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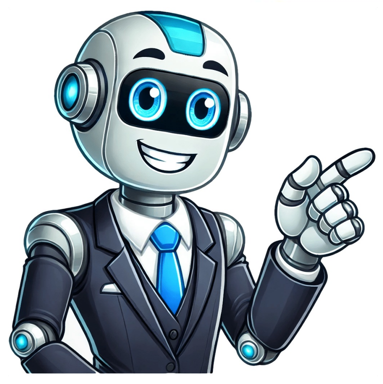

Acceleration worksheet answers

If an object's velocity changes, it is said to have been accelerated. It is possible for an object's velocity to alter by increasing, decreasing, or changing its direction of motion. We can simply comprehend that acceleration happens whenever a moving object changes its direction or speed, or both. Since acceleration has both magnitude and direction, it is a vector quantity. Additionally, it is the first derivative of velocity with respect to time or the second derivative of position with respect to time. If you are struggling with problems concerning acceleration, please don't be worried. On this website, we have provided you with various acceleration worksheets for extra practice. These Physics worksheets will give students a chance to practice a variety of problems and activities to help students dive deeper into the topic. Try our acceleration worksheets now if you're seeking a way to reteach and offer further help when it comes to acceleration. We're sure that it would be an excellent reinforcement resource. Last updated4 August 202460 calculation questions for acceleration, with FULL WORKING OUT AND ANSWERS. There is a fully worked example question for each variable. This worksheet is split into 5 sections: Section A: 10 questions to calculate Change in velocity Section B: 10 questions to calculate Acceleration Section C: 10 questions to calculate Time Section D: 15 mixed questions Section E: 15 more mixed questions I have similar worksheets for other GCSE physics equations [here](. Tes paid licenceHow can I reuse this?Select overall rating(no rating)Your rating is required to reflect your happiness.Write a reviewUpdate existing reviewIt's good to leave some feedback.Something went wrong, please try again later.This resource hasn't been reviewed yetTo ensure quality for our reviews, only customers who have purchased this resource can review itReport this resourceto let us know if it violates our terms and conditions. Our customer service team will review your report and will be in touch. 100%(5)100% found this document useful (5 votes)4K viewsSaveSave BUKU RUJUKAN FIZIK T4 KSSM FULL For Later100%100% found this document useful, undefined Last updated25 May 2022Worksheet on using the acceleration equation acceleration = (change in velocity)/time. The worksheet includes a section on problems for each variable of the equation. I find this useful as students often struggle with using this equation. Includes answers. Appropriate for KS4/GCSE or equivalent. Tes paid licenceHow can I reuse this?Select overall rating(no rating)Your rating is required to reflect your happiness.Write a reviewUpdate existing reviewIt's good to leave some feedback.Something went wrong, please try again later.This resource hasn't been reviewed yetTo ensure quality for our reviews, only customers who have purchased this resource can review itReport this resourceto let us know if it violates our terms and conditions. Our customer service team will review your report and will be in touch. Free fall occurs when an object is falling under the influence of gravity, without any other forces acting upon it. In such cases, the only force acting on the object is the gravitational force, which causes the object to accelerate towards the earth. Free fall is a fundamental concept in physics, and it is used to study the motion of objects in many different contexts, from falling apples to orbiting satellites. Understanding Acceleration Acceleration refers to the rate at which an object's velocity changes over time. When an object is falling under the influence of gravity, its velocity increases at a constant rate as it approaches the ground. This rate of change in velocity is known as the object's acceleration. In free fall, the acceleration of an object