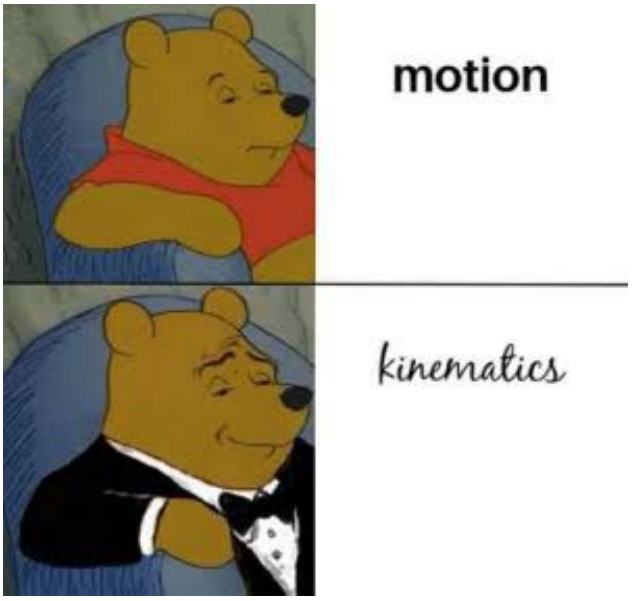

Grade 12 Physics
Kinematics Test

First Name: _____

Last Name: _____

Directions:

- Please answer to 2 decimal points
- The test is designed to be completed in 75 minutes

For grading use only

Page:	2	3	4	5	6	7	8	Total
Points:	7	7	6	15	25	10	10	80
Score:								

Questions

1. (1 point) A car accelerates uniformly from rest to a speed of 25 m/s in 10 seconds. What is the car's acceleration?
   A. 1.5 m/s^2
   B. 2.5 m/s^2
   C. 3.5 m/s^2
   D. 4.5 m/s^2

2. (1 point) An object is thrown vertically upward with an initial velocity of 20 m/s. What is its velocity after 3 seconds? (Assume $g = 9.8$ m/s^2.)
   A. 10.6 m/s
   B. 0 m/s
   C. -9.4 m/s
   D. -19.4 m/s

3. (1 point) A ball is dropped from a height of 80 m. How long does it take to hit the ground? (Assume $g = 9.8$ m/s^2.)
   A. 4 s
   B. 5 s
   C. 6 s
   D. 7 s

4. (1 point) A car traveling at 20 m/s comes to a stop in 4 seconds. What is the magnitude of its acceleration?
   A. 4 m/s^2
   B. 5 m/s^2
   C. 6 m/s^2
   D. 7 m/s^2

5. (1 point) An object moves with a constant velocity of 15 m/s for 10 seconds. What is its displacement?
   A. 100 m
   B. 125 m
   C. 150 m
   D. 200 m

6. (1 point) A ball is thrown upward with a velocity of 30 m/s. How long does it take to reach the maximum height? (Assume $g = 9.8$ m/s^2.)
   A. 2.5 s
   B. 3.0 s
   C. 3.5 s
   D. 4.0 s

7. (1 point) A cyclist accelerates uniformly from rest to a velocity of 10 m/s in 5 seconds. What is the total distance covered during this time?
   A. 15 m
   B. 20 m

C. 25 m

D. 30 m

8. (1 point) An object accelerates uniformly at 4 m/s^2 for 6 seconds. If it starts from rest, what is its final velocity?

   A. 20 m/s

   B. 24 m/s

   C. 28 m/s

   D. 32 m/s

9. (1 point) A rock is thrown horizontally at 15 m/s from a cliff that is 45 m high. How long does it take for the rock to hit the ground? (Assume $g = 9.8$ m/s^2.)

   A. 2.5 s

   B. 3.0 s

   C. 3.5 s

   D. 4.0 s

10. (1 point) A ball is thrown downward with an initial velocity of 5 m/s. How far does it fall in 3 seconds? (Assume $g = 9.8$ m/s^2.)

    A. 35.4 m

    B. 44.1 m

    C. 53.4 m

    D. 62.1 m

11. (1 point) A ball is dropped from rest, and after falling for 3 seconds, its velocity is:

    A. 9.8 m/s

    B. 19.6 m/s

    C. 29.4 m/s

    D. 39.2 m/s

12. (1 point) A train is traveling at 40 m/s and slows down uniformly to 20 m/s over 10 seconds. What is the distance traveled during this time?

