bab 2 : daya & gerakan I

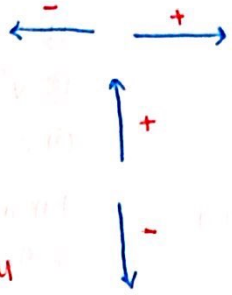
kuantiti skalar – magnitud

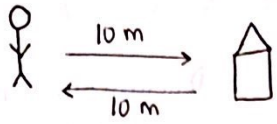
kuantiti vektor – magnitud & arah

* Laju, $v = \frac{d}{t}$ (ms^{-1}) — d: jarak

* Halaju, $v = \frac{s}{t}$ (ms^{-1}) — s: sesaran

* Pecutan, $a = \frac{v-u}{t}$ (ms^{-2}) — v−u: perubahan halaju



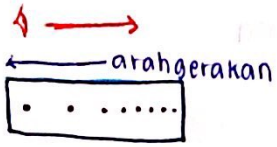


jarak = 10 + 10 = 20m #

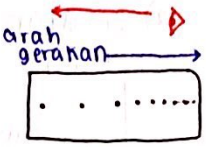
sesaran = 10 + (-10) = 0m #

pita detik

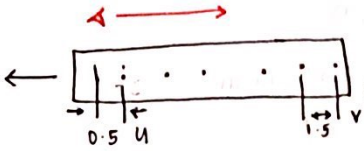
1 detik : masa bagi 2 titik bertentangan



- halaju berkurang
- nyahpecutan



- halaju bertambah
- pecutan



Hitung pecutan

① $f = \frac{1}{T}$

$T = \frac{1}{f}$

$T = \frac{1}{50}$

$T = 0.02s$

② $a = \frac{v-u}{t}$

③ $u = \frac{s}{t}$

$= \frac{0.5}{0.02}$

$= 25 cms^{-1}$

④ $v = \frac{1.5}{0.02}$

$= 75 cms^{-1}$

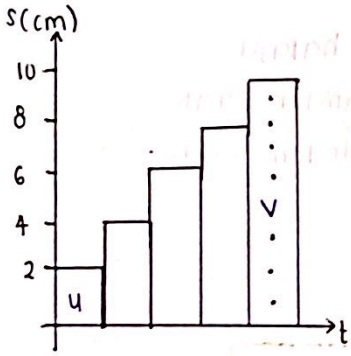
⑤ $t = 0.02 \times 5$

$= 0.1s$

⑥ $a = \frac{v-u}{t}$

$= \frac{75-25}{0.1}$

$= 500 cms^{-2}$ #



f = 50Hz

Setiap keratan ada 10 detik.