is always equal to the force of gravity acting on it, which is approximately 9.8 meters per second squared. The Free Fall Acceleration Formula The free fall acceleration formula is a mathematical equation used to calculate the acceleration of an object in free fall. It is given by the equation: a = g Where a represents the object's acceleration, and g represents the acceleration due to gravity, which is approximately 9.8 meters per second squared. This formula applies to all objects in free fall, regardless of their mass or shape. It is a simple yet powerful tool for calculating the motion of objects in free fall. Example Applications and Calculations The free fall acceleration formula is used in many different applications, from skydiving to space exploration. For example, it can be used to calculate the time it takes for an object to fall from a certain height, the velocity at which it reaches the ground, or the distance it travels during its fall. It is also used to study the motion of planets, stars, and other celestial objects in space. To use the free fall acceleration formula, simply plug in the value of acceleration due to gravity (g) and the time, distance, or velocity of the falling object. For example, to calculate the time it takes for an object to fall from a height of 100 meters, the formula would be: t = √(2h/g) Where t represents the time, h represents the height, and g represents the acceleration due to gravity. Plugging in the values, we get: t = √(2 x 100 / 9.8) = 4.52 seconds This means it would take approximately 4.52 seconds for the object to fall from a height of 100 meters. The free fall acceleration formula is a versatile and essential tool for anyone studying the motion of objects in free fall. Structure of the AtomAbsorption and Emission of EM RadiationMass Number and Atomic NumberIsotopesIonisationJJ Thomson and Plum pudding modelErnest Rutherford and the Nuclear ModelNiels Bohr changing the Nuclear ModelDiscovering the Proton and NeutronRadioactive DecayMeasuring radiation from radioactivityRadiation types and propertiesRandom nature of radioactive decayHalf lifeHalf life calculationsRadioactive contamination or irradiationHazards of contamination and irradiationStudies on the effects of radiation on humansBackground RadiationDifferent half lives of radioactive isotopesUses of nuclear radiationNuclear FissionNuclear Fission Chain ReactionWriting nuclear fission equationsDrawing and interpreting nuclear fission diagramsNuclear Fusion Last updated23 February 2024Creative Commons "Sharealike"Select overall rating(no rating)Your rating is required to reflect your happiness.Write a reviewUpdate existing reviewIt's good to leave some feedback.Something went wrong, please try again later.This resource hasn't been reviewed yetTo ensure quality for our reviews, only customers who have downloaded this resource can review itReport this resourceto let us know if it violates our terms and conditions. Our customer service team will review your report and will be in touch. First download this acceleration worksheet with answers as pdf. Try to solve problems on your own and then you can check the answers. Download this assignment ad pdf Download Numerical type questions Question 1:- The displacement (in meter) of a particle moving along x-axis is given by $x=18t+5t^2$. Calculate (i) Instantaneous velocity at $t=2s$ (ii) average velocity between $t=2s$ and $t=3s$, (iii) Instantaneous acceleration. Solution:- Given in the question that $x=18t+5t^2$ (i) we know that velocity \begin{align*} v &=\frac{dx}{dt} \\ & =\frac{d}{dt}(18t+5{{t}^{2}}) \\ & =18+10t \\ \end{align*} To find velocity at $t=2s$, put $t=2$ in above equation. So, Instantaneous velocity$=18+10\times 2=38m.