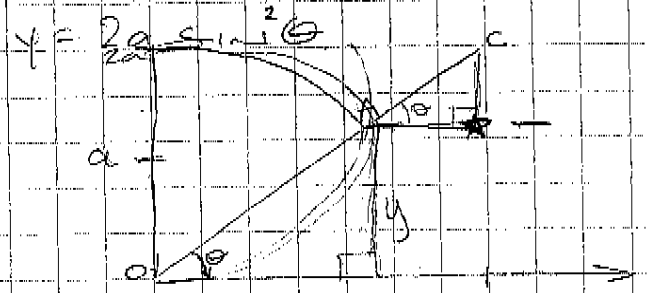
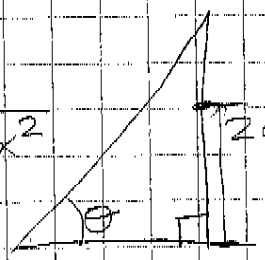
41 $x = 2a\frac{\cos\theta}{\sin\theta}$; $\sin\theta$ will always be and therefore cancel out $2a$ leaving us with the x coordinate of P

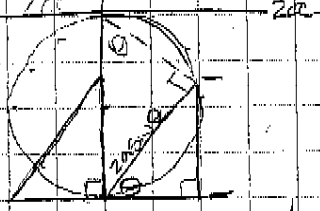
$y = 2a\sin^2\theta$

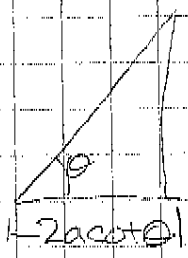


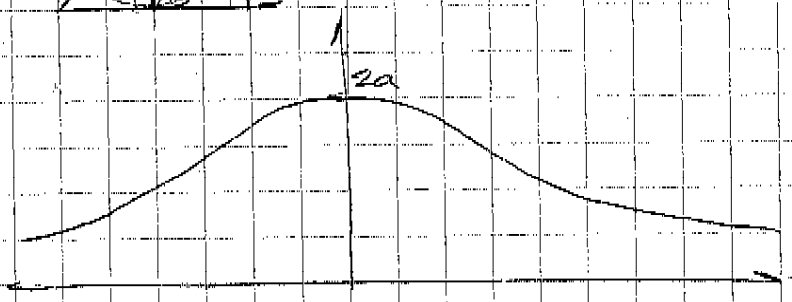
$\frac{2a}{OC} = \sin\theta$



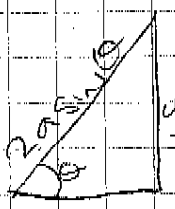
$\frac{x}{2a} = \cot\theta$ $\theta = \operatorname{arccot}\frac{x}{2a}$ $\sin\theta$







$\tan\theta = \frac{2a}{x}$ $x = 2a\cot\theta$



$\sin\theta = \frac{y}{2a\sin\theta}$ $y = 2a\sin^2\theta$

44a

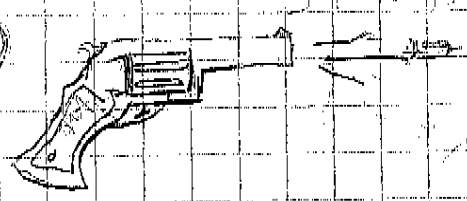


figure x = distance y = height

$x = (v\cos\alpha)t \qquad y = (v\sin\alpha)t - \frac{1}{2}gt^2$

$t = \frac{x}{v\cos\alpha}$

max height at vertex & when $y' = 0$ y coord.

x intercept other than 0, $y = 0$ what is x, plug in for t

$y = x\sin\alpha\left(\frac{x}{v\cos\alpha}\right) - \frac{1}{2}g\left(\frac{x}{v\cos\alpha}\right)^2$

$y = x\tan\alpha - \frac{gx^2}{2v^2\cos^2\alpha}$

$y' = \tan\alpha - \frac{gx}{v^2\cos^2\alpha}$

$y = \frac{x}{\cos\alpha}\left(\sin\alpha - \frac{gx}{2v^2\cos\alpha}\right)$

when $\sin\alpha = \frac{gx}{2v^2\cos\alpha}$

when $\frac{2v^2\cos\alpha\sin\alpha}{g} = x$

time bullet hits the ground

when $t = \frac{2v^2\cos\alpha\sin\alpha}{g}\cdot\frac{1}{v\cos\alpha} = \frac{2v\sin\alpha}{g} = \frac{2(500)\sin 30^\circ}{9.8} \approx 51.02$

distance from gun at ground impact

$x = \frac{2(500)^2\cos 30^\circ\sin 30^\circ}{9.8} \approx 22,092.48$ m

max height should be @ x ≈ 11,046.24 m

max height: $y' = 0$ when $\tan\alpha = \frac{gx}{v^2\cos^2\alpha}$

$\tan\alpha\left(\frac{v^2\cos^2\alpha}{g}\right) = x$

$\frac{\sin\alpha\, v^2\cos\alpha}{g} = x$

$\frac{\sin 30^\circ (500^2)\cos 30^\circ}{9.8} \approx 11,046.24$ m

$y = \frac{\sin 30^\circ (500^2)\cos 30^\circ}{9.8}$

$\frac{t}{500\cos 30^\circ} = \frac{\sin 30^\circ (500)}{9.8} \approx 25.5\text{ s} = t$

NEXT PG.

