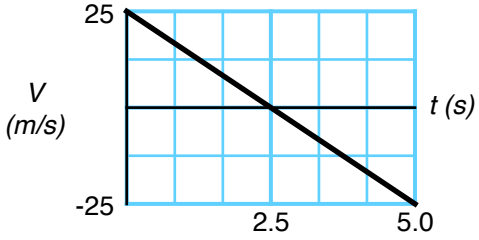
NAME: KEY

Ball Toss Graph Problems

1. The velocity as a function of time for a ball tossed up is shown. What was the maximum height of the ball?



From Graph!

$v_i = 25$ m/s

$t_1 = 2.5$ s (to max height)

$t_2 = 5.0$ s (total time in air)

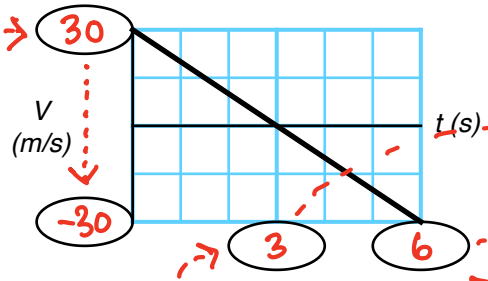
$Y = \frac{1}{2}at^2 + v_i t$

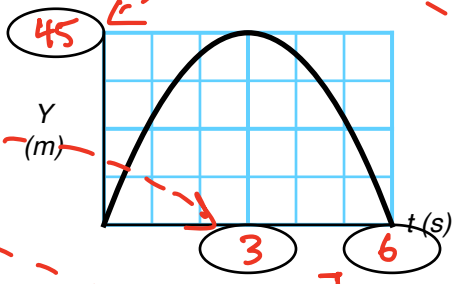
$Y = \frac{1}{2}(-10)(2.5)^2 + (25)(2.5)$

$Y = -31.25 + 62.50$

$Y = 31.25$ m

2. A rock is thrown straight up with a velocity of 30 m/s. Fill in the missing variables. Show your work below.





$v_i = 30$ m/s

$a = -10$ m/s^2

① $v = at + v_i$

$0 = -10t + 30$

$t = 3$ s

② So total time $= 3 + 3 = 6$ s

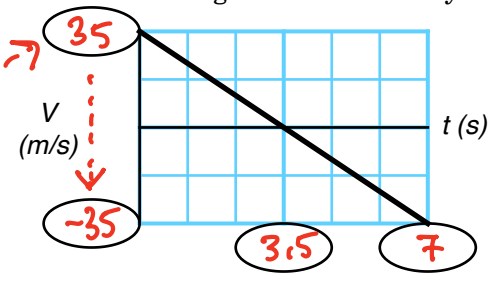
③ $Y = \frac{1}{2}at^2 + v_i t$

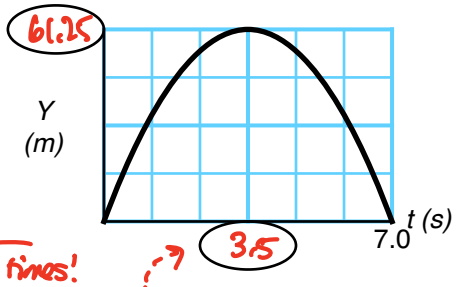
$Y = \frac{1}{2}(-10)(3)^2 + (30)(3)$

$Y = -45 + 90$

$Y = 45$ m

3. Fill in the missing variables. Show your work below.





Same times!