{{s}^{2}}$ (ii) displacement at $t=2$ is ${{x}_{1}}=18\times 2+5\times {{2}^{2}}=56m$ At $t=3$ ${{x}_{2}}=18\times 3+5\times {{3}^{3}}=54+45=99m$ average velocity $v=\frac{{{x}_{2}}-{{x}_{1}}}{{{t}_{2}}-{{t}_{1}}}=\frac{99-56}{3-2}=43m{{s}^{-1}}$ (iii) $a=\frac{dv}{dt}=\frac{d}{dt}(18+10t)=10m{{s}^{-2}}$. Question 2 :- The Displacement x of a particle at time t along a straight line is given by $x=\alpha -\beta t+\gamma t^2$. Find the acceleration of the particle. (Ans = $2\gamma $) Hint: - procedure same as above question. Question 3 :- A car accelerates from rest at constant role α for some time, after which it decelerates at a constant rate β and come to rest. If the total time elapsed is t second, then calculate (i) maximum velocity attained by the car (ii) total distance travelled by the car in terms of α, β and t. Solution :- (i) let the car accelerate for the time t, and v be the maximum velocity of the car at time t_1. We know that $v =u+at$ Therefore, $v =0+\alpha t_1$ or, $t_1=\frac{v}{\alpha} \qquad \qquad (1)$ Now starting with maximum velocity v, the car decelerates at constant rate β and comes to rest in time $(t-t_1)$. Therefore, $0=v-\beta (t-t_1)$ or, $t-{{t}_{1}}=\frac{v}{\beta }\qquad \qquad (2)$ Adding equations (1) and (2) $t = \frac{v}{\alpha} + \frac{v}{\beta} = v\left({\frac{{\alpha + \beta }}{{\alpha \beta }}} \right)$ or, $v = \frac{{\alpha \beta t}}{{\alpha + \beta }}\qquad \qquad (3)$ This gives maximum velocity attained by the car. (ii) distance covered by the car in time t_1 is ${{x}_{1}}=0+\frac{1}{2}\alpha t_{1}^{2}$ By using equation of motion $x=ut+\frac{1}{2}a{{t}^{2}}$ ${{x}_{1}}=\frac{1}{2\alpha }\cdot {{v}^{2}}=\frac{-{{v}^{2}}}{2\alpha }$ [using 1] Distance travelled by the car in time $\left(t-{{t}_{1}} \right)$ \begin{align*} x&=v (t-{{t}_{1}})-\frac{1}{2}\beta {{(t-{{t}_{1}})}^{2}} \\ & = v\cdot \frac{v}{\beta}-\frac{1}{2}\beta\frac{v^2}{\beta^2}=\frac{v^2}{2\beta}\\ \end{align*} (using epn2) Therefore total distance travelled by the car is \begin{align*} x&={{x}_{1}}+{{x}_{2}}=\frac{{{v}^{2}}}{2\alpha }+\frac{{{v}^{2}}}{2\beta } \\ & =\frac{{{v}^{2}}}{2}\left [\frac{1}{\alpha }+\frac{1}{\beta } \right] \\ \end{align*} Using equation (3) and solving for x we get $$x=\frac{\alpha \beta {{t}^{2}}}{2(\alpha +\beta)}$$ Question 4 :- A race car accelerates on a straight road from rest to a speed of $180km{{h}^{-1}}$ in $25\, s$. Assuming uniform acceleration of the car throughout find the distance covered in this time. Solution:- Here $u=0, \, t=25 s$, Given that $v=180\, Km/h=\frac{180\times 5}{18}=50\, m/s$ Acceleration $a=\frac{v-u}{t}=\frac{50-0}{25}=2\frac{m}{s^2}$ Distance, \begin{align*} s&=ut+\frac{1}{2}a{{t}^{2}} \\ & =0\times 25+\frac{1}{2}\times 2\times {{(25)}^{2}} \\ & =625m. \\ \end{align*} Question 5 :- A ball rolls down an inclined track $2 m $ long in $4s$. Find (i) acceleration, (ii) time taken to cover the second meter of the track and speed of the ball at the bottom of the track. Solution :- (i) Here it is given that $s=2m, \, t = 4s, \, u =0$ as $s=ut+\frac{1}{2}at^2$ Putting respective values we get $2=0+\frac{1}{2}\times a\times 4^2$ or, $a=0.25m/s^2$ (ii) Time taken to cover the first metre of track is given by $1 = 0 + \frac{1}{2} \times 0.25\times t^2$ $ \Rightarrow {t^2} = 8$ Or $t = 2\sqrt 2 = 2 \times 1.414=2.83 s $ Hence time taken to cover the second meter of track is $= 4-2.83 = 1.17 s.$ (iii) Speed at the bottom, $v = u + at = 0+0.25\times 4 = 1m/s$ Long answer type Questions :- Question 1- What do you understand by term acceleration and retardation distinguish between average acceleration and instantaneous acceleration. Question 2- Represent graphically and explain the motion of an object when the object is under the following conditions (i) object is at rest (ii) object with uniform motion along straight line (iii) object with accelerated motion along straight line (iv) object with decelerated motion moving along a straight line. Single choice type question :- Choose correct option to answer following questions. Question 1 :- A