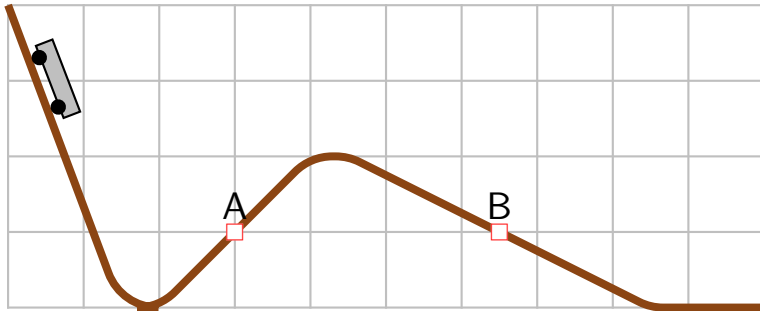


Question 1

A cart is released at the indicated point on the illustrated frictionless track; air resistance is negligible. The cart can easily pass the bends in the track.



Which of the following is true?

1. The speed of the cart at B is the same as at A.
2. The speed of the cart at B is larger than at A.
3. The speed of the cart at B is smaller than at A.
4. The speed of the cart at B could be smaller, larger or the same as at A. This depends on the height and shape of the bump.

Question 2

A snowflake is knocked off a tree branch and falls vertically down. At some point soon after it reaches terminal velocity. After that it falls with constant speed.

Which of the following is true while it falls with constant speed?

1. KE stays constant and PE stays constant. Energy $E = KE + PE$ stays constant.
2. KE stays constant and PE decreases. Energy $E = KE + PE$ decreases.
3. KE stays constant and PE decreases. Energy $E = KE + PE$ stays constant.
4. KE increases and PE decreases. Energy $E = KE + PE$ stays constant.
5. KE increases and PE decreases. Energy $E = KE + PE$ decreases.

Question 3

Two carts are accelerated by engines. Cart A has mass 4 kg and its engine delivers 200 J of energy in 20 s. Cart B has mass 8 kg and its engine delivers 400 J of energy in 80 s. The two carts are each initially at rest and eventually move with the same speeds.

What is true of the power delivered by the engines?

1. The power provided by engine A is the same as that provided by engine B.
2. The power provided by engine A is less than that provided by engine B.
3. The power provided by engine A is more than that provided by engine B.

Question 4

The energy flows in three engines are as follows.

Engine	Input	Waste	Useful Output
A	1000 J	700 J	300 J
B	1000 J	900 J	100 J
C	100 J	60 J	40 J

Which of the following ranks these in order of efficiency?

1. A largest, B middle, C smallest.
2. A largest, C middle, B smallest.
3. C largest, A middle, B smallest.
4. C largest, B middle, A smallest.
5. B largest, A middle, C smallest.

Question 5

Three charged particles are situated as illustrated. The sizes of the charges are all the same.



Various charged particles can be placed in the middle. Which (choose one) of the following is true regarding the net force on the middle charge?

1. The net force is repulsive if the middle charge is negative and attractive if it is positive.
2. The net force is zero if the middle charge is negative and repulsive if it is positive.
3. The net force is zero if the middle charge is positive and attractive if it is negative.
4. The net force is zero regardless of the middle charge.

Question 6

Three electrical wires carry currents. The charge flowing through each wire is observed for different times and the data is:

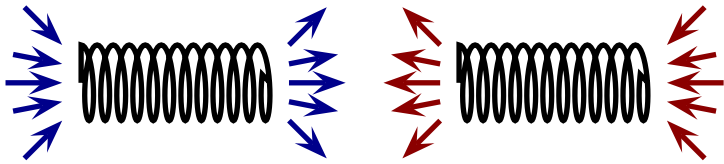
Wire	Charge	Time Observed
A	30 C	3 s
B	30 C	6 s
C	24 C	2 s

Which of the following ranks the currents correctly?

1. A and B same, C smaller.
2. A and B same, C larger.
3. A largest, B middle, C smallest.
4. C largest, A middle, B smallest.

Question 7

Two solenoids carry currents which produce the illustrated magnetic fields.



Which of the following is true regarding the solenoid on the right?

1. Attracted to the left.
2. Repelled to the right.
3. Forced up.
4. Forced down.
5. No force acts on it.