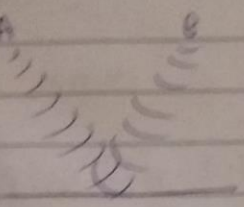
September 19 Pg 28

1a. transverse, e.g. (light waves, perpendicular, at 90), energy, longitudinal, parallel

bi.



bii. $s = 40m$. speed $= s/t$

speed $= 1500 m/s$

t_{A-B}

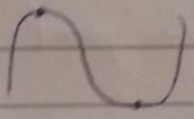
$1500 = (40 \times 2)/t$

$t = 80/1500 = 0.053$ sec.

(biii) sonar to find fish (biv) 20,000Hz

c. $5 m/s$

1 wave every 4 s



$v = f\lambda$ but $f = 1/T$

and T is time for 1 wave

$\therefore v = \lambda/T$

But we need ½ a wavelength

$\therefore 20 - 2 = 10m$

(since crest to trough, not crest to crest)

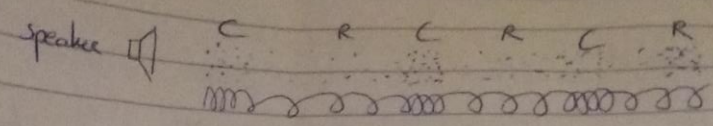
$5 = \lambda/4$

$\lambda = 20 m$

d. drum → low pitch → low freq → very loud → high amplitude

violin → high pitched → high freq → not loud → low ampl

c.



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2. a. A = ~~electron~~ neutron, B = neutron, C = electron (since A + C are charged)

(a)(ii) nucleon (b) (i) T, (ii) F, (iii) T

c) i. the β particle same emit radiation, the radiation passes through the sheet material and is detected by detector.
if reading is equal to the ~~paper~~ required count rate, then thickness is correct.
if reading is less, then sheet is thick + needs adjustment.
if reading is greater, then sheet is thin and needs adjustment.

ii. Too thick → less count rate is recorded by detector
since less radiation passed + more radiation was stopped

iii. rollers feel the thin sheet by the detector, ∴ the pressure will automatically decrease, in order to increase the thickness of the sheet.

iv. α is stopped by almost anything (even a few cm of air)
and γ penetrates through anything (even a thick layer of le

v - so that it does not need to be replaced very often
- safer to use due to not being too ionising as α.

vi. glass.

d. chemotherapy for cancer patients

3ai. $E = ?$ $E = mc(\Delta\theta)$

$c = 4200\ J/kg°C$ $E = 1.5 \times 4200 \times 85$

$\Delta\theta = 100 - 15 = 85°$ $E = 535,500\ J$

$m = 1.5kg$

ii. $P = 2000\ W$ $P = E/t$ $2000 = \frac{535,500}{t}$

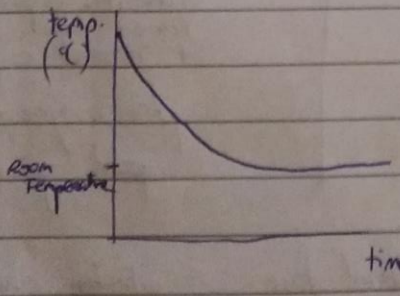
$t = ?$

$t = 535500 / 2000 = 268\ s$

ii. There will always be some energy losses, ∴ it takes longer since more energy needs to be supplied.

b 4, 2, 5, 1, 3

c. Stir the water in the cups to make sure the temperature is even in all parts of the cup.

d. 

(e i.) Since C is darker, than it is a good emitter of heat, so by radiation it gives off heat faster, cooling down faster. ∴ B remains hotter than C.

ii) A has a smaller base area compared to B. ∴ less heat losses by conduction from the bottom part, touching the surface.

(c.ii) 1) has a lid, ∴ it stops heat losses by convection also, there is no air space between cup & surface, since air is not a very good conductor of heat, heat losses by conduction to surface are minimised as decreased.

4 a. material of the surface, inclination of the slope.

b. since energy is neither created nor destroyed, but it is transformed to other forms of energy and assuming no energy losses occur, PE lost = KE gained, ∴ PE at A = KE at O.

c. PE lost : KE gained
PE = KE
$mgh = \frac{1}{2}mv^2$
$\frac{2mgh}{m} = v^2$
$v^2 = 2gh$
$v = \sqrt{2gh}$

d. - Set up apparatus as shown
- Let the trolley go + record the braking distance with a ruler.
- alter the speed of trolley (change inclination of slope) + repeat experiment
- plot a graph of speed against braking s.

e. if pushed, there will be an external force, ∴ extraction changes
also, you cannot ensure that you are using the same push every time.

f.i. speed proportional to braking distance since as speed increases, braking distance increases

(f i) B.D. of 0.83 m, from table gives a speed of 1.38 m/s

$\therefore KE = \frac{1}{2}mv^2 = \frac{1}{2} \times 0.21 \times 1.38^2 = 0.19996\ J$

(f ii) PE lost = KE gained

$\therefore mgh = \frac{1}{2}mv^2$

$mgh = 0.19996$

$0.21 \times 10 \times h = 0.19996$

$h = 0.095\ m.$

(g) Use an electromagnet to release trolley to ensure that no external forces are introduced.

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5. (a i) steel since it is a hard material

(ii) N → S

(iii) into the paper

(iv) R.H. grip rule

(v) ←, using Fleming's L.H. Rule

(vi) increasing the current
stronger magnet

(v) greater

(b. i) when magnet is moved towards the coil, the magnetic lines of flux are cut by coil, ∴ induces a current.

(ii) - moving coil with a faster speed
- more turns around coil

(iii) needle deflects right, needle deflects left, no deflection.

iv. bicycle wheels turns, magnet rotates, ∴ magnetic field lines are cut by coil, ∴ current is induced, ∴ lamp lights up.