Tejas a clam, as it is two halves

Tejas GandeshaMs. GreenFoundations of Math and Pre-Calculus 1025th January 2018 Real Life Assignment: Nanomachine 31-year-old, Shawn Douglas from University of California, assemblesnanomachines, which are made from DNA to get rid of Cancer cells. PaulRothemund stated “ He is the first to have realized his dream of a trulyprogrammable container for delivering therapies to cells in a targeted way”.

Rothemund is a biochemical engineer at Caltech. Shawn Douglas’s nanomachineresembles a clam, as it is two halves together, which is kept together by twosets of intertwined double-stranded DNA, and the inside of the clam is filledwith the payload, which are antibodies or drug molecules. Shaw Douglas always challengeshis students to create a design for a new type of nanomachine. Paraphrased Excerpt from PopularScience October 2012, written by Lauren Aaronson. Nanomachines are something that I would think is straight out of a StarTrek movie, not a real-world innovation. Nanomachines are mechanical devices, which are measured in the nanometers, which is a millionth of a nanometer (nanomachine(nanite)), hence the name Nanomachine. The task that I have been given is todesign my own Nanomachine, which could carry an antibody/payload, to a desiredcell.

I believe that it is important that many people come up with differentdesigns, to create a solution, where the Nanomachine is big enough to carry asubstantial amount of the payload, while also having it keep a low cost, aswell as be able to fit inside the veins and capillaries. To create a viablenanomachine, I must use the correct math procedures. To create my nanomachine, I must know the surface area of my machines design for

sizing, as well as thevolume, to know the amount of payload that I can carry in my nanomachine. Our own bodies are filled with manynanomachines, as even a cell can be considered to be a nanomachines, as it ismade up of components smaller than nanometers. Nanomachines are 2.

5x smallerthan DNA, making it very easy to fit inside human veins. This helps repairdamaged tissues, destroy cancer cells, making small incisions. They have alsomade it possible to deliver certain DNA parts to cells that have undergonedamage.

The design I want to create, is a simpledesign, but very effective. With little moving parts, but the hydrodynamics, tonot hold the nanomachine back, through resistance and friction. Capillaries: The capillaries will be the home to the nanomachine. This is where themachines will roam and help our blood cells. A capillary can range from 5-10micron in diameter (Regina Bailey, Understanding Capillary Fluid Exchange).

For our nanomachine, it must fit for all situations, therefore it mustbe smaller than 5 microns, to fit in each capillary. I will also be measuringthe units in nanometers, not microns. 1 micron = 1000 nanometer5 micron = 5000 nanometer.

(Conversionsand Calculations) Three Piece Nanomachine: With this three piece nanomachine, it is not very wide, but it haslength. Work Cited https://lx-group. com. au/what-are-nanomachines/ http://whatis. techtarget. com/definition/nanomachine-naniteNa https://www.

aqua-calc. com/ Surface Area: Cylinder 1Diameter: 167 nanometersRadius: 83. 5 nanometersHeight: 100 nanometers SA: 2? rh+2? r2SA: 2? x 83.

5 x 100 +2? x 83. 52SA: 524. 645973149 x 100 + 43807. 938758SA: 52464. 5973149 + 43807. 938758 SA= 96272. 5360729 nanometers2 Cylinder 2Diameter: 250 nanometersRadius: 125 nanometersHeight: 200 nanometers SA: 2? rh+2? r2SA: 2? x 125 x 200 +2? x 1252SA: 785.

398163397 x 200 +2? x 1252SA: 157079. 632679+2? x 1252SA: 157079. 632679+ 98174. 7704247SA: 255254. 403104 nanometers2 Cylinder 3Diameter: 375 nanometersRadius: 187. 5 nanometersHeight: 400 nanometers SA: 2? rh+2? r2SA: 2? x 187. 5 x 400 + 2? x 187.

