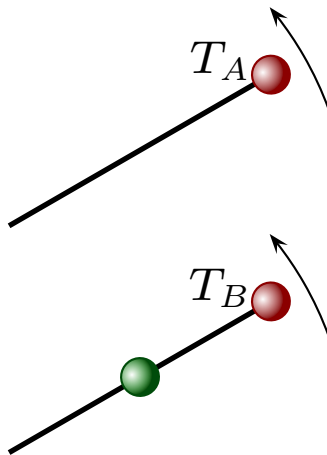
Which of the following is true regarding the tensions in the strings connected to the outermost balls?

1. $T_A > T_B$

2. $T_A < T_B$

3. $T_A = T_B$