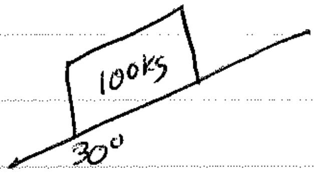
Ch 5 Practice

Answer Key

1. D
2. C
3. B
4. D
5. D
6. E
7. B
8. A
9. A
10. C
11. B
12. E
13. B
14. E
15. E
16. D
17. E
18. A
19. D
20. D
21. A
22. D

Chapter 5 Practice Test

(#1)



$A = \frac{2D}{T^2} = 2.22\,m/s^2$

(from $D = V_0 t + \frac{1}{2}At^2$)

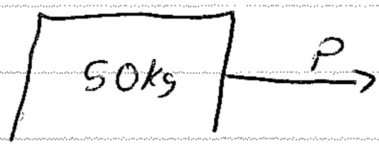
$F - mg\sin\theta - \mu F_N = M \cdot A \quad F_N = mg\cos\theta$

$F = mg\sin\theta + \mu mg\cos\theta + M \cdot A$

$500 + 86.7 + 222 = 809\,N$

D

(#2)



* If you use $g = 10\,m/s^2$ *

$F_N = m \cdot g \quad F_f = \mu \cdot F_N \quad F_{NET} = P - F_f$

$F_N = 500N \quad F_f = 250N$

$F_{NET} = P - F_f = 0\,N \quad \therefore$ **A**

* If you use $g = 9.80\,m/s^2$ *

$F_N = m \cdot g \quad F_f = \mu \cdot F_N \quad F_{NET} = P - F_f$

~~$F_N = 500N$~~ $\quad F_f =$ ~~250~~

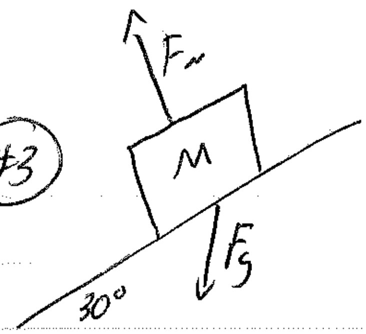
$F_N = 490N \quad F_f = 245 \quad \therefore F_{NET} > 0$

so Friction is Kinetic

$F_f = 171.5N$

$\therefore$ **C**

(#3)



$\Sigma F_x = \cancel{m}g\sin\theta - \mu \cancel{m}g\cos\theta = \cancel{M}A$

See if $g\sin\theta > \mu g\cos\theta$

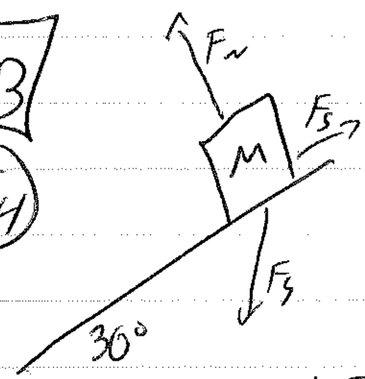
$10(\sin 30°) \overset{?}{>} (.2)(10)(\cos\theta)$

$5 \overset{?}{>} 1.73$

$\therefore$ Block Accelerates down ramp. w/ $F_{NET} = 5 - 1.73$
$= 3.27N$

B

(#4)



Static Friction $\therefore$ $\cancel{M}A = 0$

$\Sigma F_x = mg\sin\theta - F_s = M\cancel{A}^{0}$

$mg\sin\theta = \mu F_N$

$\Sigma F_y = F_N - mg\cos\theta = 0$

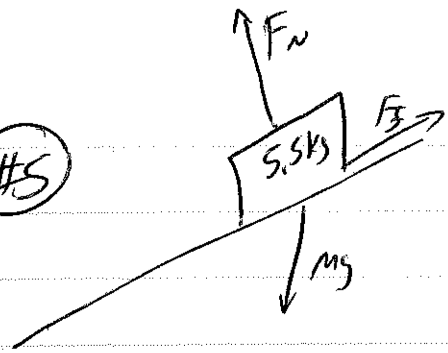
$F_N = mg\cos\theta$

$\cancel{mg}\sin\theta = \mu \cancel{mg}\cos\theta$

Using ΣF_x $mg\sin\theta = F_s$

D

(#5)



$$\Sigma F_x = mg\sin\theta - F_f = M\cdot A$$

$$F_f = \mu F_N = \mu mg\cos\theta$$

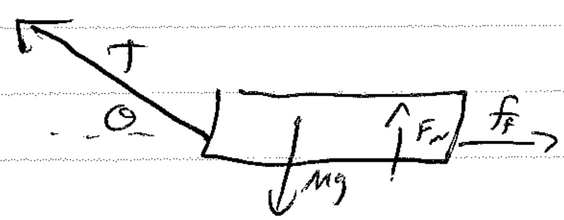
$$A = g\sin\theta - \mu g\cos\theta$$

$$= 10\sin 30^\circ - (.35)(10)\cos 30^\circ = 1.97\,m/s^2$$

$$V_f^2 = \sqrt{2A\Delta x} = \sqrt{2(1.97\,m/s^2)(72\,m)} = 16.8\,m/s$$

D

(#6)



