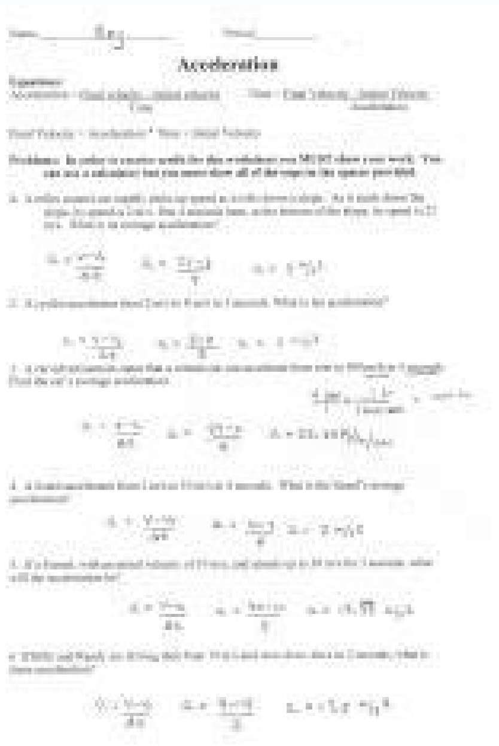
Acceleration worksheet answers 14. 2



Acceleration

Name_____

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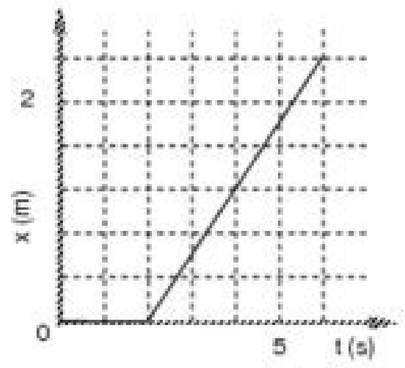
UNIT III: Worksheet 3

1.



a. Describe in words the motion of the object from 0 - 6.0 s.

b. Construct a qualitative motion map to describe the motion of the object depicted in the graph above.

c. What is the instantaneous velocity of the object at the following times?

   i. t = 1.0 s

   ii. t = 3.0 s

d. What is the simple average of these two velocities?
   What is the average velocity for the entire interval?
   Why are these two values different? Which is best to describe the motion of the object?

Physics Chapter 5 – g5a
Solve the following problems by writing down the equation used, substituting with units and specifying the answer with units. Finish for homework. Note that the acceleration due to gravity is in your reference table. You may need to use the following 2 equations:

$$d = v_i t + \frac{1}{2} a t^2$$

where v_i = initial velocity (m/s), t = time (sec), a = acceleration (m/s²), and d = distance (m)

$$v_f^2 = v_i^2 + 2ad$$

where v_f = final velocity (m/s), v_i = initial velocity (m/s), a = acceleration (m/s²), and d = distance (m)

1. **An object starts from rest and falls freely. What is the speed of the object at the end of 3.00 seconds?**

vf = vi + at = 9.81m/s²(3.00s) = 19.620 m/s

2. **An object is allowed to fall freely near the surface of an unknown planet. The object falls 54 meters in the first 3.0 seconds after it is released. What is the acceleration due to gravity on that planet?**

d =vit + ½ at2 => vi = 0 => a = 2d/t² = 2 (54m) / (3.0s)² = 12 s

3. **An object, initially at rest, falls freely near the Earth's surface. How long does it take the object to attain a speed of 98 meters per second?**

a = Δv/t => t = Δv/a = 98m/s / 9.81m/s² = 9.99 s = 10. s

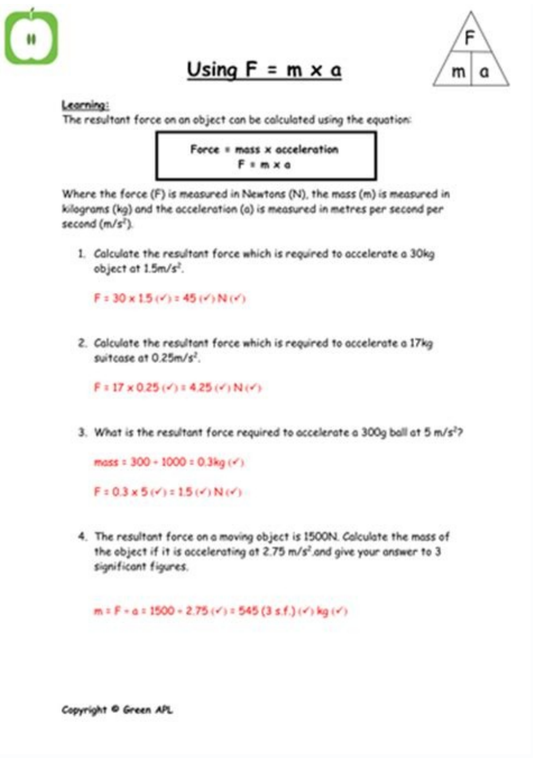
4. **Starting from rest, an object rolls freely down an incline that is 10. meters long in 2.0 seconds. What is the acceleration of the object?**

d = vit + ½ at² => a = 2d/t² = 2(10.m)/(2.0s)² = 5.0 m/s²

5. **A grape is thrown downward from street level towards the cars on the BQE with a velocity of 5.0 m/s. If the grape hits a car 25 meters down, how fast is the grape now traveling?**

