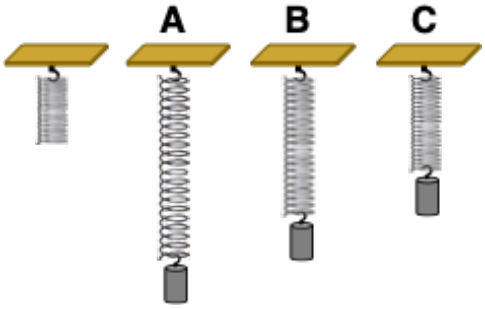
Vertical Springs: v and F

Activity 1: Speed Analysis

Question Group 1

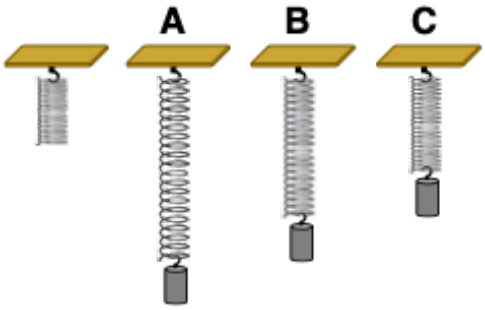
Question 1



A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. At what position does the mass have the greatest speed?

a. Position A only.
b. Position B only.
c. Position C only.
d. Positions A and C.

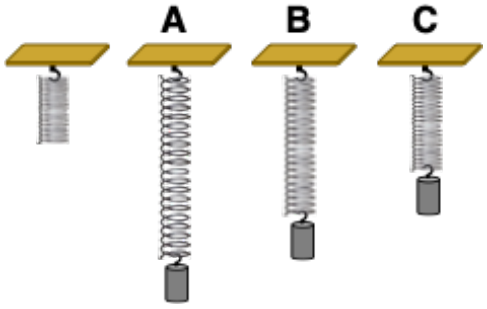
Question 2



A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. At what position does the mass have the greatest speed?

a. Positions A and C.
b. Position A only.
c. Position B only.
d. Position C only.

Question 3



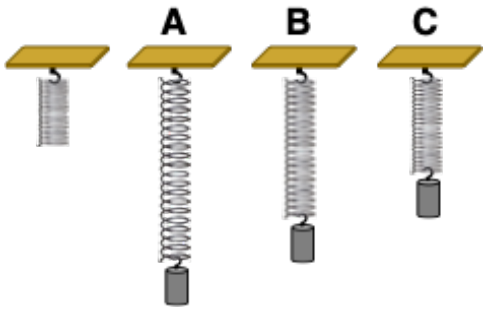
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. At what position does the mass have the greatest speed?

a. Position A only.
b. Position C only.
c. Positions A and C.
d. Position B only.

Question Group 2

Question 4

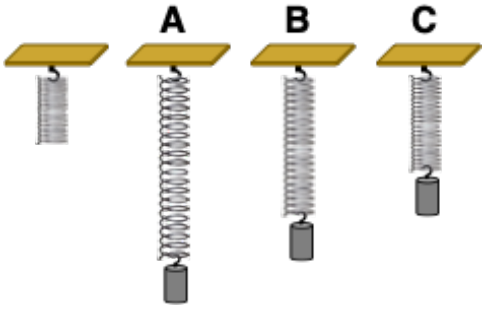
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. At what position does the mass have a speed of 0 m/s?



a. Position A only.
b. Position B only.
c. Position C only.
d. Positions A and C.

Question 5

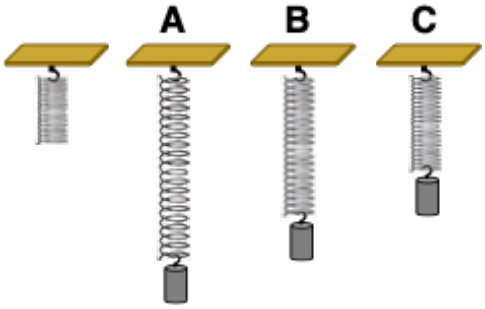
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. At what position does the mass have a speed of 0 m/s?



a. Positions A and C.
b. Position A only.
c. Position B only.
d. Position C only.

Question 6

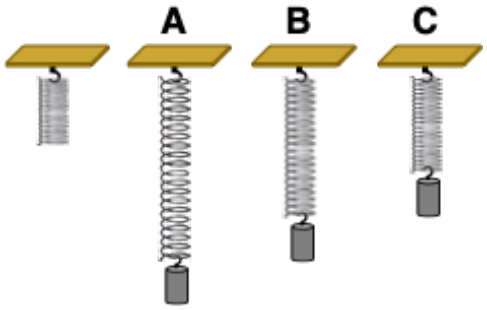
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. At what position does the mass have a speed of 0 m/s?



a. Position A only.
b. Position C only.
c. Positions A and C.
d. Position B only.

Question Group 3

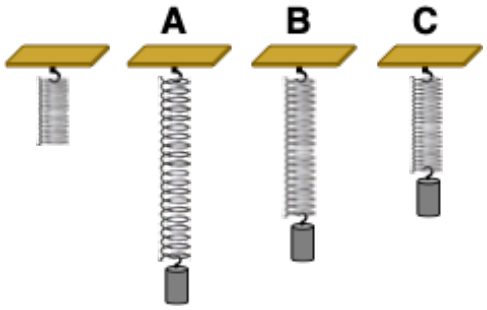
Question 7



A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the speed change as the mass moves from A to B?

a. Speed increases.
b. Speed decreases.
c. Speed remains unchanged.
d. Speed first increases and then decreases.
e. Speed first decreases and then increases.

