FE Exam

Morning - 4hr - 120 questions ~ 2 min/question

VII (Topic) Engineering Mechanics (Statics and Dynamics) - 10%

Statics ~ 6 questions - 12 min
Dynamics ~ 6 questions - 12 min

Afternoon - 4hr - 60 questions ~ 4 min/question

ME: II (Topic) Kinematics, Dynamics, and Vibrations - 15%

9 questions - 36 min.

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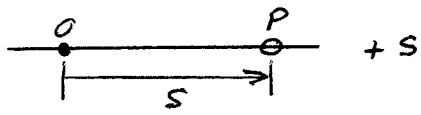
11 Morning #4



$s = 20t^3 - t^4$

$\dot{s} = 60t^2 - 4t^3$

$\ddot{s} = 120t - 12t^2$

$\dddot{s} = 120 - 24t$

At $t = 2$: $\dddot{s} = 120 - (24)(2)$

$= 120 - 48$

$= 72$ ← Ans.

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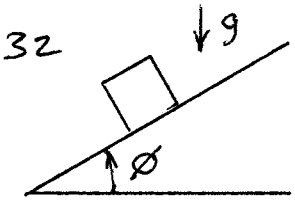
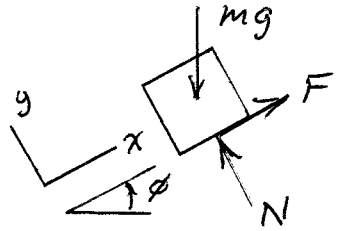
16 #32



$\mu_s = 0.25$



$\Sigma F_x = 0$

$-mg\sin\phi + F = 0$ (1)

$\Sigma F_y = 0$

$N - mg\cos\phi = 0$ (2)

$F = \mu_s N$

$= 0.25N$ (3)

(2) → (3) → (1) ⇒ $-mg\sin\phi + 0.25mg\cos\phi = 0$

$\tan\phi = 0.25$ ← Ans.

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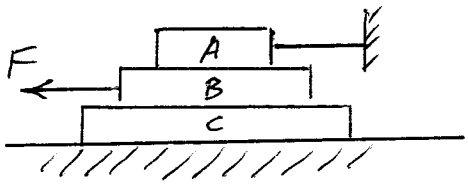
#35 ↓g



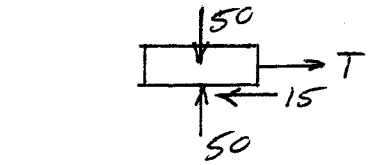
$W_A = 50\ N$

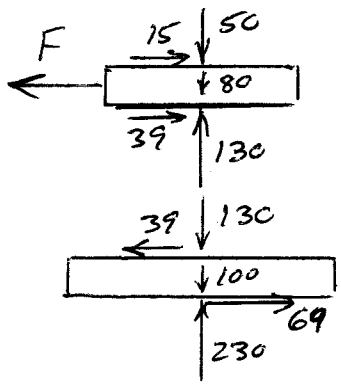
$W_B = 80\ N$

$W_C = 100\ N$

$\mu_s = 0.3$

Max. friction forces that can develop:





"69" will not be reached.

Therefore, C does not move.

$F = 39 + 15 = 54\ N$ ← Ans.

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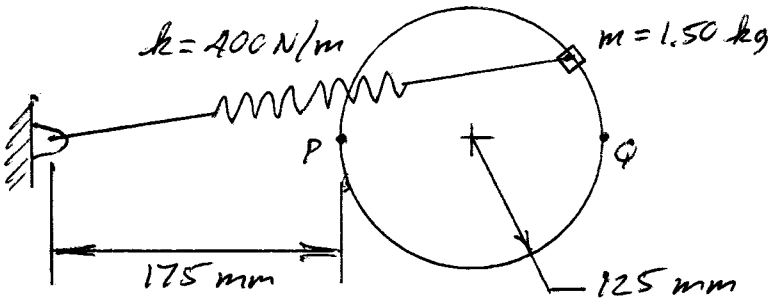
Afternoon

#6-7 $v_Q = 2\ m/s$



$T_Q = \frac{1}{2} m v_Q^2$

$= \frac{1}{2}(1.5)(2)^2$

$= 3\ N \cdot m$ or J ← Ans.

F_s @ Q: $F_s = k\delta$

$= 400(0.25) = 100\ N$ ← Ans

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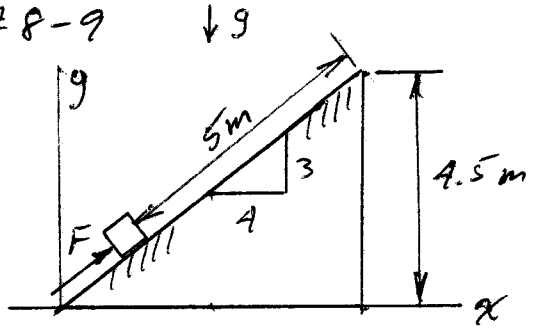
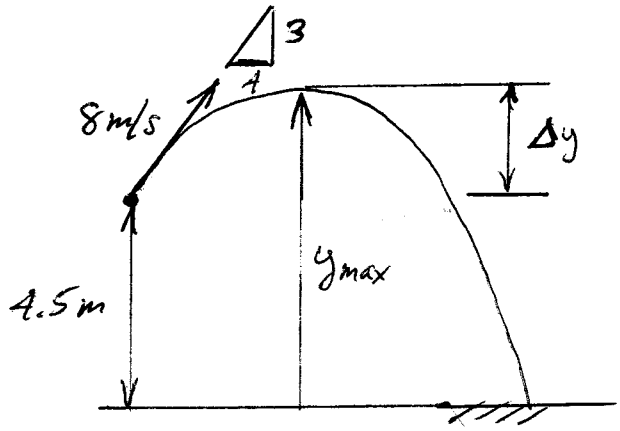
#8-9 ↓g



$U_{1\to 2} = \Delta T + \Delta V_g = \frac{1}{2} m v_2^2 + mg\Delta y$

$5F = \frac{1}{2}(2)(8)^2 + (2)(9.81)(3)$

$F = 24.6\ N$ ← Ans



$$v_y\,dv_y = -g\,dy$$

$$v_y^2 = (v_y)_1^2 - 2g\Delta y$$

Δy is max when $v_y = 0$

$$(v_y)_1 = 8\left(\frac{3}{5}\right)$$

$$\Delta y = \left(8\left(\frac{3}{5}\right)\right)^2 \frac{1}{(2)(9.81)} = 1.174\ m$$

$$y_{max} = 4.5 + \Delta y = 5.67\ m \longleftarrow \text{Ans.}$$