    A. 100 m

    B. 200 m

    C. 300 m

    D. 400 m

13. (1 point) A projectile is launched at an angle of 45° with an initial velocity of 50 m/s. What is the total time of flight? (Assume $g = 9.8$ m/s^2.)

    A. 7.1 s

    B. 8.2 s

    C. 9.3 s

    D. 10.2 s

14. (1 point) A car is traveling at 30 m/s and accelerates uniformly at 3 m/s^2. How long does it take to reach a velocity of 60 m/s?

    A. 5 s

B. 10 s

C. 15 s

D. 20 s

15. (1 point) An object is thrown vertically upward with an initial velocity of 15 m/s. What is its maximum height? (Assume $g = 9.8$ m/s^2.)

A. 8.6 m

B. 10.2 m

C. 11.5 m

D. 12.8 m

16. (1 point) A car accelerates uniformly from 10 m/s to 30 m/s over a distance of 100 m. What is the car's acceleration?

A. 2 m/s^2

B. 3 m/s^2

C. 4 m/s^2

D. 5 m/s^2

17. (1 point) An object is projected horizontally from a height of 80 m with a velocity of 20 m/s. How far does it travel horizontally before hitting the ground? (Assume $g = 9.8$ m/s^2.)

A. 80 m

B. 100 m

C. 120 m

D. 160 m

18. (1 point) A ball is thrown downward with an initial velocity of 10 m/s. After 4 seconds, its velocity is:

A. 29.8 m/s

B. 39.2 m/s

C. 49.6 m/s

D. 59.0 m/s

19. (1 point) A cyclist travels 20 m at 4 m/s, then another 30 m at 6 m/s. What is their average velocity?

A. 4.8 m/s

B. 5.0 m/s

C. 5.2 m/s

D. 5.4 m/s

20. (1 point) A rocket accelerates from rest at 10 m/s^2 for 12 seconds. What is its final velocity?

A. 100 m/s

B. 110 m/s

C. 120 m/s

D. 130 m/s

Short Answer

21. (5 points) Derive the kinematic equation $v^2 = u^2 + 2as$ using basic definitions of acceleration and displacement.?

22. A train moves with a constant acceleration of 2 m/s^2 for 15 seconds. If it starts from rest, calculate:
    (a) (2 points) The acceleration
    (b) (3 points) The distance traveled during this time.

23. A rocket is launched vertically upward with an initial velocity of 50 m/s. Calculate:
    (a) (2 points) The maximum height it reaches.
    (b) (3 points) The total time it takes to return to the ground.

24. Two cars start from rest at the same point. Car A accelerates uniformly at 3 m/s^2, while Car B accelerates uniformly at 2 m/s^2. Calculate:

(a) (2 points) The time it takes for Car A to be 30 m ahead of Car B.

(b) (3 points) The distance covered by each car at this time.

25. A ball is thrown vertically upward with an initial velocity of 25 m/s. After 2 seconds, another ball is thrown upward with the same velocity. Determine:

(a) (5 points) The time at which the two balls meet.

(b) (5 points) The height at which they meet.

26. A cyclist starts from rest and accelerates uniformly at a rate of 1.5 m/s^2 for 12 seconds. She then maintains a constant velocity for 20 seconds before decelerating uniformly to rest in 8 seconds.

(a) (3 points) Draw a velocity-time graph for the motion.

(b) (3 points) Calculate the total distance traveled.

(c) (4 points) Calculate the average velocity for the entire trip.

27. A ball is dropped from a height of 200 m. At the same instant, another ball is thrown upward from the ground with an initial velocity of 50 m/s. Determine:
    (a) (3 points) The time at which the two balls meet.
    (b) (4 points) The height at which they meet.
    (c) (3 points) The velocities of both balls at the point of meeting.

28. A car moving at 25 m/s decelerates uniformly to a stop over a distance of 100 m. It then reverses direction, accelerating uniformly at 2 m/s^2 until it reaches a velocity of 20 m/s. Calculate:
    (a) (2 points) The time taken to stop.
    (b) (4 points) The time taken to reach 20 m/s in reverse.
    (c) (4 points) The total distance covered by the car.