$vf^2 = vi^2 + 2ad$ => $vf^2 = (5.0m/s)^2 + 2(9.81m/s^2)25m$ => vf = 22.7 m/s = 23 m/s

6. **A slingshot projects a pebble vertically into the air. The pebble reaches a max height of 25.0m. What was the initial velocity of the pebble?**



Using F = m x a

Learning:
The resultant force on an object can be calculated using the equation:

Force = mass x acceleration
F = m x a

Where the force (F) is measured in Newtons (N), the mass (m) is measured in kilograms (kg) and the acceleration (a) is measured in metres per second per second (m/s^2).

1. Calculate the resultant force which is required to accelerate a 30kg object at $1.5m/s^2$.

   F = 30 x 1.5 (✓) = 45 (✓) N (✓)

2. Calculate the resultant force which is required to accelerate a 17kg suitcase at $0.25m/s^2$.

   F = 17 x 0.25 (✓) = 4.25 (✓) N (✓)

3. What is the resultant force required to accelerate a 300g ball at $5\ m/s^2$?

   mass = 300 ÷ 1000 = 0.3kg (✓)

   F = 0.3 x 5 (✓) = 1.5 (✓) N (✓)

4. The resultant force on a moving object is 1500N. Calculate the mass of the object if it is accelerating at $2.75\ m/s^2$ and give your answer to 3 significant figures.

   m = F ÷ a = 1500 ÷ 2.75 (✓) = 545 (3 s.f.) (✓) kg (✓)

Acceleration worksheet 14.2 acceleration answer key.