Hitung pecutan

1) $T = 0.02s$

2) $a = \frac{v-u}{t}$

3) $u = \frac{s}{t}$

$= \frac{2}{0.02(10)}$

$= 10 cms^{-1}$

4) $v = \frac{10}{0.02(10)}$

$= 50 cms^{-1}$

5) $t = 4 \times (0.02)(10)$

$= 0.8s$

6) $a = \frac{50-10}{0.8}$

$= 50 cms^{-2}$ #

pecutan : halaju bertambah

nyahpecutan : halaju berkurang

↳ pecutan negatif

halaju negatif : bertentangan arah

formula gerakan linear

① $v = u + at$

② $v^2 = u^2 + 2as$

③ $s = ut + \frac{1}{2}at^2$

④ $s = \frac{1}{2}(u + v)t$

① keluarkan semua info yg anda

② pilih formula yg sesuai

jatuh bebas

① $v = u + gt$

② $v^2 = u^2 + 2gs$

③ $s = ut + \frac{1}{2}gt^2$

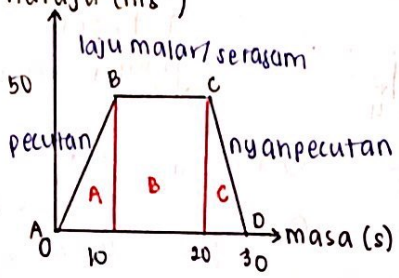
tukar a kepada g,
$g = 9.81\ ms^{-2}$

↑ -g
o
↓ +g

FAKTOR YG MEMPENGARUHI
① luas permukaan
② rintangan udara

graf gerakan

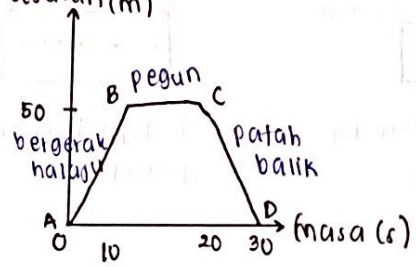
1) halaju vs masa



kecerunan, m = pecutan

luas bwh graf = jumlah jarak A + B + C

2) sesaran vs masa



kecerunan, m = halaju

laju purata = $\frac{\text{jumlah jarak}}{\text{jumlah masa}}$

inersia

kecenderungan sesuatu objek u kekal pegun / bergerak dgn halaju seragam jika tiada daya luar diberi

jisim ↑, inersia ↑

- Hukum Gerakan Newton Pertama

momentum

$p = mv$ → halaju

momentum, jisim (kgms⁻¹)

prinsip keabadian momentum

$mu = mv$ → momentum akhir

momentum awal

① kenyal (& melekat) $m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$

② tak kenyal (melekat) $m_1u_1 + m_2u_2 = (m_1 + m_2)v$

③ letupan $-m_1v_1 = m_2v_2$

Impuls

$Ft = mv - mu$

perubahan momentum

Ns = kgms⁻¹

daya impuls

$F = \frac{mv - mu}{t}$

kadar perubahan momentum

$F \propto \frac{1}{t}$ ↑↓

bab 3 : kegravitian...

hukum kegravitian semesta newton

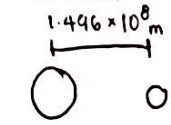
$F_g = \frac{G m_1 m_2}{r^2}$

- m_1, m_2 : jisim jasad
- F_g : daya graviti
- G : pemalar kegravitian
- r : jarak dari pusat

① $F_g \propto m_1 m_2$

② $F_g \propto \frac{1}{r^2}$

contoh :



Hitung daya graviti matahari ke atas bumi.

$[m_{matahari} = 2 \times 10^{30} kg]$

$[m_{bumi} = 6 \times 10^{24} kg]$

$F_g = \frac{G(2\times10^{30})(6\times10^{24})}{(1.496\times10^{8})^2}$

$F_g = 358 \times 10^{28} N$ #

pecutan graviti

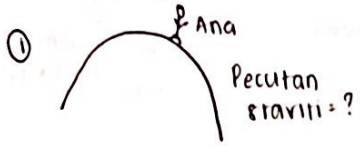
$F = \frac{G m_1 m_2}{r^2}$

$F = \left| m_1 \right| \frac{G m_2}{r^2}$

$F = \left| m \right| a$

$g = \frac{Gm}{r^2}$

- g : pecutan graviti
- m : jasad yg menarik
- r : jarak dari pusat



$r_{bumi} = 6.37 \times 10^6 m$

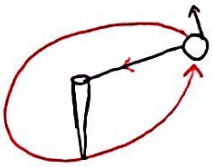
$m_{bumi} = 5.97 \times 10^{24} kg$

$m_{Ana} = 46 kg$

$g = \frac{G(5.97\times10^{24})}{(6.37\times10^{6})^2}$

$= 9.81 ms^{-2}$ #

daya memusat



v (laju linear)

- daya yg diperlukan o satu jasad berjisim yg kekal dlm gerakan membulat.

$F = \frac{mv^2}{r}$

- m : jisim objek
- v : laju linear
- r : jejari

$G = \frac{v^2}{r}$ — pecutan memusat

$F = \left| m \right| \frac{v^2}{r}$

$F = \left| m \right| a$

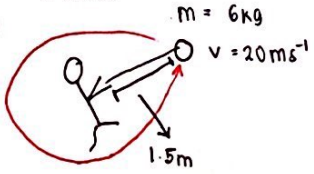
$v = \frac{2\pi r}{t}$

- v : laju linear
- r : circumference
- t : masa

OBJEK.

contoh :

1)



PLANET.

a) hitung daya memusat

$F = \frac{mv^2}{r}$

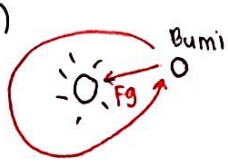
$= \frac{(6)(20)^2}{1.5} = 1600 N$

b) hitung pecutan memusat

$a = \frac{v^2}{r}$

$= \frac{(20)^2}{1.5} = 266.67 ms^{-2}$ #

2)



