

PHYSICS

CLASS – X

CHAPTER – 2

izk'k dk viorz

REFRACTION OF LIGHT

izu 1- izk'k ds viorz lsvki D; k le> rsg

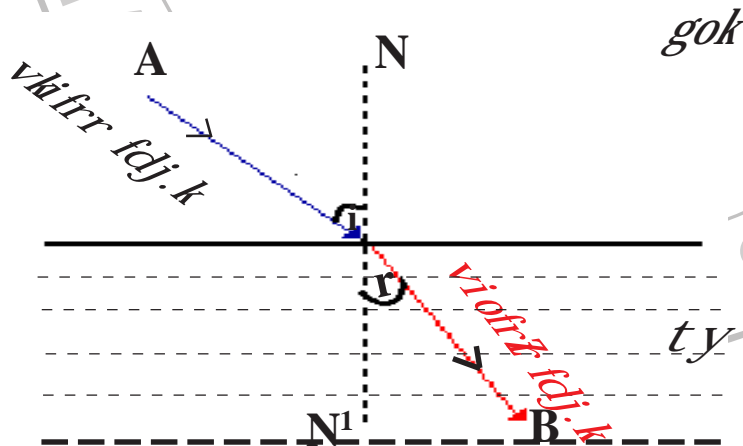
mukj & fdl hek; e lsl pkjr gkukyk izk'k tc, d ek; e lsnvjsek; e eais'k djrkgSrks izk'k dh fn'kk eai fvorz gkst krkg izk'k dh fn'kk eai fvorz dh; g ?kuk izk'k dk viorz dgykrh g

Rarer to Denser – yEc dh vly > qd tkrh g

Denser to rarer & yEc lsnvj gV tkrh g

vFkz~fojy lsl ?ku eatkusij yEc dh vly > qd tkrh g l ?ku lsl fojy eatkusij yEc lsnvj gV tkrh g

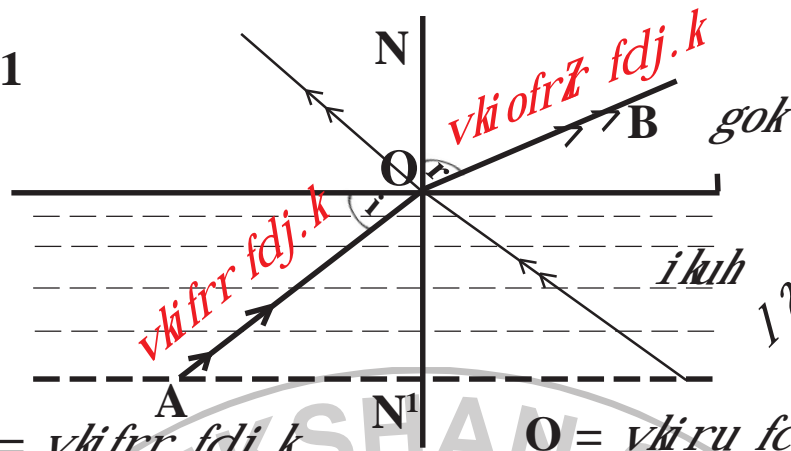
Q. No.-1



fojy lsl aku dh vly
çdk'k dk ox vf/kdre 1/2

fp=&1

Q. No.-1



AO = vki fr fdj. k

OB = vki ofr fdj. k

NN' = vki fr fdj. k

O = vki ru fcaq

<i = vki ru dsk

<r = vior dsk

fp=&1

izu 2-vior dsk; e dskfy/ld

vki fr fdj. k

Lus dsk; e dskfy/ld

mij & vior dsk; e g

(i) vki fr fdj. k vior dsk, oavki ru fcaqij Myk x; k yEc rhula, d ghry eaghs g

(ii) fdl h/ld ja dsizlk'k, oa/ld nksek; e dskfy, vki ru dsk dh T; k, oavior dsk dh T; k ea, d fuf'pr vuqkr gk'k g

$$\frac{\sin i}{\sin r} = 1 \text{ fu; rkd}$$

$$\frac{\sin i}{\sin r} = n_{21}$$

$$\frac{\sin i}{\sin r} = \frac{n_2}{n_1}$$

$$\boxed{n_1 \sin i = n_2 \sin r}$$

bl slus dsk; e dkl efer : i dgk tkrk g bl fu; e dh/ld 1621 bz easlus usdla

izu 3-vioržikal (Refractive Index) lsvki D; k l e> rsga

mŭkj & fdl h ekè; e eaiždk'k dh fdj. k dksfn 'kk cnyus dh {terk dks ml dk vioržikal dgrsga

