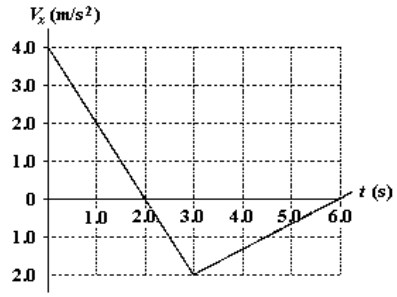
**Sample Exam 1 Phys 111 _____**

1. $V_x$ is the velocity of a particle moving along the $x$ axis as shown. If $x$ = 2.0 m at $t$ = 1.0 s, what is the position of the particle at $t$ = 6.0 s?




a. –2.0 m
b. +2.0 m
c. +1.0 m
**d. –1.0 m**
e. 6.0 m

2. A particle moving along the $x$ axis has a position given by $x = (24t - 2.0t^3)$ m, where $t$ is measured in s. What is the magnitude of the acceleration of the particle at the instant when its velocity is zero?

**a. 24 m/s$^2$**
b. zero
c. 12 m/s$^2$
d. 48 m/s$^2$
e. 36 m/s$^2$

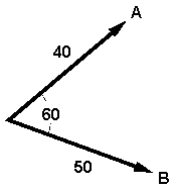
3. An automobile traveling along a straight road increases its speed from 30.0 m/s to 50.0 m/s in a distance of 180 m. If the acceleration is constant, how much time elapses while the auto moves this distance?

a. 6.00 s
**b. 4.50 s**
c. 3.60 s
d. 4.00 s
e. 9.00 s

4. John throws a rock straight down with speed 12 m/s from the top of a tower. The rock hits the ground after 2.37 s. What is the height of the tower? (air resistance is negligible)
a. 4.8 m
b. 19.6 m
c. 27.5 m
d. 38.4 m
**e. 56.0 m**

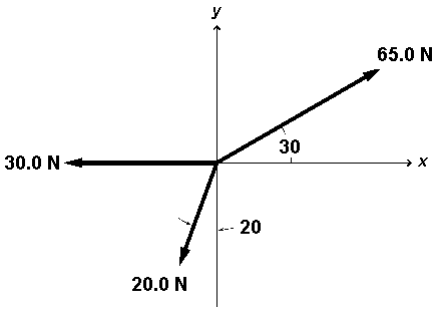
5. Two vectors $\vec{\mathbf{A}}$ and $\vec{\mathbf{B}}$ are given by $\vec{\mathbf{A}} = 5\hat{\mathbf{i}} + 6\hat{\mathbf{j}} + 7\hat{\mathbf{k}}$ and $\vec{\mathbf{B}} = 3\hat{\mathbf{i}} - 8\hat{\mathbf{j}} + 2\hat{\mathbf{k}}$. If these two vectors are drawn starting at the same point, what is the angle between them?
a. 106°
**b. 102°**
c. 110°
d. 113°
e. 97°

6. Vectors $\vec{\mathbf{A}}$ and $\vec{\mathbf{B}}$ are shown. What is the magnitude of a vector $\vec{\mathbf{C}}$ if $\vec{\mathbf{C}} = \vec{\mathbf{A}} - \vec{\mathbf{B}}$?




**a. 46**
b. 10
c. 30
d. 78
e. 90

7. The three forces shown act on a particle. What is the direction of the particle's acceleration




**a. 35°**
b. 45°
c. 65°
d. 55°
e. 85°

8. Two vectors $\vec{\mathbf{A}}$ and $\vec{\mathbf{B}}$ are given by $\vec{\mathbf{A}} = 5\hat{\mathbf{i}} + 6\hat{\mathbf{j}} + 7\hat{\mathbf{k}}$ and $\vec{\mathbf{B}} = 3\hat{\mathbf{i}} - 8\hat{\mathbf{j}} + 2\hat{\mathbf{k}}$. If these two vectors are drawn starting at the same point, what is the angle between them?
a. 106°
**b. 102°**
c. 110°
d. 113°
e. 97°

9. At $t = 0$, a particle leaves the origin with a velocity of 12 m/s in the positive $x$ direction and moves in the $xy$ plane with a constant acceleration of $\left(-2.0\hat{\mathbf{i}} + 4.0\hat{\mathbf{j}}\right)\ \text{m/s}^2$. At the instant the $y$ coordinate of the particle is 18 m, what is the $x$ coordinate of the particle?

