

Physics 2204
Kinematics Equations
Worksheet 2

1. Pam runs at 6.0 m/s for 10.0 s and David accelerates from 4.0 m/s to 10.0 m/s in 10.0s. How much farther does David travel than Pam?
2. A baseball player catches a ball moving at 24 m/s. Upon striking the player's glove, the ball moves 12 cm as it comes to rest. Assume uniform acceleration.
 - (A) How long did it take the ball to come to rest after striking the glove?
 - (B) What was the ball's acceleration as it came to rest?
3. A car moves 12 m/s and coasts up a hill with a uniform acceleration of -1.6 m/s^2 . What is its displacement after 6.0 s and 9.0s ?
4. Scott pushes a piano along a slope and has an initial velocity of 10.0 m/s [up]. Its acceleration is 2.0 m/s^2 [down].
 - (A) After its release, what is the piano's velocity at 2.0 s, 5.0 s and 8.0s?
 - (B) What is the piano's displacement at 2.0 s, 5.0 s and 8.0s?
5. A plane travels $5.0 \times 10^2 \text{ m}$ while being accelerated uniformly from rest at the rate of 5.0 m/s^2 . What final velocity does it attain?
6. An engineer must design a runway to accommodate aeroplanes that must reach a ground speed velocity of 61 m/s before they can take off. These planes are capable of accelerating at a rate of 2.5 m/s^2 .
 - (A) How long will it take the planes to reach take off speed?
 - (B) What must be the minimum length of the runway?
7. Highway safety engineers built soft barriers so that cars hitting them will slow down at a safe rate. A person wearing a seat belt can withstand an acceleration of -300.0 m/s^2 . How thick should barriers be to safely stop a car that hits it at 110.0 km/h?
8. What was the initial velocity of an object that moved 120 m in 5.60 s, reaching a final velocity of 15.0 m/s in that time? Was the object speeding up or slowing down?
9. A dragster accelerates from rest for a distance of 450 m at 14 m/s^2 . A parachute is then used to slow it down to a stop. If the parachute gives the dragster an acceleration of 7.0 m/s^2 , how far has the dragster travelled before stopping?
10. A car accelerates from rest at 6.00 m/s^2 . What distance does it travel between 10.0 s and 15.0 s?
11. If 100.0 m sprinters accelerate from rest for 3.5 s at 2.8 m/s^2 , how far have they run to this point? How long will it take them to complete their 100.0 m sprint, assuming they maintain their speed the rest of the way?

12. A car moving with a constant acceleration covers the distance between two points 60.0 m apart in 6.0 s. Its velocity as it passes the second point is 15.0 m/s.
- (A) What was the speed at the first point?
 - (B) What is the constant acceleration
 - (C) How far behind the first point was the car at rest?
13. Andrew and Sarah ran down the hill. Both started from rest and accelerated steadily. Andrew accelerated at 0.25 m/s^2 and Sarah at 0.30 m/s^2 . After running for 20.0 s, Sarah fell down.
- (A) How far did Sarah run before she fell down?
 - (B) How far had Andrew travelled when Sarah fell?
 - (C) How fast was Andrew running when Sarah fell?
 - (D) How long (to the nearest second) was it after Sarah fell that Andrew ran into her and broke his crown?
14. Police forensics visit the scene of an accident in which a car skidded into an intersection after failing to stop for a red light. The skid marks left by the vehicle in question was 30.0 m long. Forensics also determined that the car's deceleration, with the brakes fully applied, had a magnitude of 6.0 m/s^2 . If the posted speed limit was 65 km/h, was the motorist speeding prior to applying the brakes?