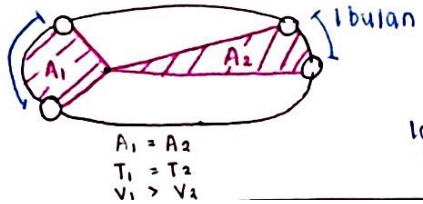
daya graviti = daya memusat

$\frac{Gm_1m_2}{r^2} = \frac{mv^2}{r}$

$\frac{Gm}{r} = v^2$

$v = \sqrt{\frac{Gm}{r}}$

- laju linear
- m : jisim apa yg ditarik



hukum Kepler III

$T^2 \propto r^3$

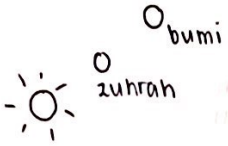
- kuasa dua tempoh adalah berkadar terus dengan kuasa tiga jejari orbitnya

banding

$$\frac{T_1^2}{r_1^3} = \frac{T_2^2}{r_2^3}$$

sorang²

$$T^2 = \frac{4\pi^2}{Gm} r^3$$

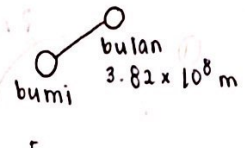


jarak bumi dari matahari $= 1.5 \times 10^8$ km

zuhrah = 225 hari

hitung jarak zuhrah

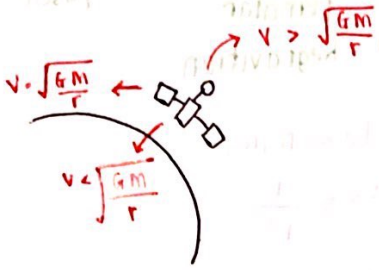
$$\frac{(365)^2}{(15\times10^{11})^3_m} = \frac{(225)^2}{r_z^3}$$



$$\begin{bmatrix} m_{bumi} = 5.98 \times 10^{24}\,kg \\ m_{bulan} = 7.35 \times 10^{22}\,kg \end{bmatrix}$$

hitung tempoh bulan mengelilingi bumi

halaju satelit



halaju lepas

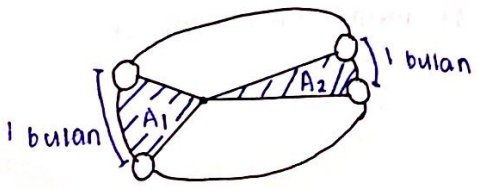
- halaju minimum yg diperlukan u menentang daya graviti dan terlepas ke angkasa.

$$v = \sqrt{\frac{2GM}{r}}$$

hukum Kepler I

- orbit bagi setiap planet ialah berbentuk elips.
- matahari berada pada salah satu daripada fokusnya.

hukum kepler II



$A_1 = A_2$

$T_1 = T_2$

$V_1 > V_2$

bab 4 : haba...

* haba : satu bentuk tenaga
* suhu : pengukuran panas / sejuk suatu bahan
* berpindah dari panas → sejuk

keseimbangan terma

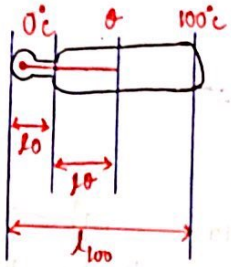
cawan = 80°c

tangan = 20°c

cawan	tangan	
80°c	20°c	60
70°c	30°c	40
60°c	40°c	20
50°c	50°c	0

1) kadar pemindahan haba (berah / sifar)
2) suhu pada 2 permukaan yg bersentuhan adalah sama

termometer



$$T_\theta = \frac{l_\theta - l_0}{l_{100} - l_0} \times 100°c$$

$$T_\theta = \frac{l_\theta}{l_{100}} \times 100°c$$

muatan haba tentu (mht)

muatan haba	muatan haba tentu
-jum. haba yg diperlukan u meningkatkan suhu sebanyak 1°c sesuatu objek tanpa mengubah bentuknya	-jum. tenaga haba yg diperlukan u meningkatkan suhu 1kg objek sebanyak 1°c tanpa mengubah bentuknya
-cth: *panas: enjin *panas: kuali	-lain bahan lain nilai MHT