a. 30 m
b. 21 m
**c. 27 m**
d. 24 m
e. 45 m

10. In 2.0 s, a particle moving with constant acceleration along the $x$ axis goes from $x = 10$ m to $x = 50$ m. The velocity at the end of this time interval is 10 m/s. What is the acceleration of the particle?
a. +15 m/s$^2$
b. +20 m/s$^2$
c. –20 m/s$^2$
**d. –10 m/s$^2$**
e. –15 m/s$^2$

11. A ball is thrown horizontally from the top of a building 0.10 km high. The ball strikes the ground at a point 65 m horizontally away from and below the point of release. What is the speed of the ball just before it strikes the ground?

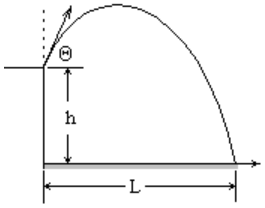
a. 43 m/s
**b. 47 m/s**
c. 39 m/s
d. 36 m/s
e. 14 m/s

12. A bird, accelerating from rest at a constant rate, experiences a displacement of 28 m in 17 s. What is the final velocity after 11 s?

a. 0.19 m/s
b. 1.6 m/s
c. 3.3 m/s
**d. 2.1 m/s**
e. 5.1 m/s

13 A ball is thrown at an angle of θ = 30 deg from the top of a building 0.10 km high. If the magnitude of ball's initital velocity is 20 m/s, how long is the ball in air?

a. 1.2 s
b. 4.8 s
**c. 5.7 s**
d. 12.6 s
e. 18.0 s




14. The initial speed of a cannon ball is 200 m/s. If the ball is to strike a target that is at a horizontal distance of 3.0 km from the cannon, what is the minimum time of flight for the ball?

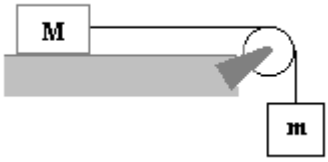
a. **16 s**
b. 21 s
c. 24 s
d. 14 s
e. 19 s

15 A 3.00-kg mass undergoes an acceleration given by $\mathbf{a} = (2\mathbf{i}+5\mathbf{j})$ m/s$^2$. The magnitude of the net force is

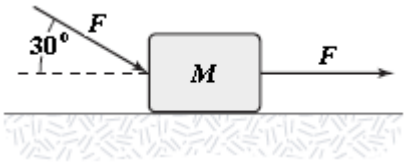
a. 2.0 N
b. 4.0 N
c. 6.0 N
d. 12.0 N
**e. 16.0 N**

16. A 10-kg block on a horizontal plane is connected by a cord over a massless, frictionless pulley to a second block of mass m. What hanging mass m is needed so that the 10-kg block can move at acceleration of 2.8 m/s$^2$ ?

a. 1 kg
b. 2 kg
c. 3 kg
**d. 4 kg**
e. 5 kg



17. The horizontal surface on which the block slides is frictionless. If $F$ = 20 N and $M$ = 5.0 kg, what is the magnitude of the resulting acceleration of the block?




a. 5.3 m/s$^2$
b. 6.2 m/s$^2$
**c. 7.5 m/s$^2$**
d. 4.7 m/s$^2$
e. 3.2 m/s$^2$

18. At an instant when a 4.0-kg object has an acceleration equal to $(5\hat{\mathbf{i}} + 3\hat{\mathbf{j}})$ m/s$^2$, one of the two forces acting on the object is known to be $(12\hat{\mathbf{i}} + 22\hat{\mathbf{j}})$ N. Determine the magnitude of the other force acting on the object.
a. 2.0 N
**b. 13 N**
c. 18 N
d. 1.7 N
e. 20 N

19. The tension in a string from which a 4.0-kg object is suspended in an elevator is equal to 28 N. What is the acceleration of the elevator?
a. 11 m/s$^2$ upward
b. 1.2 m/s$^2$ upward
c. 1.2 m/s$^2$ downward
d. 10 m/s$^2$ upward
**e. 2.8 m/s$^2$ downward**