SUBJECT: prysics midterm
2. Estimations and Unit Analysis
1. a) what is the speed of sound in meters per second?
t=1.55ec X=0.5km
0.5KM/1000m = 500m = d/t
$\frac{0.5 \text{km}   1000 \text{m}}{1 \text{km}} = 500 \text{m} = d/t}{500 \text{m} / 1.6 = (333.3 \text{m/s})}$
b) what is it in kilometers per hour  0.5km   60spc   60 m/n = (1200 km   hr)  1.5sec   1min   1 hour
0.5km 60syc 100m/n = (1200 km/hr)
1.5 sext I min I Thour
2 . a) what is 0.25 m3 in cm3?
$35m^3/100cm)^3 = (250,000cm^3)$
(Im)
b) what is 100 km   hour in m/s?
100km 1000m   1hour   1 min = (27.78 m/s)
The I U.Km   60 min 1 60 sec
c) what is 2 kg m s <sup>-2</sup> in gm cm ms <sup>-2</sup> ?
c) what is 2 kg m s <sup>-2</sup> in gm cm ms <sup>-2</sup> ?  2 kg m; (1000g) (100cm) = (2x10 <sup>5</sup> g cm/s <sup>2</sup> )  c <sup>2</sup> (1kg) (1m)
S 1 1kg / 1 lm /
3 Vectors
I a) x, is a vector wild magnitude of ID meters and makes
an angle of 15 degrees my respect to y-axis.
7
$\frac{10 \sin(15)}{x_1} = \frac{2.59 \text{m}}{10 \cos(15)} = \frac{9.60 \text{m}}{10 \cos(15)} = $
b) x, is a vector wi a magnitude 20 meters that makes an angle
135 degrees w respect to x-axis
20 COS (135) = -14.14m
20 sin (135) = 14.14m
$(\vec{x}_2 = -14.14\hat{1} + 14.14\hat{1})$

SUBJECT:
2. a) Draw diagram of their trajectory (E is x-axis, N isy-axis)
25km P
45
70.5km
12) well as the Single location in the state of
b) what is the final location in x-y coordinates?
36KM 45 (.25)COS(45) = 0.1767
35KM 45 (.25)COS (45) = 0.1761 45 (.25)SIN(45) = 0.1761
0.5+.176=0.67
(Xx=0:67kmi+0:67kmi)
c) what is the distance from the origin?
$\sqrt{0.67^2+0.67^2}=\sqrt{C^2}$
$\left(C=0.95\mathrm{km}\right)$
4. Motion Along a Straight Rine
I a) what is the displacement of the particle bothen
$t = -2.0 \text{ sec} + t = -2.0 \text{ sec}?$ $\triangle x = x_f - x_i$
x(t) = -1.0 - 4.0t m $x_t = -1.0 - 4.0(2) m = -9.0m$ $\Delta x = -9.0 - 7.0 = (-16m)$
$X_1 = -1.0 - 4.0(-2m) = 7.0m$
X1 1.0 1.0( 2.1.)
b) what is the velocity?
V= X/t V= -10.0m / 450c = (-4m/s)

SUBJECT:
2. $x(t) = -2(t) + 7(t)^2$
d) what is the average velocity bothen t=0 4 t=2 sec?
$X(0)=-2(0)+7(0)^2$ $X=0$ $V=\Delta X$ $\times 24-0 = -34/2 < 0$
$\chi(a) = -2(2) + 7(2)^{2}  \chi = a + \Delta t  a = 0$
= 12m 5
b) Draw a graph of the velocity.
24
3 20 1
2 14 19 14 19 19 19 19 19 19 19 19 19 19 19 19 19
1 12 19
ō '\
0 1 2 3 4 5
TIME (SEC)
c) what is the instantaneous velocity at t=1 second?
$x(1) = -2(1)+7(1)^{2}$
$-2+7=\left(\times=5mls\right)$
d) what is the acceleration?
$a = \Delta V / \Delta t = 12m/s  (om/s)$
S 11/12
of 10.0 m/s?
constant acceleration (a) = 5.0 m/s?
$\alpha = \Delta v   \Delta t \qquad (t) 5.0  \text{m/s}^2 = 10  \text{m/s}  (t)$
5.0 (±)
5 OMIS2
t = a seconds
b) what is her displacement at that time?
$x(t) = 1 (5.0 \text{ m/s}^2) (2s)^2 + (0) + 0$
(9) (4)
1 (20)
$\frac{2}{x(t)=10m}$

SL	IBJECT:
	c) suppose she is running the 100 m sprint. If the continues
	at 10.0 mls for the remainder of the race, what
	will be her total time?
	100m-20m = 80m/10m/s = 85+2s = 10seconds
5	Motion in two + Three Dimensions
	1. a) Draw a diagram of the situation.
	(142.5m
	75m
	b) what is the norizontal velocity required to make the shot?
	q= 9.81m/s2
	y=-162:5m
	ay=-9.81m/s2 1111 75m=Vor(5.768)
	102.5m2=0+1(9:81m15P)+2 (10x=13.02m15)
	t=58s
	2. a) How far away does it I and?
	R= Vo2 Sin(20) = (40)2 sin 2(45) /9.81 (= 63m)
	9
	b) How long is it in the air?
	T = 2Vosin(A) = 2(40) sin45/9.81 (6 seconds)