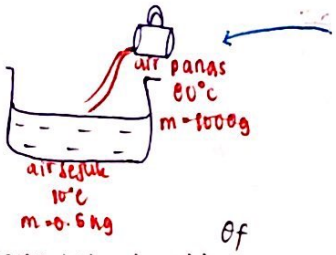
formula:

$Q = mc\theta$ → perubahan suhu

Q: tenaga haba (J); m: jisim; c: MHT ($Jkg^{-1}°c^{-1}$)

2) $Q = Pt$ → masa; P: kuasa (W)

3) $Pt = mc\theta$



Berapakah suhu akhir campuran?

heat loss = heat gain

$-Q = Q$

$-mc\theta = mc\theta$

$-1(\theta f - 80) = (0.5)(\theta f - 10)$

haba pendam tentu (HPT)

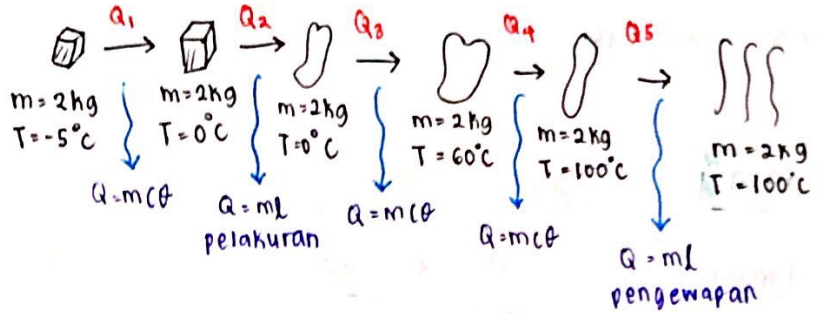
- jumlah haba yg diperlukan u mengubah 1kg bentuk bahan tanpa mengubah suhunya.
- formula:

$Q = ml$ (HPT: Jkg^{-1}; m: jisim)

MHT	HPT
-suhu berubah	- bentuk berubah
-bentuk x berubah	- suhu tak berubah

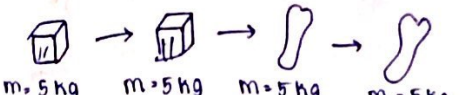
berg's law

perjalanan hidup seketul ais



contoh soalan :

hitung jumlah haba ū menukarkan 5kg ais pada -3°C menjadi air pada 60°C.



$Q_1 = mc\theta$ $Q_2 = mL$ $Q_3 = mc\theta$

jumlah haba = $Q_1 + Q_2 + Q_3$

[MHT ais = 2100
MHT air = 4200
HPT air = 3.36×10^5]

hukum gas

$P_1V_1 = P_2V_2$

BOYLE

P — tekanan

V — isipadu

suhu T

GAY LUSSAC (tekanan)

$\frac{P_1}{T_1} = \frac{P_2}{T_2}$

CHARLES

$\frac{V_1}{T_1} = \frac{V_2}{T_2}$

°C → K

+273

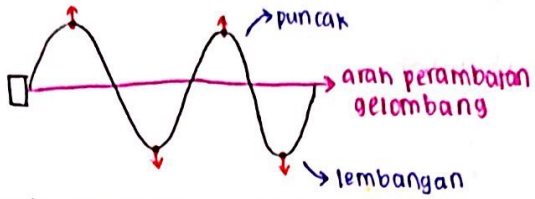
kPa → Pa

$\times 10^3$

bab 5 : GELOMBANG...

jenis gelombang

1) melintang

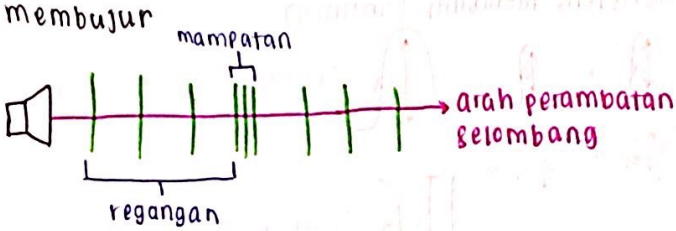


- arah perambatan gelombang adalah **berserenjang** dengan arah pergerakan zarah.

contoh :

