Name:______________________________

Velocity

Date:______________________

1. A caterpillar travels across the length of a 2.00-meter porch in 6.5 minutes. What is the average velocity of the caterpillar in m/s?

v_{ave} = ____________________

2. A hiker is at the bottom of a canyon facing the canyon wall closest to her. She is 280.5 meters from the wall and the sound of her voice travels at 340 m/s at that location. How long after she shouts will she hear her echo?

t = ____________________

3. A motorist traveling on a straight stretch of open highway sets his cruise control at 90 km/hr. How far will he travel in 15 minutes?

s = ____________________

4. A woman from Pasadena makes a trip to a nearby shopping mall that is located 40 miles from her home. On the trip to the mall she averages 80 mi/hr but gets a speeding ticket upon her arrival. On the return trip she averages just 40 mi/hr. What was her average speed for the entire trip?

v_{ave} = ____________________

5. A cross-country race car driver sets out on a 100-mile race. At the halfway marker (50 miles), her pit crew radios that she has averaged only 50 mi/hr. How fast must she drive over the remaining distance in order to average 100 mi/hr for the entire race?

v = ____________________

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Free Fall Problem Set Name:______________________

1. A ball is dropped off of a 20.5 meter rooftop. What will the velocity of the ball be just before it hits the ground?

2. A sky diver jumps out of an airplane and falls for 6.5 seconds before pulling his parachute. How far has he fallen in that time?

3. A physics student throws his book off of a rooftop. If the book fell a total distance of 3.1 meters and it took .45 seconds for it to hit the ground, what was the speed of the book when it left the student's hand?

4. A ball is thrown straight up in the air. If it is in the air for 3.2 seconds, how high did the ball reach?

Accelerated Motion Problems #2 Name:______________________

1. A feather is dropped inside a vacuum chamber.
   a. What is the velocity after .3 seconds?

   b. How far has it fallen after .3 seconds?

2. A dragster is uniformly accelerated from rest at a rate of 4.5 m/s^2 over a distance of 100 meters. What is its velocity as it hits the 100 meter finish line?

3. A woman hits her car brakes in a panic stop and decelerates at a rate of 5 m/s^2. The car comes to rest at a distance of 62.5 meters from the point where she first applied her brakes. How fast was she traveling when she hit her brakes?

4. A spaceship is traveling at 3000 m/s when its booster rocket is fired accelerating it at a rate of 15 m/s^2. What distance does the spaceship travel during its first 4 seconds of acceleration?

5. The Eiffel Tower is 300 meters tall. Disregarding air friction, at what velocity would an object be traveling when it reaches the ground if it were dropped from the top of the tower?

6. A rocket accelerates upward from rest with a uniform acceleration of 4.2 m/s^2. How far will the rocket have traveled at the end of 8.0 seconds?

7. The brakes on a car permit it to decelerate at the rate of -.8 m/s^2. How much distance is required to stop this car when it is traveling 60 km/hr?

8. A solar powered aircraft reaches lift off speed of 120 km/hr in 300 meters. What is the acceleration of the plane?

9. A motorcycle traveling 30 m/s decelerates at the rate of -2 m/s^2. What distance does it travel before coming to rest, and how long does it take to stop?

10. Beth and Rosa brake their racing sled so that it decelerates at a uniform rate of -.43 m/s^2. How long does it take to stop if it travels 85 meters before coming to rest?

11. Tests on the new Speedmobile show that it can decelerates at a uniform rate of -.67 m/s^2. How long does it take to stop if it travels 85 meters before coming to rest?

12. Andrew kicks a soccer ball down a hill so that it leaves the top of the hill with a speed of .2 m/s. It accelerates at a constant .1 m/s^2. How far will the ball travel in 30 seconds?

13. The Saturn car company finds that its new racing car will accelerate at a uniform rate of 6.28 m/s^2 over a 1 kilometer track. How long will it take the car to cover this track?

14. A rocket traveling 50 m/s accelerates at a rate of 2 m/s^2. What is the speed of the rocket after it has traveled 500 meters, and what time does it take to reach this speed?

