

EXAM 1 - 041

- Q1 Q0 1 shake = 10^{-8} seconds. Find out how many
Q0 nano seconds (ns) are there in 1 shake.
Q0 (1 nano = 10^{-9})
Q0
A1 10 ns
A2 0.01 ns
A3 100 ns
A4 0.001 ns
A5 0.1 ns
Q0
- Q2 Q0 A drop of oil (mass = 0.90 milligram and density = 918
Q0 kg/m^3) spreads out on a surface and forms a circular
Q0 thin film of radius = 41.8 cm and thickness h
Q0 (see Fig 8). Find h in nano meter (nm).
Q0 (1 nano = 10^{-9})
Q0
A1 1.8 nm
A2 0.00060 nm
A3 0.15 nm
A4 0.60 nm
A5 0.030 nm
Q0
- Q3 Q0 A man runs on a straight road for 8.0 km at a speed
Q0 of 8.0 km/h. He then continues in the same direction
Q0 for another 6.0 km at a speed of 12 km/h. What is his
Q0 average speed during this 14 km run?
Q0
A1 9.3 km/h
A2 10 km/h
A3 4.0 km/h
A4 11 km/h
A5 1.5 km/h
Q0
- Q4 Q0 A stone is thrown vertically upward with an initial
Q0 speed of 10 m/s. What is its speed when it returns
Q0 to a height of 3.83 m above its starting point?
Q0
A1 5.0 m/s
A2 6.0 m/s
A3 4.0 m/s
A4 8.0 m/s
A5 9.8 m/s
Q0
- Q5 Q0 A particle moves along the x axis. Its position from
Q0 its starting point as a function of time t is given in
Q0 Fig 2. What is the total distance that this particle
Q0 travels from t=0 to t=6.0 s?
Q0
A1 12 m
A2 4.0 m
A3 7.0 m
A4 10 m
A5 zero
Q0
- Q6 Q0 A particle starts from $X_0 = 10$ m at time $t_0 = 0$. Its
Q0 velocity (v) as a function of time (t) is as shown in
Q0 Fig 1. Find the position (X) of the particle at time
Q0 t = 3.0 s.
Q0

