One-Dimensional Motion

Directions:
Answer the following questions.

1. Using the word bank, categorize the following measurements.

Scalar	Vector

Acceleration Speed	Displacement Velocity	Distance

2. Build the formula for acceleration.

$$\bar{a} = \frac{(\square - \square)}{\square}$$

3. Jada is flying from Chicago to Las Vegas, a 2,500 kilometer distance. Her plane will fly 965 kilometers per hour. How long will it take her to get to Las Vegas, assuming she flies in a straight line? Round to the nearest hundredth.

4. Jimmy is holding a ball four feet above the ground. He is standing over a 250 foot cliff. If he drops the ball straight down, how fast will the ball be traveling when it hits the ground? Round the answer to the nearest hundredth.

5. Juliet's new sports car can accelerate at 9.29 m/s^2. How long will it take to accelerate from 0 km/hr to the car's maximum speed of 349 km/hr? Answer should be in seconds and rounded to the nearest hundredth.

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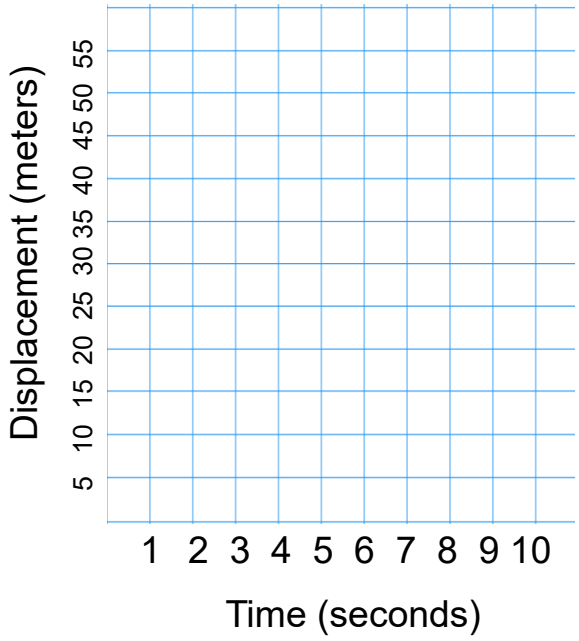
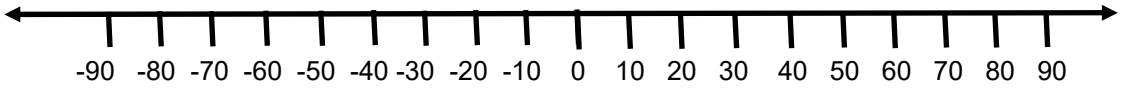
6. Graph Jenny's change in position, if she is running at 5 m/s for 10 s.

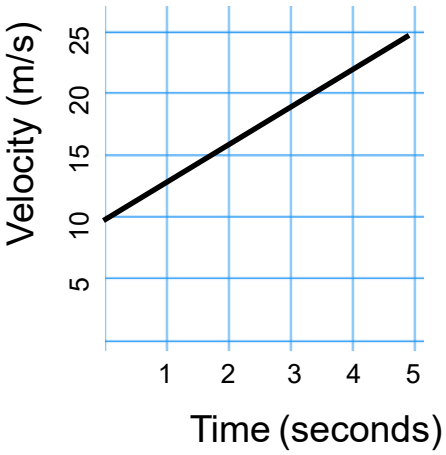


7. A ball is rolling at -1 m/s. Where would the ball end up if it rolled for one minute?



8. Julius is driving at 55 mph. He slams on the breaks when he sees a stop light turn red 50 meters away. If he slows at -4 m/s^2, will he be able to stop at the stop light?
   A. Yes
   B. No
   C. Not enough information

9. Estimate the displacement given the graph of velocity over time.



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10. Match the definition with the correct term.

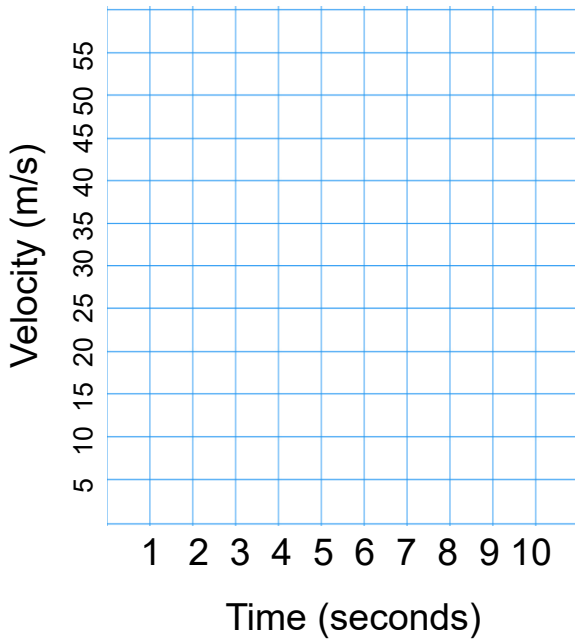
Kinematics	rate of change in position as related to change in time
Displacement	branch of physics providing mathematical formulas to understand motion
Velocity	measurement of how far an object has moved from a starting position

11. Build the formula for average velocity.

$$\bar{v} = \frac{\square}{\square}$$

12. Which of the following is the magnitude of the average acceleration constant for Earth's gravity?
    A. 32 m/s^2
    B. 6.67430 x 10^{-11} N m^2/kg^2
    C. 9.8 m/s^2
    D. 9.8 m/s

13. Graph John's change in position if he is driving at 15 m/s and accelerating at 4 m/s^2 over 10 seconds.



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14. Michael dances 10 feet forward, then moonwalks five feet backwards toward his starting position. Answer the following questions about his movement.
    What distance has Michael covered?
    What is Michael's displacement?

15. Mary is conducting a traffic accident investigation. She is trying to determine the final velocity of a speeding car when the accident occurred. A traffic camera on the highway, caught the car going 100 mph. Five minutes later, another traffic camera caught the impact ten miles down the highway. Given all of this information, what would be the best kinematic equation to solve for the car's final velocity?

    A. $\Delta x = v_i \cdot t + \frac{a \cdot t^2}{2}$

    B. $v_f{}^2 = v_i{}^2 + 2a \cdot d$

    C. $v_f = v_i + a \cdot t$

    D. $\Delta x = \frac{(v_i + v_f)}{2} \cdot t$

16. Coyote is chasing a roadrunner and realizes he ran off a 175 meter cliff when he glances down. How long will it take Coyote to fall to the ground? Round to the nearest hundredth.

17. A plane lands at 75 m/s, there are 1,800 m to reach the safe taxi speed of 8 m/s. What is the plane's minimum acceleration to slow down? Round to the nearest hundredth.

18. A train accelerates at 0.25 m/s^2. The train will travel seven miles from one station to the next station. The train's conductor will apply the brakes one mile before the previous station. What is the highest velocity the train will reach? Round to the nearest hundredth.

19. Select the correct answer from the choices provided in the underlined sections.
    If an object is tossed up in the air, gravity's acceleration will <u>slow down / speed up</u> the object's initial velocity until the velocity hits zero. Then the object's velocity will start increasing in the <u>negative / positive</u> direction.

20. Select the correct answer from the choices provided in the underlined section.
    Average acceleration is the quotient of change in <u>velocity / position</u> divided by change in time.