C A R
cahaya air radio

2) membujur

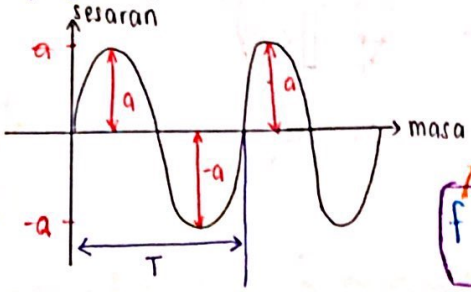


- arah perambatan gelombang adalah **selari** dengan arah pergerakan zarah.

cth: BUNYI.

jenis graf

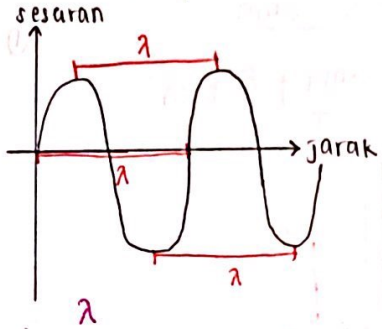
1) sesaran - masa



$f = \frac{1}{T}$ — frekuensi, ayunan persaat (Hz), tempoh

tempoh : masa yg diperlukan u satu ayunan lengkap

2) sesaran - jarak

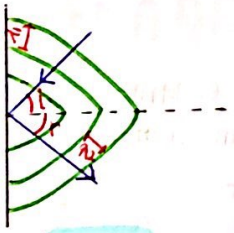


$v = f\lambda$ → panjang gelombang

λ

puncak → puncak
lembangan → lembangan
regangan → regangan
mampatan → mampatan
} membujur

pantulan gelombang

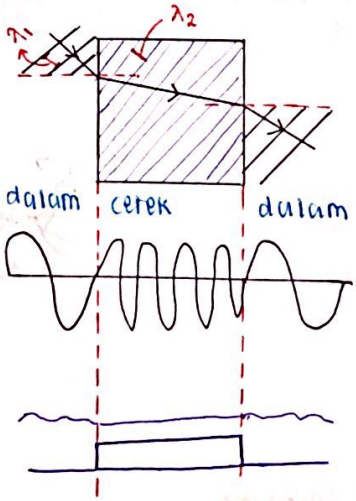


$i = r$

sudut tuju — sudut pantulan

berubah	x berubah
• arah	• f • λ • v • a • E

pembiasan gelombang



berubah	x berubah
• arah • λ • v	• f • a • E

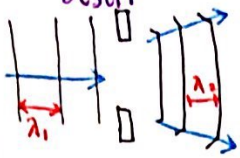
$f_1 = f_2$ $\quv = f\lambda$ $\quad f = \frac{v}{\lambda}$

$\frac{v_1}{\lambda_1} = \frac{v_2}{\lambda_2}$

pembelauan gelombang

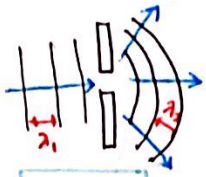
① celah

-besar



$\lambda_1 = \lambda_2$

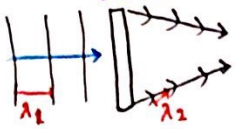
-kecil (lebih jelas) @ (ketara)



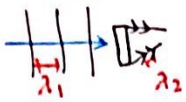
$\lambda_1 = \lambda_2$

② halangan

-besar



-kecil (lebih jelas) @ (ketara)

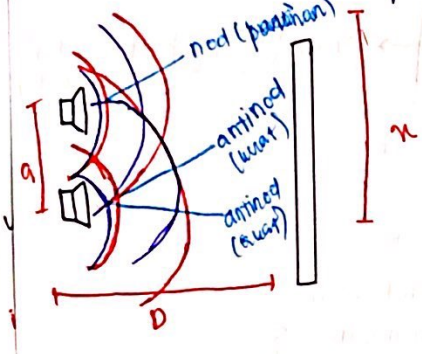


berubah	tak berubah
• a	• f
• E	• λ
	• v

interferens gelombang

- superposisi antara 2 gelombang yg berpunca dari sumber yg sama

koheren: sama f & fasa



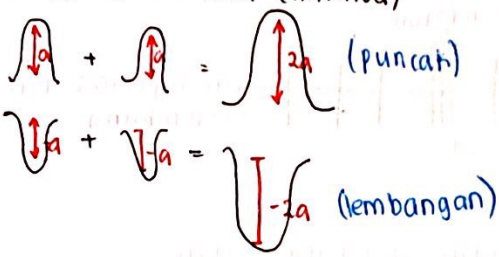
a = jarak antara 2 sumber

D = jarak antara sumber dgn skrin

x = jarak antara :
- antinod dgn antinod
- nod dgn nod

$$\lambda = \frac{ax}{D}$$

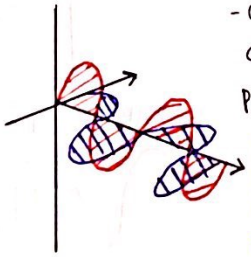
① interferens membina (antinod)