52SA: 1178. 0972451 x 400 + 2? x 187. 52SA: 471238. 898038 + 220893. 233456SA: 692132. 131494 nanometers2 Right angled Prism E D A 100 nanometers A and E: SA: (100 x 100) / 2SA: 5000 nanometers2 B: SA: 100 x 50SA: 5000 nanometers2 C: SA: 50 x 100SA: 5000 nanometers2 D: SA: 50 x ? 20000SA: 7071. 06781187 nanometers2 All together:(A) 5000+ (E) 5000 + (B) 5000 + (C) 5000 + (D) 7071.

06781187= 27071. 0678119 But we must subtract B becausethe back would be a part of Cylinder 2. 27071. 0678119 – 5000= 22071. 0678119 There is going to be two fins, one for each side. Whole volume: The Bases for Cylinder 1 and 2 must be subtracted, as both are on top ofanother cylinder, and no extra material would be needed to make that. Cylinder 1: 96272.

5360729 nanometers2Diameter: 167 nanometersRadius: 83. 5 nanometers Area of a Circle: ? r2Area of a Circle: ? x 83. 52 Area of a Circle: 21903. 97 nanometers2 Cylinder 1: 96272.

5360729 nanometers2Base: 21903. 97 nanometers2 96272. 5360729 – 21903.

97= 74368. 5660729 Cylinder 2: 255254. 403104 nanometers2Diameter: 250 nanometersRadius: 125 nanometers Area of a Circle: ? r2Area of a Circle: ? x 1252Area of a Circle: 49087.

39 nanometers2 Cylinder 2: 255254. 403104 nanometers2Base: 49087. 39 nanometers2 255254. 403104 – 49087. 39 = 206167.

013104 Adding up the Surface AreasCylinder 1 (minus base) + Cylinder 2 (minus base) + Cylinder 3 + RightAngle Prism 1 + Right Angle Prism 2 Full Surface Area: 74368. 5660729 + 206167. 013104 + 692132. 131494 + 22071. 0678119+ 22071. 0678119Full Surface Area = 1016809.

84629 nanometers2 Volume: Cylinder 1Diameter: 167 nanometersRadius: 83. 5 nanometersHeight: 100 nanometers Volume: ? r2hVolume: ? x 83. 52 x 100Volume: 21903. 969379 x 100Volume: 2190396. 9379 nanometers3 Cylinder 2Diameter: 250 nanometersRadius: 125 nanometersHeight: 200 nanometers Volume: ? r2hVolume: ? x 1252 x 200Volume: 49087. 3852123 x 200Volume: 9817477. 04246 nanometers3 Cylinder 3Diameter: 375 nanometersRadius: 187. 5 nanometersHeight: 400 nanometers Volume: ? r2hVolume: ? x 187.

52 x 400Volume: 110446. 616728 x 400Volume: 44178646. 6912 nanometer3 Adding up the VolumeVolume = Cylinder 1 + Cylinder 2 + Cylinder 3Volume = 2190396. 9379 + 9817477.

04246+ 44178646. 6912Volume = 56186520. 6716 nanometers3 Volume and Surface Area of my Nanomachine: Surface Area = 1016809. 84629 nanometers2Volume = 56186520. 6716 nanometers3 Justifying MyDesign The reason I chose this design formy Nanomachine was for it to fit correctly. My goal, was to create the least amountof surface area with the most amount of volume. This is not an easy task, asthe more surface are the more volume, and the less surface area the less spacefor the payload of antibodies. I tried to do this, by creatingsomething like a layer cake.

Where there are 3 cylinders stacked on top of eachother, to create, almost a pyramid. I did this to create less resistance andfriction. The results in better hydrodynamics, meaning that it is easier forthe nanomachine to flow freely in the capillaries.

There are also two fins on the sidesof the nanomachine. Rockets use fins on the sides of the jets to help withstability, which lets the rock to stay oriented and on the intended flighttrack (Richard Nakka). It is easy for the nanomachine do catch drag, and pullitself off track. The fins can help a help a little with that. Work Cited “ What are Nanomachines?” LX Group, 25 Mar. 2012, lx-group. com. au/what-are-nanomachines/.

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