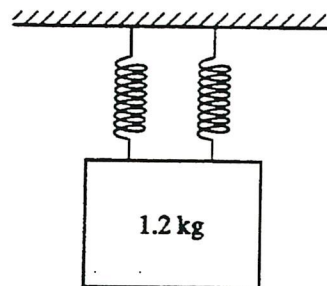


22. A newly discovered planet has twice the mass of the Earth, but the acceleration due to gravity on the new planet's surface is exactly the same as the acceleration due to gravity on the Earth's surface. The radius of the new planet in terms of the radius  $R$  of Earth is

- (A)  $\frac{1}{2}R$   
(B)  $\frac{\sqrt{2}}{2}R$   
(C)  $\sqrt{2}R$   
(D)  $2R$   
(E)  $4R$

Questions 23-24



Two identical massless springs are hung from a horizontal support. A block of mass 1.2 kilograms is suspended from the pair of springs, as shown above. When the block is in equilibrium, each spring is stretched an additional 0.15 meter.

23. The force constant of each spring is most nearly
- (A) 40 N/m  
(B) 48 N/m  
(C) 60 N/m  
(D) 80 N/m  
(E) 96 N/m
24. When the block is set into oscillation with amplitude  $A$ , it passes through its equilibrium point with a speed  $v$ . In which of the following cases will the block, when oscillating with amplitude  $A$ , also have speed  $v$  when it passes through its equilibrium point?
- I. The block is hung from only one of the two springs.  
II. The block is hung from the same two springs, but the springs are connected in series rather than in parallel.  
III. A 0.5-kilogram mass is attached to the block.
- (A) None  
(B) III only  
(C) I and II only  
(D) II and III only  
(E) I, II, and III