② interferens memusnah (nod

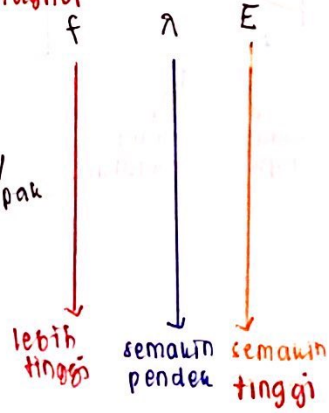
puncak + lembangan = _____

gelombang elektromagnet

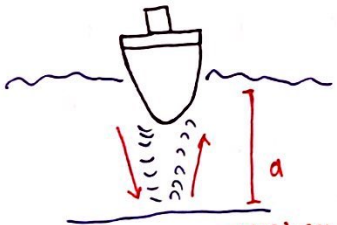


- arah perambatan medan elektrik adalah berserenjang dengan arah perambatan medan magnet

Real	radio
Madrid	mikro
Is	infrared
Visible	visible light / cahaya tampak
Under	ultraungu
Xabi	x-ray
Galonso	Gama



selamasa bunyi



$$d = \frac{vt}{2}$$

d → kedalaman / jarak

v → halaju gelombang

t → masa

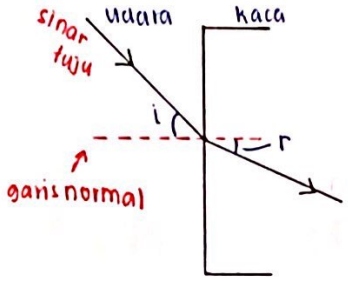
bab 6 : cahaya

pembiasan cahaya

- cahaya merambat melalui 2 medium berbeza ketumpatan optik dan arah perambatan cahaya berubah menyebabkan halaju berubah.

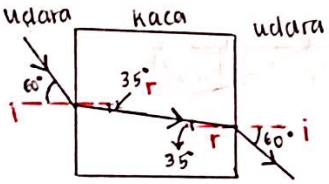
kurang tumpat → lebih tumpat
* mendekati garis normal

sentiasa di udara / kurg tumpat
i = sudut tuju
r = sudut biasan



$n = \frac{\sin i}{\sin r}$ ← indeks biasan

contoh :



hitung kedua² nilai indeks biasan

$n = \frac{\sin i}{\sin r}$

$= \frac{\sin 60°}{\sin 35°}$

$= 1.51$ #

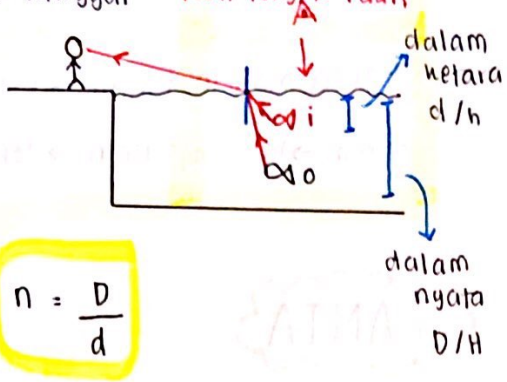
$n = \frac{c}{v}$ — c: laju cahaya dlm vakum $3.0 \times 10^8\ ms^{-1}$; v: laju cahaya dlm medium

$\downarrow v = \frac{c}{n \uparrow}$

udara → kaca
halaju cahaya berkurang

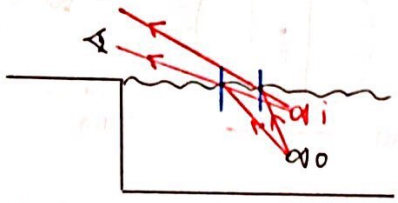
dalam nyata & dalam ketara

① sinar tunggal — ikan tengok paan



$n = \frac{D}{d}$

② double ray



bila sudut tuju melebihi sudut genting

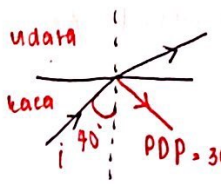
pantulan dalam penuh

pembiasan : kurang tumpat → lebih tumpat
PDP : lebih tumpat → kurang tumpat

$n = \frac{1}{\sin c}$ → sudut genting = apabila sudut tuju sama dengan sudut genting, cahaya terbias 90° pada permukaan medium

