Mir Artificial Gravity Analysis, Intuitor.com Movie-Minilab

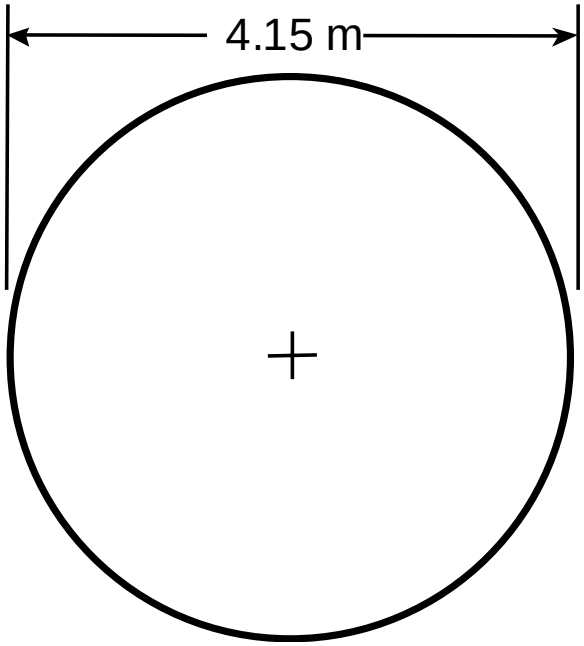
Name _____ Date _____

Movie: *Armaggedon* (1998) Bruce Willis, Billy Bob Thornton, Ben Affleck, Liv Tyler
Purpose: Determine if the artificial gravity on the Mir space station in the movie *Armaggedon* is depicted accurately.

Background: In *Armaggedon* two space shuttles travel to the Russian space station Mir and dock. Mir was a real Russian space station that used to orbit Earth. Supposedly the Russian cosmonaut on board Mir turns on artificial gravity just before the docking. Assume that Mir rotates around the x-axis as shown in the attached drawing.

Data and Analysis:

1). Use the circle shown at right to represent a cross section of the module rotating around its center. Draw a stick figure inside the circle showing how a two meter tall person would stand inside the core module The stick figure should be drawn approximately to scale. Indicate on the drawing the direction of centripetal force on the person's feet. This force creates the sensation of artificial gravity.



2) Find the required tangential velocity to produce 1 g = 9.8 m/s/s of centripetal acceleration at the person's feet. This will create artificial gravity similar to the gravity on Earth.

3) Find the RPM of Mir based on the velocity described in question 2.

4) Find the level of artificial gravity (centripetal acceleration) at the person's head assuming the RPM calculated in Question 3.

5) Find the highest level of artificial gravity (in other words centripetal acceleration) in Mir using the RPM calculated in question 3. (Hint: this will occur at the largest radius.)

6) Explain why a uniform artificial gravity of 1 g would not be achievable by rotating Mir.

Conclusions: Summarize your conclusions with respect to how accurately artificial gravity is depicted in the movie *Armaggedon.*

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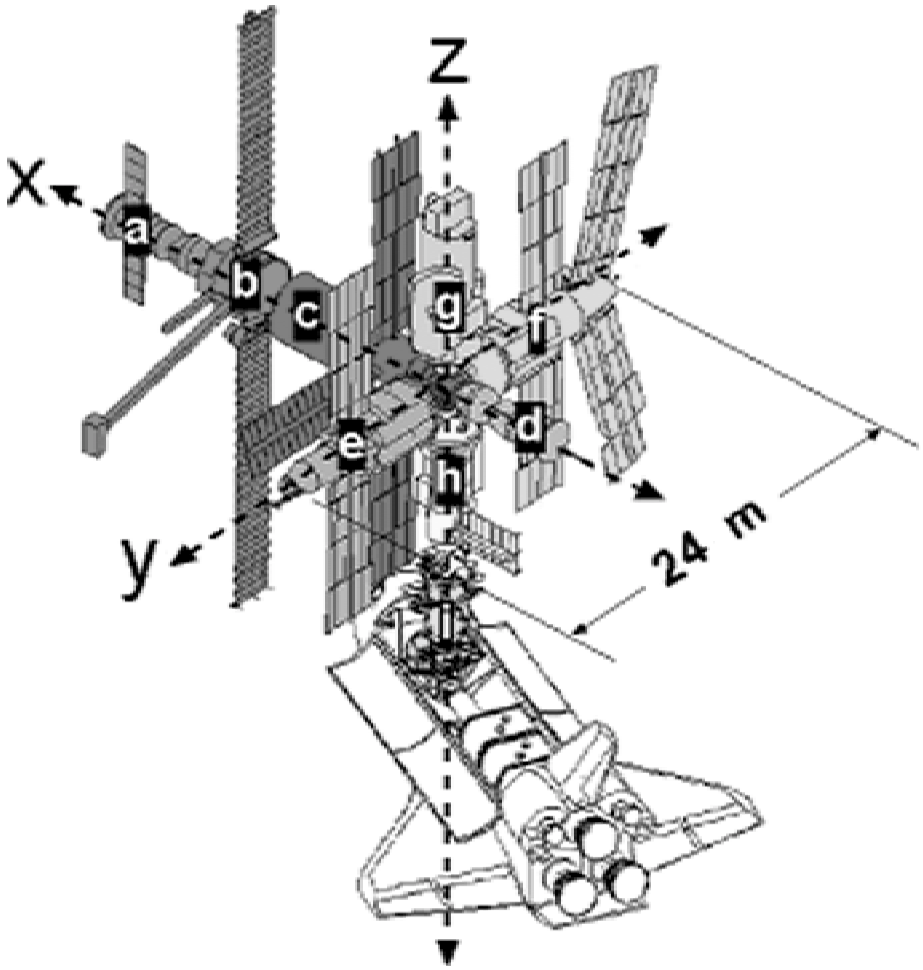
Mir Drawing



Section	Mass (kg)	Length (m)	Diameter (m)
a. Progress-M	7000	7	2
b. Kavant 1	11000	5.8	4.15
c. MIR Core	20000	15	4.15
d. Soyuz-TM	7000	7.5	2
e. Kavant 2	20000	12	4.4
f. Spectr	19640	12	4.35
g. Priroda	19700	12	4.35
h. Kristall	20000	12	4.4
i. Docking Modual			
Total	124340		

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