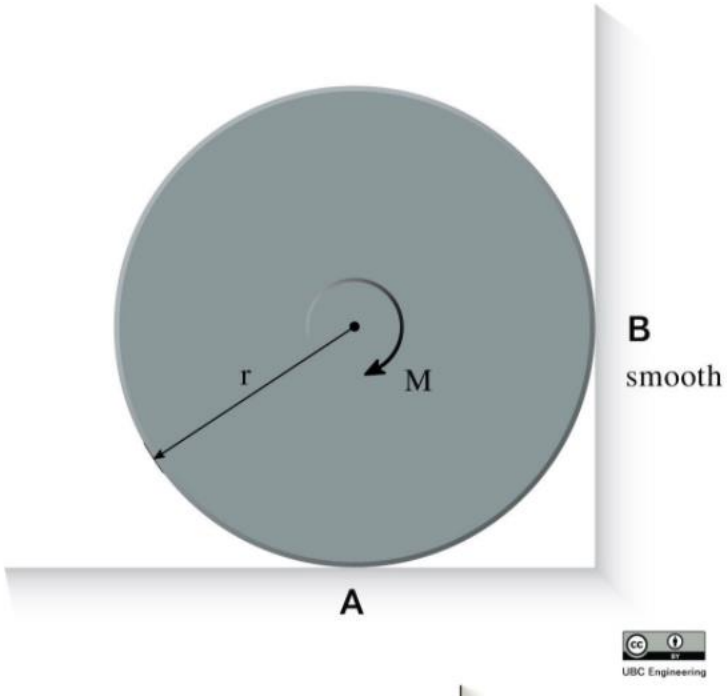
Question One - Preliminary question P8-2
Draw a clear force diagram.
Determine M to cause impending motion of the cylinder. In other words what is M needed so the overall moment is 0?
What is the torque or moment caused by the friction force = so how big does M have to be overcome that moment?



Weight = 100 N
Floor A is not smooth
$\mu_{static} = 0.1$
μ kinetic = 0.05
Wall B is smooth
Radius r = 1 m

Answers: NA is the normal force up
NB is the normal force to the left, no upwards force there as it is smooth
Friction force to the right FA = 0.1 x NA

You have to use ***mu static*** as the idea is that the cylinder does not move.

Sum of the forces in the y direction are zero
Up is positive

NA – 100 = 0 so NA = 100 N up

Friction = coefficient x normal force so FA = 0.1 x 100 = 10 N to the right

Sum of the moments about O have to be zero
NB does not produce a moment as the lever arm is zero

0 = (FA)(1 meter) – M
0 = 10 - M
so M = 10 Nm

Answers:

Sum of forces = 0 FA = 0.333 x 100 = 33.3 N to the right
Sum of the moments = 0 0 = (FA)(1 meter) – M so M = 33.3 Nm

(-3 marks if did not read coefficients carefully and used mu kinetic)

Sum of forces = 0 FA = 0.444x 100 = 44.4 N to the right
Sum of the moments = 0 0 = (FA)(1 meter) – M so M = 44.4 Nm

Sum of forces = 0 FA = 0.555 x 100 = 55.5 N to the right
Sum of the moments = 0 0 = (FA)(1 meter) – M so M = 55.5 Nm

PHYS 1170 Your Name:

Due at the end of class.

Your final answer must have 3 sig. figs. Your mark: /10

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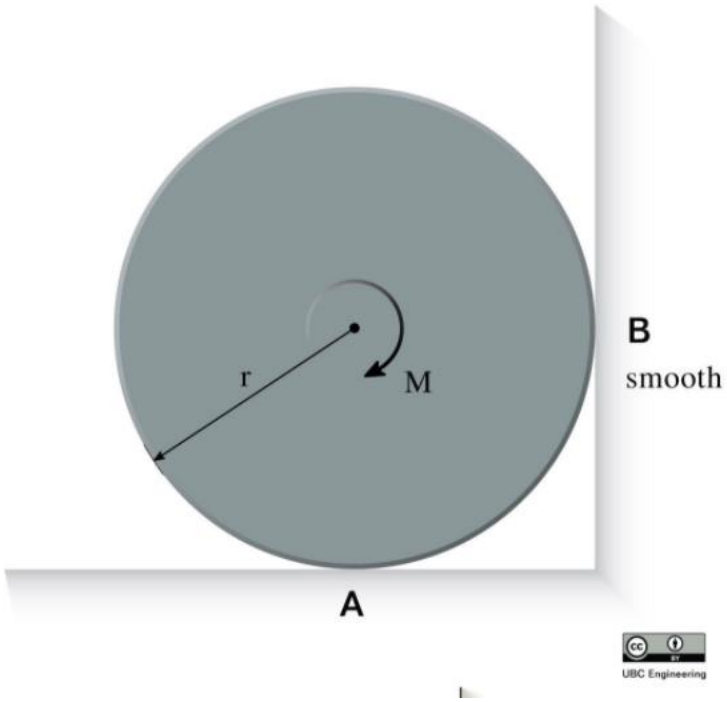

