PHYSICS 6A TR MIDTERM — TEST FORM A

(1) $a = \frac{F}{m}$ $\Delta v = a\Delta t = \frac{F\Delta t}{m} = \frac{2\cdot 6}{3}$ m/s $= 4$ m/s **D**

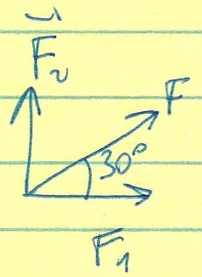
(2) FBD $\uparrow F = ?$ $\uparrow a = 9.8$ $F - W = ma$

$\downarrow W = 800N = mg$ $F = ma + W = 1600N$

(3) Newton's 3rd law **C**

To convince yourself that this force is < 100 N look at example 5-4 in the book

(4)



$F = ma$ $m = 1kg$ $a = 10$ m/sec

$F_2 = 5N$ → $F = 10 N$

$F_1 = F\cos 30 = 8.66N$ **C**

(5) $V = V_0 + at = at$

$V^2 - V_0^2 = 2a(x - x_0)$ $V^2 = 2ax$ $V = \sqrt{2ax} = \sqrt{2\cdot 10\cdot 400}$ m/s

$V = 89$ m/sec **B**

(6) Same as conceptual point 6-3 in book **A**

(7) See Fig 2-6 in book ~~B~~ **C**

(8) $A_x = A\cos\theta = A$
$A_y = A\sin\theta = 0$
$B_x = -B\cos 60$
$B_y = B\cos 30$

[C]

(9) Constant v means no net force so (b) and (c) are out
There is gravitation so (e) is out
There is a normal force, so (d) is out
This leaves (a)

[A]

(10) [B] because y-motion and x-motion are independent

(11) The horizontal component of v is constant $= V_x = V\cos\theta$
$V = 23\cos 60$ m/s $= 11.5$ m/s [C]

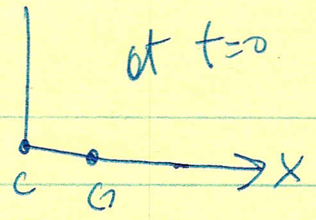
(12) [B]

(13) Horizontal velocity is constant $V_x = 75.4$ m/s
Vertical velocity
$V_y = -gt = -39.2$ m/s

$V = \sqrt{V_x^2 + V_y^2} = \sqrt{75.4^2 + 39.2^2}$ m/s $= 85$ m/s [D]

(14) Acceleration down the plane is $g\sin\theta$ independent of mass [E]

(15)



At $t=0$ $X_{C0} = 0$ $v_C = 100$ km/hr

$X_{G0} = 70$ m $v_G = 80$ km/hr

Cheetah : $X_C = X_{C0} + v_C t = v_C t$

Gazelle : $X_G = X_{G0} + v_G t$

$X_C = X_G \Rightarrow v_C t = X_{G0} + v_G t$

$t = \frac{X_{G0}}{v_C - v_G}$

$100 \frac{km}{hr} = 27.77$ m/sec

$80 \frac{km}{hr} = 22.22$ m/sec

$\rightarrow t = \frac{70 \text{ m}}{(27.77 - 22.22) \text{ m/s}}$ $t = 12.6$ sec

C

(16)

$V = \frac{\Delta x}{\Delta t}$ $\Delta x = 2000$ m $\Delta t = \Delta t_1 + \Delta t_2$

$\Delta t_1 = \frac{\Delta x_1}{V_1} = \frac{1000}{80}$ sec $= 12.5$ sec

$\Delta t_2 = \frac{\Delta x_2}{V_2} = \frac{1000}{50}$ sec $= 20$ sec

$\Rightarrow v = \frac{\Delta x}{\Delta t} = \frac{2000 \text{ m}}{(12.5 + 20) \text{ s}} = 61.5$ m/s **B**

(17) [A] Constant $\vec{v}$, no force

(18) [C] Weight is down
Normal force is ⊥ plane
Friction is up the ramp

(19) [C] Friction must cancel F if mass not moving