

I'm not robot!

Complete the table on the first page of worksheet-compare.pdf. Fill each grid space with an appropriately concise answer. Sample responses are on the second page of worksheet-compare.pdf. Page 1: The questions Page 2: The answers worksheet-transform.pdfThe graph below shows velocity as a function of time for some unknown object. What can we say about the motion of this object? Plot the corresponding graph of acceleration as a function of time. The problem presents us with a velocity-time graph. Do not read it as if it was showing your position. You can't immediately determine where the object is from this graph. You can say what direction it's moving, how fast it's going, and whether or not it's accelerating, however. The motion of this object is described for several segments in the graph below. Acceleration is the rate of change of displacement with time. To find acceleration, calculate the slope in each interval. Plot these values as a function of time. Since the acceleration is constant within each interval, the new graph should be made entirely of linked horizontal segments. Displacement is the product of velocity and time. To find displacement, calculate the area under each interval. Find the cumulative areas starting from the origin (given an initial displacement of zero) 00 s → 0 = 0 m 04 s → 0 + 8 = +8 m 08 s → 0 + 8 − 8 = 0 m 12 s → 0 + 8 − 8 − 16 = −16 m 16 s → 0 + 8 − 8 − 16 − 8 = −24 m 20 s → 0 + 8 − 8 − 16 − 8 + 0 = −24 m 24 s → 0 + 8 − 8 − 16 − 8 + 0 + 8 = −16 m 30 s → 0 + 8 − 8 − 16 − 8 + 0 + 8 + 24 = +8 m Plot these values as a function of time. Pay attention to the shape of each segment. When the object is accelerating, the line should be curved. Sketch the displacement-time, velocity-time, and acceleration-time graphs for... an object moving with constant velocity. (Let the initial displacement be zero.) an object moving with constant acceleration. (Let the initial displacement and velocity be zero.) Since the velocity is constant, the displacement-time graph will always be straight, the velocity-time graph will always be horizontal, and the acceleration-time graph will always lie on the horizontal axis. When velocity is positive, the displacement-time graph should have a positive slope. When velocity is negative, the displacement-time graph should have a negative slope, and the acceleration-time graph should bend downward. When acceleration is zero, all three graphs should lie on the horizontal axis. The graph below shows the altitude of a skydiver initially at rest as a function of time. After 7 s of free fall the skydiver's chute deployed completely, which changed the motion abruptly. Determine the velocity at the instant... just before the parachute opened just after the parachute opened What was the skydiver's acceleration... from the beginning of the jump to the time just before the parachute opened? from the time just after the parachute opened to the time when the skydiver landed? Sketch the corresponding graphs of... velocity-time acceleration-time Questions about velocity. There are at least two ways to determine the velocity just before the parachute opened. One would be to use the fact stated in the stem of the problem — that the skydiver was in free fall. We could use the first equation of motion for an object with a constant acceleration. Up is positive on this graph, so gravity will have to be negative. $v = v_0 + atv = (0 \text{ m/s}) + (-9.8 \text{ m/s}^2)(7 \text{ s})v = -69 \text{ m/s}$ We could also use the graph itself (instead of the description of the graph) to solve this part of the problem. In the last half second, from 6.5 to 7.0 seconds, the graph looks very nearly straight and the skydiver appears to drop from 90 to 60 meters. Slope is velocity on a displacement-time graph. Compute it. $v = \frac{\Delta y}{\Delta t} = \frac{60 \text{ m} - 90 \text{ m}}{7.0 \text{ s} - 6.5 \text{ s}}v = -60 \text{ m/s}$ So which answer is correct? Well neither. Free fall in an atmosphere is technically impossible, which means the first answer is only true in an idealized world. The second answer is definitely a mathematical approximation. We don't really know the slope of the tangent to the left side of 7 seconds. I said it sort of looks straight in the last half second, but sort of doesn't cut it. I think it's more likely that the skydiver was almost in free fall than the curve was almost straight in the last half second before the chute opened. If I were to ask this question of my students, however, I would accept both answers as reasonable and award full credit — as long as there were no other errors like missing units. From 7 to 17 seconds, the graph is straight. Straight lines on a displacement-time graph indicate constant velocity. Velocity is slope on this kind of graph. Compute it. $v = \frac{\Delta y}{\Delta t} = \frac{240 \text{ m} - 0 \text{ m}}{17 \text{ s} - 7 \text{ s}}v = -6.0 \text{ m/s}$ This is the answer to this part of the problem. On this there can be no debate. Questions about acceleration. There appear to be 4 valid ways to determine the acceleration in the first 7 seconds. The first is to just agree with what the text description says. The skydiver is in free fall. Free fall acceleration on Earth is just a number — a number that you should memorize if you have a professional reason for learning physics. $a = -9.8 \text{ m/s}^2$ The second method uses the graph and an equation of motion. Since we're given a displacement-time graph, use the displacement-time relationship, a.k.a. the second equation of motion. After 7 seconds, the skydiver has fallen from rest a distance of 240 meters. $\Delta s = v_0t + \frac{1}{2}at^2\Delta s = 240 \text{ m}/(7 \text{ s})^2a = -9.8 \text{ m/s}^2$ The third and fourth methods use the other two equations of motion. Since these rely on our choices for the final velocity, multiple valid answers are possible. Let's say we use the velocity calculated from the slope of a "tangent" with a value of -60 m/s and the velocity-time relationship, a.k.a. the first equation of motion. Then... $v = v_0 + atv = v/ta = (-60 \text{ m/s})/(7 \text{ s})a = -8.6 \text{ m/s}^2$ We could also use the velocity-displacement relationship, a.k.a. the third equation of motion, with a final velocity of -60 m/s and a displacement of -240 m . That gives us... $v^2 = v_0^2 + 2a\Delta s = v^2/2\Delta s = (-60 \text{ m/s})^2/(-240 \text{ m})a = -7.5 \text{ m/s}^2$ I don't like these last two answers, but I'd have to accept them if a student gave them to me. They are valid answers given what the graph shows. Given how much they disagree with the other answers means they're probably "wrong", but so what? They aren't wrong because of faulty reasoning. They're wrong because of the limitations of the graph. Welcome to the real world. After 7 seconds, life is easy. Look at the graph near the end. It's a straight line. Look at it again. Isn't it lovely? So straight. A straight line on a displacement time graph indicates constant velocity or zero acceleration. Let me compute it for you. Oh wait, there's nothing to compute. Draw a hole and add a unit to it. $a = 0 \text{ m/s}^2$ Questions about the graphs. Here's the original altitude-time, or displacement-time, or position-time or whatever-you-want-to-call-it graph. It's what I gave you to work with. Here's the velocity-time graph. All the signs are negative. The velocity became more and more negative until the chute opened, then it was a smaller (but constant) negative number afterwards. Here's the acceleration-time graph. The skydiver falls with a constant negative acceleration of -9.8 m/s^2 for 7 seconds, then she has no acceleration. No means zero meters per second squared. Constant values are horizontal lines on this graph. Master Class 11 Physics And Be Successful in exams. Here find Physics Notes, assignments, concept maps and lots of study material for easy learning and understanding. We have lots of study material written in easy language that is easy to follow. You are here in this page means you are looking for something to help you study physics of class 11. So this page contains notes of most of the class 11 chapters and we also have assignments of most of the chapters that you can practice. 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