Question 8



A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the speed change as the mass moves from A to B?

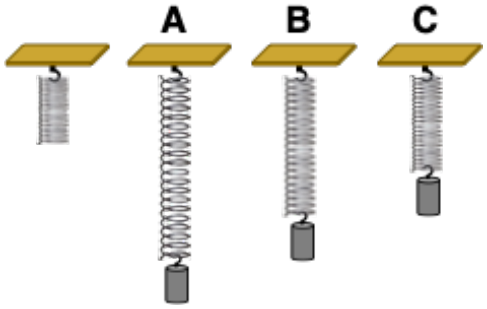
a. Speed remains unchanged.
b. Speed increases.
c. Speed first increases and then decreases.
d. Speed decreases.
e. Speed first decreases and then increases.

Question 9

A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the speed change as the mass moves from C to B?

a. Speed increases.
b. Speed decreases.
c. Speed remains unchanged.
d. Speed first increases and then decreases.
e. Speed first decreases and then increases.

Question 10

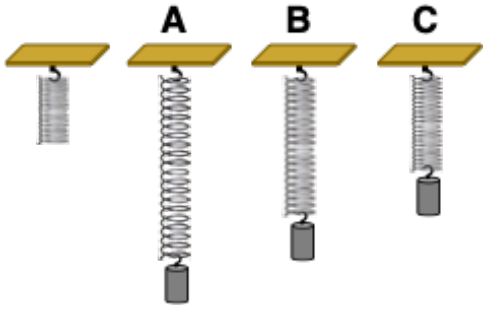


A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the speed change as the mass moves from C to B?

a. Speed remains unchanged.
b. Speed increases.
c. Speed first increases and then decreases.
d. Speed decreases.
e. Speed first decreases and then increases.

Question Group 4

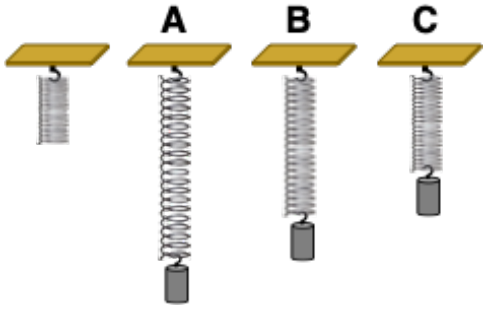
Question 11



A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the speed change as the mass moves from B to A?

a. Speed increases.
b. Speed decreases.
c. Speed remains unchanged.
d. Speed first increases and then decreases.
e. Speed first decreases and then increases.

Question 12



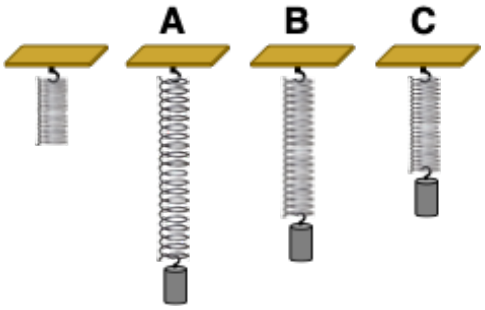
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the speed change as the mass moves from B to A?

a. Speed remains unchanged.
b. Speed increases.
c. Speed first increases and then decreases.
d. Speed decreases.
e. Speed first decreases and then increases.

Question 13

A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the speed change as the mass moves from B to C?

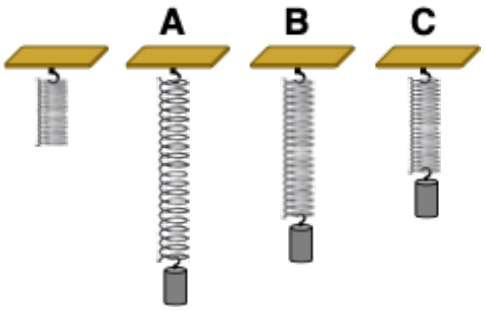
a. Speed increases.
b. Speed decreases.
c. Speed remains unchanged.
d. Speed first increases and then decreases.
e. Speed first decreases and then increases.



Question 14

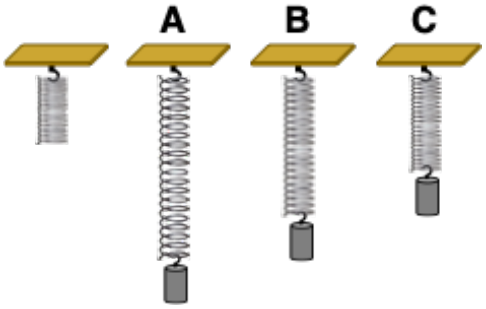
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the speed change as the mass moves from B to C?

a. Speed remains unchanged.
b. Speed increases.
c. Speed first increases and then decreases.
d. Speed decreases.
e. Speed first decreases and then increases.



Activity 2: Force Analysis
Question Group 5
Question 15

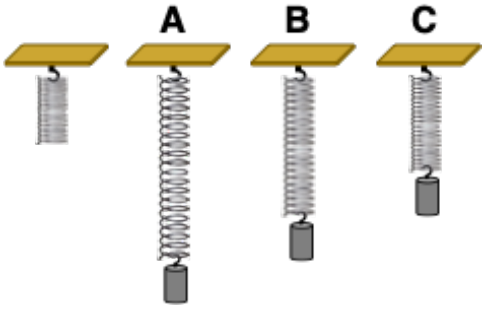
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. At what position does the mass experience the greatest net force?



a. Position A only.
b. Position B only.
c. Position C only.
d. Positions A and C.