	2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	30
1. TWO children pull a third child on a snow squeer sled exerting forces $\vec{F}_1 + \vec{F}_2$ as snown from above in Fig.1  Find the acceleration of the system if the mass of the child and sted together is $49.0 \text{kg.}$ note that the direction of the frictional force is unspecified; it will be in the opposite direction of the sum of $\vec{F}_1$ and $\vec{F}_2$ $\vec{F}_1 = x = 10.00546 \qquad y = 10.0146$ $= 7.07 \text{Ni} \qquad = 14.32 $	SUBJECT:	
sted exerting forces $\vec{F}_1$ 4 $\vec{F}_2$ as shown from above in Fig.1  Find the acceleration of the system if the mass of the child and sted together is 49.0kg. Note that the direction of the frictional force is unspecified; it will be in the opposite direction of the sum of $\vec{F}_1$ and $\vec{F}_2$ $\vec{F}_1 = x = 10.00545 \qquad y = 10.51045$ $= 7.07N_1 \qquad = 7.07N_1$ $= 7.07N_1 \qquad = 14.32$ $= 4.92N_1 \qquad = -4N_2$ $= \sqrt{13.99N_1 + 13.07^2} = 14.32N_1$ $+40.92 = 4.94(4) \qquad (9=14.015^2)$ $= 14.32-7.5 = 4.94(4)$ $= 14.31 + 11.32$	o Forces	
sted exerting forces $\vec{F}_1$ 4 $\vec{F}_2$ as snown from above in Fig.1  Find the acceleration of the system if the mass of the child and sted together is 49.0kg. Note that the direction of the frictional force is unspecified; it will be in the opposite direction of the sum of $\vec{F}_1$ and $\vec{F}_2$ $\vec{F}_1 = x = 10.00845 \qquad y = 10.51045$ $= 7.07N_1 \qquad = 7.07N_1$ $= 7.07N_1 \qquad = 14.32$ $= 14.32 - 1.5 = 14.3$	1. Two children pull a third child on a snow saucer	
Find the acceleration of the system if the mass of the child and sted together is $49.0 \text{kg}$ . Note that the direction of the frictional force is unspecified; it will be in the opposite direction of the sum of $\vec{F}_1$ and $\vec{F}_2$ $\vec{F}_1 = x = 10.0346 \qquad y = 10.0146$ $= 7.07N_1 \qquad = 7.07N_1$		
Df the frictional force is unspecified, it will be in the opposite direction of the sum of $\vec{F}_1$ and $\vec{F}_2$ $\vec{F}_1 = x = 10 \cos 46 \qquad y = 10 \sin 46$ $= 7.07 N_1 = 7.07 N$ $= 7.07 N_1 = 7.07 N$ $= \sqrt{13.92}N \qquad y = 3.07 N$ $P = \sqrt{13.92}N + 13.07^2 = 14.32 N$ $+ 400 = 3.07   13.99   0 = 12.37^2$ $= 14.32 - 7.5 = 49(4)$ $= 14 M   s^2$		
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$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	opposite direction of the sum of F, and F2	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Fi x=1000545 y=1051046	
$P = \frac{13.99 \text{ N}}{13.99^{2} \times 13.07} = \frac{14.32 \text{ N}}{1409} = \frac{14.32 \text{ N}}{13.07^{2}} = \frac{14.32 \text{ N}}{1409} $	= 7.07N = 7.07N	
$P = \frac{13.99 \text{ N}}{13.99^{2} \text{ N} + 13.07^{2}} = \frac{14.32 \text{ N}}{1400}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}{12.99}} = \frac{14.32 \text{ N}}{14.32 + 13.07}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}{12.99}} = \frac{14.32 \text{ N}}{12.32 \text{ N}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}{12.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}{12.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}{12.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}{12.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}{12.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}{12.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}{12.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}{12.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}{12.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}{13.99^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}{13.99^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.32 + 13.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.07^{2}}}$ $P = \sqrt{\frac{13.99^{2} \text{ N} + 13.07^{2}}} = \frac{14.32 \text{ N}}{14.07^{2}}}$		
$P = x = 13.99 N \qquad y = 3.07 N$ $P = \sqrt{13.99^{2}N + 13.07^{2}} = 14.32 N$ $+ 490 = 3.07 / 13.99 \qquad 0 = 12.37^{\circ}$ $F_{net} = mq_{x} = 14.32 - 7.9 = 49(4)$ $(9.82 = 49(9)) \qquad (9 = 14 m   s^{2})$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	
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Fret= $mqx = 14.32-7.5 = 49(a)$ $6.82 = 49(q)$ $q = 14 m   s^2$	$P = \sqrt{13.99^2 N + 13.07^2} = 14.32 N$	
$6.82 = 49(9)$ $(9 = 14 \text{ m/s}^2)$		
	49 49	
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