vFlók

fdl h ekè; e dk vioržikal 'kk eaiždk'k dh phy (c) rFlk ml ekè; e eaiždk'k dh phy (v) ds vuqkr dks vioržikal dgrsga bl sn ; kµ ½; vl sl fpr fd; k t krk ga

fdl h ekè; e dk vioržikal = $\frac{\text{'kk eaiždk'k dh phy}}{\text{fdl h ekè; e eaiždk'k dh phy}}$

$$vFlkz \quad \boxed{n = \frac{c}{v}}$$

izu 4-vkišk d vioržikal (Relative Refractive Index) fdl s dgrsga

mŭkj & nkele; ekadsfujišk vioržikal ds vuqkr dks vkišk vioržikal dgrsga ekè; e&1 rFlk ekè; e&2 ds fujišk vioržikal n_1 , o an₂ gks rks ekè; e&2 dkele; e&1 dsl kišk vioržikal dks iž %n₂₁ lsfu: fir fd; k t krk ga

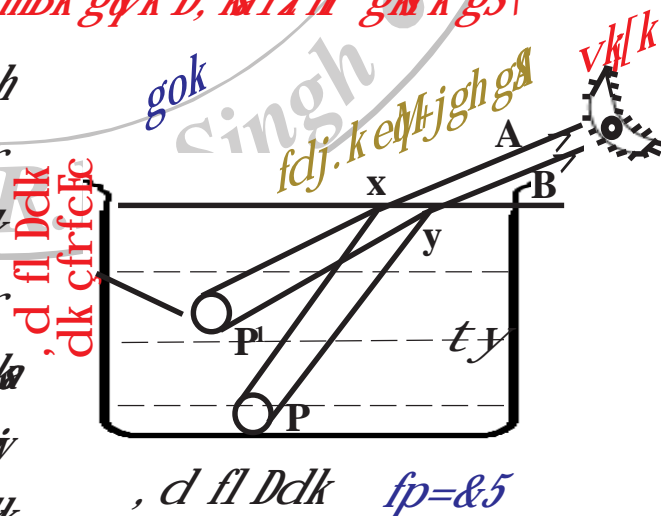
$$\boxed{n_{21} = \frac{n_2}{n_1}}$$

Okmu dlp - 1.52, fDya dlp - 1.65, i kuh - 1.33, glyk - 2.42

ulv & gok dk vioržikal l cl sde rFlk glyk dk l cl svf/kl gkrk ga

izu 5-ikuh eaj/lk gqk fl Ddk Aj mBk gqk D; k ižlr gkrk gs

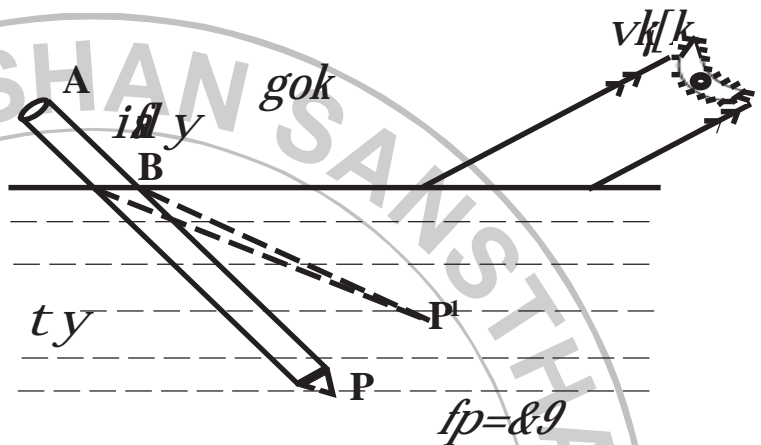
mŭkj & iždk'k ds viorž ds dky. k i kuh eaj/lk gqk fl Ddk Aj mBk gqk ižlr gkrk ga i kuh ds vaj crž eaf l Ddk dh fLFkr P gA rFlk PB nsvki fr fdj. lafudyrhga A rFlk B l s; sfdj. la ok qeavi ofrž gkrhga vfhyc l snjv gv t krhga D; la i kuh ok qdh višk l ?ku ekè; e gA ; snku > qdh fdj. la vk/k ij P fcagij vfhk h i frfcEc P'



ij nřkh t křh gř , d k iřlr gkrk gřfd i kuh eřfl Ddk dh okřrfod
fLEkrP' ij gřsysduP' ij fl Ddk dk vkřřd h fLEkr gřt kř l sřij
gř vr% i kuh eřj[kř x; k fl Ddk nřkusij dřN mBk gřk ekyř i Mřk
gř