Question 16

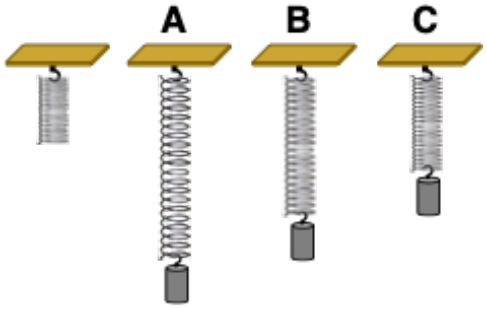
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. At what position does the mass experience the greatest net force?



a. Positions A and C.
b. Position A only.
c. Position B only.
d. Position C only.

Question 17

A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. At what position does the mass experience the greatest net force?

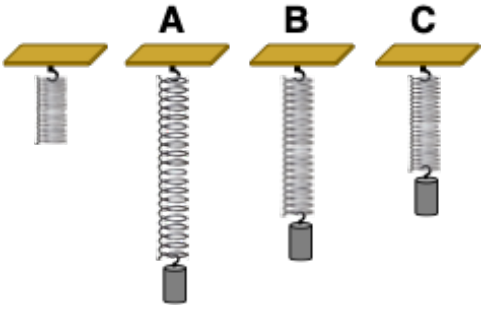


a. Position A only.
b. Position C only.
c. Positions A and C.
d. Position B only.

Question Group 6

Question 18

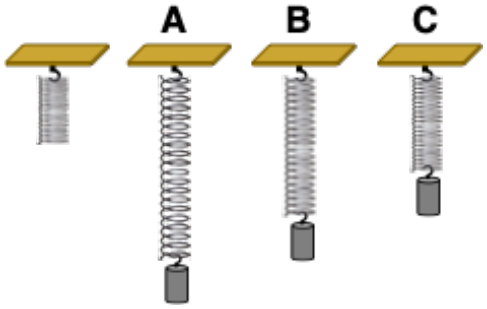
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. At what position does the mass experience a net force of 0 N?



a. Position A only.
b. Position B only.
c. Position C only.
d. Positions A and C.

Question 19

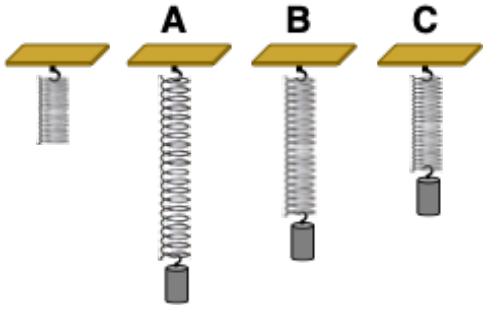
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. At what position does the mass experience a net force of 0 N



a. Positions A and C.
b. Position A only.
c. Position B only.
d. Position C only.

Question 20

A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. At what position does the mass experience a net force of 0 N

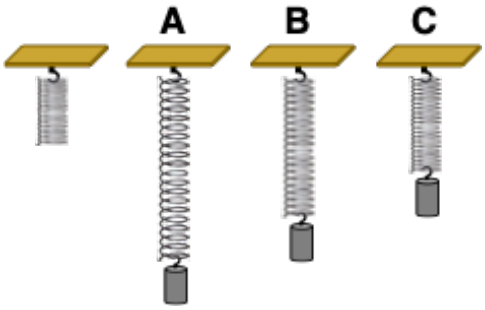


a. Position A only.
b. Position C only.
c. Positions A and C.
d. Position B only.

Question Group 7

Question 21

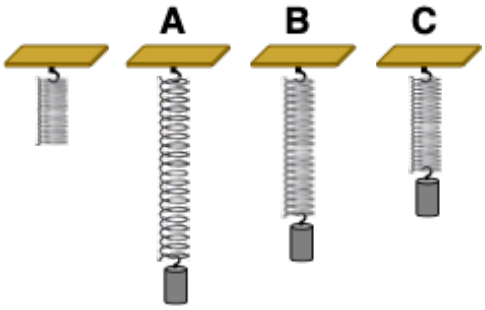
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the net force change as the mass moves from A to B?



a. Net force increases.
b. Net force decreases.
c. Net force remains unchanged.
d. Net force first increases and then decreases.
e. Net force first decreases and then increases.

Question 22

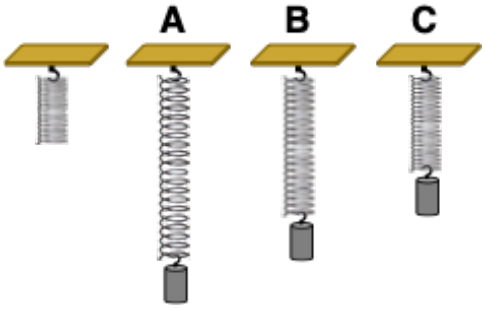
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the net force change as the mass moves from A to B?



a. Net force remains unchanged.
b. Net force increases.
c. Net force first increases and then decreases.
d. Net force decreases.
e. Net force first decreases and then increases.

