3 A 2.00-kilogram object weighs 19.6 newtons on Earth. If the acceleration due to gravity on Mars is 3.71 meters per second squared, what is the object’s mass on Mars?

(1) 2.64 kg  (2) 2.00 kg  (3) 19.6 N  (4) 7.42 N

4 A car moves with a constant speed in a clockwise direction around a circular path of radius \( r \), as represented in the diagram below.

[Diagram of a circular path with directions labeled North, South, East, and West]

When the car is in the position shown, its acceleration is directed toward the

(1) north  (2) west  (3) south  (4) east

7 The diagram below represents a spring hanging vertically that stretches 0.075 meter when a 5.0-newton block is attached. The spring-block system is at rest in the position shown.

[Diagram of a spring with a block attached, showing a stretch of 0.075 m and a force of 5.0 N]

The value of the spring constant is

(1) 38 N/m  (2) 67 N/m  (3) 130 N/m  (4) 650 N/m

10 Earth’s mass is approximately 81 times the mass of the Moon. If Earth exerts a gravitational force of magnitude \( F \) on the Moon, the magnitude of the gravitational force of the Moon on Earth is

(1) \( F \)  (2) \( \frac{F}{81} \)  (3) 9\( F \)  (4) 81\( F \)

13 A 1750-kilogram car travels at a constant speed of 15.0 meters per second around a horizontal, circular track with a radius of 45.0 meters. The magnitude of the centripetal force acting on the car is

(1) 5.00 N  (2) 583 N  (3) 8750 N  (4) 3.94 \times 10^5 N
40 A 25-newton horizontal force northward and a 35-newton horizontal force southward act concurrently on a 15-kilogram object on a frictionless surface. What is the magnitude of the object’s acceleration?

(1) 0.67 m/s²  (3) 2.3 m/s²  
(2) 1.7 m/s²  (4) 4.0 m/s²

42 Which graph best represents the relationship between the magnitude of the centripetal acceleration and the speed of an object moving in a circle of constant radius?

(1) WHY?

39 A person weighing 785 newtons on the surface of Earth would weigh 288 newtons on the surface of Mars. What is the magnitude of the gravitational field strength on the surface of Mars?

(1) 2.83 N/kg  (3) 6.09 N/kg  
(2) 3.72 N/kg  (4) 9.81 N/kg

40 A motorcycle being driven on a dirt path hits a rock. Its 60-kilogram cyclist is projected over the handlebars at 20. meters per second into a haystack. If the cyclist is brought to rest in 8.50 second, the magnitude of the average force exerted on the cyclist by the haystack is

(1) \(6.0 \times 10^3\) N  (3) \(1.2 \times 10^3\) N  
(2) \(5.9 \times 10^2\) N  (4) \(2.4 \times 10^3\) N

52 A 10-newton force compresses a spring 0.25 meter from its equilibrium position. Calculate the spring constant of this spring. [Show all work, including the equation and substitution with units] [2]