Name: _____ Period: _____

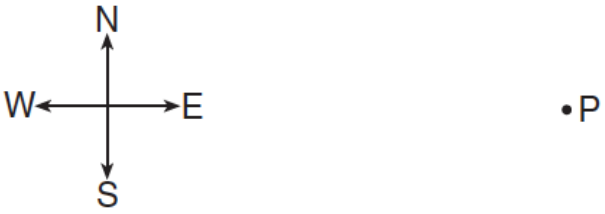
Kinematics-Horizontal Kinematics

Base your answers to questions 1 and 2 on the information below.

A 747 jet, traveling at a velocity of 70 meters per second north, touches down on a runway. The jet slows to rest at the rate of 2.0 meters per second^2.

1. Calculate the total distance the jet travels on the runway as it is brought to rest. [Show all work, including the equation and substitution with units.]

2. On the diagram below, point P represents the position of the jet on the runway. Beginning at point P, draw a vector to represent the magnitude and direction of the acceleration of the jet as it comes to rest. Use a scale of 1.0 centimeter = 0.50 meter/second^2.



3. An observer recorded the following data for the motion of a car undergoing constant acceleration.

Time (s)	Speed (m/s)
3.0	4.0
5.0	7.0
6.0	8.5

What was the magnitude of the acceleration of the car?
1. 1.3 m/s^2
2. 2.0 m/s^2
3. 1.5 m/s^2
4. 4.5 m/s^2

4. A car traveling on a straight road at 15 meters per second accelerates uniformly to a speed of 21 meters per second in 12 seconds. The total distance traveled by the car in this 12-second time interval is
1. 36 m
2. 180 m
3. 216 m
4. 252 m

5. A race car starting from rest accelerates uniformly at 4.9 m/s^2. What is the car's speed after it has traveled 200 meters?
1. 1960 m/s
2. 62.6 m/s
3. 44.3 m/s
4. 31.3 m/s

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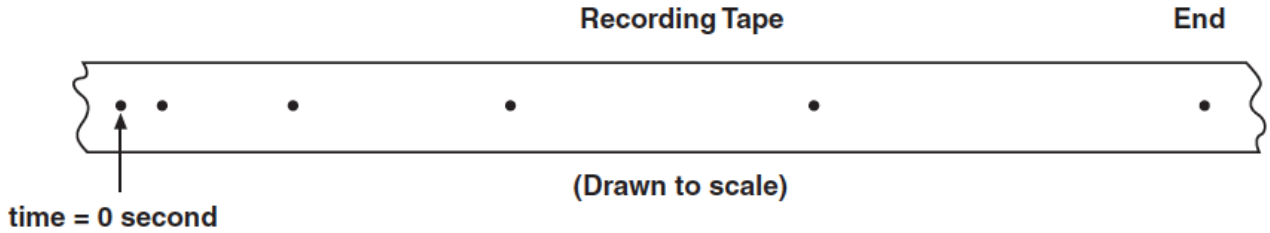
Kinematics-Horizontal Kinematics

Base your answers to questions 6 through 9 on the information and diagram below.

A spark timer is used to record the position of a lab cart accelerating uniformly from rest. Each 0.10 second, the timer marks a dot on a recording tape to indicate the position of the cart at that instant, as shown.

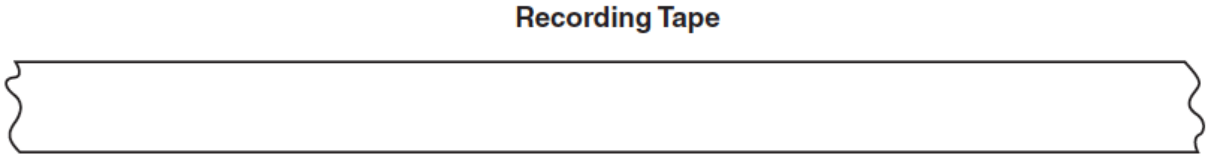


6. Using a metric ruler, measure the distance the cart traveled during the interval t=0 second to t=0.30 second. Record your answer to the nearest tenth of a centimeter.

7. Calculate the magnitude of the acceleration of the cart during the time interval t=0 second to t=0.30 second. [Show all work, including the equation and substitution with units.]