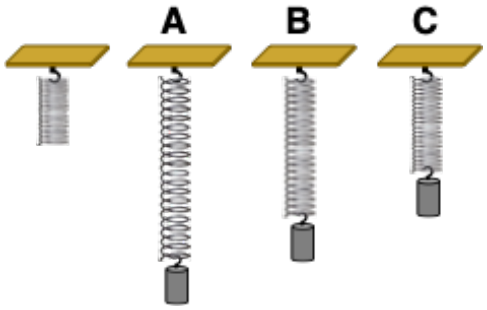
Question 23

A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the net force change as the mass moves from C to B?



a. Net force increases.
b. Net force decreases.
c. Net force remains unchanged.
d. Net force first increases and then decreases.
e. Net force first decreases and then increases.

Question 24

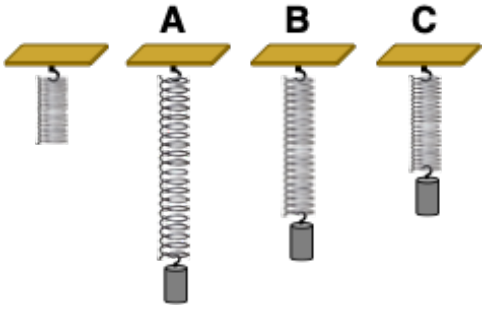


A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the net force change as the mass moves from C to B?

a. Net force remains unchanged.
b. Net force increases.
c. Net force first increases and then decreases.
d. Net force decreases.
e. Net force first decreases and then increases.

Question Group 8

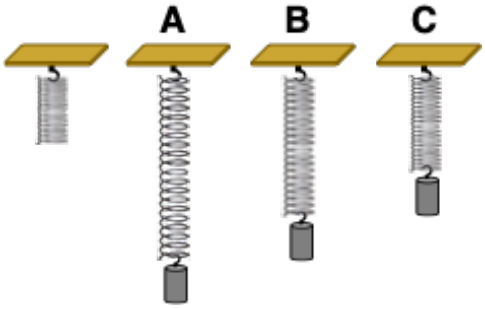
Question 25



A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the net force change as the mass moves from B to A?

a. Net force increases.
b. Net force decreases.
c. Net force remains unchanged.
d. Net force first increases and then decreases.
e. Net force first decreases and then increases.

Question 26

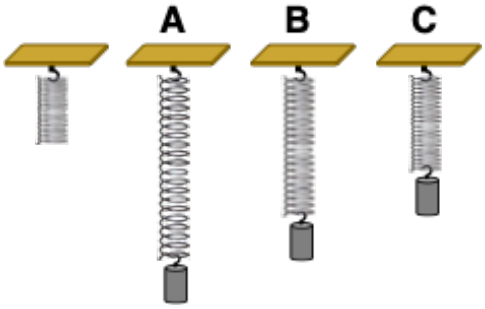


A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the net force change as the mass moves from B to A?

a. Net force remains unchanged.
b. Net force increases.
c. Net force first increases and then decreases.
d. Net force decreases.
e. Net force first decreases and then increases.

Question 27

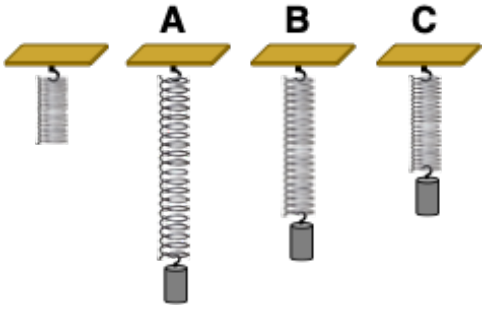
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the net force change as the mass moves from B to C?



a. Net force increases.
b. Net force decreases.
c. Net force remains unchanged.
d. Net force first increases and then decreases.
e. Net force first decreases and then increases.

Question 28

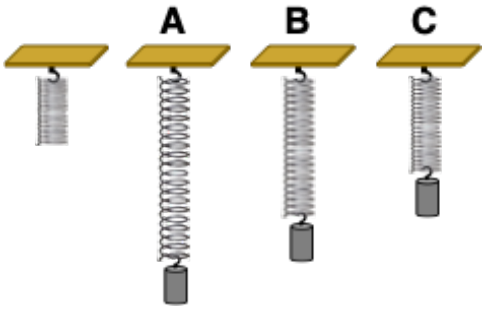
A spring is attached to a ceiling hook. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. In what manner does the net force change as the mass moves from B to C?

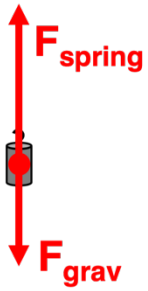


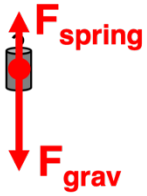
a. Net force remains unchanged.
b. Net force increases.
c. Net force first increases and then decreases.
d. Net force decreases.
e. Net force first decreases and then increases.

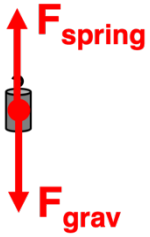
Activity 3: Free-Body Diagrams
Question Group 9
Question 29

A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. Which free-body diagram represents the type, relative size and direction of the forces acting on the mass at location A?



