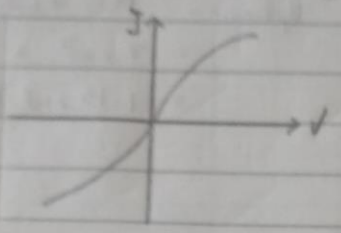
Sept 17 Pp 1

1a i) current ii) Resistance iii) Voltage

b. i) as long as all other physical quantities are kept constant.

ii) 


iii) shape of graph is not a straight line, ∴ the filament lamp does not obey Ohm's Law.

c. $I = ?$ $V = 240\ V$ $R = 0.05\ k\Omega = 50\ \Omega$

$V = IR$

$240 = I(50)$

$I = 240/50 = 4.8\ A$

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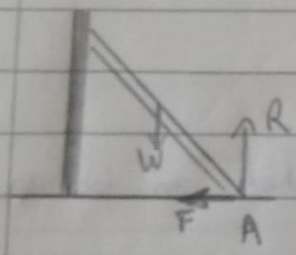
2. a. vector, size, direction.

b. $m_{ladder} = 12\ kg$.

i) $W = mg = 12 \times 10 = 120\ N$.

ii) 


iii) R increases.

ci) on diagram.

ii) smaller

iii) moving the ladder closer to the wall, so that the distance between W + A decreases.

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3a. $m_{raft} = 2.3 \times 10^6$ kg.
$RF = 9 \times 10^7$ N

RF $9 \times 10^7$ N ↑ Upthrust
↓ $W = 2.3 \times 10^7$ N

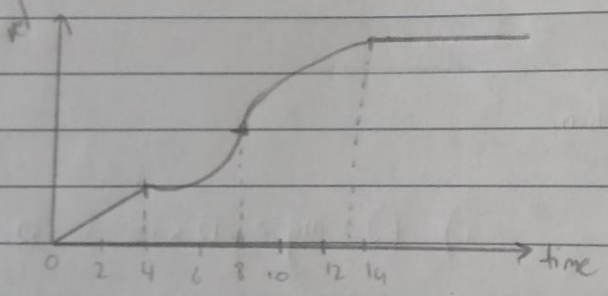
$W = mg = 2.3 \times 10^6 \times 10 = 2.3 \times 10^7$ N.

b. $RF = \text{Upthrust} - W \Rightarrow \text{Upthrust} = RF + W$
$= 9 \times 10^7 + 2.3 \times 10^7$
$= 1.13 \times 10^8$ N.

c. $F = ma$
$9 \times 10^7 = a \times 2.3 \times 10^6$
$a = 9 \times 10^7 / 2.3 \times 10^6 = 39 \text{ m/s}^2$

d. Upthrust becomes equal to weight, such that Resultant F = 0.

e.




f.) Find area under graph

15° = 535
570
605

4a. energy sources that never run out but which can be used over + over again.

b. wind energy, geothermal energy.

? ci. av. yearly $I_{rm}$ 15° = 535 J/, $I_{rm}$ 30° = 570 J/, for 55° = 605 J/. ∴ area easy to read is best at angle 30°

cii. Eff = 22%. $\text{Eff} = \frac{\text{En. Out}}{\text{Eng In}} \times 100\%$

$22 = \frac{\text{Energy Out.}}{(660 \times 6)} \times 100$

max Energy at 30°

$\frac{87120}{100} = \text{Energy out}$

En. Out = Electrical Energy = 871.2 J. each second

d. No power station is needed for solar energy.

5. a. Isotope is an atom of the same element, having the same proton no. but a different mass no.

b i) on graph paper.

ii) 5730 years

iii) 6000 yrs = 20 boxes

? = 9.5 boxes

$(6000 \times 9.5) \div 20 = 2850$ years

iv) $34380 \div 5730$

= 6 half lives.