body is covering distance in proportion to square of time. The acceleration of the body is (a) increasing (b) decreasing (c) zero (d) constant Answer:- (d) Question 2:- The relation between t and distance x is $t=\alpha x^2+\beta x$. Where α and β are constants. The retardation is (a) $2\alpha v^3$ (b) $2\alpha \beta v^3$ (c) $2\beta v^3$ (d) $2\beta ^2 v^3$ Answer :- (a) Given that \begin{align*} t=\alpha x^2+\beta x \\ \frac{dt}{dt}=2\alpha x\frac{dx}{dt}+\beta \frac{dx}{dt} \\ 1=2\alpha xv+\beta v\\ v\cdot (2\alpha x+\beta)=1\\ (2\alpha x+\beta) =\frac {1}{v} \end{align*} Again differentiating both the sides w.r.t. t we get \begin{align*} 2\alpha \frac {dx}{dt}=-v^{-2}\cdot \frac {dv}{dt}\\ 2\alpha v=-v^{-2}\cdot acceleration \end{align*} $\Rightarrow \, acceleration\,=\,- 2\alpha v^3$ Hence, $retardation \, =+2\alpha v^3$ Question 3 :- The velocity displacement graph of a particle moving along a straight line is shown. The most suitable acceleration-displacement graph will be. [IIT 05] Solution : - (a) From the given velocity-displacement graph, $slope=\frac{{{v}_{0}}}{{{x}_{0}}}$, and intercept on y-axis isv_0 Thus equation for this graph will be \begin{align*} v&=\frac{-v_0}{x_0}x+v_0\,\, \left[y=mx+c \right] \\ \frac{dv}{dt}&=-\frac{v_0}{x_0}\frac{dx}{dt} \\ a&=-\frac{v_0}{x_0}.v \\ &=-\frac{v_0}{x_0}\left[-\frac{v_0}{x_0}x+v_0 \right] \\ &=\frac{v_{0}^{2}}{x_{0}^{2}}x-\frac{v_{0}^{2}}{x_0} \end{align*} From this we can clearly see that graph must have positive slope $\left(\frac{{v_0}^{2}}{x^2}\right)$ and negative intercept $\left(-\frac{v_{0}^{2}}{x_0} \right)$ on y-axis. Question 4 :- A car, starting from rest accelerates at the rate f through a distance s, then continues at constant speed for time t and then decelerates at the rate f/2 to come to rest. If the total distance traversed is 5 S, then [A1EE 05] (a) $s=ft$ (b) $s=\frac{1}{6}ft^2$ (c) $s=\frac{1}{2}ft^2$ (d) $s=\frac{1}{4}ft^2$ Solution :- (c) For accelerated motion $u=0,\, a = f\, and \, s = s$. As, $v^2-u^2=2as$ $\therefore$ $v_{1}^{2}-0^2=2fs$ or, $v_1=\sqrt{2fs}$ For uniform motion $u=v_1=\sqrt{2fs}, \, t=t$ Distance travelled, $s_2=ut=\left(\sqrt{2fs} \right) t$ For decelerated travelled $u=\sqrt{2fs}, \, a=-f/2, \, v=0$ As, $v^2-u^2=2as$ $0^2-\left(\sqrt{2fs} \right) ^2=2\times \left(-f/2 \right) s_3$ distance travelled, $s_3=2s$ given in the question total distance travelled is $s+s_2+s_3=5s$ $s+\left(\sqrt{2fs} \right) t+2s=5s$ or, $\sqrt{2fs}t=2s$ Squaring both sides me get $s=\frac{1}{2}ft^2$ Question 5 :- The acceleration of a particle is increasing linearly with time t as bt. The particle starts starts from origin with an initial velocity v_0 .The distance travelled by the particle in time t will be (a) $v_0t+\frac{1}{3}bt^2$ (b) $v_0t+\frac{1}{2}bt^2$ (c) $v_0t+\frac{1}{6}bt^3$ (b) $v_0t+\frac{1}{3}bt^3$ Answer :- (c) \begin{align*} a=\frac{dv}{dt}=bt \\ \therefore v=\int{\sqrt{\left(bt \right)}dt}=\frac{bt^2}{2}+c \end{align*} Initially at $t=0, \, v=v_0$ $\Rightarrow c=v_0$ Hence, $v=\frac{dx}{dt}=\frac{bt^2}{2}+v_0$ Or, \begin{align*} x&=\int{\left(\frac{bt^2}{2}+v_0 \right)}dt \\ &=\frac{bt^3}{6}+v_0t+C' \end{align*} At $t=0,\, x=0$ $\therefore$ $C'=0$ Therefore, $x=v_0t+\frac{1}{6}bt^3$ Very short answer type questions :- Question 1 :- Give an example which shows that a positive acceleration can be associated with a slowing down object. Question 2 :- is the acceleration of a car greater than when accelerator is pushed to the floor or when break pedal is pushed hard. Question 3 :- suppose the acceleration of a body varies with time. Then what does area under its acceleration – time graph for any time interval represent. Question 4 :- The ϑ –t graphs of two objects make angle of and with the time axis. Find the ratio of their acceleration. Question 5 :- is it possible that your cycle has northward velocity but southward acceleration? If yes, how? Also Read