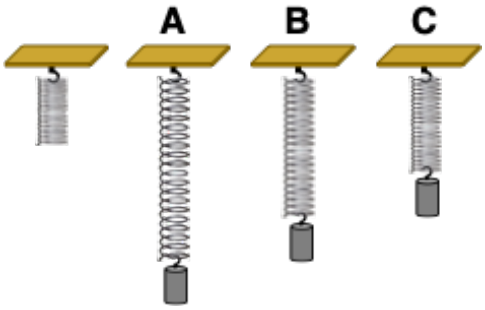


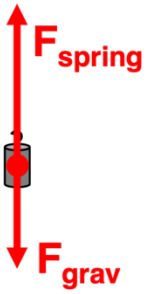


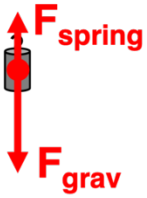


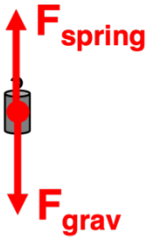
Question 30

A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. Which free-body diagram represents the type, relative size and direction of the forces acting on the mass at location A?



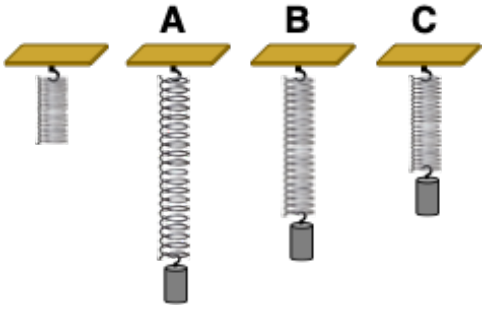


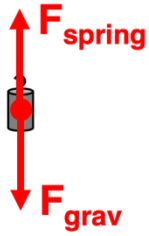


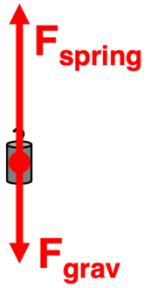


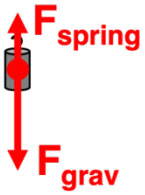
Question 31

A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. Which free-body diagram represents the type, relative size and direction of the forces acting on the mass at location A?



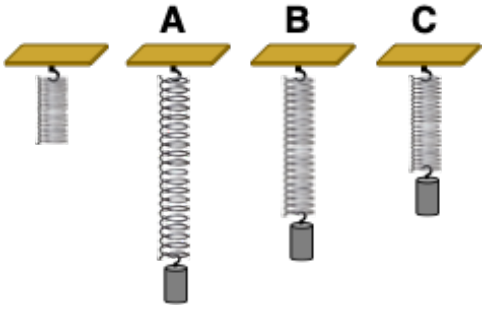


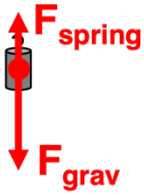


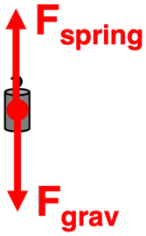


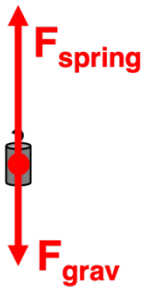
Question 32

A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. Which free-body diagram represents the type, relative size and direction of the forces acting on the mass at location A?



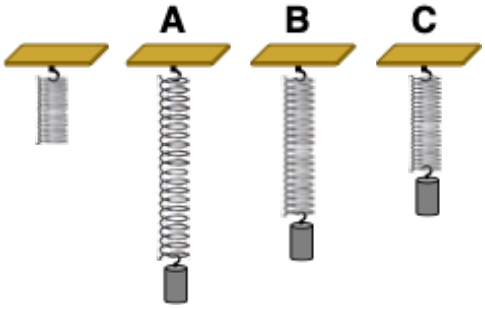


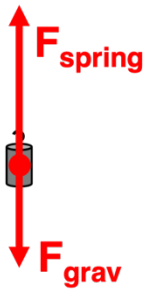


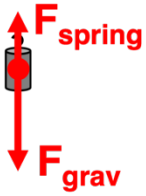


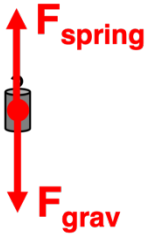
Question Group 10
Question 33

A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. Which free-body diagram represents the type, relative size and direction of the forces acting on the mass at location B?



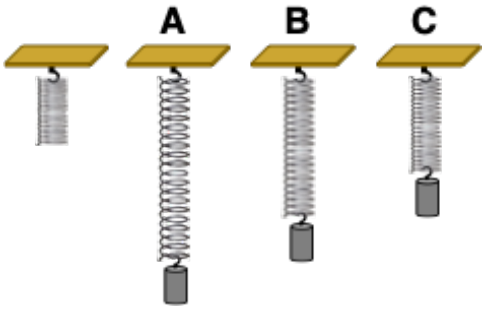


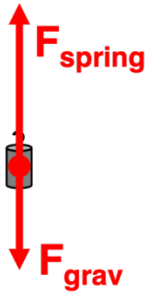


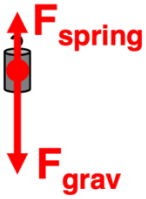


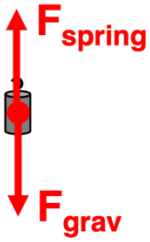
Question 34

A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. Which free-body diagram represents the type, relative size and direction of the forces acting on the mass at location B?



