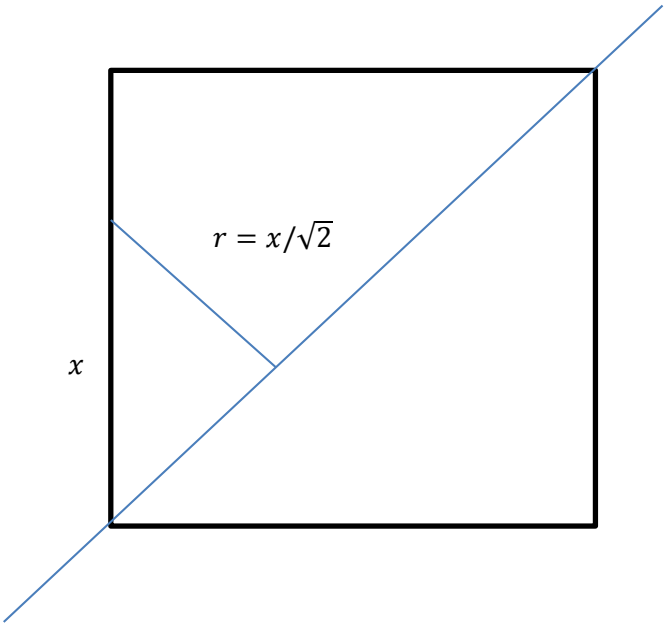
Answer on Question#39651, Physics, Mechanics | Kinematics | Dynamics

Question:

Four thin uniform rods of mass m and length are joined to form a square. What will be the moment of inertia about an axis along its one diagonal?

Answer:



Moment of inertia for one rod equals:

$$I_1 = \int dm\, r^2$$

$$dm = \frac{m}{l} dx$$

$$r = \frac{x}{\sqrt{2}}$$

Therefore:

$$I_1 = \int_0^l \frac{m}{l} dx \left(\frac{x}{\sqrt{2}}\right)^2 = \frac{ml^2}{6}$$

Therefore, total moment of inertia equals:

$$I = 4I_1 = \frac{2}{3} ml^2$$

Answer: $\frac{2}{3}ml^2$