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General Physics I, Quiz 1
PHYS10400, Class year 98
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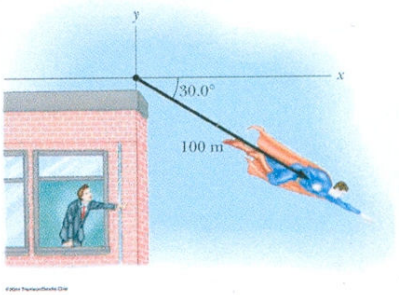
Chapter 1-6, Serway; ABSOLUTELY NO CHEATING!
Please write the answers on the blank space or on the back of this paper to save resources.

1. 100 miles/hr = 160.9 km/hr
2. Basic rules of basketball：A bottomless basket made of white cord net and suspended from a metal ring, 18 inches (46 cm) in diameter, which is attached 10 feet (3.04 m) above the floor.
3. On your wedding day your lover gives you a gold ring of mass 3.80 g. Fifty years later its mass is 3.35 g. On the average, how many atoms were abraded from the ring during each second of your marriage? The atomic mass of gold is 197 u. Ans. 9.5×10^{12}.
4. Newton's law of universal gravitation is represented by $F=\frac{GMm}{r^2}$; Here F is the gravitational force exerted by one small object on another, M and m are the masses of the objects, and r is a distance. Force has the SI units kg·m/s^2. What are the SI units of the proportionality constant G? $m^3/s^2\,kg$.
5. The position of a particle moving along the x axis varies in time according to the expression x = 3t, where x is in meters and t is in seconds. Evaluate its position at t = 3.00 s. Ans. 9m.
6. A 745i BMW car can brake to a stop in a distance of 121 ft. from a speed of 60.0 mi/h. To brake to a stop from a speed of 80.0 mi/h requires a stopping distance of 211 ft. The average braking acceleration for 60 mi/h to rest is $1259/1000$ m/s^2. Express the answer in m/s^2.
7. $\vec{A}=3\hat{i}+4\hat{j}$, $\vec{B}=2\hat{i}+\hat{j}$ Find $\vec{A}-\vec{B}$. Ans. $\hat{i}+3\hat{j}$.
8. $\vec{A}=2\hat{i}+2\hat{j}$, $\vec{B}=2\hat{i}-5\hat{j}$ And $\vec{R}=\vec{A}+\vec{B}$, the magnitude of $\vec{R}$ is 5.

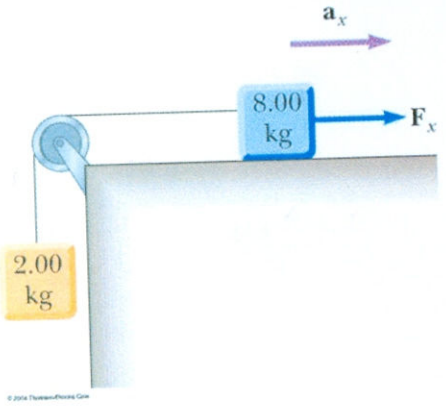


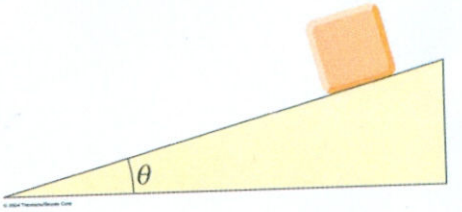
9. Find the horizontal components of the 100-m displacement of a superhero that flies from the top of a tall building following the path shown in the following figure. 86.6 m
10. A vector is given by $\vec{R}=2\hat{i}+\hat{j}+3\hat{k}$. The angles between $\vec{R}$ and the x axes is $\cos^{-1}\frac{2}{\sqrt{14}}=57.6^\circ$
11. A bolt drops from the ceiling of a train car that is accelerating northward at a rate of 2.50 m/s2. What is the acceleration of the bolt relative to the Earth? Ans. 0.
12. A woman weighs 120 lb. Determine her weight in Newtons. Ans. 534.5N.

13. Three forces, given by $\boldsymbol{F}_1 = (-2.00\,\hat{i} + 2.00\,\hat{j})N$, $\boldsymbol{F}_2 = (5.00\,\hat{i} - 3.00\,\hat{j})N$, and $\boldsymbol{F}_3 = (-45.00\,\hat{i})N$, act on an object to give it an acceleration of magnitude 3.75 m/s^2. What is the direction of the acceleration? Ans. // $(-4\hat{i} - \hat{j})$

14. Draw a free-body diagram of a block which slides down a frictionless plane having an inclination of $\theta = 15.0°$ (figure below). If the block starts from rest at the top and the length of the incline is 2.00 m, find its speed when it reaches the bottom of the incline. Ans. 2.25 m/s

15. In the system shown in following, a horizontal force Fx acts on the 8.00-kg object. The horizontal surface is frictionless. For Fx = 98 N, the 2.00-kg object accelerates upward.





16. A curve in a road forms part of a horizontal circle. As a car goes around it at constant speed 14.0 m/s, the total force on the driver has magnitude 130 N. The vector total force on the driver may be 214.9 N if the speed is 18.0 m/s instead?

17. Atomic mass unit u = 1.66×10^{-27} kg.

18. Speed of light in vacuum c = 3×10^{8} m/s (exact)

19. 1 kilometer = 1000 meter.