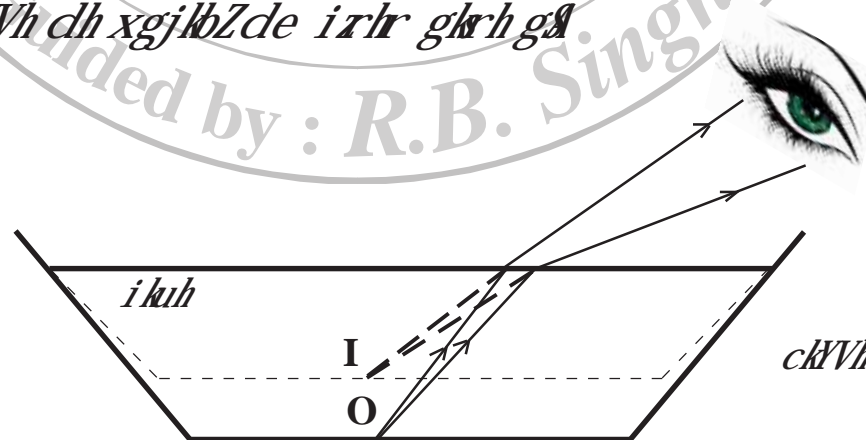
izu 6- i kuh dsvřj vlřkh Mřh gřZiřl y ; k dlp dh NM+Vsř h ekyř i Mřh gř
LoPN fp= řjk l e> křd

mřkj & i kuh eř vřkr% Mřh gřZ
iřl y vřřok dlp dh NM+
Vsř iřlr gkrh gř ; g
řWuk iřlk' k dsvřřř
ij vlřřřř gř iřlk' k
dh řdj. kř l řku eř; e
l sřojy eř; e dh vřj
pyřhgřřs; g vřřřřř l snřj gř t křh gř n' křl P řcřřřdh fLEkrP'
ij nřkrk gř vr% iřl y dsvřřs dk Nřj řřřřř řij mBk gřk řřřř
iřl y vřřřř l rg ij řřřřř Vsř řn[křk gř



izu 7- i kuh l sřřh cřVh dh xgřkbZde D; kř ekyř i Mřh gř

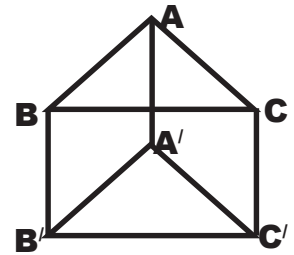
mřkj & i kuh l sřřh cřVh dh xgřkbZiřlk' k dsvřřřř dsvřřř. k de iřlr gkrh
gř i kuh l sřřh cřVh dsvřřř ij dh, d fl jko l svřřř řdj. kř i kuh
dh l rg ij gok eř vřřřřřř vřřřřř l snřj gř řdj vlřřř ij igřřř
gř ; řřřř. kř l svřřřřřř iřlr gkrh gř cřVh mřřř iřlr gkrh gř
vřřřř~cřVh dh xgřkbZde iřlr gkrh gř