ACCELERATED MOTION II

Name:_____________________________

Date:____________________________

Note: Acceleration due to gravity: $g = 9.8\ m/s^2$

1. A feather is dropped inside a vacuum chamber.

   a. What is the velocity after 0.30 seconds?

   v_f = ____________________

   c. How far has it fallen after 0.30 seconds?

   s = ____________________

2. A dragster is uniformly accelerated from rest at a rate of $4.5\ m/s^2$ over a distance of 100 meters. What is its velocity as it hits the 100 meter finish line?

   v_f = ____________________

3. A woman hits her car brakes in a panic stop and decelerates at a rate of $5\ m/s^2$. The car comes to rest at a distance of 62.5 meters from the point where she first applied her brakes. How fast was she traveling when she hit her brakes?

   v_o = ____________________

4. A spaceship is traveling at 3000 m/s when its booster rocket is fired accelerating it at a rate of $15.00\ m/s^2$. What distance does the spaceship travel during its first 4.000 seconds of acceleration?

   s = ____________________

5. The Eiffel Tower is 300 meters tall. Disregarding air friction, at what velocity would an object be traveling when it reaches the ground if it were dropped from the top of the tower?

   v_f = ____________________

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NAME____DATE__________________

SPEED AND ACCELERATION

DIRECTIONS: Solve each of the following problems.

1. A rocket accelerates upward from rest with a uniform acceleration of 4.2 m/s$\bar{e}$c^2. How far will the rocket have traveled at the end of 8.0 seconds?

____

2. The brakes on a car permit it to decelerate at the rate of -0.8 m/s$\bar{e}$c$^{2.}$. How much distance is required to stop this car when it is traveling 60.0 km/hr?

____

3. A solar-powered aircraft reaches lift-off speed of 120 km/hr in 300 meters. What is the acceleration of the plane?

____

4. A motorcycle traveling 30.0 m/sec decelerates at the rate of -2.0 m/s$\bar{e}$c^2. What distance does it travel before coming to rest, and how long does it take to stop?

____

5. Beth and Rosa brake their racing sled so that it decelerates at a uniform rate of -0.43/s$\bar{e}$c^2. How long does it take to stop if it travels 85 meters before coming to rest?

____

6. Tests on the new Speedmobile show that it can decelerate from 96.2 m/sec to 39.7 m/sec in 4.352 seconds. What distance does the car travel in this time? What is the car's rate of deceleration during this period?

____

7. Andrew kicks a croquet ball down a hill so that it leaves the top of the hill with a speed of 20 cm/sec. It accelerates at a constant 10 cm/sec^2. How far will the ball travel in 30 seconds?

____

8. Donna Jeanne sees an elephant dart into the road 50 meters ahead of her car while she is driving a t 65 km/hr. She slams on her brakes, which decelerates the car at the rate of -5.8 m/sec^2. Will she be able to avoid hitting the elephant?

____

9. The Whizbangg Car Company finds that its new racing car will accelerate at a uniform rate of 6.39 m/sec^2 over a 1.000 kilometer track. How long will it take the car to cover this track?

____

10. A rocket traveling 50.0 m/sec accelerates at a rate of 2.0 m/s$\bar{e}$c^2. What is the speed of the rocket after it has traveled 500 meters, and what time does it take to reach this speed?

____

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NAME____DATE __________________________

ACCELERATION

DIRECTIONS: Solve each of the following problems.

1. A speedboat increases its speed from 42 m/sec to 88 m/sec in a 4.0 second period. What is its acceleration during this period?

   ____

2. A jet plane is traveling at 210 km/hr when its wheels leave the runway and at 340 km/hr 8.0 seconds later. What is its acceleration during this time?

   ____

3. The same plane lands at a speed of 185 km/hr and comes to rest 36.2 seconds later. What is its acceleration during landing?

   ____

4. Bob Ulster times a race car as it passes two points on a race track. Its speeds at those two points are 43.2 m/sec and 68.7 m/sec. If the car requires 2.0 seconds to travel between these two points, what was its acceleration?

   ____

5. Felix steals second base running at a speed of 4.2 m/sec. He slides into second from a distance of 3.1 m. What is his acceleration during this slide, and what time is required for him to complete the slide?

   ____

6. The Space Shuttle leaves its launch pad with a uniform acceleration of 8.5 m/sec^2. What will be its speed after 1.0 seconds? After 10 seconds? After 40.0 seconds?

   ____

7. Donna swings at a racketball moving with a forward speed of 3.0 m/sec. She hits the ball with a force that accelerates it by 2.5 m/sēc^2 for 0.8 sec. What is the final velocity of the ball?

   ____

8. A spacecraft orbits at a uniform speed of 1050 m/sec. The firing of one of its rockets gives it an acceleration of 185 m/sec^2. What will be its new speed after 12.5 seconds of rocket ignition?

   ____

9. The driver of a bobsled brakes the speed of his sled from 24.8 m/sec to 12.2 m/sec. If the brakes are applied for 1.4 seconds, what was the rate of acceleration?

   ____

10. An airplane, traveling 142.5 km/hr at the moment it touches the runway, runs off the end of the runway still traveling at 36.7 km/hr. If the plane's rate of acceleration was -1.6 m/sec^2, how long and far did the plane travel along the runway?

   ____

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