Weight = 100 N

Floor A is not smooth

Wall B is smooth

Radius r = 1 m

$\mu_{static} = 0.333$

$\mu_{kinetic} = 0.222$

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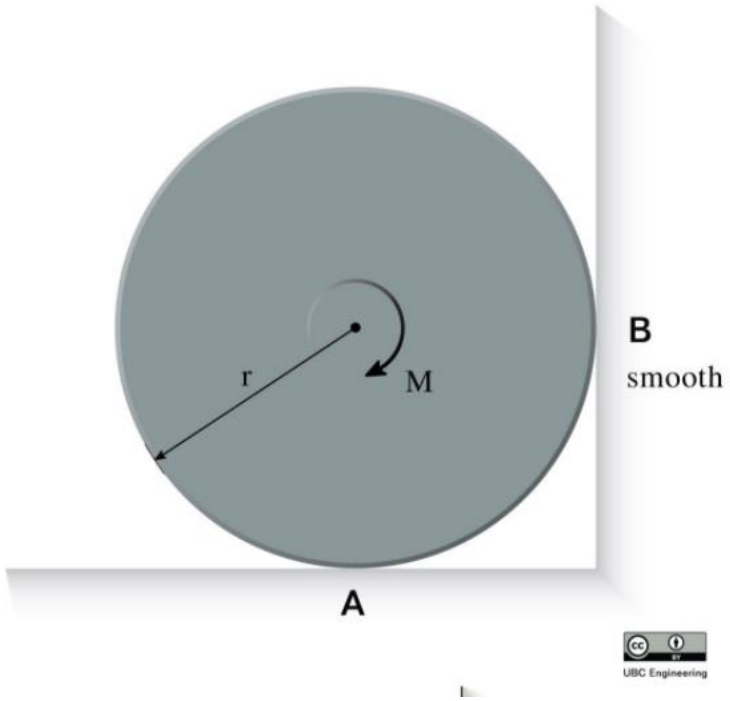

Weight = 100 N

Floor A is not smooth

Wall B is smooth

Radius r = 1 m

$\mu_{kinetic} = 0.333$

$\mu_{static} = 0.44$

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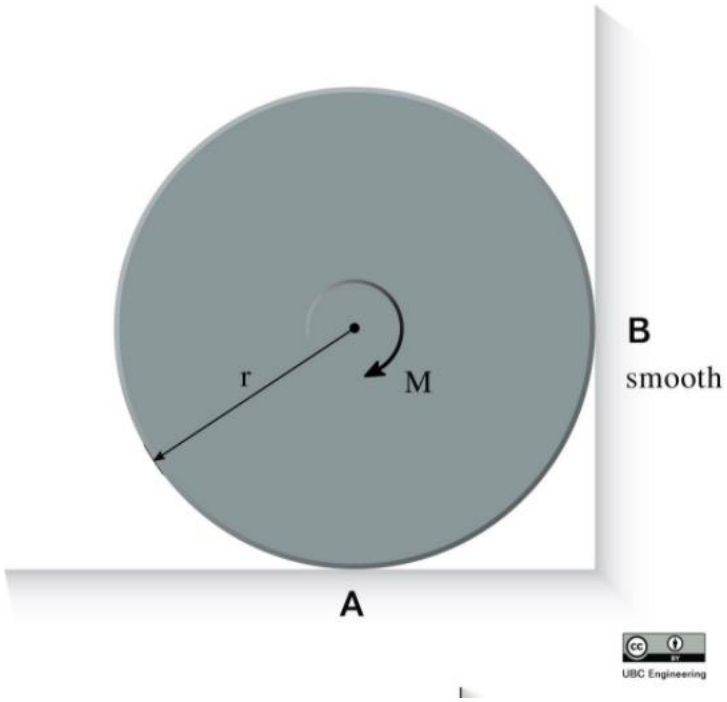

Weight = 100 N

Floor A is not smooth

Wall B is smooth

Radius r = 1 m

$\mu_{kinetic} = 0.444$

$\mu_{static} = 0.555$