fp= 2-10 i kuh l sřřh cřVh dh xgřkbZdk de iřlr gkrh

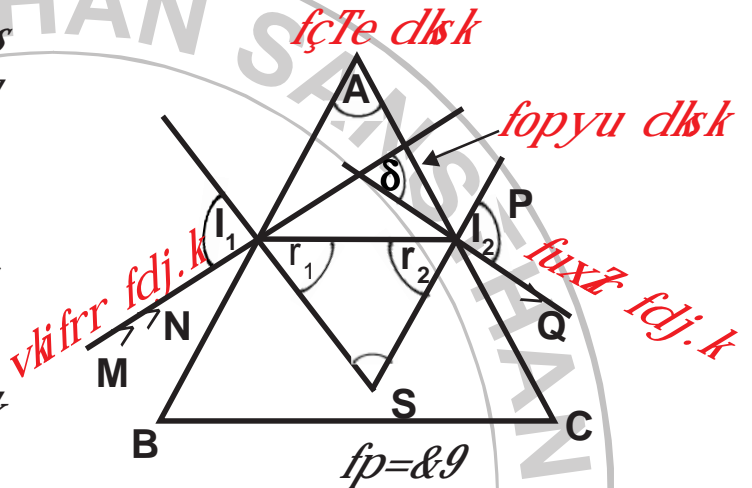
izu 8- fiŕe (Prism) lsvki D; k l e> rsgŕ

mŭkj & rhu Qydlŕl sf?kjsgq i kŭn'kŕl ekŕ; e dks fiŕe dgrsgŕ bl eadkŕZŕh Qyd, d& nŭjsdŕl ekukŕrj ugha gkrkŕ bl ea i k p l rgŕ gkrh gŕ ft l ea nks f=Hŕ kdkj, oarhu l rgŕ vk; rkdkj gkrh gŕ



izu 9-fiŕe lsgkŕj izk'k dsviorŕ dksfn/koarFlk l & kŕ o. kŕ dja

mŭkj & fp= ea ABC, d fiŕe gŕ <A dks fiŕe dk dks k dgrs gŕ bl e MN vki fr r fdj. k NP vifrŕ fdj. k rFlk PQ fuxŕ fdj. k gŕ l₁ viorŕ dks k rFlk l₂ fuxŕ dks k gŕ l₁ dkl ŕr viorŕ dks k r₁ rFlk l₂ dkl ŕr fuxŕ dks k r₂ gŕ



$$\angle i_1 + \angle i_2 = \angle A + \angle \delta$$

izu 10- fopyu dks k (Angle of Deviation) lsvki D; k l e> rsgŕ

mŭkj & izk'k dh fdj. k t c fiŕe lsgkŕj xŕ jr h gŕ rks vki fr r fdj. k, oa fuxŕ fdj. k ds ulps cus dks k dks fopyu dks k dgrsgŕ bl & (MVA) l sl fpr fd; k t krk gŕ

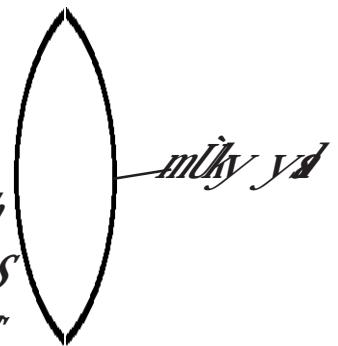
izu 11- yŕ fdl s dgrsgŕ; s fdrus izk'j ds gkrsgŕ i fHŕ'kr dja

mŭkj & nks Qydlŕl sf?kjsgq i kŭn'kŕl ekŕ; e dks yŕ dgrsgŕ ft l ea de& l & de, d l rg xŕyŕ gkrk gŕ

vFlk

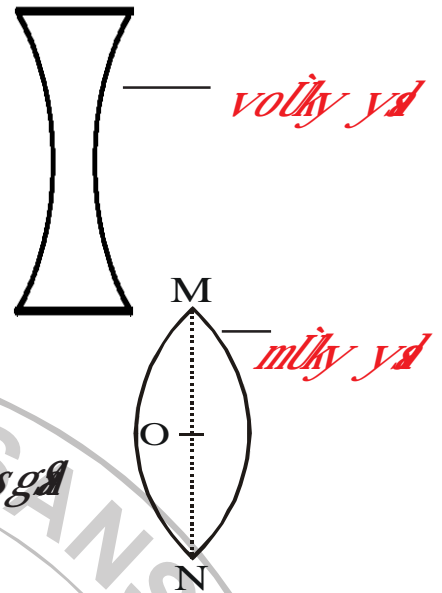
nks i kŭn'kŕl xŕyŕ dks mŕk fu" B Hŕx dks yŕ dgrsgŕ yŕ nks izk'j ds gkrsgŕ

