Practice Kinematics Questions

(Answers are at the end)

1) One possible unit of speed is _____.

A) light years per century. C) miles per hour. E) none of the above.
B) kilometers per hour. D) all of the above.

2) When you look at the speedometer in a moving car, you can see the car's

A) average acceleration. C) average distance E) average speed.
B) instantaneous traveled.
acceleration. D) instantaneous speed.

3) Acceleration is defined as the CHANGE in _____.

A) velocity divided by the
time interval. C) velocity of an object. E) distance divided by the
B) time it takes to move from D) time it takes to move from time interval.
one speed to another speed. one place to another place.

4) Suppose you are in a car that is going around a curve. The speedometer reads a constant 30 miles per hour. Which of the following is NOT true?

A) Your velocity is constant. C) Your speed is constant. E) Your direction is
B) Your acceleration is D) You and the car are constantly changin
constant. accelerating.

5) An object travels 8 meters in the first second of travel, 8 meters again during the second second of travel, and 8 meters again during the third second. Its acceleration is _____.

A) 8 m/s to power of (2). C) 16 m/s to power of (2). E) none of the above
B) 0 m/s to power of (2). D) 32 m/s to power of (2).

6) Ten seconds after starting from rest, a car is moving at 40 m/s. What is the car's average acceleration?

A) 2.5 m/s to power of (2) C) 40 m/s to power of (2) E) 0.25 m/s to power of (2)
B) 4.0 m/s to power of (2) D) 10 m/s to power of (2)

7) As an object falls freely in a vacuum, its _____.

A) velocity increases. B) acceleration increases.
C) both A and B D) none of the above

8) In the absence of air resistance, objects fall at constant _____.

A) distances each successive second.
B) acceleration.
C) speed.
D) velocity.
E) all of the above

9) Speed is _____.

A) a measure of how fast something is moving.
B) always measured in terms of a unit of distance divided by a unit of time.
C) the distance covered per unit time.
D) all of the above. E) none of the above.

10) A ball is thrown upwards and caught when it comes back down. In the absence of air resistance, the speed of the ball when caught would be _____.

A) less than the speed it had when thrown upwards.
B) more than the speed it had when thrown upwards.
C) the same as the speed it had when thrown upwards.

11) Suppose an object is in free fall. Each second the object falls _____.

A) a larger distance than in the second before.
B) with the same average speed.
C) with the same instantaneous speed.
D) the same distance as in the second before.
E) none of the above

12) If you drop a feather and a coin at the same time in a tube filled with air, which will reach the bottom of the tube first?

A) Neither-they will both reach the bottom at the same time.
B) The coin
C) The feather

13) Consider drops of water leaking from a water faucet. As the drops fall they _____.

A) remain at a relatively fixed distance from each other.
B) get closer together.
C) get farther apart.

14) A ball tossed vertically upward rises, reaches its highest point, and then falls back to its starting point. During this time the acceleration of the ball is always _____.

A) directed downward.   B) directed upward.
C) in the direction of motion.   D) opposite its velocity.

15) The hang time (time one's feet are off the ground in a jump) for most athletes is:

A) slightly more than 1 second.
B) less than 1 second.

C) about 1 second.
D) considerably more than 1 second.

16) When a basketball player jumps to make a shot, once the feet are off the floor, the jumper's acceleration _____.

A) is usually greater for taller players (but not always).
B) varies with body orientation.

C) depends on launch speed.
D) depends on all the above.
E) is g; no more, no less.

17) Suppose you take a trip that covers 240 km and takes 4 hours to make. Your average speed is _____.

A) 120 km/h.
B) 960 km/h.

C) 60 km/h.
D) 480 km/h.

E) 240 km/h.

18) Suppose a car is moving in a straight line and steadily increases its speed. It moves from 35 km/h to 40 km/h the first second and from 40 km/h to 45 km/h the next second. What is the car's acceleration?

A) 10 km/s^2
B) 40 km/s^2

C) 5 km/s^2
D) 45 km/s^2

E) 35 km/m^2

19) A ball is thrown straight up. At the top of its path its instantaneous speed is _____.

A) 0 m/s.
B) about 50 m/s.

C) about 10 m/s.
D) about 20 m/s.

E) about 5 m/s.

20) A ball is thrown straight up. At the top of its path its acceleration is _____.

A) about 5 m/s^2
B) about -10 m/s^2

C) about 10 m/s^2
D) 0 m/s^2

E) about -5 m/s^2

21) When something falls to the ground, it accelerates. This acceleration is called the acceleration due to gravity and is symbolized by the letter g. What is the value of g on the earth's surface?

A) about -5 m/s^2
B) about -10 m/s^2

C) about 5 m/s^2
D) about 10 m/s^2

E) 0 m/s^2

22) A car accelerates at 2 m/s to power of (2). Assuming the car starts from rest, how much time does it need to accelerate to a speed of 30 m/s?

