2017 F=ma Exam: Problem 14

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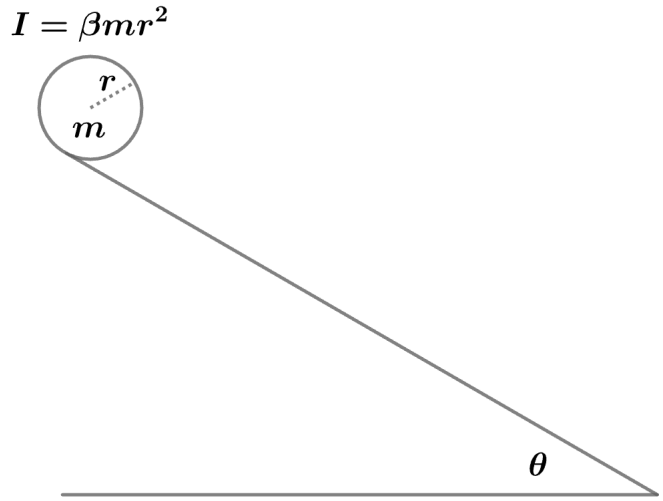

Recall the acceleration of an object rolling without slipping down an incline of angle θ is given by

$$a = \frac{g \sin \theta}{1 + \beta}$$

where the object has moment of inertia $I = \beta m r^2$.

- A) Solid sphere: $\beta = 2/5$
- B) Solid disk: $\beta = 1/2$
- C) Spherical shell: $\beta = 2/3$
- D) Hoop: $\beta = 1$

Since the solid sphere has the smallest β compared to the other objects, it has the largest acceleration. Thus, the answer is $\boxed{\text{A}}$.