In this page we have Worksheet on Motion for Class 9 physics . Hope you like them and do not forget to like , social share and comment at the end of the page. Question 1 A particle is moving up an inclined plane. Its velocity changes from 15m/s to 10m/s in two seconds. What is its acceleration? Answer u=15 m/s , v=10m/s ,t=2 sec , a=? $a = \frac {v-u}{t} =-2.5 m/s^2$ Question 2 The velocity changes from 45m/s to 60m/s in Three seconds. What is its acceleration? Answer u=45 m/s , v=60m/s ,t=3 sec , a=? $a = \frac {v-u}{t} =5 m/s^2$ Question 3 A body covered a distance of z metre along a semicircular path. Calculate the magnitude of displacement of the body, and the ratio of distance to displacement? Answer Let r be the radius of semicircular path $z= \pi r$ or $r= \frac {z}{ \pi}$ Displacement = Diameter = 2r = $\frac {2z}{ \pi}$ Now ratio of distance to displacement $= \frac {z}{\frac {2z}{ \pi}} = \frac {\pi}{2}$ Question 4 A particle moving with an initial velocity of 5m/s is subjected to a uniform acceleration of 2.5m/s2. Find the displacement in the next 4 sec.? Answer u=5 m/s ,a=2.5m/s2, t=4 s ,s=? $s= ut + \frac {1}{2}at^2$ s=40 m Question 5 A train is travelling at a speed of 60 km/ h. Brakes are applied so as to produce a uniform acceleration of −0.5 m /s2. Find how far the train will go before it is brought to rest. Answer u=60 km/hr=16.66 m/s ,a=-0.5 m /s2,v=0,s=? $v^2 = u^2 + 2as$ s=277.55m Question 6 A Truck covers 30km at a uniform speed of 30km/hr. what should be its speed for the next 90km if the average speed for the entire journey is 60km/h? Answer Total distance travelled = 30 +90 =120 km Average speed=60 km/hr Hence total time taken = 120/60 =2 hr Now when travelling with 30 km/hr for 30 km. Time taken = 1 hr So time left = 2-1 =1 hr. So Truck has to taken 90 km in 1 hour in order to have average speed of 60 km/hr Hence the speed should be = 90/1= 90 km/hr for the next 90 km Question 7 A stone is thrown in a vertically upward direction with a velocity of 10 m/s. If the acceleration of the stone during its motion is 10 m /s2 in the downward direction, what will be the height attained by the stone and how much time will it take to reach there? Answer u=10 m/s , v=0 , a=-10 m /s2, s=? , t=? $v^2 = u^2 + 2as$ s=5 m $v = u + at$ or t = 1 sec Question 8 A person goes to market, makes purchases and comes back at a constant slower speed. Draw displacement-time and velocity time graphs of the person? Answer Displacement Time graph is given as below velocity Time graph is given as below Question 9 John runs for 10 min. at a uniform speed 9km/h. At what speed should he run for the next 20 min. so that the average speed comes 12km/hr? Answer Total time = 10 +20 =30 min Average speed=12 km/hr Hence total distance = 6 km Now when travelling with 9 km/hr for 10 min. Distance = 1.5 Km So Distance left = 6-1.5 =4.5 km. So John has to taken 4.5 km in 20 min in order to have average speed of 12 km/hr Hence the speed should be = (4.5/20)*60= 13.5 km/hr for the next 20 min Question 10 A particle was at rest from 1 a.m. It moved at a uniform speed 50km/hr from 1.30 a.m. to 2:00 a.m. Find the average speed between (a) 1.00 a.m. and 2.00 a.m. (b) 1.15 a.m. and 2.00 a.m. (c) 1.30 a.m. and 2.00 a.m. Answer Distance travelled between 1.30 a.m. to 2:00 a.m = 50 /2 =25 km a. average speed between 1.00 a.m. and 2.00 a.m = Distance /time = 25/1=25 km/hr b. average speed between 1.15 a.m. and 2.00 a.m = (25/45)*60 =33.22 km/hr c. average speed between 1.30 a.m. and 2.00 a.m = (25/30) *60 =50km/hr Question 11 An object moves along a circular path of diameter 14cm with constant speed. If it takes 2 min. to move from a point on the path to the diametrically opposite point. Find (a) The distance covered by the object (b) The speed (c) The displacement (d) average velocity. Answer Distance = $\pi r =\frac {22}{7} \times 7 = 22 cm$ Speed = Distance/time = 22 /120 =.183 cm/sec Displacement = diameter= 14 cm Average velocity = Displacement /time = 14/120 = .116 cm/sec Question 12 A particle with a velocity of 2m/s a t=0 moves along a straight line with a constant acceleration of 0.2m/s2. Find the displacement of the particle in 10s? Answer u=2 m/s ,a=0.2m/s2 ,t=10 s ,s=? $s = ut + \frac {1}{2}at^2$ s=30 m Question 13 A particle is pushed along a horizontal surface in such a way that it starts with a velocity of 12m/s. Its velocity decreases at a uniform rate of 0.5m/s2. (a) Find the time it will take to come to rest. (b) Find the distance covered by it before coming to rest? Answer u=12 m/s ,a =-0.5m/s2 ,v=0 $v=u+ at$ t=24 sec $s = ut + \frac {1}{2}at^2$ s=432 m Question 14 A train accelerated from 20km/hr to 80km/hr in 4 minutes. How much distance does it cover in this period? Assume that the tracks are straight? Answer $v=u+at$ $a = \frac {(80 - 20) \times 60 }{ 4} = 900 km/h$ Now $v^2 = u^2 + 2 a s$ s = 3.33 km Question 15 A cyclist moving on a circular track of radius 50m completes one revolution in 4 minutes. What is his (a) average speed (b) average velocity in one full revolution? Answer Distance = $2 \pi r = 100 \times 3.14 $ Average speed = distance /time = 1.309 m/sec Displacement =0 Average velocity=0 link to this page by copying the following textWorksheet on Motion for Class 9 physics Also Read Class 9 Maths Class 9 Science Acceleration is how fast velocity changes: Speeding up Slowing down (also called deceleration) Changing direction etc It is usually shown as: m/s2 "meters per second squared" What is this "per second squared" thing? An example will help: A runner accelerates from 5 m/s (5 meters per second) to 6 m/s in just one second So they accelerate by 1 meter per second per second per second See how "per second" is used twice? It can be thought of as (m/s)/s but is usually written m/s2 So their acceleration is 1 m/s2 The formula is: Acceleration = Change in Velocity (m/s) Time (s) You are cruising along in a bike race, going a steady 10 meters per second (10 m/s). Acceleration: Now you start cycling faster! You increase to 14 m/s over the next 2 seconds (still heading in the same direction): Your velocity increases by 4 m/s, over a time period of 2 seconds, so: Acceleration = Change in Velocity (m/s) Time (s) = 4 m/s 2 s = 2 m/s2 Your speed changes by 2 meters per second per second. You went from 7 m/s to 0, so that is a decrease in speed: Acceleration = Change in Velocity (m/s) Time (s) = −7 m/s 2 s = −3.5 m/s2 We don't always say it, but acceleration has direction (making it a vector): A car is heading West at 16 m/s. The driver flicks the wheel, and within 4 seconds has the car headed East at 16 m/s. What is the acceleration? The numbers are the same, but the direction is different! Acceleration = Change in Velocity (m/s) Time (s) Acceleration = From 16 m/s West to 16 m/s East 4 s From 16 m/s West to 16 m/s East is a total change of 32 m/s towards the East. Acceleration = 32 m/s East 4 s = 8 m/s2 East For more complicated direction changes read vectors.

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