100 ÷ 2 = 50 | 12.5 ÷ 2 = 6.25

50 ÷ 2 = 25 | 6.25 ÷ 2 = 3.125

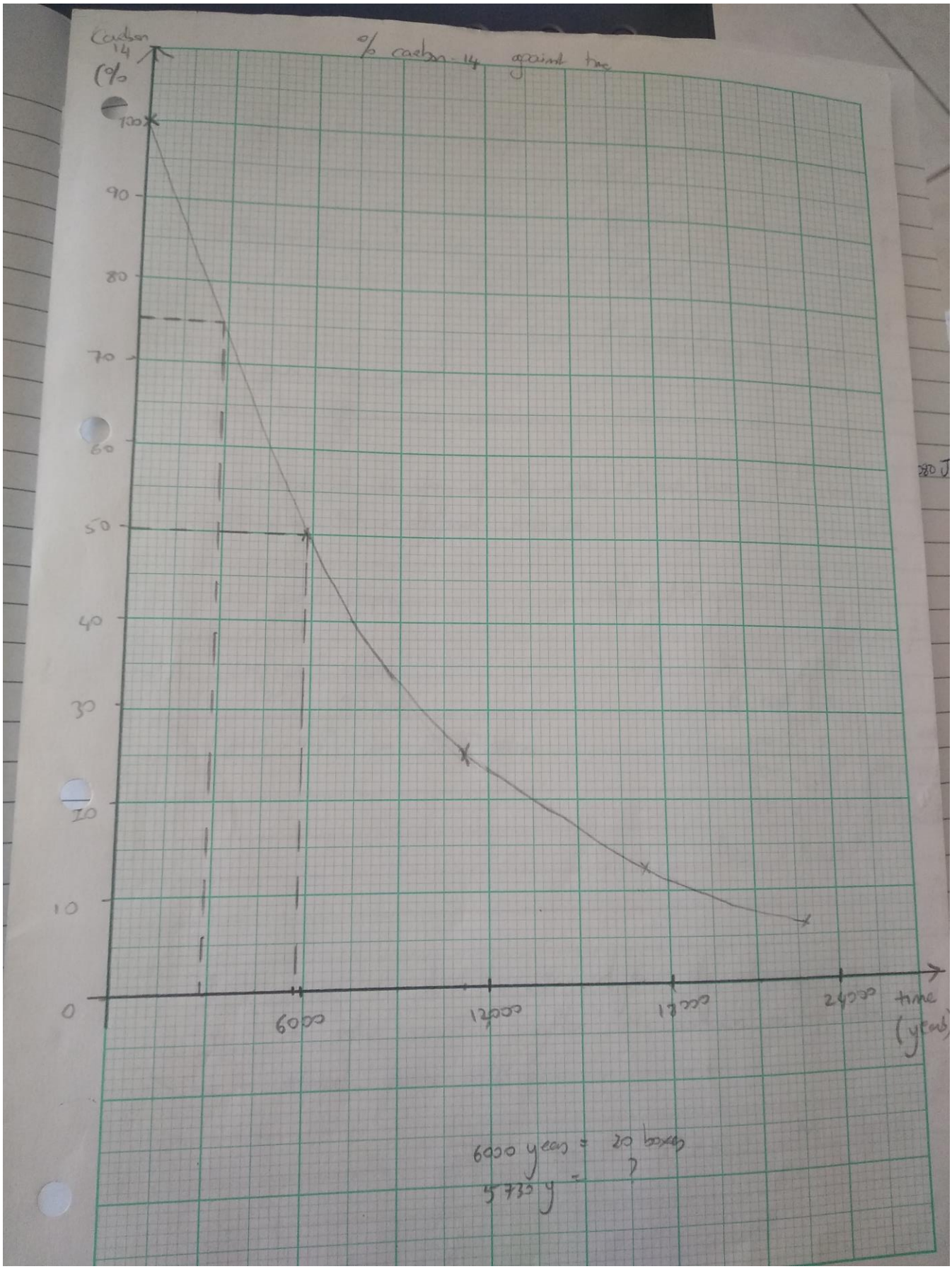
25 ÷ 2 = 12.5 | 3.125 ÷ 2 = 1.5625

Ans 1.5625%.

