

First major exam term 991

Q1 Q0 The position (x) of a particle moving along the x-axis  
ch Q0 depends on time (t) according to the equation:

1. Q0  $x = a*t^{**2} - b*t^{**3}$   
Q0 where: x is in meters and t is in seconds. What would  
Q0 be the dimensions of b?

- Q0  
A1 L/T\*\*3  
A2 L\*T\*\*3  
A3 L/T\*\*2  
A4 1  
A5 1/T\*\*3

Q2 Q0 How many molecules of water are there in a cup  
ch Q0 containing 250 cm\*\*3 of water?

1. Q0 Molecular mass of H2O = 18 g/mole  
Q0 Density of water = 1.0 g/cm\*\*3  
Q0 Avogadro s number = 6.02 \* 10\*\*23 molecules/mole  
Q0

- A1 8.4 \* 10\*\*24  
A2 6.0 \* 10\*\*23  
A3 1.9 \* 10\*\*26  
A4 3.7 \* 10\*\*28  
A5 2.5 \* 10\*\*3

Q3 Q0 Using the fact that the speed of light in space  
ch Q0 is about 3.00 \* 10\*\*8 m/s, determine how many miles

1. Q0 light will travel in one hour.  
Q0 (1 mile = 1.61 km)

- Q0  
A1 6.71\*10\*\*8 miles  
A2 2.50\*10\*\*6 miles  
A3 5.40\*10\*\*9 miles  
A4 8.32\*10\*\*3 miles  
A5 4.83\*10\*\*2 miles

Q4 Q0 A particle moves with a constant speed along the  
ch Q0 circumference of a circle of radius 5 m. It completes

2. Q0 one revolution every 20 s. What is the magnitude  
Q0 of its average velocity during the first 5 s?  
Q0 Assume that at t = 0, the particle is on +x-ais  
Q0 (see figure 1).

- Q0  
A1 sqrt(2) m/s  
A2 1/sqrt(2) m/s  
A3 1.57 m/s  
A4 zero m/s  
A5 2.54 m/s

Q5 Q0 A particle moves along the x-axis according to the  
ch Q0 equation:

2. Q0  $x = 50*t + 10*t^{**2}$   
Q0 where x is in m and t is in s. Calculate the  
Q0 instantaneous velocity of the particle at t = 3s.

Q0

A1 110 m/s  
A2 50 m/s  
A3 20 m/s  
A4 240 m/s  
A5 90 m/s

Q0

Q6 Q0 A balloon carrying a package is ascending  
ch Q0 (going vertically upward) at the rate of 12 m/s.

2. Q0 When it is 80 m above the ground the package is  
Q0 released. How long does it take the package  
Q0 to reach the ground?

Q0

A1 5.4 s  
A2 4.0 s  
A3 8.9 s  
A4 3.1 s  
A5 1.5 s

Q0

Q7 Q0 If vector  $A = 28 i + 11 j$  and vector B  
ch Q0 (magnitude of  $B = 25$ ) as shown in figure 2, what  
3. Q0 is the magnitude of the sum of these two vectors?

Q0

A1 32  
A2 35  
A3 39  
A4 45  
A5 23

Q0

Q8 Q0 Vector  $A = -6 i + 14 j$ . Find vector B  
ch Q0 whose magnitude is twice that of A and  
3. Q0 is opposite in direction to A.

Q0

A1  $12 i - 28 j$   
A2  $-6 i + 14 j$   
A3  $3 i - 7 j$   
A4  $- i + j$   
A5  $18 i - 12 j$

Q0

Q9 Q0 If vector  $A = 6 i - 7 j$  and vector B  
ch Q0  $= -12 i + 10 j$ , what angle does vector  
3. Q0  $C = 2A - B$  make with +x-axis measured  
Q0 counterclockwise.

Q0

A1 315 deg  
A2 45 deg  
A3 135 deg  
A4 90 deg  
A5 225 deg

Q0

Q10 Q0 A particle moves in the x-y plane with a constant  
ch Q0 acceleration given by  $a = (-4 j) \text{ m/s}^2$ . At  $t=0$  its  
4. Q0 position is  $(10 i) \text{ m}$  and its velocity is  
Q0  $(-2 i + 8 j) \text{ m/s}$ . What is the distance from the  
Q0 origin to the particle at  $t=2 \text{ s}$ ?