A) 15 seconds
B) 2 seconds

C) 30 seconds
D) 60 seconds

E) none of the above

23) If a freely falling object were somehow equipped with a speedometer, its speed reading would increase each second by _____.

A) about 15 m/s.
B) a rate that depends on its initial speed.

C) about 10 m/s.
D) about 5 m/s.
E) a variable amount.

24) If an object were equipped with a speedometer and allowed to fall freely on a planet where the acceleration due to gravity is 20 m/s to power of (2), the reading on the speedometer increases each second by _____.

A) 40 m/s.
B) a rate that depends on its initial speed.
C) 10 m/s.
D) 30 m/s.
E) 20 m/s.

25) Ten seconds after starting from rest, a freely falling object will have a speed of about_____.

A) 100 m/s.
B) 500 m/s

C) more than 500 m/s.
D) 50 m/s.

E) 10 m/s.

26) One-half second after starting from rest, a freely falling object will have a speed of about :

A) 20 m/s.
B) 2.5 m/s.

C) 10 m/s.
D) 5 m/s.

E) none of the above

27) If you drop a feather and a coin at the same time in a vacuum tube, which will reach the bottom of the tube first?

A) The feather
B) The coin C) Neither-they will both reach the bottom at the same time.

28) If a projectile is fired straight up at a speed of 10 m/s, the total time to return to its starting point is about _____.

A) 20 seconds.
B) not enough information to estimate

C) 10 seconds.
D) 2 seconds.
E) 1 second.

29) The vertical height attained by a basketball player who achieves a hang time of a full 1 second is about _____.

A) 0.8 m.
B) more than 2.5 m.

C) 2.5 m.
D) 1 m.

E) 1.2 m.

30) Suppose a jumper claims a hang time of 2 seconds. Then that jumper must be able to jump a vertical distance of _____.

A) 5 m. B) 2 m. C) 4 m. D) 1 m. E) 3 m.

Answer the following questions in the space provided. Show all work.

31) What is the average speed of a cheetah that runs 65 m in 3.0 seconds?

32) A bicycle travels 15 km in 30 minutes. What is its average speed?

33) What is the average acceleration of a car that goes from rest to 59 km/h in 9.0 seconds?

34) A jet on an aircraft carrier can be launched from 0 to 50 m/s in 2.0 seconds. What is the

acceleration of the jet?

35) A skateboarder starting from rest accelerates down a ramp at 4.0 m/s^2
for 4.0 s. What is the final speed of the skateboarder?

36) An apple falls from a tree and 0.5 second later hits the ground. How fast is the apple falling
when it hits the ground?

37) What speed must you toss a ball straight up so that it takes 4.0 s to return to you?

38) You toss a ball at 30.0 m/s straight upward. How much time will the ball take to reach the

top of its path?

39) What is the hang time of a person who can jump a vertical distance of 0.80 m?

40) What vertical distance can a person with a 0.8-s hang time jump?

41) How much time does a car with an acceleration of 4.0 m/s^2 take to go from 10 m/s to 30 m/s?

42) Starting from rest, a car undergoes a constant acceleration of 6.0 m/s^2. How far will the car
travel in the first second?

43) A crate falls from an airplane flying horizontally at an altitude of 2,000 m. Neglecting air drag,
how long will the crate take to strike the ground?

44) If a projectile fired beneath the water, straight up, breaks through the surface at a speed of
16 m/s, to what height above the water will it ascend?

45) A stone is dropped from a cliff. After it has fallen 40 m, what is the stone's velocity?

_____

1) Answer: D   10) Answer: C
                          6) Answer: B
2) Answer: D   11) Answer: A
                          7) Answer: A
3) Answer: A   12) Answer: B
                          8) Answer: B
4) Answer: A   13) Answer: C
                          9) Answer: D
5) Answer: B   14) Answer: A

15) Answer: B

16) Answer: E

17) Answer: C

18) Answer: C

19) Answer: A

20) Answer: B

21) Answer: B

22) Answer: A

23) Answer: C

24) Answer: E

25) Answer: A

26) Answer: D

27) Answer: C

28) Answer: D

29) Answer: E

30) Answer: A

31) Answer: 22 m/s

32) Answer: 30 km/hr

33) Answer: 6.6 km/s^2

34) Answer: 25 m/s^2

35) Answer: 16 m/s

36) Answer: 5 m/s

37) Answer: 20 m/s

38) Answer: 3.00 s

39) Answer: 0.80 s

40) Answer: 0.8 m

41) Answer: 5.0 s

42) Answer: 3.0 m

43) Answer: 20.0 s

44) Answer: 12.8 m

45) Answer: 28 m/s