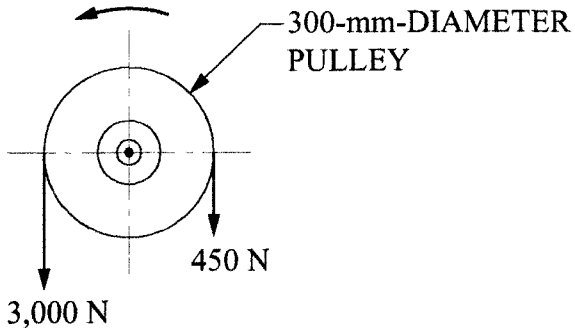
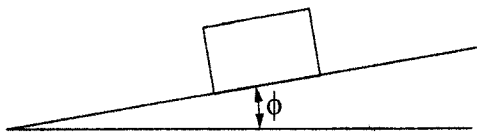
29. A pulley is driven by a belt as shown in the figure below. Neglecting centrifugal effects, the minimum coefficient of friction that will prevent slipping between the belt and the pulley is most nearly:



- ○ A. 0.60
- ○ B. 0.56
- ○ C. 0.31
- ○ D. 0.20

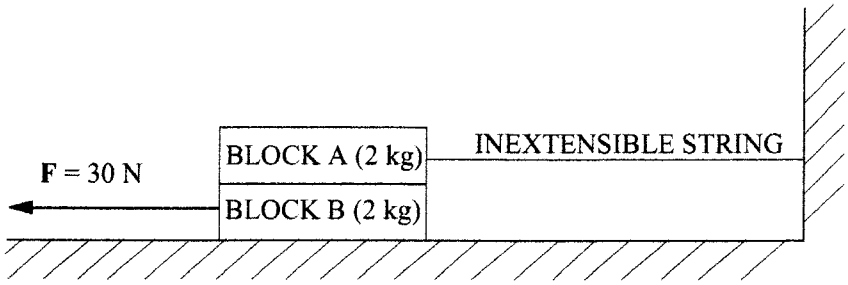
30. In the figure below, the coefficient of static friction between the block and the inclined plane is 0.25. The block is in equilibrium. As the inclined plane is raised, the block will begin to slide when:



- ○ A. $\sin \phi = 1.0$
- ○ B. $\cos \phi = 1.0$
- ○ C. $\cos \phi = 0.25$
- ○ D. $\tan \phi = 0.25$

NEXT→

31. Two blocks, A and B, are arranged so that A rests on top of B and is attached to a vertical wall by an inextensible string. A force of 30 N is applied to Block B, which is sufficient to make it slide to the left. If $\mu_K = 0.2$ between A and B, and if $\mu_K = 0.4$ between B and the bottom surface, the acceleration of B (m/s^2) is most nearly:



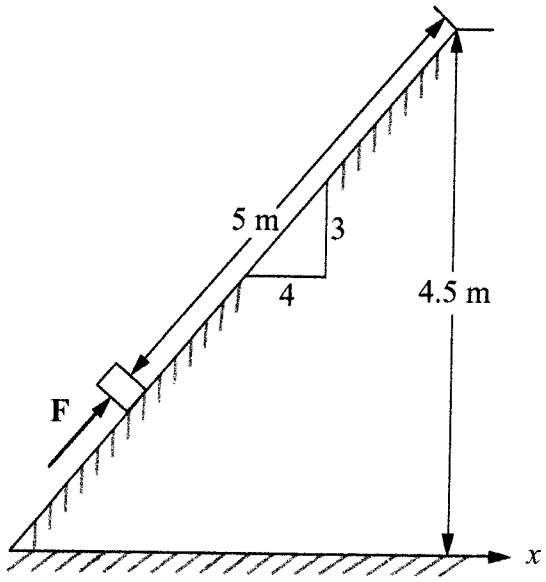
- A. 5.2
- B. 7.2
- C. 9.1
- D. 15.0

32. A 2-kg block slides along a rough horizontal surface and slows to 10 m/s after traveling 20 m. If the kinetic coefficient of friction between the block and surface is 0.2, the initial speed (m/s) of the block was most nearly:

- A. 10.0
- B. 10.4
- C. 13.4
- D. 20.0

NEXT→

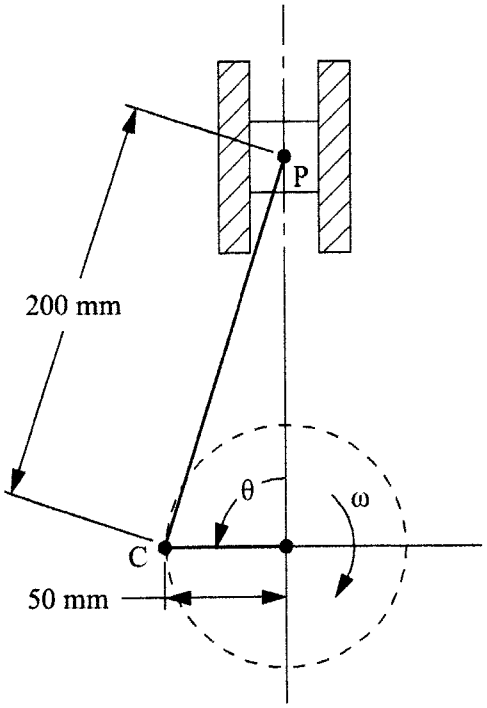
33. The 2-kg block shown in the figure is accelerated from rest by force **F** along the smooth incline for 5 m until it clears the top of the ramp at a speed of 8 m/s. The value of **F** (N) is most nearly:



- ○ A. 11.8
- ○ B. 19.6
- ○ C. 24.6
- ○ D. 69.4

NEXT→

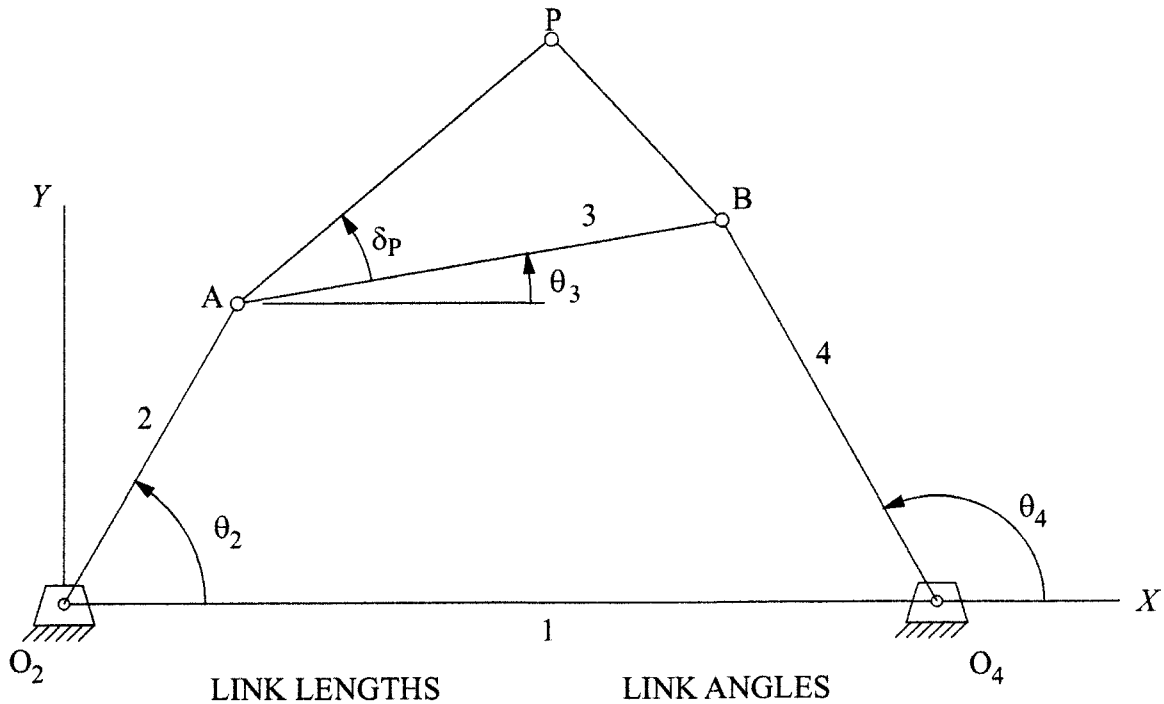
34. The piston and cylinder of an internal combustion engine are shown in the following figure. If $\omega = 377$ rad/s, the piston speed (mm/s) when $\theta = 90°$ is most nearly:



- ○ A. 0
- ○ B. 10,500
- ○ C. 18,850
- ○ D. 24,300

NEXT→

35. The figure shows a four-bar linkage. If Link 3 rotates in the counterclockwise direction, the angle at Point P, measured in the global *X*-*Y* coordinate frame, is most nearly:

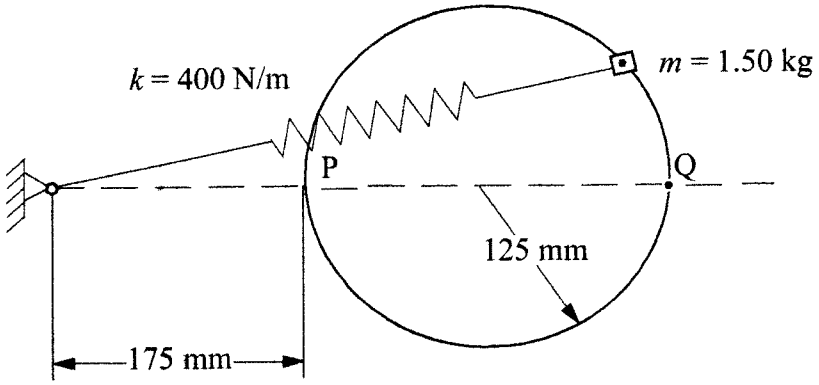


LINK LENGTHS		LINK ANGLES	
L_1	= 400 mm	θ_2	= 60°
L_2	= 158 mm	θ_3	= 15°
L_3	= 216.97 mm	θ_4	= 120°
L_4	= 222.84 mm	δ_P	= 30°
L_{AP}	= 187 mm		

- ○ A. 225°
- ○ B. 135°
- ○ C. 45°
- ○ D. –45°

NEXT→

36. An object with a mass m of 1.50 kg moves without friction in a circular path as shown below. Attached to the object is a spring with a spring constant k of 400 N/m. The spring is undeformed when the object is at Point P, and the speed of the object at Point Q is 2.00 m/s.



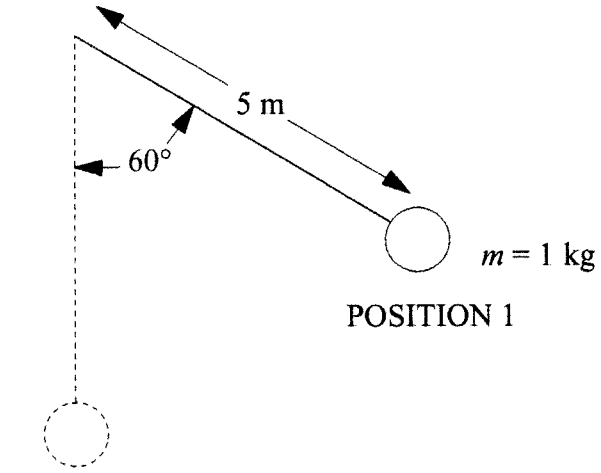
NOT TO SCALE

The translational kinetic energy (J) of the object at Point Q is most nearly:

- ○ A. 1.50
- ○ B. 3.00
- ○ C. 6.00
- ○ D. 29.40

NEXT→

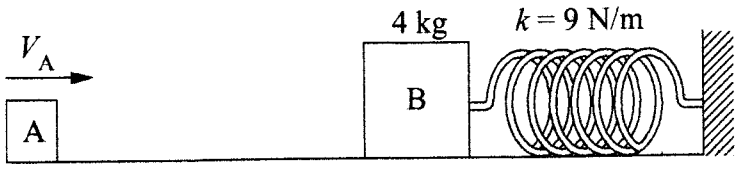
37. If a pendulum is released from rest at Position 1, the velocity (m/s) of the mass at Position 2 is most nearly:



- ○ A. 5.0
- ○ B. 7.0
- ○ C. 9.8
- ○ D. 12.7

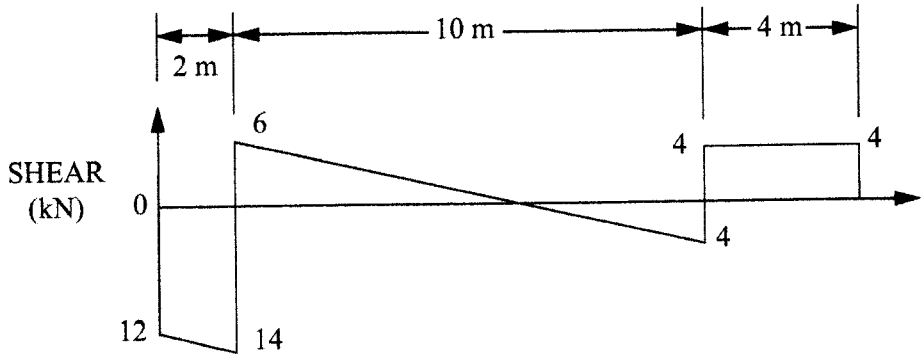
NEXT→

38. In the figure below, Block B is initially at rest and is attached to an unstretched spring. Block A travels to the right and hits Block B. Immediately after impact, the velocity of Block B is 6 m/s to the right. The maximum acceleration (m/s^2) of Block B after impact is most nearly:



- ○ A. 1.5
- ○ B. 2.25
- ○ C. 6.0
- ○ D. 9.0

39. The shear diagram for a particular beam is shown below. All lines in the diagram are straight. The bending moment at each end of the beam is zero, and there are no concentrated couples along the beam. The maximum magnitude of the bending moment (kN·m) in the beam is most nearly:



- ○ A. 8
- ○ B. 16
- ○ C. 18
- ○ D. 26

NEXT→