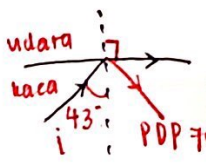
sudut tuju bila sudut biasan 90°

① i < C (window shopping)



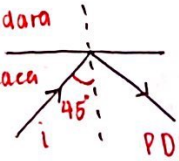
PDP = 30%

② i = C (tinted kereta)



PDP 70%

③ i > C



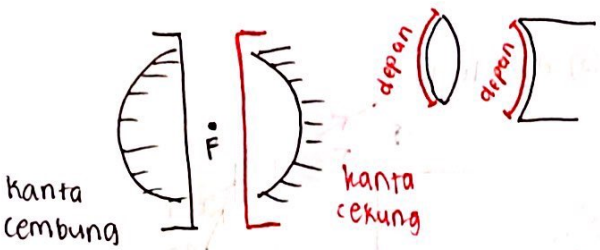
PDP 100%

imej maya : - tidak terbentuk di skrin
- imej tidak boleh diubah

imej nyata : - terbentuk di skrin
- imej boleh diubah

maya	nyata
kanta → depan	kanta → belakang
cermin → belakang	cermin → depan

KANTA



titik fokus - apabila cahaya dibiaskan / dipantulkan cahaya akan pergi ke titik ini dahulu

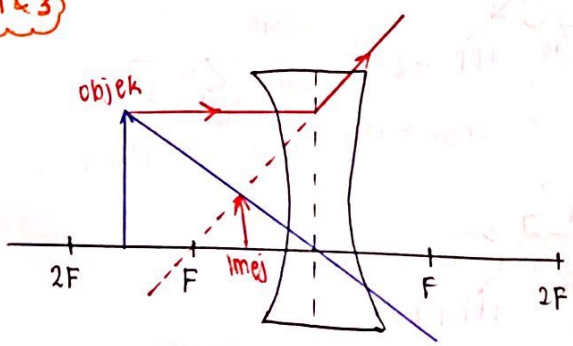
HUKUM KANTA
① → , F
② F , →
③ center , terus

cermin cembung = **kanta cekung**

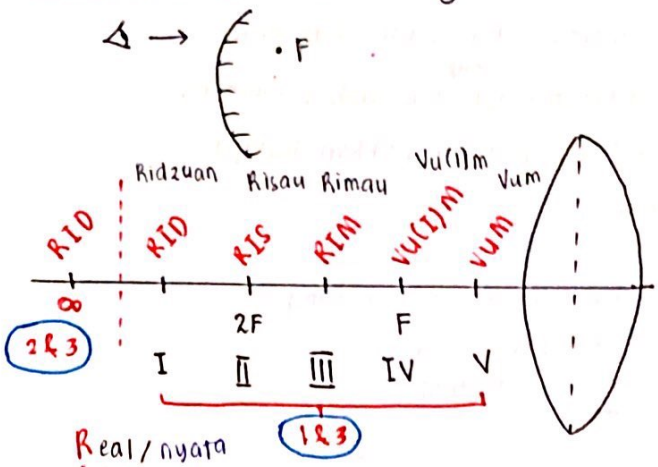
- dekat mana² pun objek, ciri² imej adalah sama