4.4 cont.

$\therefore y = (500)\sin 30(25.5) - \frac{1}{2}(9.8)(25.5^2) \approx 3,188.98$ m

c) $y = \tan 30°(x) - \frac{9.8}{2(500^2)\cos^2 30°}(x^2)$

* $c = -5$

(4.6) $x = 2ct - 4t^3$ CUBIC

$y = 3t^4 - ct^2$ QUAD

c testing for c

-5 $x = -10t - 4t^3$

$y = 3t^4 + 5t^2$

-1 $x = -2t - 4t^3$

$y = 3t^4 + t^2$

0 $x = -4t^3$

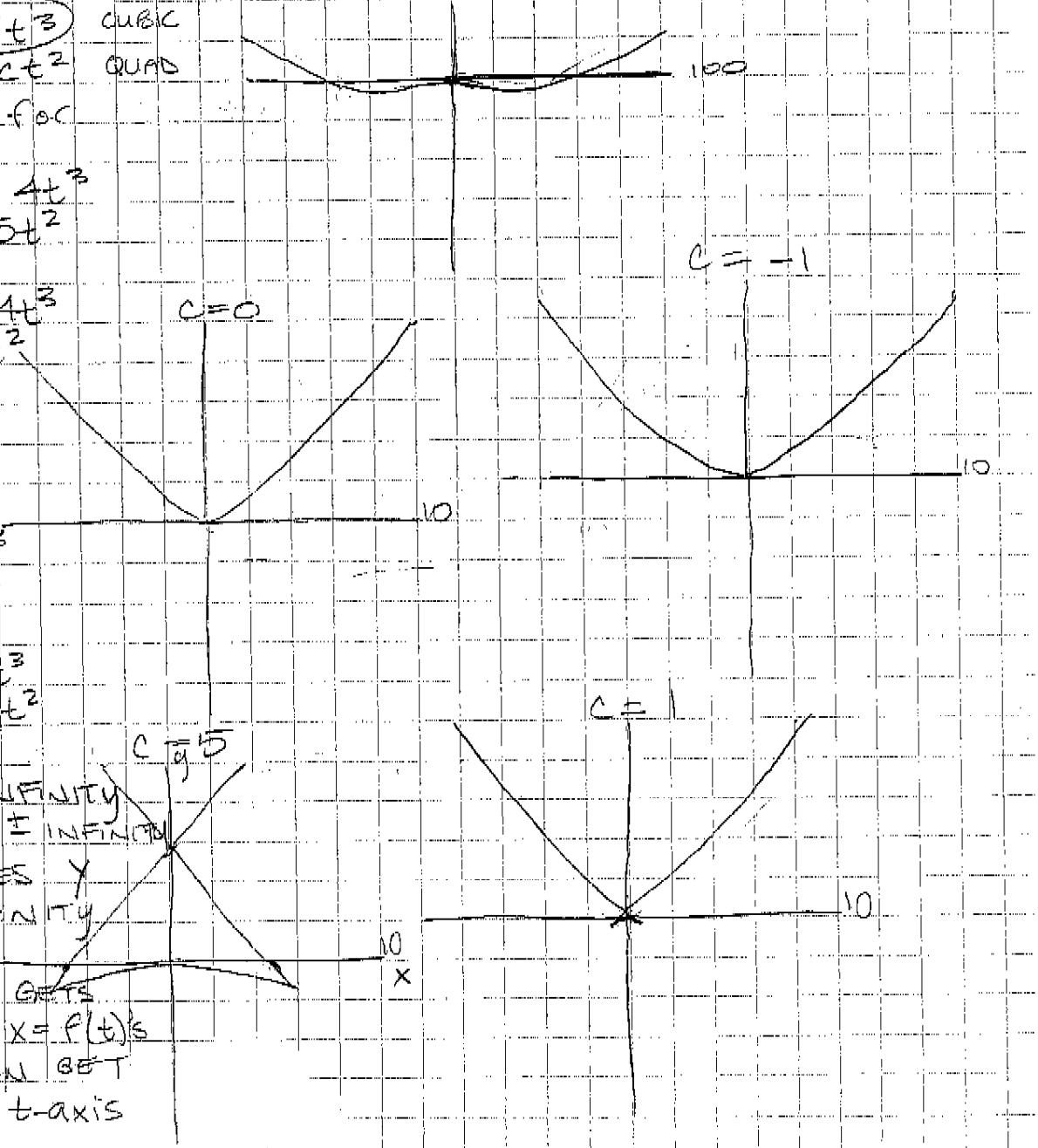
$y = 3t^4$

1 $x = 2t - 4t^3$

$y = 3t^4 - t^2$

5 $x = 10t - 4t^3$

$y = 3t^4 - 5t^2$



Y GOES TO INFINITY AS X GOES TO ± INFINITY AS C INCREASES Y GOES TO INFINITY FASTER, AND THE TRIANGLE GETS BIGGER, AS X = f(t)'s local max & MIN GET FURTHER FROM t-axis