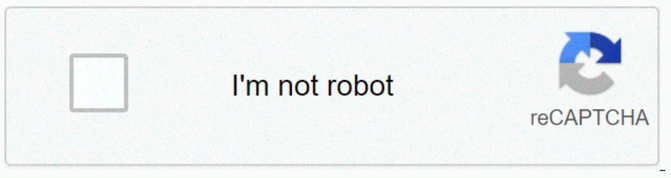

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Average velocity versus average speed

Before turning our attention to problems involving non-constant acceleration and the use of calculus, we consider the concept of average speed. We will look at examples involving movement with constant acceleration. Average speed We return to the example of the stone being launched vertically upwards from ground level at an initial speed of 30 m/s. The acceleration is taken as \(-10\) m/s\(^2\). We found that the stone's speed is 0 m/s after three seconds, when it is at an altitude of 45 meters. The average speed for the first three seconds of movement is \[\dfrac{x(3)-x(0)}{3-0} = \dfrac{45}{3} = 15 \text{ m/s}. \] This can be illustrated at position-time graph of chord from origin to point \(3.45)\). The gradient of this chord is 15. After another second, the height (position) of the stone is 40 m. That is, \(x(4) = 40\). The average speed for the first four seconds is \[\dfrac{x(4)-x(0)}{4-0} = \dfrac{40}{4} = 10 \text{ m/s}. \] This can be illustrated by chords from the origin of the point \(((4.40)\). This chord has gradient 10. The average speed from the time the stone reaches its highest point to when the total time elapsed is 5 seconds, \[\dfrac{x(5)-x(3)}{5-3} = \dfrac{25-45}{2} = -10 \text{ m/s}. \] The average speed from the time the stone is started to the time it returns to ground level is \[\dfrac{x(6)-x(0)}{6-0} = 0 \text{ m/s}. \] In general, we can type \[\text{Average Speed} = \dfrac{x(t_2)-x(t_1)}{t_2-t_1}, \] where \(x(t_i)\) is the location of the particle at a time \(t_i\). Average speed The average speed is the distance traveled divided by the time it takes: \[\[\text{Average speed} = \dfrac{\text{Distance travelled}}{\text{Time taken}}. \] Back to the example of the stone launched upwards at initial speed 30 m/s: the average speed for the first three seconds is \(\dfrac{45}{3} = 15\) m/s the average speed for the first four seconds is \(\dfrac{45}{3} = 15\) m/s the average speed for the first four seconds is \(\dfrac{50}{4} = 12.5\) m/s the average speed from the time the stone reaches its highest point to when the total time has elapsed, is 5 seconds is \(\dfrac{20}{2} = 10\) m/s the average speed from the time the stone is started until the time it returns to ground level is \(\dfrac{90}{6} = 15\) m/s. Next page - Content - Differential calculus and movement in a straight line The average speed of an object is defined as the distance traveled divided by the time elapsed. Speed is a vector amount, and the average speed can be defined as displacement divided by time. For the special case of straight line movement in the x-direction, the average speed takes the form: The speed units can be implied from the definition to be meter/second or generally any distance unit over any time unit. You can approach an instant speed on the track at any time by taking the limit as the time interval becomes smaller and and Such a limiting process is called a derivative, and the instant speed can be defined as average speed, straight line movement Average speed, generally case Average speed vs Average speed physics definitely has a way of making things difficult, at least for common mind. However, it should be considered that scientists, engineers and physicists need to differentiate terms for a more accurate experimentation and data analysis. Thus, we enter a world of speed and speed. Yes, most of us know that the first is skalar and the latter is a vector quantity. But I'm pretty sure that when asked about the difference between average speed and average speed, you can't actually elaborate more than the scale and vector ranges. If you think that both measurements will usually produce similar values, then you're wrong. When it comes to travel, average speed and average speed will often vary, and perhaps with large amounts. We are all taught that when a car goes forward, and has reached its destination at a right distance of 10 km, in a time of 1 hour, then the speed will be 10 km / h, and the speed will be 10 km / h north, assuming, that you actually go north. Well, it was quite simple; just add a direction and voila! Instant conversion. If only it was so easy! In average speeds and average speeds, the direction can change, and speeds may vary, so the calculations can somehow become a little more complex. Then again, do not be intimidated, as it is quite easy when you get the understanding of it. Once again, when referring to speed, it is not a vector expression, therefore no direction is involved. The average speed is about the total distance traveled divided by the total time it takes. A car from point A when an exact point B will have an average speed by adding all the distance the tire divided by how long it took to get there. Note that the directions of travel can go east, then west, zigzag or back and forth; destination point can even return to the starting point. Average speed does not care about the shift from origin, only the total distance covered to get to the destination. Consider this equation when trying to calculate the average speed to travel from points A to D: Average speed = (Distance from A to B + Distance from B