Sept 19 Pp.28

1a. 4, 5, 2, 1, 3

b. car is released not pushed ; same inclination for each surface, same car for each test

(ci) polished tiles (ii) they provide the least friction, ∴ braking distance increases

di. $u = 0.5\ m/s$
$s = 0.05m$
$v = 0$
$dec = acc = ?$

$v^2 = u^2 + 2as$
$0 = (0.5)^2 + 2(a)(0.05)$
$\frac{-0.25}{0.1} = a$
$a = -2.5\ m/s^2$
∴ dec = $2.5\ m/s^2$

dii $a = \frac{v-u}{t}$
$-2.5 = \frac{0-0.5}{t}$
$t = \frac{-0.5}{-2.5} = 0.2s$

(iii) faster speed, longer / bigger braking distance

(ei.) thinking distance (ii) lack of concentration
use of alcohol.
poor eyesight

(iii) 30 - 22 = 8m.

(iv) speed = $\frac{\text{thinking dist}}{\text{thinking time}} = \frac{8}{0.4} = 20\ m/s$

2a.) m = 70kg Pressure is the force per unit area
A = 0.04m²

ii) P = F/A = 70×9 / 0.04 = 17,500 Pa

iii) Fatboll shoes have a smaller A, ∴ P increases since P ∝ A, ∴ more grip

b. i. P = hfg = 30 × 1025 × 10 = 307,500 Pa

ii. T. P = 307,500 + 101,000 = 408,500 Pa.

ii. Since as bubble rises, pressure on the outside of bubble decreases, ∴ volume increases since difference between inner & outer pressure decreases.

(c.i.) $\zeta_{moon} = \zeta_{moon}$

$(Fxs)_{both\ pistons} = (Fxs)_{water}$

$20 \times 0.4 = 0.1 \times F$

F = 80 N.

(ii) $P = \frac{F}{A} = \frac{80}{0.00004}$

P = 2,000,000 Pa

(iii) 2,000,000 Pa

(iv) P = F/A

$2000000 = F / 1 \times 10^{-4}$

F = 200N

(v) oil is nearly incompressible

(vi) the brakes will not work properly since the air pockets will interfere with the hydraulic system

3. ai background radiation

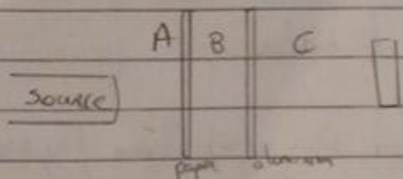
ii. cosmic rays, building material

b.i protons 27, neutrons 60 - 27 = 33, electrons 27

ii. electron, negative charge

iii. - β is stopped by a thin sheet of aluminium while γ is only slowed down by a thick wall of lead.
- β can ionise but γ does low ionisation.

iv



- Set up apparatus as shown
- Read count rate before source is released - background radiation
- Read count rate with GM tube at A, at B and at C.
- Reading A should be same as Reading B. Since β is not stopped by paper. Moreover, Reading C should be less than A + B, since β is stopped by aluminium. Moreover C should be the background radiation only.

ci. isotopes are atoms of the same element, having the same proton no. but a different mass no.

ii. half life is the time taken for the atoms of a radioactive substance to decay by ½.

iii. half life 5600 yrs, ∴ 11200 yrs = 2 half lives
1g ÷ 2 = 0.5g
0.5g ÷ 2 = 0.25g

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4. a. solids:
tightly packed next to each other, pushing against each other but vibrate about each, fixed but remain in their same position.
gases:
particles far apart randomly. Very strong forces, moving around haphazardly.

(b.i) A - thermometer, B - heater,

(ii) top pan balance

(iii.)

(iv) foam / gable / wool

(v) to stop heat losses by conduction

(vi) greater than.

(vii) the space between thermometer + block is to be filled with glycerin to avoid heat losses by convection.

c. i. as water evaporates, it reduces the K.E. of the particles on the body, ∴ temperature falls.

ii the rate of evaporation is proportional to surface area
∴ if surface area ↑ (wider), then evaporation happens fa

iii. C of sand is less than C of water.

iv. C of sea is very big, ∴ it takes long to heat up because it requires more energy to heat 1kg by 1°C. but it also takes longer to cool down.
On the other hand C of sand is less than that of water. ∴ it heats up quickly but cools quickly as well.

5a. i A: magnet, B: solenoid, C: centre-zero galvanometer.

ii. as magnet is moved towards solenoid, magnetic field lines are cut, inducing a current in the circuit, ∴ pointer deflects

iii. the pointer deflects in the opposite direction., since there is a change in direction of the magnetic field

iv - faster movement of magnet - increase no. of turns in solenoid

v. generation of electricity, such as to light a bulb on a bicycle.

(bi.) step-down. (i.) transformer for a laptop charger

(iii) because iron is a soft magnetic material.

(iv) $\frac{N_p}{N_s} = \frac{V_p}{V_s}$ $V_s = 250V$.

$\frac{2300}{1400} = \frac{240}{V_s}$.

v. $P = IV = 1.5 \times 2300 = 3450\ W$

Assuming 100% efficiency: $3450\ W = I(250)$

$I = 3450 / 250 = 13.8\ A$

vi. Because some energy is lost.

vii. Faraday's law states that the size of the emf induced is directly $\propto$ to the rate of change of magnetic flux.