Name:_____ Date:_____ Hour: 1 2 3 4 5 6

Motion Ideas

Directions: DO NOT WRITE ON THIS PAPER. Copy the question, then answer.

1) The simplest definition for speed is "how fast". Is it a scalar or vector quantity? So does it care about size only or size and direction? Can it have negative values?
2) The simplest definition for velocity is "speed with direction". Is it a scalar or vector quantity? So does it care about size only or size and direction? Can it have negative values?
3) The simplest definition for acceleration is "change in velocity". Is it a scalar or vector quantity? So does it care about size only or size and direction? Can it have negative values?
4) What does positive velocity mean? How about negative velocity?
5) What does positive acceleration mean? How about negative acceleration?
6) Can you have motion without acceleration? Can you have acceleration without motion?

Velocity Practice

Directions: Show all work on a separate sheet of paper. Remember, for each math problem I am looking for you to write the givens, write the formula(s), plug into the formula(s), write the correct answer, WITH UNITS, and circle it.

7) How far would an object move in 20 seconds if it were traveling a constant velocity of 63 m/s?
8) A bullet is fired at 660 m/s at a target 200 m away. How long before the bullet hits the target?
9) A family on a road trip makes the 280 mile trip to Chicago in 5 hours. What is their average speed?
10) A boat is traveling up a river at 25 mph while the river is flowing downstream at 4 mph. How fast is the boat passing someone standing on shore?
11) A track star runs the 400 m in 52 seconds. What is her velocity?
12) A cyclist manages to ride 82 miles with an average speed of 26 miles per hour. How long did it take them to complete their ride? (please give an answer in time units we will understand)
13) A marathon runner completes the race (26.2 miles) in 4 hours and 26 minutes. What was his average speed? (first convert the time into one convenient time unit)
14) A rollercoaster can complete its 2,500 m circuit in 45 seconds. What is the average velocity of the cars?
15) What is the speed of a rocket that travels 9000 meters in 12.12 seconds?
16) A jet plane is traveling at 124 m/s. How far does it travel in 4 seconds?
17) If a plane traveling to Hawaii averages 520 mph and the trip is 5200 miles, how long will it take to fly?
18) A satellite in low earth orbit follows a path of about 27,000 miles and travel about 18,000 mph. How long does it take the satellite to complete 1 full orbit?

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Acceleration Practice

19) A car accelerates to 22 m/s from rest in 20 seconds. What is its acceleration?

20) You jump in a pool from the high dive and stop from 4 m/s in 1.5 seconds. What is your acceleration?

21) Rolling down a big hill on your bike, you go from zero to 24 mph in 8 seconds. What is your acceleraton?

22) An airplane lands and slows from 180 miles per hour to 30 miles per hour in 10 seconds. What is its acceleration?

23) A skydiver opens their parachute and goes from 120 mph to 20 mph in 2 seconds. What is their acceleration?

24) A sports car has an acceleration of 12 miles per hour per second. How long does it take to go from zero to 60 mph?

25) A rock sitting at the top of a hill begins to roll down. If its speed increases 4 m/s every 2 seconds and takes 10 seconds to roll down the hill, what speed does it reach? (looking for final velocity)

26) If a car starts from rest and after 1 second it's going 2 m/s, after the second second, it's going 4 m/s. After the third second, it's going 6 m/s. What is its acceleration?

Rising/Falling objects

27) If a plant falls off a window ledge and falls for 2 s, how far did it fall? What was its velocity as it hit the ground?

28) If you throw a ball straight up in the air at 30 m/s, how many seconds until the ball reaches its peak? What speed will it reach when you catch it again? How many seconds did it fall for?

29) You drop a rock off an ocean cliff and it takes 4 seconds before you see a splash. How tall is that cliff? How fast was the rock going when it hit the water?

30) If you drop a bouncy ball off a roof and it takes 1.2 seconds to hit the ground, how tall is the roof? What is the ball's velocity as it hits the ground? What is the acceleration of that ball on the way down? What is the acceleration of the ball up after it bounces?

Directions: Use the graph below for questions 31-33. Explain what happens for each section of time: A, B, C.

31) Describe the motion of an object if this were a position vs time graph.

32) Describe the motion of an object if this were a velocity vs time graph.

33) Describe the motion of an object if this were an acceleration vs time graph.