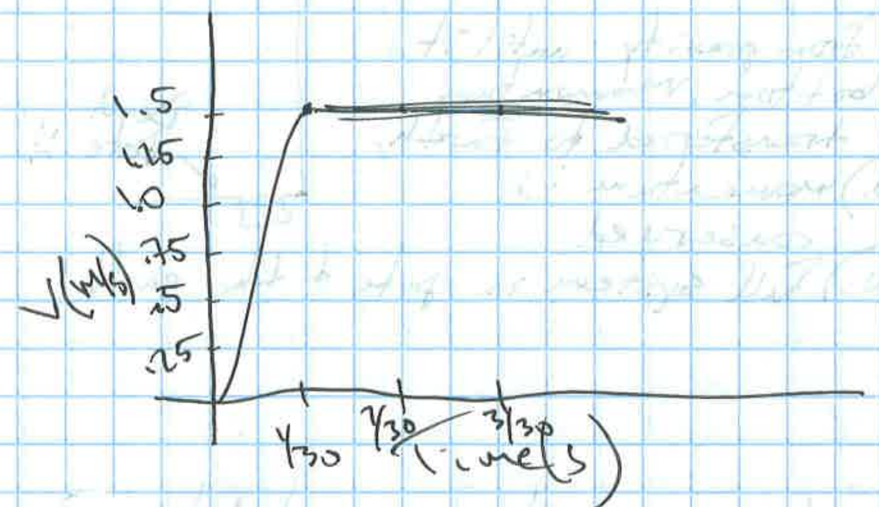
25 #2

1.) Rocket has large acceleration when it takes off
- Acceleration lowers after it takes off
- The propellant is still applying a force on the rocket

$1.5\,m / (1/30)\,s \rightarrow 45\,m/s^2 \rightarrow$ I would die

Constant speed → 1/30 sec



2) a) $.2\,m/s^2$ ~~1000~~ $1\,m/s \,/\, 5\,s \rightarrow$ $\boxed{.2\,m/s^2}$

b) $F = ma$ $(1000\,kg)(.2\,m/s^2) \rightarrow$ $\boxed{F = 200 \text{ Newtons}}$

c.) $F = ma$ $(65\,kg)(10\,m/s^2) \rightarrow$ $\boxed{F = 650 \text{ Newtons}}$

d.) This makes sense

e.) $P = \Delta E/\Delta t = \frac{F\Delta x}{\Delta t} = \frac{ma\Delta x}{\Delta t} = \frac{(1000\,kg)(.2\,m/s^2)(1\,m)}{5\,s}$ $\boxed{40\,J}$

3.) Energy is conserved; however, some kinetic energy was transferred into heat

4) ~~Cart B on~~ $2m_B = m_a$ $\quad 3v_B = v_a$

$KE = \frac{1}{2}mv^2$ $\quad \frac{1}{2}m_a v_a^2 = \frac{1}{2}2m_B(3v_B)^2$

$2 \cdot 9$

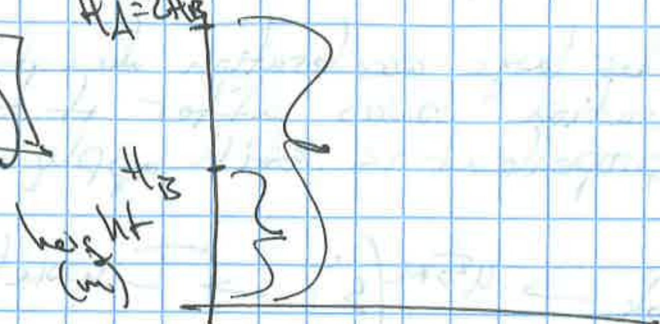
18

$\boxed{18 \text{ to } 1}$

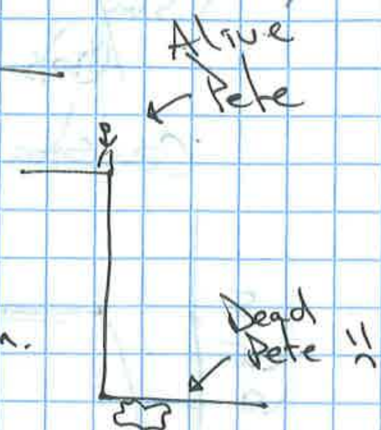
5.) Energy lens, because deals with potential & kinetic.

5.) $mgh = \frac{1}{2} mv$

$$v_{fA} = \sqrt{2}\,(v_{fB})$$



6.) a) $p = mv$ $m_0 = m_f = 60\text{ kg}$
$v_0 = 0\text{ m/s}$



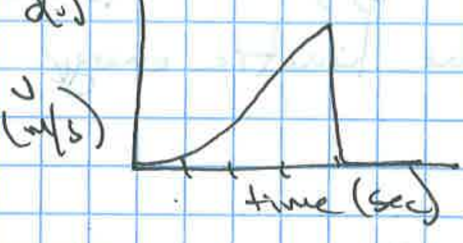
i.) velocity ↑ due to acceleration from gravity until it
ii.) goes to zero at the bottom. Momentum increased and is then transferred to Earth.
iii.)

iv.) momentum is conserved
v.) Full system is pete & the earth

b) i.) Initially, there is potential energy. then converted to
ii.) kinetic energy. At the end there is only thermal energy from collision w/ Earth
iii.) Energy is conserved. Potential Energy is accounted for as kinetic then thermal energy.

c) i.) Gravity is the force acting on Pete.
ii.) Earth & Pete are the two bodies of concern. Pete's momentum was transferred to Earth. The effect on Earth is negligable.

d.)



7) a) Momentum is building up due to velocity increasing
- energy is being converted from Potential to Kinetic.
- Forces from Earth (gravity) are acting on box
- Box is being displaced over time

b) Energy is the best lens

c) $PE = KE \rightarrow mgh = \frac{1}{2}mv^2 \rightarrow 10\ m/s^2 (60m) = \frac{1}{2}(v^2)$

$v = \sqrt{(2)(10\ m/s^2)(60m)} \rightarrow v_f = \sqrt{1200\ m^2/s^2} \rightarrow \boxed{v_f = 34.6\ m/s}$

d.) Track "A" for Fastest Acceleration is highest on track A at the end ~~for~~ due to steep decline.

e.) Track C

f.) Track B

10.) a) Impulse of club transfers momentum to ball

b) ~~At the bottom.~~ Momentum imparted to ball from club is greater at bottom.

c.) I don't understand this question

d.) the ball is stationary until the club transfers energy & momentum to balls

e.) The ~~club~~ club probably wasn't touching the ball

f.) 1 m/s

g.) 50 m/s

h.) club slows down. Using energy lens, club's KE is being transferred to golf ball

i.) 10 : 1

j.) 1/1000th of a second

k.) $F = ma = (.5\ kg)(5\ m/s^2) = \boxed{\sim 2.5\ kg\ m/s^2}$

l.) $P = E/\Delta t = F\Delta x/\Delta t = (2.5\ kg\ m/s^2)(100\ m/s) \rightarrow \boxed{P = 250\ J}$