

Accelerated Motion - Physics 112 Worksheet

1. A car starts from rest and accelerates east at 2.0 m/s^2 for 5.0 s. What is its final velocity? (+10m/s)
2. A truck starts from rest and reaches a final velocity of 20 m/s North in 4.0 seconds. What is its acceleration? (+5.0 m/s^2)
3. A snowmobile starting from rest accelerates at 3.0 m/s^2 until it reaches a velocity of 30 m/s East. How long did it take to do this? (10 s)
4. A car moving with a velocity of 15 m/s West accelerates to a velocity of 60 m/s West in 5.0 s. What was its acceleration? (-9.0 m/s^2)
5. An object moving with a velocity of 50 m/s North accelerates to a velocity of 10 m/s North in 4.0 s. What is its acceleration? (-10 m/s^2)
6. A car has an acceleration of 4.0 m/s^2 West. If its original velocity was 30 m/s East, how long does it take for the car to stop? (7.5 s)
7. A plane starts from rest and accelerates East for 6.0 s at a rate of 4.0 m/s^2 . How far does it go in that time? (72 m)
8. An object starting from rest accelerates for 8.0 s and goes a distance of 120 m. What was its acceleration? (+3.8 m/s^2)
9. An object starting from rest accelerates at 5.0 m/s^2 and goes a distance of 90 m. How long did it take to do this? (6.0 s)
10. A car travelling at 10 m/s East accelerates at 3.0 m/s^2 East for 5.0 s.
 - a. How far does it go? (88 m)
 - b. What is its final velocity? (+25 m/s)
11. A car with a speed of 25 m/s East brakes to a stop in 5.0 seconds.
 - a. What is its acceleration? (-5.0 m/s^2)
 - b. What distance does it go with its brakes on? (63 m)
12. A car with a velocity of 35 m/s North accelerates to a velocity of 15 m/s North in 4.0 s. and then continues at this new velocity for another 8.0 s. What is its resultant displacement? (+2.2 $\times 10^2$ m)
13. A car with a speed of 36 km/h North accelerates to a speed of 108 km/h North while going a distance of only 200 m. North.
 - a. What is its acceleration in m/s^2 ?
 - b. How long does it take?
14. A car starting from rest accelerates at 3.0 m/s^2 to a velocity of 72 km/h South. What is its resultant displacement?
15. A car starting from rest accelerates to a velocity of 30 m/s West and goes a distance of 150 m. while doing this. What is its acceleration?
16. A moving car comes to a stop in a distance of only 125 m and has an acceleration of 4.0 m/s^2 West.
 - a. What was its original velocity in km/h?
 - b. How long did it take to stop?
17. A puck starts across the ice with a velocity of 30 m/s. It is slowed down by friction at the rate of 1.50 m/s^2 . Calculate:
 - a. the time required for it to stop.
 - b. the distance travelled before stopping.
18. A car initially travelling at a uniform velocity, accelerates at the rate of 1.0 m/s^2 for 12 s. if the car goes 190 m during this time, what was its initial velocity?
19. A puck is shot across the ice with a speed of 10 m/s. If it stops after 2.0 s, find:
 - a. its acceleration.
 - b. the distance it travelled across the ice.
20. A car moving at 2.0 m/s North is accelerated at the rate of 4.0 m/s^2 North.
 - a. What is its velocity after 6.0 seconds?
 - b. What is its displacement after 6.0 seconds?
 - c. What is its displacement during the sixth second?
21. A bullet is accelerated from rest in a gun barrel which is 1.00 metre long. If its muzzle velocity, (the speed with which it leaves the gun), is 600 m/s, what is its acceleration?
22. An aeroplane taking off from a runway has a run of 500 m. If it starts from rest, moves with a constant acceleration and makes the run in 20.0 s, what was its take-off velocity in km/h?
23. The reaction time of the average automobile driver is 0.70 seconds. If an automobile can decelerate at 5.0 m/s^2 and is going at 50 km/h, calculate the distance travelled while coming to a complete stop after a red light is observed.
24. A subway train starts from rest at a station and accelerates 2.00 m/s^2 for 10.0 seconds. It then runs at a constant velocity for 5.00 minutes before decelerating to a stop at 4.00 m/s^2 at the next station. How far is it between the two stations?
25. A train starts from rest and accelerates to a speed of 30.0 m/s in only 15.0 s. It continues at this speed until it has gone a distance of 6000 m from its starting point. It slows down at this point at the rate of 2.00 m/s^2 until it stops.
 - a. How long is the train moving?
 - b. How far did the train go?
 - c. How fast was it going 12.0 s after it started?
26. Betty and Bob decide to race their bicycles over a 400 metre track. Bob can accelerate at 1.00 m/s^2 but can only do this for 6.00 seconds before he has reached his top speed. Betty, however, takes 10.0 seconds to reach her top speed and her acceleration is only 0.80 m/s^2 .
 - a. Find the top speed of each.
 - b. Which person wins the race?
 - c. How far behind is the loser when the race is over?