$a = -10$ m/s^2

t (total) $= 7.0$ s

① Since total time = 7 seconds, time to max height = $7/2$

② Since $v = 0$ @ Max Height

$v = at + v_i$

$0 = -10(3.5) + v_i$

$v_i = 35$ m/s

③ $Y = \frac{1}{2}at^2 + v_i t$

$= \frac{1}{2}(-10)(3.5)^2 + (35)(3.5)$

$= -61.25 + 122.5$

$= 61.25$ m

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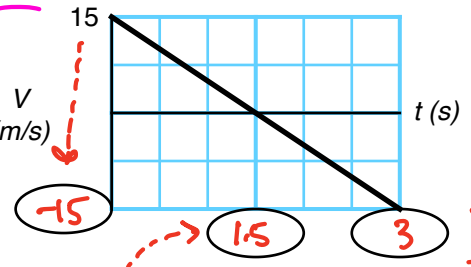
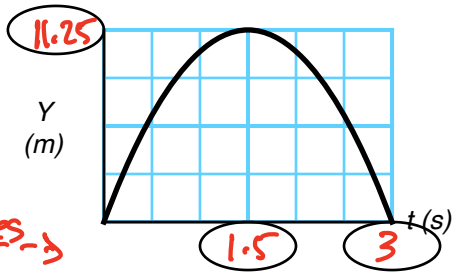
4. Fill in the missing variables. Show your work below.





$V_i = 15$ m/s

$a = -10$ m/s^2

① $V = 0$ @ max height

$V = at + V_i$

$0 = -10t + 15$

$t = 1.5$ s

② So total time $= 1.5 + 1.5 = 3$ s

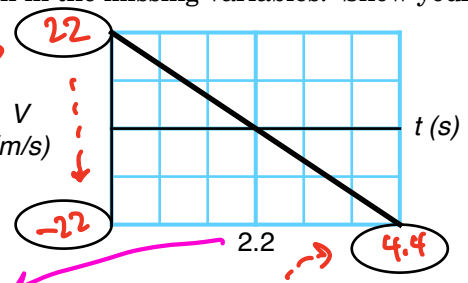
③ $Y = \frac{1}{2}at^2 + V_i t$

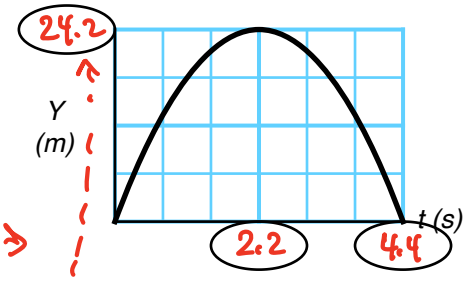
$= \frac{1}{2}(-10)(1.5)^2 + (15)(1.5)$

$= -11.25 + 22.5$

$Y = 11.25$ m

5. Fill in the missing variables. Show your work below.





$a = -10$ m/s^2

t to top $= 2.2$ s

① So total time $= 2.2 + 2.2 = 4.4$ s

② $V = at + V_i$

$0 = -10(2.2) + V_i$

$V_i = 22$ m/s

③ $Y = \frac{1}{2}at^2 + V_i t$

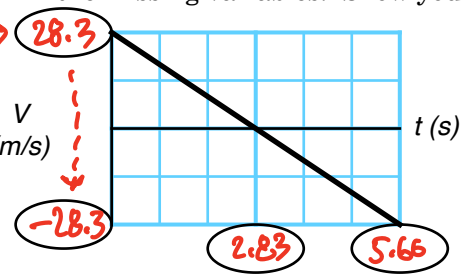
$= \frac{1}{2}(-10)(2.2)^2 + (22)(2.2)$

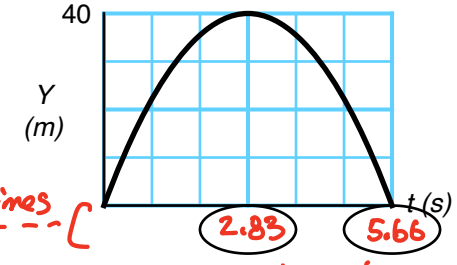
$= -24.2 + 48.4$

$= 24.2$ m

6. Fill in the missing variables. Show your work below.

This one is tricky!





Max Height = 40m

$a = -10$ m/s^2

② Since $v = 0$ @ max height.

$V = at + V_i$

$0 = -10(2.83) + V_i$

$V_i = 28.3$ m/s

① Since time up = time down, ask yourself an easier question! If some dropped from 40 m up, how long would it take to fall?

So $V_i = 0$ m/s $Y = -40$m $a = -10$ m/s^2

$Y = \frac{1}{2}at^2 + V_i t \rightarrow -40 = \frac{1}{2}(-10)t^2 + (0)t$

$-40 = -5t^2$

$t^2 = 8$

$t = 2.83$ seconds

So time up = 2.83

& total time $= 2.83 + 2.83 = 5.66$

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Answers:

1. a)