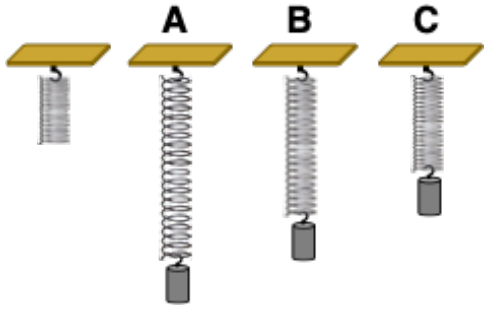


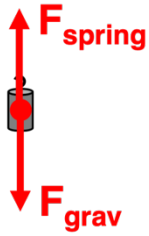


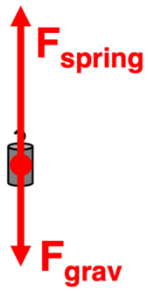


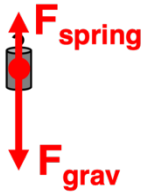
Question 35

A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. Which free-body diagram represents the type, relative size and direction of the forces acting on the mass at location B?



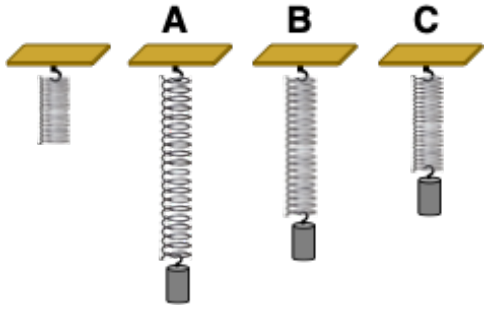


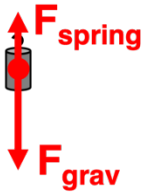


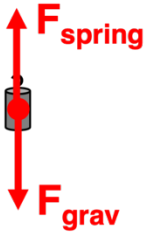


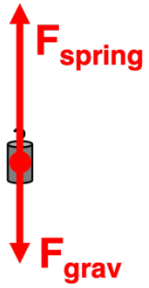
Question 36

A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. Which free-body diagram represents the type, relative size and direction of the forces acting on the mass at location B?



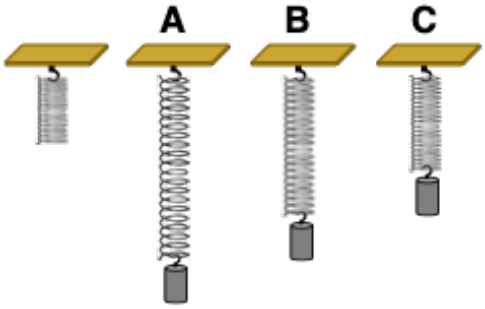


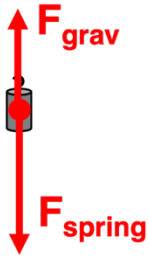


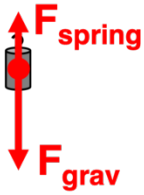


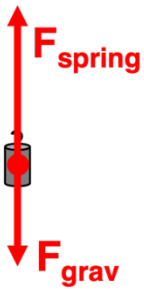
Question Group 11
Question 37

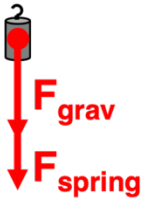
A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. Which free-body diagram represents the type, relative size and direction of the forces acting on the mass at location C?





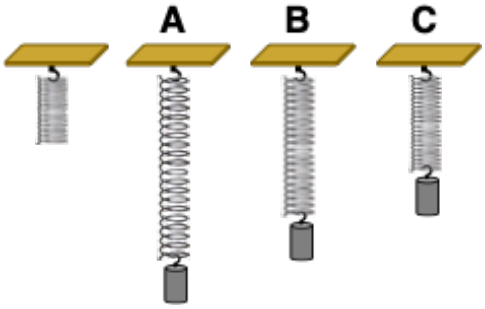


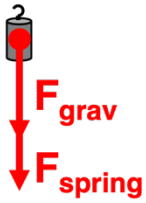


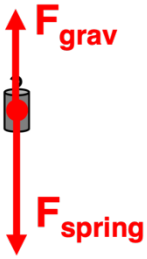


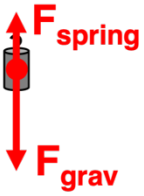
Question 38

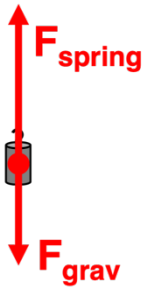
A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. Which free-body diagram represents the type, relative size and direction of the forces acting on the mass at location C?





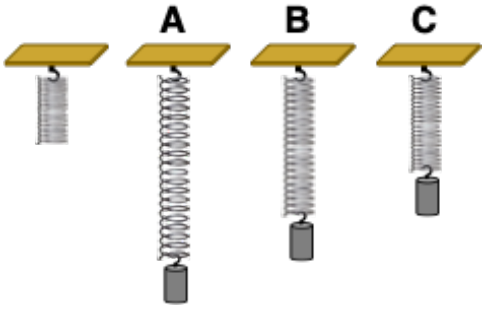


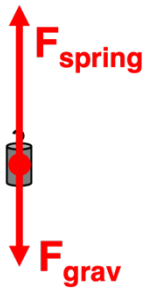


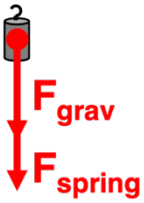


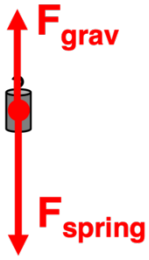
Question 39

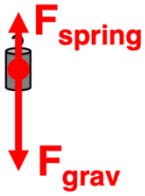
A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. Which free-body diagram represents the type, relative size and direction of the forces acting on the mass at location C?





