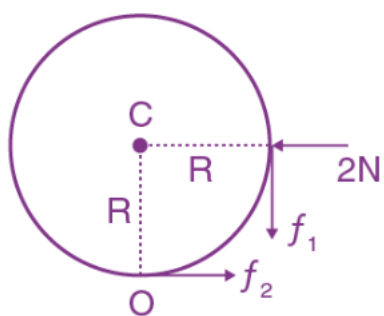


Question 7) A boy is pushing a ring of mass 2 kg and radius 0.5 m with a stick as shown in the figure. The stick applies a force of 2N on the ring and rolls it without slipping with an acceleration of  $0.3 \text{ m/s}^2$ . The coefficient of friction between the ground and the ring is large enough that rolling always occurs and the coefficient of friction between the stick and the ring is  $(P/10)$ . The value of P is

- (A) 1
- (B) 2
- (C) 3
- (4) 4



$$F - f_2 = ma$$

$$2 - f_2 = 2 \times 0.3$$

$$\text{Therefore, } f_2 = 1.4 \text{ N}$$

Applying  $\tau = I\alpha$  about C

$$(f_2 - f_1)R = I\alpha = I(a/R)$$

$$(1.4 - \mu \times 2) \times 0.5 = 2 \times (0.5)^2 \times (0.3/0.5) \text{ (since } I = MR^2)$$

$$\mu = 0.4 = 4/10 = P/10$$

$$\text{Therefore, } P = 4$$