Newton's Laws Practice Items

1. A moving body with no net forces acting upon it will...

A. come to rest.
B. exist in static equilibrium.
C. continue moving with constant velocity.
D. undergo a constant positive acceleration.

2. A block is at rest on an inclined plane. As the angle of incline is increased beyond the point at which the block begins to slide...

A. the normal force upon the block decreases.
B. the force of friction increases.
C. the force required to prevent sliding of the block decreases.
D. the weight of the block decreases.

3. A man (mass 150 kg) is standing on a scale in an elevator which is dropping free fall. According to the scale, how much does he weigh? g = 10 m/s^2

A. 0 N
B. 15 N
C. 150 N
D. 1500 N

4. The force compelling an object to remain in uniform circular motion is called

A. the centripetal force
B. the reaction force
C. the centrifugal force
D. the equatorial force

5. A man is standing on a scale in an elevator which is accelerating downwards at 6 m/s^2. The scale registers 400 N. How much would the man normally weigh?

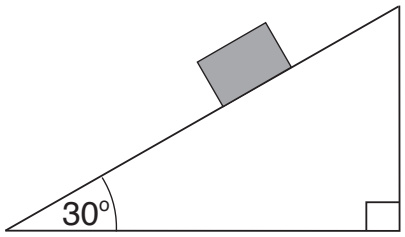
A. 100 N
B. 150 N
C. 800 N
D. 1000 N

6. A 2 kg object travels at 5 m/s in a certain direction. An unknown force is applied to the object along that same direction. Ten seconds of constant application results in the object traveling at the speed of 25 m/s. What is the magnitude of the unknown force?

A. 1 N
B. 2.5 N
C. 4 N
D. 10 N

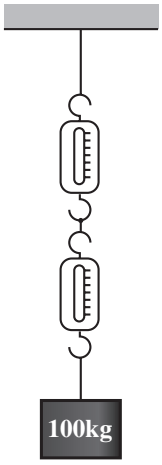
7. Which of the following combinations of materials for the block and plane below would prevent the block from freely sliding under the influence of gravity?

A. wood on wood (ms = .3)
B. steel on concrete (ms = .9)
C. steel on steel (ms = .7)
D. more than one of the above are correct



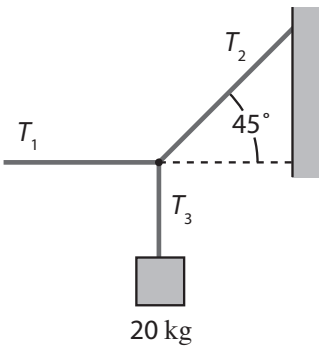
8. A 100kg mass is suspended from two spring scales connected together as shown in the figure at right. The scales are of negligible weight. In this arrangement

A. each scale reads 50N.
B. each scale reads 500N.
C. each scale reads 1000N.
D. the top scale reads 1000N and the bottom reads zero.



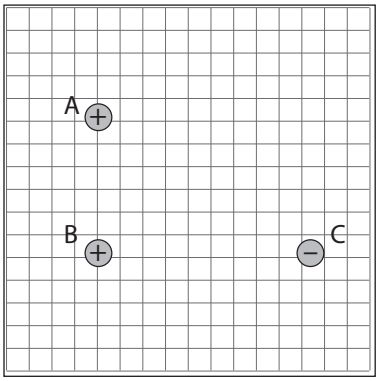
9. The weight of a 20kg mass is supported as shown in the figure below. Three cords of negligible weight are joined at a knot. What is the magnitude of tension T_1 ?

A. 14N
B. 20N
C. 200N
D. 280N



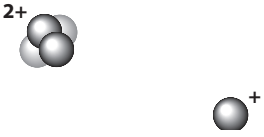
10. The units of electric field in the SI system may be referred to as either volts per meter or, equivalently, as newtons per coulomb. At the location of particle B depicted in the figure below, the electric field of particle A has a magnitude of 3.0×10^{-5} V/m, and the electric field of particle C has a magnitude of 4.0×10^{-5} V/m. Particle B possesses a charge of 1.5×10^{-6} C. What is the magnitude of the net force on particle B ?

A. 1.1×10^{-11} N
B. 1.4×10^{-11} N
C. 5.0×10^{-11} N
D. 7.5×10^{-11} N



11. A proton (mass = 1.67×10^{-27} kg), moving at a speed of 3.0×10^{5} m/s in the vicinity of an alpha particle (mass = 6.64×10^{-27} kg) exerts a force of 6.7×10^{-19} N on the alpha particle. What force does the alpha particle exert on the proton?

A. 6.7×10^{-19} N
B. 1.3×10^{-18} N
C. 2.7×10^{-18} N
D. cannot be determined without also knowing the speed of the alpha particle



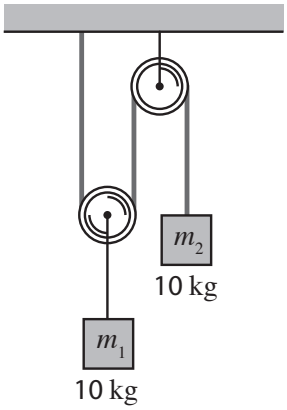
12. Neglecting friction and the mass of the pulley, what is the acceleration of the mass m_2 in the apparatus below?

A. 0 m/s^2

B. 5 m/s^2 in the downward direction

C. 5 m/s^2 in the upward direction

D. 10 m/s^2 in the downward direction



13. Traveling on a flat roadway an automobile speeds around a curve of radius R. The coefficient of kinetic friction between the car's tires and the roadway is μ_k, and the coefficient of static friction is μ_s. Which best expresses the maximum speed v_{max} at which the car can travel without slipping?

A. $\sqrt{\mu_s g R}$

B. $\sqrt{\frac{\mu_k N R}{m}}$

C. $\frac{\mu_s N R}{m}$

D. $\frac{\mu_k N R}{m}$

14. Within an apparatus kept at near absolute zero temperature, an alpha particle, $^4_2\mathrm{He}^{2+}$, and an ionized helium-3 nucleus, $^3_2\mathrm{He}^{2+}$, begin moving at the same moment in time from a position near the surface of the positive plate in the parallel plate capacitor shown below. Which particle strikes the far plate first?

A. $^3_2\mathrm{He}^{2+}$

B. $^4_2\mathrm{He}^{2+}$

C. They will both strike at the same time.

D. Neither particle begins to move.