Rotation & Torque

Disc A (mass 5.0 kg, radius 15.0 cm) is turned by a constant 3.0 N force that is applied 20.0 cm away from the pivot point, perpendicular to the lever arm. The arm has a mass of 0.5 kg, length 20.0 cm and is attached to the center of the disc.

a. What is the torque on the disc due to the applied force?
b. What is the moment of inertia for the disc-bar combination?
c. What is the angular acceleration for the combination?
d. What is the angular velocity of the system after 5 seconds (assume they are initially at rest)?

15.0 cm   20.0 cm

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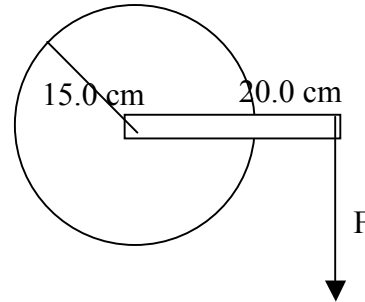
Disc B (mass 3.0 kg, radius 10.0 cm)is now added to the combination by a rope. The tension in the rope is negligible in the bottom section of the rope.

e. What would the angular acceleration be for the back disc if the front had the same acceleration as above?
f. What torque is needed on the back disc to produce this acceleration?
g. What is the tension in the top section of the rope?
h. What is the net torque on the front disc-rod combination?
i. What force would you need to apply?

10.0 cm   15.0 cm   20.0 cm

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