8. Calculate the average speed of the cart during the time interval t=0 second to t=0.30 second. [Show all work, including the equation and substitution with units.]

9. On the diagram below, mark at least four dots to indicate the position of a cart traveling at constant velocity.



10. A car initially traveling at a speed of 16 meters per second accelerates unfiromly to a speed of 20 meters per second over a distance of 36 meters. What is the magnitude of the car's acceleration?
    1. 0.11 m/s^2
    2. 2.0 m/s^2
    3. 0.22 m/s^2
    4. 9.0 m/s^2

11. An object accelerates uniformly from 3 meters per second east to 8 meters per second east in 2.0 seconds. What is the magnitude of the acceleration of the object?
    1. 2.5 m/s^2
    2. 5.0 m/s^2
    3. 5.5 m/s^2
    4. 11 m/s^2

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Kinematics-Horizontal Kinematics

Base your answers to questions 12 and 13 on the information below.

A physics class is to design an experiment to determine the acceleration of a student on inline skates coasting straight down a gentle incline. The incline has a constant slope. The students have tape measures, traffic cones, and stopwatches.

12. Describe a procedure to obtain the measurements necessary for this experiment.

13. Indicate which equation(s) they should use to determine the student's acceleration.

14. A car increases its speed from 9.6 meters per second to 11.2 meters per second in 4.0 seconds. The average acceleration of the car during this 4-second interval is
    1. 0.40 m/s^2
    2. 2.4 m/s^2
    3. 2.8 m/s^2
    4. 5.2 m/s^2

15. As a car is driven south in a straight line with decreasing speed, the acceleration of the car must be
    1. directed northward
    2. directed southward
    3. zero
    4. constant, but not zero

16. The speed of an object undergoing constant acceleration increases from 8.0 meters per second to 16.0 meters per second in 10 seconds. How far does the object travel during the 10 seconds?
    1. 3.6×10^2 m
    2. 1.6×10^2 m
    3. 1.2×10^2 m
    4. 8.0×10^1 m

Base your answers to questions 17 and 18 on the information below.

A car traveling at a speed of 13 meters per second accelerates uniformly to a speed of 25 meters per second in 5.0 seconds.

17. Calculate the magnitude of the acceleration of the car during this 5.0-second time interval. [Show all work, including the equation and substitution with units.]

18. A truck traveling at a constant speed covers the same total distance as the car in the same 5.0-second time interval. Determine the speed of the truck.

19. If a car accelerates uniformly from rest to 15 meters per second over a distance of 100 meters, the magnitude of the car's acceleration is
    1. 0.15 m/s^2
    2. 1.1 m/s^2
    3. 2.3 m/s^2
    4. 6.7 m/s^2

20. The speed of a wagon increases from 2.5 meters per second to 9.0 meters per second in 3.0 seconds as it accelerates uniformly down a hill. What is the magnitude of the acceleration of the wagon during this 3.0-second interval?
    1. 0.83 m/s^2
    2. 2.2 m/s^2
    3. 3.0 m/s^2
    4. 3.8 m/s^2

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Kinematics-Horizontal Kinematics

21. A skater increases her speed uniformly from 2.0 meters per second to 7.0 meters per second over a distance of 12 meters. The magnitude of her acceleration as she travels this 12 meters is
    1. 1.9 m/s^2
    2. 2.2 m/s^2
    3. 2.4 m/s^2
    4. 3.8 m/s^2

22. During a 5.0-second interval, an object's velocity changes from 25 meters per second east to 15 meters per second east. Determine the magnitude and direction of the object's acceleration.

23. A car, initially traveling east with a speed of 5 meters per second, is accelerated uniformly at 2 meters per $second^2$ east for 10 seconds along a straight line. During this 10-second interval, the car travels a total distance of
    1. 50 m
    2. 60 m
    3. 1.0×10^2 m
    4. 1.5×10^2 m

24. A child riding a bicycle at 15 meters per second accelerates at -3.0 meters per $second^2$ for 4.0 seconds. What is the child's speed at the end of this 4.0-second interval?
    1. 12 m/s
    2. 27 m/s
    3. 3.0 m/s
    4. 7.0 m/s