Q0

A1 10 m  
A2 14 m

A3 6.4 m

A4 2.7 m

A5 8.9 m

Q0

Q11Q0 A ball is thrown horizontally from the top of  
ch Q0 a building 100 m high. The ball strikes the ground

4. Q0 at a point 65 m from the base of the building  
Q0 (see figure 3). What is the speed of the ball just  
Q0 before it strikes the ground?

Q0

A1 47 m/s

A2 33 m/s

A3 29 m/s

A4 56 m/s

A5 73 m/s

Q0

Q12Q0 A rock is projected from ground level as shown in  
ch Q0 figure 4. Four seconds later the rock is observed

4. Q0 to strike the top of a 10-m tall fence that is  
Q0 a horizontal distance of 75 m from the point of  
Q0 projection. Determine the speed ( $v_0$ ) with which  
Q0 the rock was projected.

Q0

A1 29 m/s

A2 26 m/s

A3 15 m/s

A4 10 m/s

A5 18 m/s

Q0

Q13Q0 A 140-m wide river flows with a uniform speed of  
ch Q0 4.0 m/s toward the east. Starting from a point on

4. Q0 the north bank it takes 20 s for a boat to cross the  
Q0 river with constant speed to a point directly across  
Q0 on the south bank. What is the speed of the boat  
Q0 relative to the water?

Q0

A1 8.1 m/s

A2 9.5 m/s

A3 5.7 m/s

A4 7.0 m/s

A5 10. m/s

Q0

Q14Q0 In figure 5, if  $P = 6.0$  N, what is the magnitude of  
ch Q0 the force exerted by block (2) on block (1)?

5. Q0 Assume the surface is frictionless.

Q0

A1 4.8 N

A2 6.4 N

A3 7.2 N

A4 5.6 N

A5 1.2 N

Q0

Q15Q0 A 3.0 kg block is pushed across a horizontal surface  
ch Q0 by a force  $F = 20$  N as shown in figure 6. If the

5. Q0 coefficient of kinetic friction between the block and  
Q0 the surface is 0.30, and  $\theta = 30$  deg, what is the  
Q0 magnitude of the acceleration of the block?

Q0

A1 1.8 m/s\*\*2

A2 2.1 m/s\*\*2

A3 3.3 m/s\*\*2

A4 1.1 m/s\*\*2

A5 5.8 m/s\*\*2

Q0

Q16Q0 A 2.0 kg object has a velocity of (4 i) m/s at t=0.

ch Q0 A constant resultant force of (2 i + 4 j) N then

5. Q0 acts on the object for 3.0 s. What is the magnitude  
Q0 of the velocity of the object at the end of the 3 s  
Q0 interval?

Q0

A1 9.2 m/s

A2 6.3 m/s

A3 8.2 m/s

A4 7.2 m/s

A5 12 m/s

Q0

Q17Q0 Two masses M and 3M are connected by a light cord

ch Q0 as shown in figure 7. The coefficient of kinetic

5. Q0 friction between the surface and the 3M block is  
Q0 0.20, and the coefficient of kinetic friction

Q0 between the surface and the M block is 0.30.

Q0 If F = 14 N and M = 1.0 kg, what is the magnitude

Q0 of the acceleration of either block?

Q0

A1 1.3 m/s\*\*2

A2 2.0 m/s\*\*2

A3 1.5 m/s\*\*2

A4 1.8 m/s\*\*2

A5 3.5 m/s\*\*2

Q0

Q18Q0 An object (attached to the end of a string) swings

ch Q0 in a vertical circle of radius R = 1.2 m

6. Q0 (see figure 8). At an instant when theta = 30 deg,  
Q0 the speed of the object is 5.0 m/s. Find the  
Q0 magnitude of the total acceleration of the object.

Q0

A1 22.5 m/s\*\*2

A2 18.6 m/s\*\*2

A3 31.8 m/s\*\*2

A4 12.0 m/s\*\*2

A5 44.4 m/s\*\*2

Q0

Q19Q0 On a rainy day the coefficient of friction between

ch Q0 the tires of a car and a level circular track is

6. Q0 reduced to half its usual value. The ratio of the  
Q0 maximum safe speed on a rainy day for rounding the  
Q0 circular track to its usual value (when it is not  
Q0 raining) is

Q0

A1 0.71

A2 0.25

A3 0.50

A4 0.29

A5 1.0

Q0

Q20Q0 Which of the following statements is TRUE

6. Q0

A1 Radial acceleration is due to the change in the

A1 direction of the velocity.

