b) $\vec{v}+\vec{u}$

$\vec{v}+\vec{u} = (-2i+2j)+(2i-2j) = 0i+0j = 0$

c) $\vec{v}-\vec{u}$

$\vec{v}-\vec{u} = (-2i+2j)-(-2i-2j) = -4i+4j$

d) $\vec{v}+\vec{u}=0$ & $\vec{v}-\vec{u} = -4i+4j$ represent a vector extending (-4, 4) on coordinate plane.

e) $\vec{v}\cdot\vec{u} = (-2)(2)+(2)(-2) = -4-4 = -8$

(2) 1) a) $v = u+at$ UNIT-I

$= 15+3\times4$

$= 15+12 = 27\ m/s$

b) $s = ut+\frac{1}{2}at^2$

$= 15\times4+(\frac{1}{2}\times3\times4^2)$

$= 60+24 = 84m$

2) a) $\Delta x_p = 600m-338m = 262m$

$\Delta t_p = 105-55 = 55$

$v_p = \frac{\Delta x}{\Delta t} = \frac{262m}{55} = 52.4m/s$

$\Delta_0 x_Q = 2900m-2138m = 762m$

$\Delta t = 305-255 = 55$

$v_Q = \frac{\Delta x}{\Delta t} = \frac{762m}{55} = 152.4m/s$

b) $a = \frac{\Delta v}{\Delta t} = \frac{100 m/s}{20 s} = 5 m/s^2$

3) a) $v^2 = u^2 + 2as$

$s = \frac{v^2 - u^2}{2a} = \frac{(6.00)^2 - (0)^2}{2 \times 0.8} = \frac{36}{1.6} = 22.5 m$

b) $v = u + at$

$t = \frac{v - u}{a} = \frac{6.00 m/s - 0 m/s}{0.8 m/s^2} = \frac{6.00}{0.8} = 7.5 sec$

4) $R = \frac{v_0^2 \sin(2\theta)}{g}$

$v_0 = \sqrt{\frac{60g}{\sin(2\theta)}} = \sqrt{\frac{60 \times 9.81}{\sin(90^\circ)}} = \sqrt{588.6} \approx 24.26 m/s$

$T = \frac{2 v_0 \sin\theta}{g} = \frac{2 \times 24.26 \times \sin(45)}{9.81} = 3.505 ec$

5)

Unit-4

1a) $f_{gravity,\,incline} = mg\sin\theta$

$F_N = mg\cos\theta$

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

$f_{net} = f_{gravity\ incline} - f_k = mg\sin\theta - mg\cos\theta$

$$a = \frac{f_{net}}{m} = g(\sin\theta - \mu\cos\theta)$$

$$a = g(\sin\theta - \mu\cos\theta)$$

b) $a = g\sin\theta$ $\mu = 0$

2a) $a = g(\sin\theta - \mu\cos\theta)$

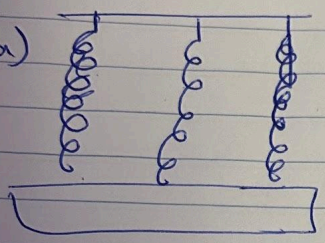
$= 9.81 \times (\sin(10)^\circ - 0.05 \cdot \cos(10^\circ)$

$= 1.2196$

b) 49.2 m down the slope after 3 seconds

final speed = 36.61 m/s

4) a)



b) $\Delta\vec{x}^p = \frac{3(-k)\Delta x}{3(-k)} = \frac{\vec{F}^p}{3(-k)}$

b) $3(-k)\Delta\vec{x}^p = \vec{F}^p$

5) a) $V = \frac{2 \times 60^{kg} \times 9.8 m/s^2}{1.2 kg/m^3} = \frac{1176}{0.15} = 88.59 m/s$

b) $V = \frac{2 \times 60 kg \times 9.8 m/s^2}{1.2 kg m^3} = \frac{1176 kg \times m}{m\ s^2} / 15 kg/m$

$= 78.4 m^2/s^2 = 8.86 m/s$

6) a) $A = \pi \times \left(\frac{d}{2}\right)^2$

$= 3.14 \times \left(\frac{0.2 m}{2}\right)^2 = 0.0314 m^2$

b) $\Delta L = 10{,}000 N \times 10 m / 0.0314 m^2 \times 45 \times 10^9$

$\Delta L = 7.07 \times 10^{-5}$

~~b) $\Delta L = 10{,}000 N \times 10 m$~~

Physics Midterm answers

UNIT - 0

1) $11.0 g/cm^3$ C

2) 10 hrs C

3) 90 km/hr D

4) $1/6 \, km hr^{-1} s^{-1}$ C

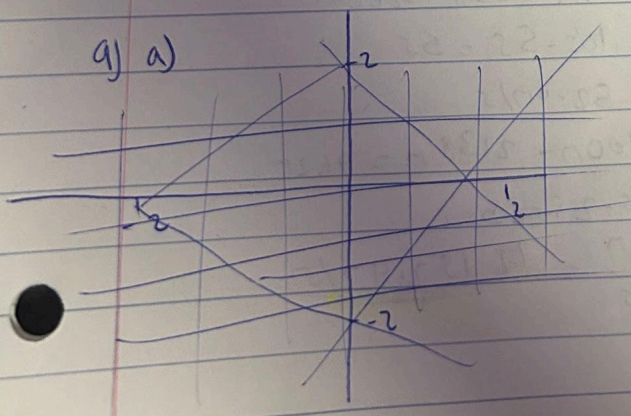
5) $5000 m^2$ A

6) 9×10^4 D

7) -7.1 -7.1 km/hr D

8) 225 degree A

9) a)



Unit 2

3) 1) a) $T = \frac{F_1}{\sin\theta} = \frac{1000}{\sin(7)} = \frac{1000}{0.9925} = 761.05N$

b) $F_f = \mu F_N$

$\frac{900kg}{0.05}$

2) a) $v_f^2 = v_i^2 + 2ad$

$a = \frac{-v_i^2}{2d} = \frac{(33.33)^2}{2 \times 100} = \frac{1111.11}{200} = -5.56 m/s^2$

b) $F = 20{,}000kg \times (-5.56 m/s^2) = -111{,}200$

3.1) $a = \frac{F_{net}}{m} = \frac{17.84N}{50kg} = 0.357 m/s^2$

3.2) a) $F_c = L \sin\theta$

$= 80{,}000 \times \sin 30° = 80{,}000 \times 0.5 = 40{,}000N$

b) $F_c = \frac{mv^2}{r}$ $r = \frac{mv^2}{F_c} = \frac{6000 \times (166.67)^2}{40{,}000} = 4166.67m$

c) $t = \frac{d}{v} = \frac{13090.84}{166.67} = 78.555$