$A=0$ constant velocity

$$\Sigma F_x = T_x - F_f = M\cdot A$$

$$\Sigma F_y = T_y + F_N - Mg = \cancel{M\cdot A}$$

$T_x = F_f$ $\qquad$ $F_N = Mg - T_y$

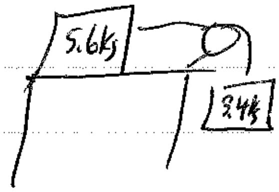
$T\cos\theta = F_f$ $\qquad$ $F_N = Mg - T\sin\theta$

$$F_f = \mu\cdot F_N$$

$$= \mu(mg - T\sin\theta)$$

E

#7



$\mu M_1 g$

$\Sigma F_x = T - F_f = M_1 \cdot A$

$\Sigma F_y = M_2 \cdot g - T = M_2 \cdot A$

$M_2 g - \mu m_1 g = (M_1 + M_2) A$

$A = \frac{M_2 g - \mu m_1 g}{(M_1 + M_2)} = \frac{34N - 15.7N}{9N}$

$= 2.03 m/s^2$

B

#8 $m_2 g - T = m_2 \cdot A$ $\quad 2 - T = .2 \cdot A$

$T - m_1 g \sin\theta - \mu m_1 g \cos\theta = M_1 \cdot A$

$T - 1.25 - .217 = .25A$ $\quad T - 1.47 = .25A$

$.53 = .45A$ $\quad A = \frac{.53}{.45} = 1.18 m/s^2$

$V_f = \sqrt{2A\Delta x} = \sqrt{2(1.18)(.3m)} = .84 m/s$

A

(#9) $M_3 g - T_2 = M_3 \cdot A$ $\quad 45 - T_2 = 4.5A$

$T_2 - T_1 - F_f = M_2 \cdot A$ $\quad T_2 - T_1 - 3.75 = 1.5A$

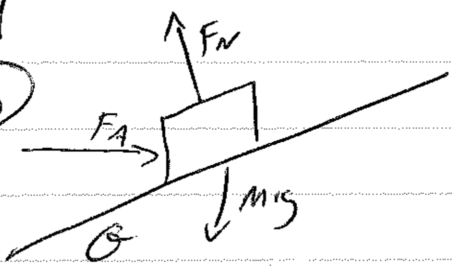
$T_1 - M_1 g = M_1 \cdot A$ $\quad T_1 - 25 = 2.5A$

$\quad 16.25 = 8.5A$

$A = \frac{16.25}{8.5} = 1.91\,m/s^2$

[A]

(#10)

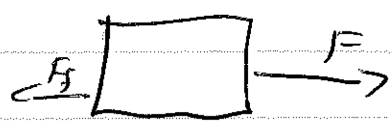


$\Sigma F_y = F_N - mg\cos\theta - F_A \sin\theta = 0$

$F_N = mg\cos\theta + F_A \sin\theta$

[C]

(#11)



$\Sigma F_x = F - F_f = M \cdot A$

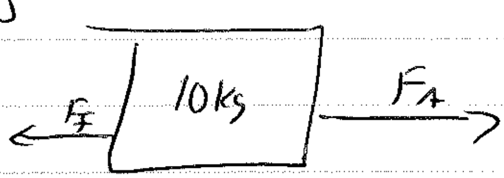
$F - \mu M g = M \cdot A$

$F - MA = \mu \cdot m \cdot g$

$\mu = \frac{F - MA}{Mg} = \frac{F}{Mg} - \frac{A}{g}$

[B]

(#12)



Since $\mu_s = .5$
50 N must be applied
to move object, since
only 40 N applied, $A = 0$

$\Sigma F_x = F_A - F_f = ~~M \cdot A~~ \; 0$

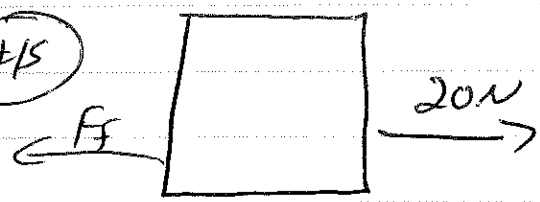
[E]

$F_f = F_A = 40\,N$

#13 B - Not relevant question

#14 E

#15



$A = 0$

$F_A = F_f = 20 N$

E

#16 D

#17 E $\mu = \frac{F_f}{F_N} = \frac{\text{Newtons}}{\text{Newtons}}$

#18 A - If β increased - more A to right
B - If α increased - more A to left
C - If μ_k for A increased - lowers net force on A
D - If μ_k for B increased - lowers net force on B
E - F_N on Block 2 increased - more friction - less net force.

A

#19 For circle, direction of Acceleration towards center of circle. Always changing. constant speed = constant magnitude.

D

#20 constant speed in a circle - Acceleration towards center of circle - (Def. of centripetal Force)

#21 $V = \frac{2\pi R}{T}$ $R = \frac{VT}{2\pi} = \frac{(4.2 m/s)(.24 s)}{2\pi} = .16 m/s$

A

#22 D A_c = towards center of circle.