(i) **mŭky yŕ (Convex Lens)** & ft l yŕ dh l rgŕ chp ea chj dh vŕj mŕj h gŕ Zjgrh gŕ; k ft l yŕ dh ekŕbZchp ea vŕfkd jgrh gŕ



ml smūky yā dgrsgā

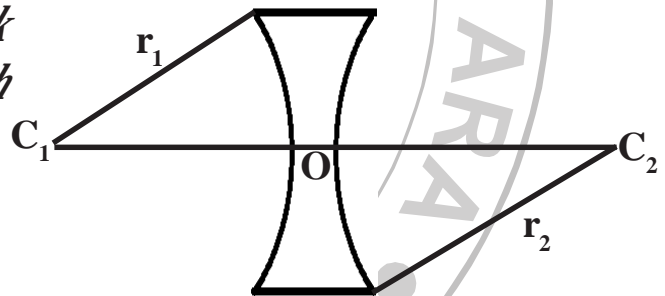
(ii) vory yā (Concave Lens) &ft l yā
dh l rgāclp eavānj dh vāj > qh gqZ
jgrhgsvflokft l yā dhekvbZclp
eade rFlk fduljāij vākd jgrhg
ml svory yā dgrsgā



izu 12- yā ds}kj d lsvki D; k l e> rsgā
mūkj & yā ds?kj ds O kl dkyā dk}kj dgrsgā
fp= eāMON }kj d gā

izu 13- yā dsoŌrk dāe (Centre of Curvature), oaoŌrk f=T; k (Radius
of Curvature) dh ifj Hk'kk nā

mūkj &ft u nks i k j n 'kZl xlyā dk mūk fu" B Hkx, d yā glrk gā mu xlyā
ds dāe dsoŌrk dk dāhz rFlk mudh f=T; k dsoŌrk dh f=T; k dgrsgā
fp= eāC₁ rFlk C₂ oŌrk dk
dāhz rFlk r₁, oar₂ oŌrk dh
f=T; k gā

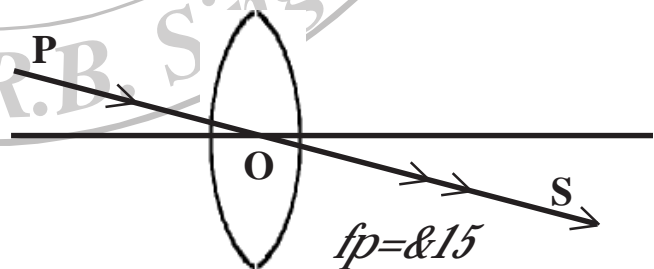


izu 14- iāku v{k (Principle axis)
fdl s dgrsgā

mūkj & yā dsoŌrk ds dāe l sxt jusokyh dāi fud j}lk iāku v{k dgykrhgā fp=
eāC₁OC₂ iāku v{k gā

izu 15- iāk'kk dāe (Optical Centre)
lsvki D; k l e> rsgā

mūkj & yā dk og fcāqft l l sxt jus
okyh fdj. k dsfy, vki fr fdj. k, o
fuxZ fdj. k l ekūtrj gk t k rsgā ml s iāk'kk dāe dgrsgā fp= eābl o
l sfn/lk kx; k gā