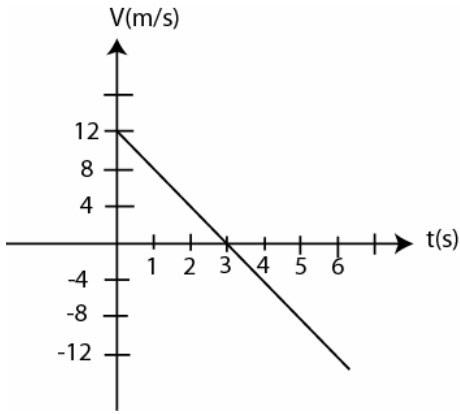


Figure 1

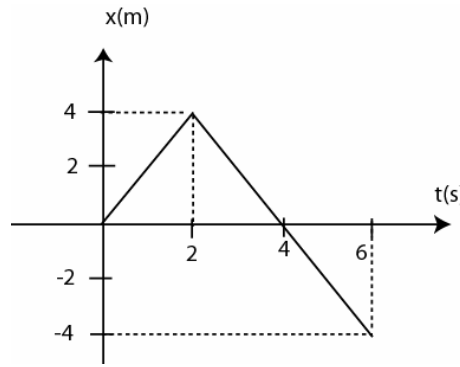


Figure 2

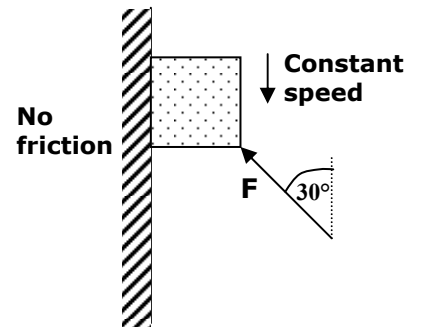


Figure 3

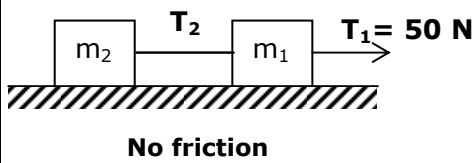


Figure 4

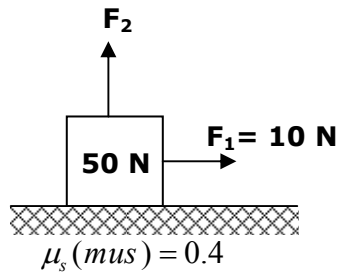


Figure 5

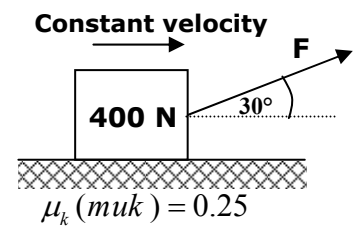


Figure 6

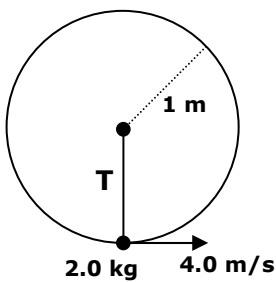


Figure 7

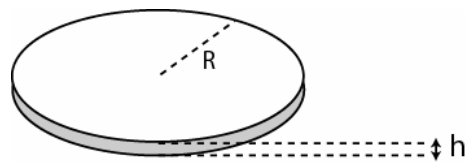


Figure 8

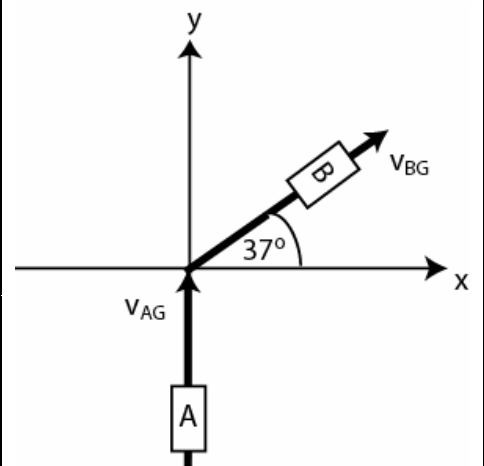


Figure 9

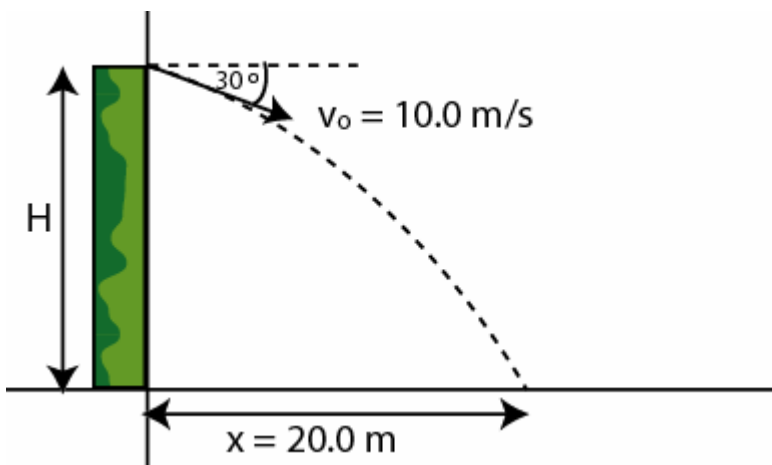


Figure 10

- A1 28 m
- A2 10 m
- A3 36 m
- A4 46 m
- A5 9.0 m

Q0

- Q7 Q0 Two vectors are given as: $A = -3.0 i + 5.0 j + 4.0 k$ and $B = 4.0 i + 5.0 j + 3.0 k$, where i, j and k are the unit vectors in the positive x, y and z directions.
- Q0 Find the angle between the vectors A and B .

Q0

- A1 60 degrees
- A2 45 degrees
- A3 30 degrees
- A4 90 degrees
- A5 0 degree

Q0

- Q8 Q0 In the cross product $F = v \times B$, take $v = 2.0 i$, $F = 6.0 j$ and the x -component of vector B equals zero.
- Q0 What then is B in unit-vector notation?

Q0

- A1 $-3.0 k$
- A2 $3.0 k$
- A3 $2.0 j + 6.0 k$
- A4 $2.0 j - 6.0 k$
- A5 $-2.0 j + 6.0 k$

Q0

- Q9 Q0 Two displacement vectors A and B have equal magnitudes of 10 m. Vector A is along the $+y$ axis and vector B makes 45 degrees counterclockwise with $+x$ axis. Find the vector C such that $B + C = 2A$.

Q0

- A1 $C = -7 i + 13 j$
- A2 $C = -7 i + 3 j$
- A3 $C = 7 i + 13 j$
- A4 $C = 7 i + 3 j$
- A5 $C = 7 i + 27 j$

Q0

- Q10 Q0 Car A travels with velocity $(30 j)$ m/s (relative to the ground) and car B travels with speed of 50 m/s in a direction making an angle of 37 degrees with $+x$ axis (relative to the ground) (see Fig 9). What is the velocity of car A relative to car B ?