A2 Tangential acceleration is due to the change in

A2 the direction of the velocity.

A3 A projectile is fired at an angle 45 deg, the

A3 acceleration is zero at the maximum height.

A4 A projectile is fired at an angle 45 deg, the

A4 velocity is zero at the maximum height.

A5 The action and reaction forces always act on the

A5 same object.

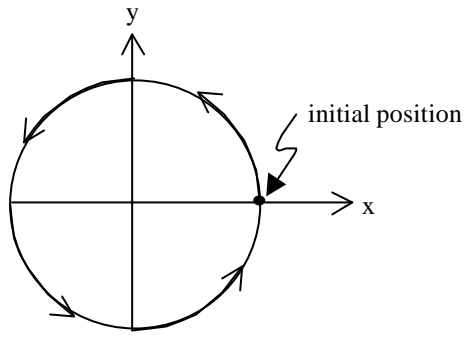


Figure 1

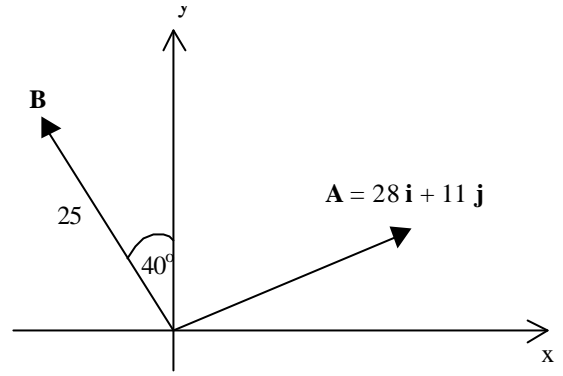


Figure 2

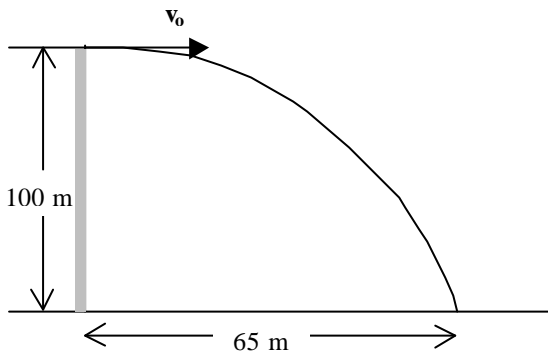


Figure 3

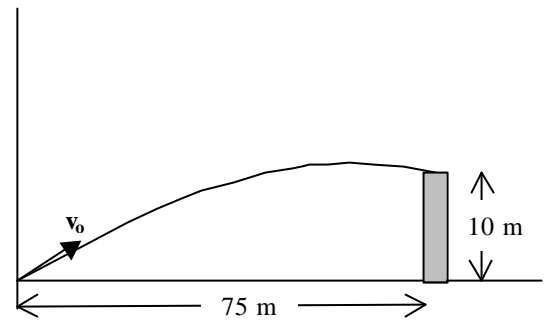


Figure 4

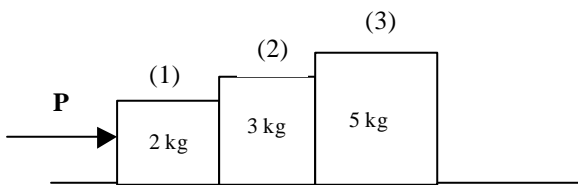


Figure 5

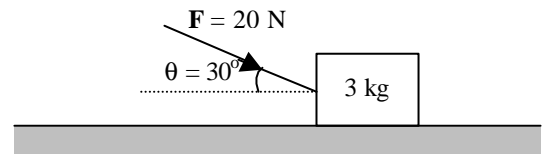


Figure 6



Figure 7

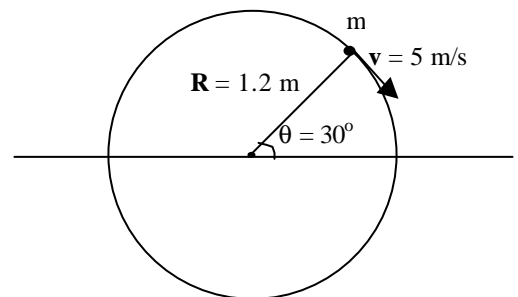


Figure 8