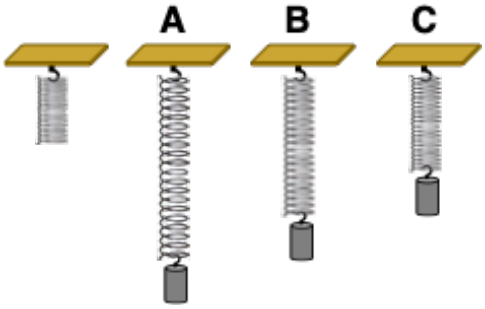


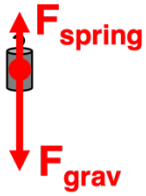


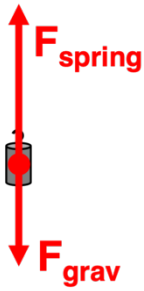


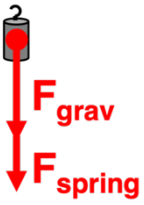
Question 40

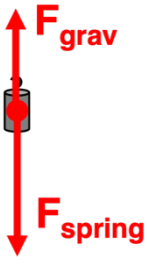
A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. Which free-body diagram represents the type, relative size and direction of the forces acting on the mass at location C?



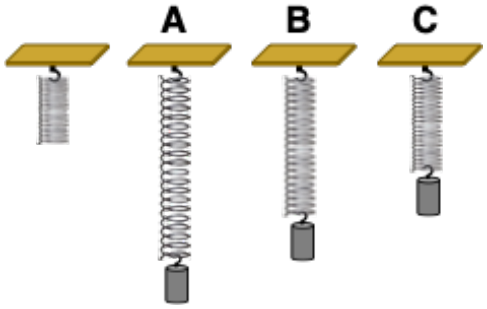








Question Group 12
Question 41

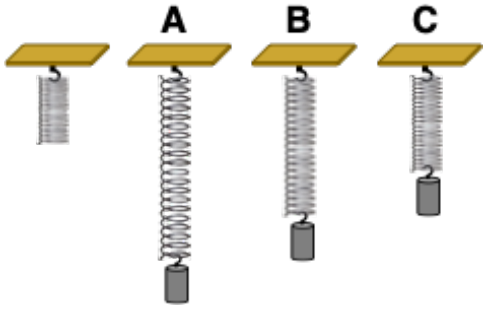


A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. What can be concluded about the **magnitude** of the gravity and spring forces as the mass moves from A to B?

The force of gravity …
a. increases
b. decreases
c. remains the same

The spring force …
a. increases
b. decreases
c. remains the same

Question 42

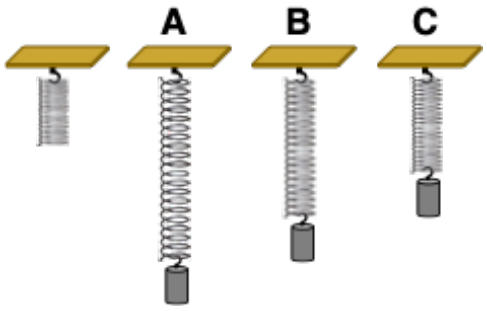


A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. What can be concluded about the **magnitude** of the gravity and spring forces as the mass moves from A to B?

The force of gravity …
a. remains the same
b. increases
c. decreases

The spring force …
a. remains the same
b. increases
c. decreases

Question 43

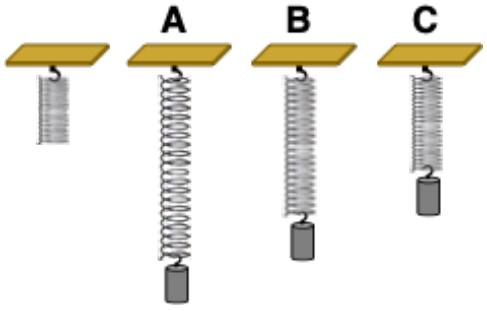


A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. What can be concluded about the **magnitude** of the gravity and spring forces as the mass moves from C to B?

The force of gravity …
a. increases
b. decreases
c. remains the same

The spring force …
a. increases
b. decreases
c. remains the same

Question 44

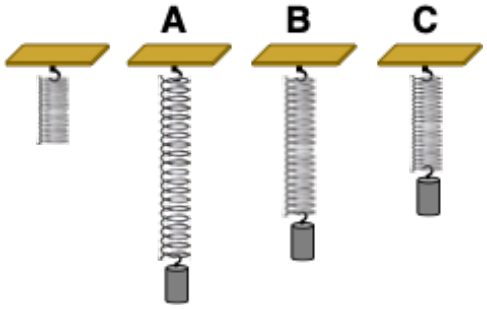


A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. What can be concluded about the **magnitude** of the gravity and spring forces as the mass moves from C to B?

The force of gravity …
a. remains the same
b. increases
c. decreases

The spring force …
a. remains the same
b. increases
c. decreases

Question Group 13
Question 45

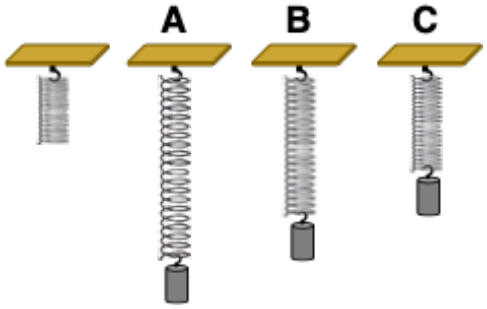


A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. What can be concluded about the **magnitude** of the gravity and spring forces as the mass moves from B to A?