yā dh l Hh nāj; k iāk'kk dāe l seki h t krhgā

izu 16- yd ds Qkdl rFlk Qkdl ktrj lsvki D; k l e> rsgd

mlyj & yd ds izkku vfk ds

l ekuktrj vkrhgphZfdj. ka

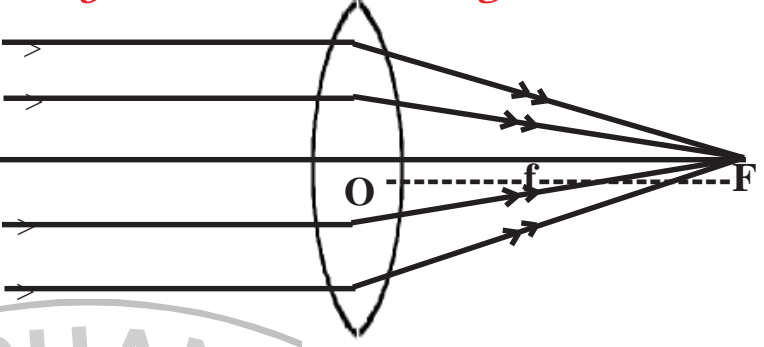
ft l fcaqij l d r gkrh

gs; k ft l fcaqij vil r

gkrh gphZirhr gkrh gs

ml fcaqdkya dk Qkdl

dgrsgd



yd ds izk'ktr dshzo rFlk Qkdl (F) ds clp dh nyjh dks Qkdl nyjh dgrsgd

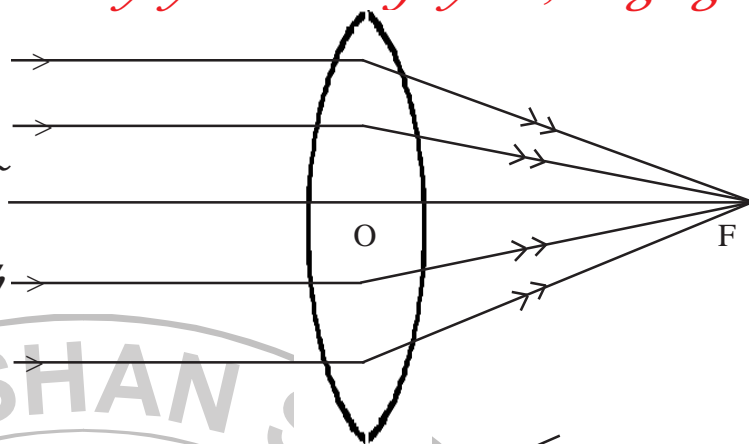
bl sfp= eaf l sfn[kk k x; k gd

izu 17- mly yd rFlk vory yd eavaj Li "V djd

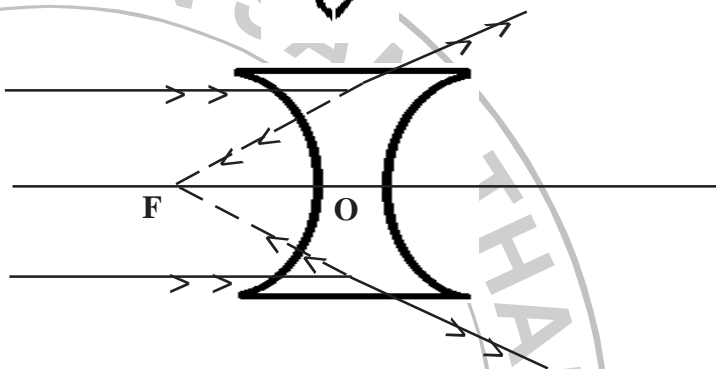
mlyj & mly yd rFlk vory yd eafufufyf[kr vaj ggd

<i>00</i>	<i>mly yd</i>	<i>voly yd</i>
<i>(i)</i>	<i>fdukisij i rykyfdu clp ea ekWk glrk gd</i>	<i>fdukisij ekWk, oacp ea i ryk glrk gd</i>
<i>(ii)</i>	<i>mly yd }kjk okrfod , oa dkWifud nkukizlkj ds i frfca curs gd</i>	<i>vory yd }kjk doy dkWifud çfrfcl gh curk gd</i>
<i>(iii)</i>	<i>mly yd dk Qkdl okrfod glrk gd</i>	<i>vory yd dk Qkdl dkWifud glrk gd</i>
<i>(iv)</i>	<i>mly yd dh Qkdl nyjh /kukred gkrhgSbl fy, bl dh {lerk /kukred gkrh gd</i>	<i>vory yd dh Qkdl nyjh _ .kkred gkrhgSbl fy, bl dh {lerk _ .kkred gkrh gd</i>
<i>(v)</i>	<i>mly yd dks vfhk kjh yd dgrsgd</i>	<i>vory yd dks vil kjh yd dgrsgd</i>

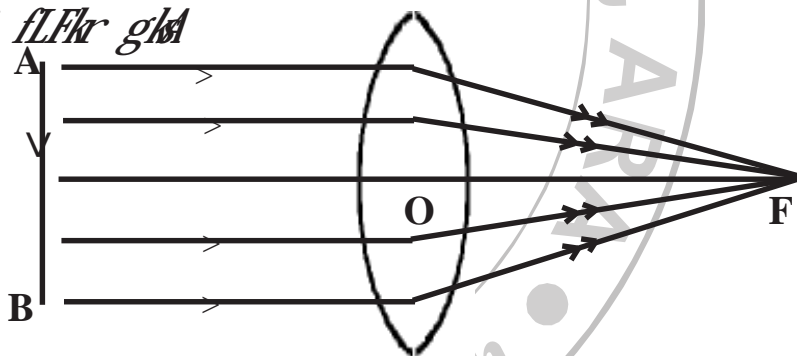
izu 18- mŭky yŭ dŭvffHl kjhrFlk vory yŭ dŭvil kjhyŭ D; lŭdgrsgŭ
 mŭkj & mŭky yŭ l s vki fr r
 l ekulŭrj fdj. kiŭ yŭ l sfuxŭ
 gkŭs dŭs ch l ŭ r gkŭh gSvFlkŭ~
 , d fcaŭij , d= gkŭ t kŭh gŭ
 bl h dŭj. k mŭky yŭ dŭvffHl kjh
 yŭ dgrsgŭ bl sl ŭ r dŭkjhyŭ
 Hh dgk t kŭk gŭ



