

- (1) The Cartesian coordinates of a point in the xy-planes are $(x,y) = (3.50\text{m}, 2.50\text{m})$. Find the polar coordinates of the point.
 (a) $R < \theta = 5.30 < 55.5^\circ$ (b) $R < \theta = 2.30 < 25.5^\circ$ (c) $R < \theta = 4.30 < 35.5^\circ$ (d) $R < \theta = 3.30 < 45.5^\circ$
- (2) The branch of classical mechanics which describes the motion of points, bodies (objects) and systems of bodies (group of Objects) without consideration of the causes of motion.
 (a) Heat (b) Light (c) kinematics (d) relativity
- (3) The average velocity of an object is defined as the displacement of an object divided by the total time
 (a) True (b) false (c) none of the above (d) all of the above.
- (4) If a car is travelling at a speed of 28.0m/s , is the driver exceeding the speed limit of 55miles/hour .
 (a) No, 52.6mi/h (b) Yes, 62.6mi/h (c) Yes, 51.8mi/h (d) Yes, 70mi/h
- (5) The traffic light turns green and the driver of a high performing car slams the accelerator to the floor. The accelerometer registers 22.0m/s^2 . Convert this reading to km/min^2 .
 (a) 50.2km/min^2 (b) 60.1km/min^2 (c) as (d) 20km/min^2 .
- (6) An airplane accelerated down a runway at 3.20m/s^2 for 32.8s until it finally lifts off the ground. Determine the distance travelled before takeoff.
 (a) 1730 m (b) 1740 m (c) 1750 m (d) 1720 m
- (7) A car starts from rest and accelerates uniformly over a time of 5.21 seconds for a distance of 110m . Determine the acceleration of the car.
 (a) 8.10 m/s^2 (b) 8.20 m/s^2 (c) 9.10 m/s^2 (d) 2.10 m/s^2
- (8) Charles is riding the Giant Drop at America. If Charles free falls for 2.6 seconds , what will his final velocity and how far will he fall.
 (a) $-33.3\text{ m}, -26\text{ m/s}$ (b) $-33.1\text{ m}, -25.5\text{ m/s}$ (c) $-31.3\text{ m}, -26\text{ m/s}$ (d) $-43.3\text{ m}, -26.1\text{ m/s}$
- (9) A race car accelerates uniformly from 18.5 m/s in 2.47 seconds . Determine the acceleration of the car and the distance travelled.
 (a) $11.5\text{ m/s}^2, 89.8\text{ m}$ (b) $11.4\text{ m/s}^2, 80\text{ m}$ (c) $11.2\text{ m/s}^2, 79.8\text{ m}$ (d) $21.2\text{ m/s}^2, 11\text{ m}$
- (10) A feather is dropped on the moon from a height of 1.40 metres . The acceleration of gravity on the moon is 1.67m/s^2 . Determine the time for the feather to fall to the surface of the moon.
 (a) 1.29 s (b) 1.29 s (c) 1.40 s (d) 2.0 s
- (11) Rocket powered sleds are used to test the human response to acceleration. If a rocket-powered sled is accelerated to a speed of 444m/s in 1.83 seconds , then what is the acceleration distance that the sled travels.
 (a) 406 m (b) 506 m (c) 606 m (d) 607 m
- (12) A bike accelerates uniformly from rest to a speed of 7.10 m/s over a distance of 35.4m . Determine the acceleration of the bike.
 (a) 0.812 m/s^2 (b) 0.512 m/s^2 (c) 0.612 m/s^2 (d) 0.712 m/s^2
- (13) An engineer is designing the runway for an airport. Of the planes that will use the airport, the lowest acceleration rate is likely to be 3 m/s^2 . The takeoff speed for this plane will be 65 m/s . Assuming this is the minimum acceleration, what is the minimum allowed length of the runway?

(a) 709 m (b) 809 m (C) 704 m (d) 304 m

(14) A car travelling at 22.4 m/s skids to a stop in 2.5 seconds. Determine the skidding distance.

(a) 20 m (b) 28.6 m (C) 39 m (d) 16.6 m

(15) An antelope is capable of jumping to a height of 2.62 m. Determine the takeoff speed of the Antelop.

(a) 7.17 m/s (b) 8.18 m/s (C) 4.2 m/s (d) 3.2 m/s

(16) If Akeem Olajuwon has a vertical leap of 1.29 m, then what is his takeoff speed and his hang time (total time to move upwards to the peak and then return to the ground.

(a) 5.9 m/s, 4 s (b) 4.03 m/s, 2 s (C) 5.03 m/s, 1.03 s (d) 6.03 m/s, s

(17) A bullet leaves a rifle with a muzzle velocity of 521 m/s. While accelerating through the barrel of the rifle, the bullet moves a distance of 0.840 m. Determine the acceleration of the bullet (assuming a uniform acceleration).

(a) 1.62×10^5 m/s (b) 3.0×10^5 m/s (C) 4.4×10^5 m/s (d) 3.2×10^5 m/s

(18) A baseball is propped straight up into the air and has a hang-time of 6.25s. Determine the height to which the ball rises before it reaches its peak. (note: the time to rise to the peak is one-half the total hang-time).

(a) 119.3 m (b) 320.2 m (C) 430 m (d) 48 m

(19) The observation desk of tall skyscraper is 370 m above the street. Determine the time required for a penny to free fall from the deck to the street below.

(a) 8.23 s (b) 9.93 s (C) 8.69 s (d) 7.2 s

(20) A bullet is moving at a speed of 367 m/s when it embeds into a lump of moist clay. The bullet penetrates for a distance of 0.0621 m. Determine the acceleration of the bullet while moving into the clay. (Assume a uniform acceleration).

(a) 1.08×10^6 m/s² (b) 2.08×10^6 m/s² (C) 4.08×10^6 m/s² (d) 2.28×10^6 m/s²

(21) A stone is dropped into a deep well and is heard to hit the water 3.41 s after being dropped. Determine the depth of the well.

(a) 65 m (b) -55.0 m (C) -47.3 m (d) 42 m

(22) It was once recorded that a Jaguar left skid marks that were 290 m in length. Assuming that the Jaguar skidded to a stop with constant acceleration of -3.90 m/s², determine the speed of the Jaguar before it began to skid.

(a) 40.1 m/s (b) 30.7 m/s (C) 56.3 m/s (d) 47.6 m/s

(23) A plane has a takeoff speed of 88 m/s and requires 1365 m to reach that speed. Determine the acceleration of the plane and the time required to reach this speed.

(a) 2.86 m/s², 30.8 s (b) 3.86 m/s², 30.8 s (C) 4.86 m/s², 36.8 s (d) 28.6 m/s², 10.8 s

(24) A dragster accelerates to a speed of 112 m/s over a distance of 298 m. Determine the acceleration (assume uniform) of the dragster.

(a) 1.8 m/s^2 (b) 5.8 m/s^2 (c) 15.8 m/s^2 (d) 14.8 m/s^2

(25) With what speed in miles/hr ($1 \text{ m/s} = 2.23 \text{ mi/hr}$) must an object be thrown to reach a height of 91m (equivalent to one football field)? Assume negligible air resistance.

(a) 53 m/s, 6 mi/hr (b) 42.3 m/s, 94.4 mi/hr (c) 3 m/s, 6.9 mi/hr (d) 5 m/s, 16 mi/hr