The force of gravity …
a. increases
b. decreases
c. remains the same

The spring force …
a. increases
b. decreases
c. remains the same

Question 46

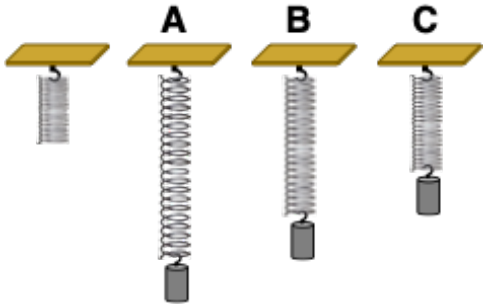


A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. What can be concluded about the **magnitude** of the gravity and spring forces as the mass moves from B to A?

The force of gravity …
a. remains the same
b. increases
c. decreases

The spring force …
a. remains the same
b. increases
c. decreases

Question 47

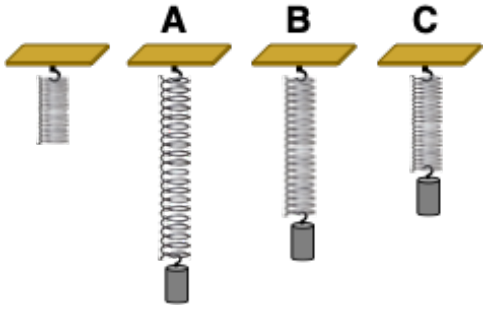


A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. What can be concluded about the **magnitude** of the gravity and spring forces as the mass moves from B to C?

The force of gravity …
a. increases
b. decreases
c. remains the same

The spring force …
a. increases
b. decreases
c. remains the same

Question 48

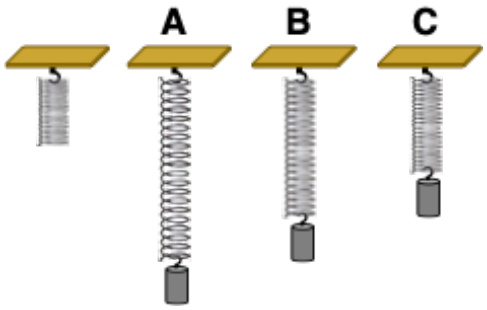


A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. What can be concluded about the **magnitude** of the gravity and spring forces as the mass moves from B to C?

The force of gravity …
a. remains the same
b. increases
c. decreases

The spring force …
a. remains the same
b. increases
c. decreases

Question Group 14
Question 49

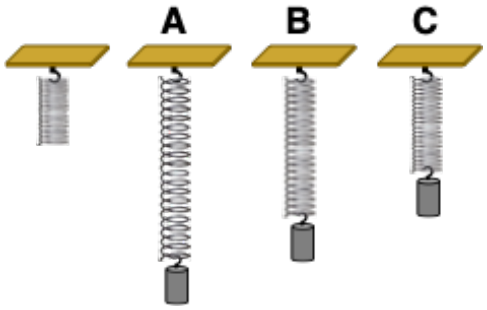


A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. What can be concluded about the **direction** of the gravity and spring forces as the mass moves from A to C?

The force of gravity …
a. Always up
b. Always down
c. First down; then up
d. First up; then down

The spring force …
a. Always up
b. Always down
c. First down; then up
d. First up; then down

Question 50



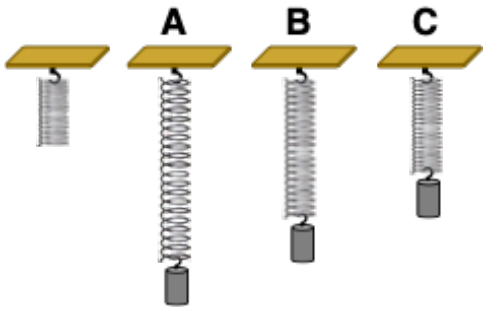
A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. What can be concluded about the **direction** of the gravity and spring forces as the mass moves from A to C?

The force of gravity …
a. Always up
b. First up; then down
c. Always down
d. First down; then up

The spring force …
a. Always up
b. First up; then down
c. Always down
d. First down; then up

Question 51

A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. What can be concluded about the **direction** of the gravity and spring forces as the mass moves from C to A?



The force of gravity …

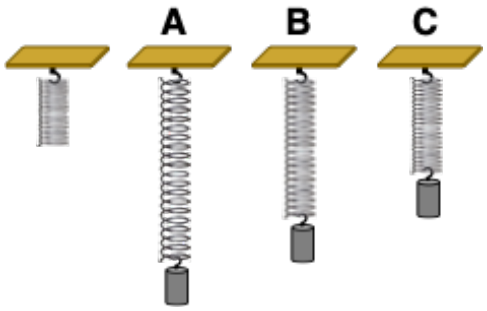
a. Always up
b. Always down
c. First down; then up
d. First up; then down

The spring force …

a. Always up
b. Always down
c. First down; then up
d. First up; then down

Question 52

A spring is attached to a ceiling hook as shown. A mass is attached to the spring and pulled down to position A. It is released from rest and vibrates back and forth between positions A and C. Position B is the equilibrium position. What can be concluded about the **direction** of the gravity and spring forces as the mass moves from C to A?



The force of gravity …

a. Always up
b. First up; then down
c. Always down
d. First down; then up

The spring force …

a. Always up
b. First up; then down
c. Always down
d. First down; then up