6. i) In a collision, the total momentum before the collision is equal to the total momentum after the collision, as long as there are no external forces acting.

ii) 0

iii) t. initial mom. : $mv = M \times 6 = 6M$ kg m/s


% carbon-14 against time
Carbon 14 (%
100
90
80
70
60
50
40
30
20
10
0
6000
12000
18000
24000
time (years)
6000 years = 20 boxes
5730 y = ?

ii. t. mom. bef = t. mom. aft

$(5 \times 8) \times 3 = M \times 6$

$\frac{120}{6} = M$

$M = 20\ kg.$

iv) total mass = 20

$m_{empty} = 8$

$\therefore m_{goods} = 20 - 8$

$= 12\ kg.$

bi) $F = ma$

ii) Since there was a change in velocity, there must have been an external force acting on the goods, hence breaking them.

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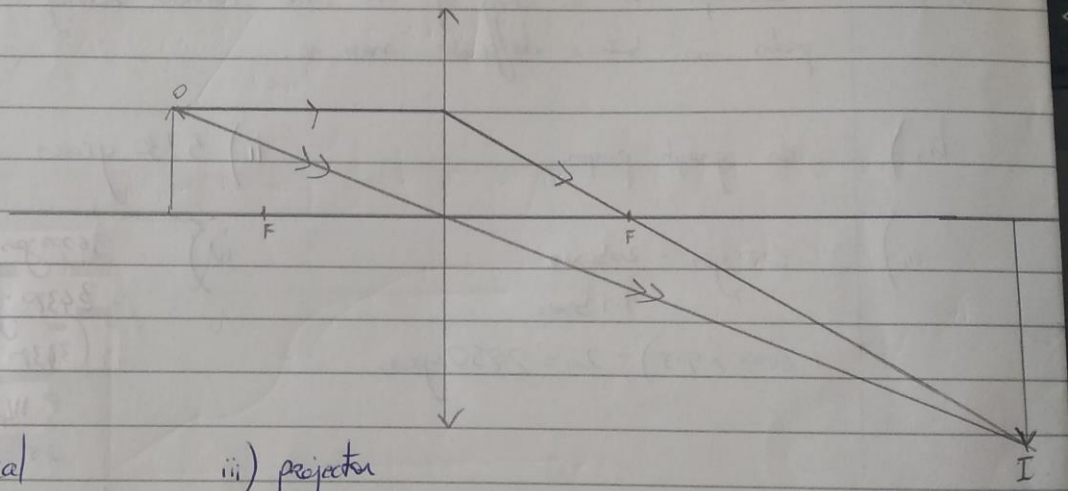
7a. i)




ii) Real

iii) projector

iv) h.o. =

h.i. =

v) $m_p = \frac{h_i}{h_o} = \frac{3.6}{1.8} = 2$

bi) Refraction

ii) instead of bending inwards to meet, the rays will move away

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8 a. chemical → wire → heat & light

b. electricity will not flow since rubber is not a good conductor of electricity ∴ light bulb will not light up

c i. $P = 14.4\,W$, $V = 240\,V$, $I = ?$

$P = IV$

$14.4 = I \times 240$

$I = \frac{14.4}{240} = 0.06\,A$

ii. $E = QV$ ∴ $E = VIt = 240 \times 0.06 \times 43200 = 622,080\,J$

$Q = It$

$t = 12\,hrs \times 60 \times 60 = 43200\,s$

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9 a i. For an elastic material, F applied is directly ∝ extension, so long as the elastic limit is not exceeded.

ii. extension → (be less/is more) than 10mm

length of unloaded spring → longer than before.

b i. centre of gravity

i. the weight of the ruler is passing through this point.

ii. F → ext

1N → 10mm $\quad \frac{5 \times 1}{10} = 0.5N$

? → 5mm

iv) since balanced

$C_{mom} = G_{mom}$

$\frac{1}{2} \times 0.5 = 0.5 \times W$

$\frac{1 \times 0.5}{0.5} = W$

$W = 1N$

a. Andromeda Galaxy

b. year = $365\frac{1}{4}$ days $\times 24 \times 60 \times 60 = 31557600$ sec.

$$\text{speed} = \frac{s}{t}$$

$$3 \times 10^8 = \frac{s}{31557600}$$

$$\therefore s = 9.47 \times 10^{15}\ m$$

c. telescope

d. the Sun is a star and Earth rotates around the sun, but the moon is a natural satellite which rotates around the Earth.

e. the gravitational pull that Earth has on it and its velocity (inertia)

f. benefit of space research: economic growth, better communication using satellites, understanding the weather, creating jobs in technology