Q0

- A1 $(-40i)$ m/s
- A2 $(40i+30j)$ m/s
- A3 $(-40i-60j)$ m/s
- A4 $(40i)$ m/s
- A5 $(-40i-30j)$ m/s

Q0

- Q11 Q0 A projectile is thrown from a height H with a speed of 10.0 m/s at an angle of 30 degrees below horizontal as shown in Fig 10. Find H , if the horizontal distance $x = 20.0$ m.

Q0

- A1 37.7 m
- A2 98.0 m
- A3 49.0 m
- A4 20.0 m
- A5 67.8 m

Q0

- Q12Q0 A stone is tied to the end of a string and is rotated
Q0 with constant speed around a horizontal circle of
Q0 radius 1.0 m. If the magnitude of its acceleration is
Q0 225 m/s^2 , What is the period (T) of the motion?
Q0
A1 0.42 s
A2 1.0 s
A3 0.028 s
A4 5.0 s
A5 2.0 s
Q0
- Q13Q0 At $t=0$, a particle leaves the origin with a velocity
Q0 of $v_0 = (4\mathbf{i} + 2\mathbf{j}) \text{ m/s}$. After 20.0 s its velocity is
Q0 $\mathbf{v} = (20\mathbf{i} - 4\mathbf{j}) \text{ m/s}$. Find its acceleration
Q0 (assumed constant).
Q0
A1 $(0.8\mathbf{i} - 0.3\mathbf{j}) \text{ m/s}^2$
A2 $(0.5\mathbf{i} + 0.4\mathbf{j}) \text{ m/s}^2$
A3 $(0.3\mathbf{i} - 0.7\mathbf{j}) \text{ m/s}^2$
A4 $(0.7\mathbf{i} + 0.7\mathbf{j}) \text{ m/s}^2$
A5 0 m/s^2
Q0
- Q14Q0 A 2.0 kg box slides down a frictionless vertical
Q0 wall while you push on it with a force F at a 30 degrees
Q0 angle with the vertical (see Fig 3). What is the magnitude
Q0 of the normal force of the wall on the box if it is to
Q0 slide down at a constant speed?
Q0
A1 11.3 N
A2 5.67 N
A3 15.6 N
A4 2.56 N
A5 zero N
Q0
- Q15Q0 The weight of an astronaut on Earth is 800 N. What is
Q0 his weight on planet Mars, where $g = 3.76 \text{ m/s}^2$?
Q0
A1 307 N
A2 213 N
A3 930 N
A4 135 N
A5 800 N
Q0
- Q16Q0 A 20.0 kg block is resting on a frictionless horizontal
Q0 table. A horizontal string pulls the block. If the
Q0 tension in the string is 20.0 N, what is the speed
Q0 of the block after moving 2.0 m?
Q0
A1 2.0 m/s
A2 4.0 m/s
A3 1.0 m/s
A4 3.0 m/s
A5 5.0 m/s
Q0
- Q17Q0 Two masses $m_1 (= 2.0 \text{ kg})$ and $m_2 (= 3.0 \text{ kg})$ are
Q0 connected as shown in Fig 4. Find the tension T2
Q0 if the tension T1 = 50.0 N.
Q0
A1 30.0 N
A2 50.0 N
A3 20.0 N

A4 10.0 N

A5 zero

Q0

Q18Q0 A box with a weight of 50 N rests on a rough horizontal
Q0 surface ($\mu_s = 0.4$). Two forces F_1 (=10 N) and F_2 act on the
Q0 box as shown in Fig 5. What is the smallest vertical force
Q0 F_2 for which the box just starts sliding horizontally?

Q0

A1 25 N

A2 10 N

A3 14 N

A4 5.0 N

A5 35 N

Q0

Q19Q0 A 400-N block is pushed along a rough horizontal surface
Q0 ($\mu_k = 0.25$) by an applied force F as shown in Fig 6. The
Q0 block moves at constant velocity. The magnitude of F is :

Q0

A1 101 N

A2 152 N

A3 83 N

A4 294 N

A5 405 N

Q0

Q20Q0 One end of a 1.0-m long string is fixed, the other end is
Q0 attached to a 2.0-kg stone. The stone swings in a vertical
Q0 circle, passing the lowest point at 4.0 m/s (see Fig 7).
Q0 The tension force (T) of the string at this point is:

Q0

A1 52 N

A2 12 N

A3 20 N

A4 32 N

A5 0 N