Center of gravity worksheet answers

1. Determine the coordinate of the object's center of gravity, as shown in the figure below. Solution: Divide the object into three parts. Part area 1 (A1) = (2)(6) = 12 cm2 The center point is on the x-axis (x1) = 1/2 (2) = 1 cm The center point is on the y axis (y1) = 1/2 (6) = 3 cm Part area 2 (A2) = (4)(2) = 8 cm2 The center point is on the x axis (x2) = 2 + (1/2)(4) = 2 + 2 = 4 cm The center point is on the axis y (y2) = 2 + (1/2)(2) = 2 + 1 = 3 cm Part area 3 (A3) = (2)(6) = 12 The center point is on the x-axis (x3) = 2 + 4 + (1/2)(2) = 2 + 4 + 1 = 7 cm The center point is on the y axis (y3) = 1/2 (6) = 3 cm Center of gravity coordinate on the x axis : Coordinate of the center of gravity on the y axis : The coordinate of the object's center of gravity is on the x-axis and the y-axis (x, y) = (4, 3) Read : Heat transfer conduction - problems and solutions 2. Determine a coordenada do centro de gravidade do objeto, sobre o eixo x. Solutions Divide the object into three parts, A, B, C, Advertisement and D. Calculate the area of each part : AA = ½ (base)(height) = ½ (1.5)(3) = (1.5)(1.5) = 2.25 AB = (length)(width) = (4.5-1.5)(1) = (3)(1) = 3 AC = ½ (base)(height) = ½ (6-4.5)(3) = (1.5)(1.5) = 2.25 AD = ½ (base)(height) = ½ (4.5-1.5)(6-3) = ½ (3)(3) = (1.5)(3) = 4.5 yA = 1/3 (3) = 1 yB = 1/2 (1) = 0,5 yC = 1/3 (3) = 1 yD = 3 + (1/3)(6-3) = 3 + (1/3)(3) = 3 + 1 = 4 Coordinate of the center of gravity at y axis : Coordinate of the center of gravity about the x axis is 2 cm. Read : Buoyant force - problems and solutions 3. Determine the coordinate of the object's center of gravity, as shown in the figure. Solution : Divide the object into four parts, A, B, C, and D. Calculate the area of each part. AA = (length)(width) = (4)(3) = 12 AB = 1/2 (base)(height) = 1/2 (6-4)(3) = 1/2 (2)(3) = (1)(3) = 3 AC = 1/2 (base)(height) = 1/2 (8-6)(3) = 1/2 (2)(3) = (1)(3) = 3 AD = (length)(width) = (8)(6-3) = (8)(3) = 24 yA = 1/2 (3) = 1.5 yB = 3 - (1/3)(3) = 3 - 1 = 2 yC = 3 – (1/3)(3) = 3 - 1 = 2 yD = 3 + (1/2)(6-3) = 3 + (1/2)(3) = 3 + 1.5 = 4.5 xA = 1/2 (4) = 2 xB = 4 + (1/2)(6-4) = 4 + (1 /2)(2) = 4 + 1 = 5 xC = 6 + (1/2)(8-6) = 6 + (1/2)(2) = 6 = 1 = 7 xD = 1/2 (8) = 4 Coordinate of the center of gravity at the x axis : Coordinate the center of gravity on the y axis : Read : Electromagnetic induction, EMF induced - problems and solutions To continue enjoying our site , we ask you to confirm your identity as human. Thank you very much for your cooperation. Yardstick tools and materials, meter stick, cane, broomstick, PVC pipe, or any stick of a general size similar to Clay or other weight masking tape to make and notice Support the stick with both hands, supporting the ends only on your indicator fingers. Slowly slide your fingers until they meet. Your fingers will meet under the center of gravity of the stick. the weight or a piece of clay to some point on the stick. Again rest the stick on two fingers, then slide your fingers together to locate the new center of gravity. Move the weight or piece of clay to some new place on the stick. Repeat the experiment. Your fingers will always meet right under the center of gravity. What's happening? The center of gravity of the stick is where you can balance the stick on just one finger. When you first support the stick with two fingers, one finger (which is closer to the center of gravity) will usually be holding a little more weight than the other. When you try to move your fingers closer, the one that is carrying less weight will slide more easily. This finger will continue to slide more easily until it approaches the center of gravity than the other finger, at which point the situation will reverse and the other finger will begin to slide faster. Your left and right fingers simply alternate movement until they are in the center of gravity, where both fingers support equal weight. Going further Often, the center of gravity of an object is also the center of its length. The next time you need to carry something evenly long and thin — like a wooden pole or a pipe or metal length (or, if you're a tightrope walker, that very long balancing stick)- finding the center of gravity by sliding your hands together near the middle of the object can help you find your center. If you need to carry shorter lengths in your car, you can find the approximate center of the material in this way, have it cut, and be confident that you have two pieces of approximately equal size. How does this pile up? Does it matter what the end is? NAME_____ CLASS_____ DATE_____ For the first flight, the cargo plane is loaded with 2 Igloo cargo cartridges. The first fiberglass shell contains 4,550 pounds of cargo and is located 40 feet from the reference point. The second aluminum shell contains 7,000 pounds of cargo and is located 110 feet from the reference point. The empty mass (see specifications) is located 75 feet from the reference point. Calculate the center of gravity of your aircraft. (TIP: Don't forget to add the weight of the Igloo shell to the weight of the load.) The second flight is loaded with 2 aluminum Igloo cargo cartridges each containing 9,590 pounds. His ground crew placed one container 120 feet from the landmark and the other 90 feet from the landmark. The empty mass is still located at 75 feet. Calculate the center of gravity of your aircraft. (TIP: Don't forget to add the weight of the Igloo shell to the weight of the load.) Did your first flight meet the specifications of the center of gravity? Your second flight attended your necessary center of gravity needed

_____ _____NAME_____ CLASS_____

DATE_____ Estimate values for data that you cannot find in a reasonable period of time. You should be able to find the length of the plane (for the requested reference distances), the engine mass and fuel capacity. The distances in Table 1 should be measured from a reference line that begins at the nose (front) of the 747. Use the BACK key to return to this page. Problem 1 will guide you in the calculation to find the mass of the fuel. All problems are expressed in metric units. What is the fuel capacity of the 747? Fuel capacity = Fuel volume =

_____

Fuel mass = _____ (Tip: Remember, F = mag = W. Acceleration due to gravity, ag, is 9.8 m/s2.) Weight (kg) Weight (N) load w1 engine w2 wings w3 fuselage w4 fuel w5 vertical tail w6 horizontal tail w7 Table 2 : Aircraft component weights What n is equal? [Tip: The n number is the number of quantities being added.] n =

_____

Using your answers to problems 6 and 7, calculate the center of gravity. After a long flight, the amount of fuel left in the tanks is 20% of the initial amount. What is the mass and weight of the fuel left? Record your answers in Table 3. Mass weight (kg) Weight (N) Remaining fuel table 3 : Remaining fuel data recalculate the plane's center of gravity with reduced fuel weight. Has the center of gravity changed? If so, how many meters has the center of gravity moved? If so, the center of gravity moved toward or away from the nose of the plane? Do you think the pilot would notice such a change in the center of gravity while flying? Because? Because? Because?