Virtual Maya
Upright Tegak
Diminished Kecil

1 & 3

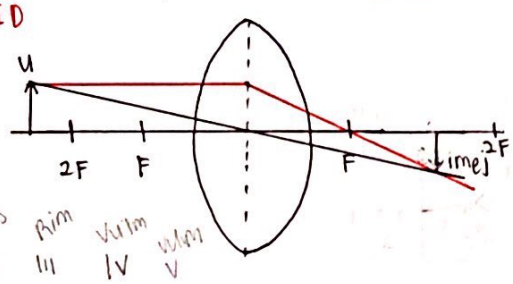


kanta cembung



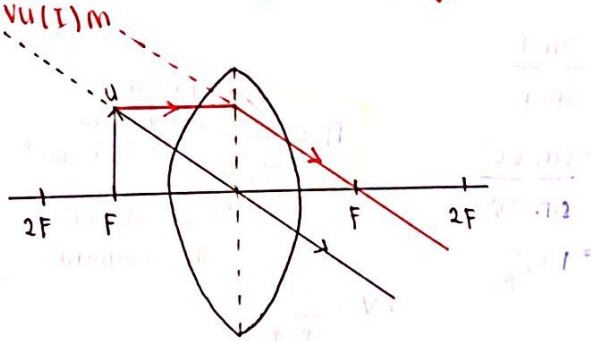
Real / nyata
Inverted / songsang
Diminished / kecil
Same size / sama saiz
Magnify / besar
Virtual / maya
Upright / tegak
Infinity / tidak terhingga

case I (u > 2f)
*RID



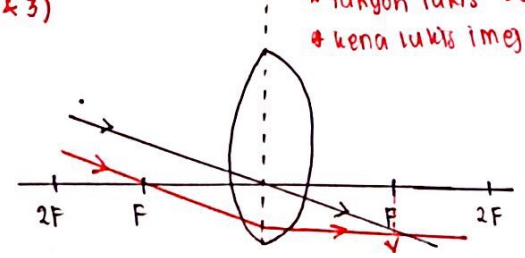
Rid Ris Rim Vu(I)m Vum
I II III IV V

Case IV (u = f) (takyoh lukis imej)
* Vu(I)m



case VI (u = ∞)
*RID
(2&3)

V = image
* takyoh lukis objek
* kena lukis imej di F



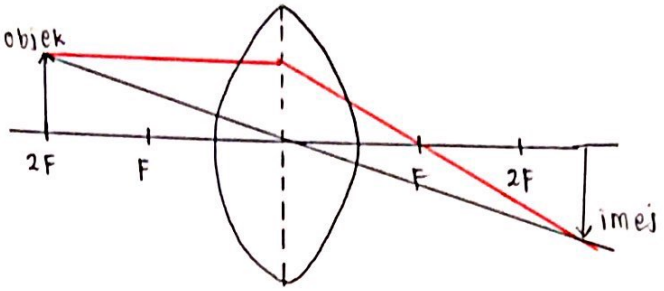
pantulan cahaya

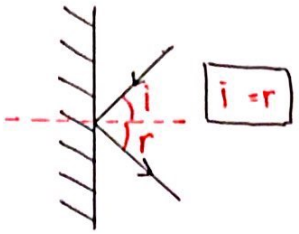
* cermin satah

case II ($u = 2F$)

(1&3)

R I S



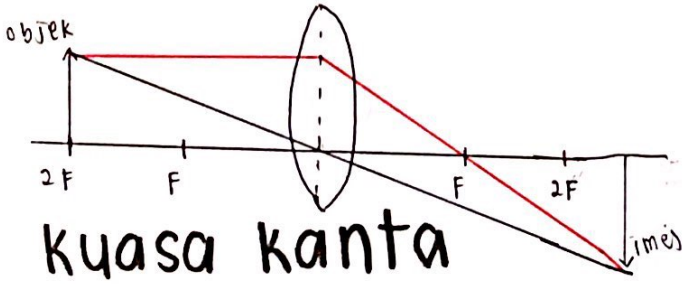


ciri² imej cermin satah

1) maya
2) tegak
3) sama saiz
4) sama jarak
5) songsang sisi

case III ($2F > u > F$)

nyata
R' I M - membesar
songsang



kuasa kanta

$$P = \frac{1}{f}$$

P → kuasa kanta (diopter)

f → panjang fokus (m)

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

f → panjang fokus

u → jarak objek dari pusat kanta

v → jarak imej dari pusat kanta

u	+	+
v	maya + nyata −	−
f	+	−

contoh soalan:

v −
u +
f −

Objek diletakkan 30 cm (u) dari kanta cekung.

Panjang fokus (f) kanta cekung ialah 15 cm.

Tentukan kedudukan imej.

v = ?

f = −15 cm

u = +30 cm

v = −?

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

$$\frac{1}{-15} = \frac{1}{30} + \frac{1}{v}$$

$$\frac{1}{v} = \frac{-1}{15} - \frac{1}{30}$$

$$\frac{1}{v} = -\frac{1}{10}$$

$v = -10$ cm #