to C + Distance from C to D) / Total time taken to get from A to D Provided that the total distance traveled is 100 km, and it took 1 hour to get there, the average speed is 100 km / h The average velocity is completely different, not to mention that it is an amount (with direction). Average speed can reach a tremendous value, while the average speed can be very minimal, even zero. This is possible due to different way to calculate the average speed. The main difference is the factor used in the calculation, and that Offset. The displacement does not care about the distance to the entire course, as it deals only with the direct distance from the origin of the destination. The formula is very similar to that of average speed, but instead of the total distance covered, it is replaced by displacement. Here is the formula for the average speed of traveling from A to D: Average speed = Offset from A to D / Total time taken to get from A to D The direct distance (offset) from A to D may well be very small. Thus, the average speed can be very minimal. A zero offset can even occur when the destination returned to its origin. In this case, the average speed is also zero. So, if the offset from point A to point D is only 5 km east, and it took an hour to get there, regardless of the 100 km travel distance, the average speed is only 5 km/h east. If the direction of the entire course is right, the average speed and average speed will be equal. Summary: 1. Average speed is a scalar count, while the average speed is a vector count. 2. Average speed takes into account the total distance traveled, while the average speed is concerned with the offset between two points. 3. In the average speed, the direction is expressed. 4. More often than not, the values will vary, with the average speed usually having higher value. 5. The average speed can be equal to zero, even when the body has completed a travel movement, as long as the destination point is back on its origin. In this case, the average speed will always have a greater value. Help us improve. Consider this post! (12 votes, average: 4.42 out of 5) As a result of the GENERAL DATA PROTECTION REGULATION (GDPR). We do not allow internet traffic to byju's website from countries in the EU at this time. No tracking or performance measurement cookies were served on this page. If you see this message, it means that we are having trouble loading external resources on our website. If you are behind a Web filter, make sure that the domains *.kastatic.org and *.kasandbox.org are revoked. If you see this message, it means that we are having trouble loading external resources on our website. If you are behind a Web filter, make sure that the domains *.kastatic.org and *.kasandbox.org are revoked. To know about average speed and average speed, we must first know about some terms and their meanings. Distance traveled – Distance traveled, as the name clearly tells, is the total distance traveled by the object. Time taken – The time it took the object to move the given distance. Offset – Offset is the shortest distance between the first point where the object was and the last point where the object ended up. Speed – is the distance traveled by an object during the unit time. Speed is a scalar number. This means that has no specified direction. Speed refers to how fast an object moves, or essentially the speed at which the distance is covered. Speed – Speed is the total offset of the object in a specified direction in the device time. Speed is a vector count. This means that it has a specified direction. Speed refers to the time speed of displacement of the object. Imagine a person who walks a certain distance before returning to his original position. Since speed is the frequency of displacement, this movement results in zero speed. If a person wants to maximize his speed, he must maximize the displacement from his original position. Since speed is a vector amount, when you consider it we need to keep track of direction. The main difference between speed and speed is that the speed does not take into account the direction since it is a scalar amount, and the speed depends on the distance traveled, while speed is a vector amount that takes into account the direction, and the speed depends on the displacement. Average speedThe average speed of an object is the total distance traveled by the object divided by total time passed to cover the 4 distance. The average speed of an object tells you at an average speed where it will cover the distance, that is, an object has a speed of 30km / hour, the position will change on average by 30km every hour. Average speed is a speed, that is, a number divided by time to get that number. SI unit of speed is meters per second. The average speed is calculated by the formula S =d/h, where S equals the average speed, d equals the total distance and t equals total time. Problems:1). A car travels a distance of 70 km in 2 hours. What is the average speed? Answer: average speed = distance/timeIt is the average speed of the car 70 km/2 hours = 35 km/hour2). A person can walk at a speed of 1.5 meters / second. How far will he go in 4 minutes? Answer: average speed = distance/timeDance = average speed (time)Distance = 1.5 (4) (60)Distance = 360 meters.3. A train runs in a straight line at a constant speed of 60 km / h for a certain distance d and then travels another distance equal to 2d in the same direction at a constant speed of 80 km / h in the same direction as it previously went. a) What is the average speed of the train during the entire journey? Solution a) The time t1 to cover distance d at a speed of 60 km/h is given by t1 = d / 60Time t2 to cover distance 2d at a speed of 80 km / h is given by t2 = 2d / 80Average Speed = distance / time = (d + 2d) / (d/60) + (2d/80) = 3d / 80 (80d + 2d×60)/ (60×80)= 3 d/(200d/4800) = 3d (4800)/200d = 72 km/hAverage VelocityAverage speed of an object can be defined as offset with respect to original position at that time. In other words, it is the speed at which an object makes offsets with time. At the average speed, the SI unit is meters per per The average speed may also have said to be the ratio of total displacement of an object to total time for this action to take place. The direction of average speed is the direction of displacement. Even if the speed of the object is varying and the size is changing, the direction will still be the same as the direction of displacement. The average speed size is always either smaller than or equal to the average speed, because the offset is always less than or equal to the distance covered. The average speed is calculated by the formula V =D/h, where V equals average speed, D equals total offset and t equals total time. Problems:1. A truck driver drives 20 km down the road in 5 minutes. He backs up and drives 7.5 miles back down the road in 3 minutes. What is his average speed? Solution: V = D/tV = (20 – 12)/ (5+3)V = 8/8V = 1 kilometer /minute2. A boy walks 10 km east in 2 hours and then 2.5 km west in 1 hour. Calculate the total average speed of this boy? Solution: V = D/tV = (10 -2.5)/2+1V = 7.5/3V = 2.5 km / h3. Calculate the average speed at a specific time interval for a person if he moves 7 m in 4 s and 18 m in 6 s along the x-axis? Solution: First distance travelled by the person, xi = 7 m,Last distance travelled, xf = 18 m,Initial time interval ten = 4 s,Final time interval tf = 6 s,Average speed V = xi − xf / ten − tf = 18−7 / 6−4 = 11 / 2 = 5.5 m/s.The differences and similarities between average speed and average speedSimilarities – Both of these conditions are on average of a certain length after time taken. The SI unit and other standard units of measurement of both average speed and average speed are the same. The formula used to calculate the average speed and average speed is almost the same, v = D /t, s = d /t, with only slight difference as in the first case, direction should be mentioned. Differences - Average speed is a scale and is not affected by the presence or absence of a direction, while the average speed is a vector needs a direction. The average speed distances, it is the total length traveled while it is measured, while the average speed takes displacement, that is, the right distance from the original position to the final position. Problems related to both average speed and average speed1. A car drives along a straight road to the east for 120 meters in 5 seconds, and then go west for 60 meters in 1 second. Determine average speed and average speed. Solution: Distance = 120 meters + 60 meters = 180 metersDisplacement = 120 meters - 60 meters = 60 meters, to the east. Time elapsed = 5 seconds + 1 second = 6 seconds. Average speed = Distance / time elapsed = 180 meters / 6 seconds = 30 / second. Average speed = Offset / time elapsed = 60 meters / 6 seconds = 10 meters/ second.2. A runner runs around rectangle tracks with length = 50 meters and and = 20 meters. He travels around the rectangle path twice, eventually running back to the starting point. If the total time he takes to run around the track is 100 seconds, determine the average speed and average speed. Solution:The circumference of the rectangle, which is the distance traveled in a round = 2 (50 meters) + 2 (20 meters) = 100 meters + 40 meters = 140 meters. Running around rectangle twice = 2 (140 meters) = 280 meters. Distance = 280 meters. Displacement = 0 meters. (Since the runner returned to the first point) The average speed is equal to the distance / time elapsed = 280 meters / 100 seconds = 2.8 meters / second. Average speed equals offset/time gone=0/100 seconds=0.3. A man begins to walk from a point on a circular field of radius 0.5 km and 1 hour later he finds himself at the same point where he first started. (a) What is the average speed of the entire journey he traveled? What is the average speed of this man for the same? Solution: a) If this man walks around a circular field and returns to the same point, he has covered a distance equal to the circumference of the circle. Thus, the average speed he traveled = Distance / time = circumference / time = Pi (0.5) (2) / 1 hour = 3.14 km / hour (ca)b) If he walks around in a circle and returns to the same point where he started in a circle then the change in his position is zero. Since the change in his position is zero, displacement is also equal to zero. This means that the average speed is also equal to zero. Zero.

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