vory yŭ l s vki fr r
 l ekulŭrj fdj. kiŭ yŭ l sfuxŭ
 gkŭs ij vil r gkŭh gSvFlkŭ~
 Qŭ t kŭh gŭ bl h dŭj. k vory
 yŭ dŭvil kjhyŭ dgrsgŭ bl s
 vil r dŭkjhyŭ Hh dgk t kŭk gŭ



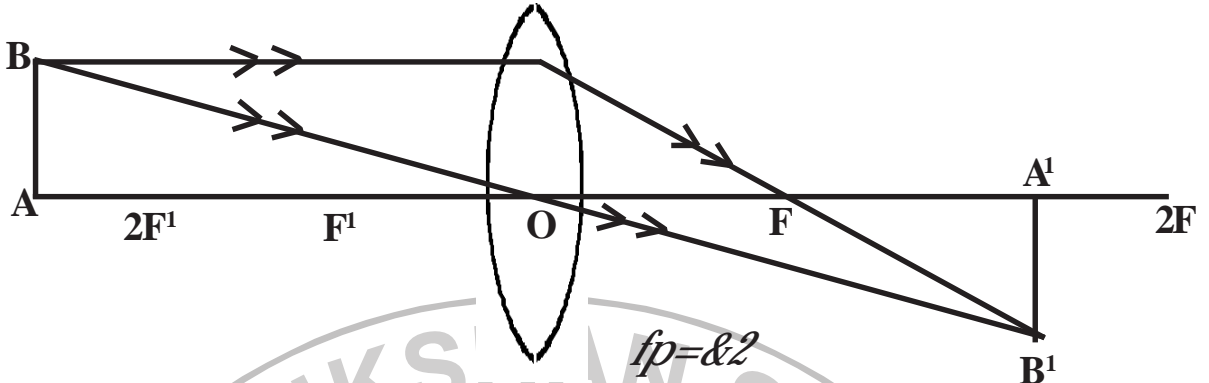
izu 19- mŭky yŭ eaŭoffHlŭ nŭj; lŭij j/ l s oLrqdk iŭrfcŭc culŭ
 mŭkj & (1) t c oLrqvulŭr ij flFlŭr gŭ



(a) oLrqdk iŭrfcŭc F ij curk gŭ

(b) ; g iŭrfcŭc oLrfod/ mŭVkrFlk oLrq l scgŭ gh NŭVŭ gkŭk gŭ

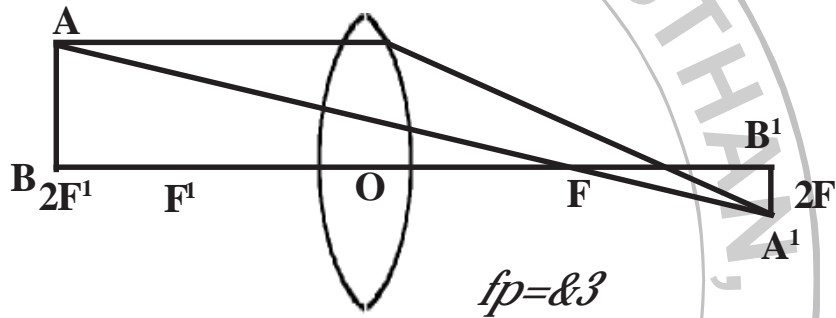
(2) *t c oLrqvulr rFlk $2F'$ ds clp fLFkr gl*



(a) *oLrqdk i frfcl c F rFlk $2F$ ds clp curk gl*

(b) *;g i frfcl c oLrfod/ mVvk rFlk oLrq l s Nvk glrk gl*

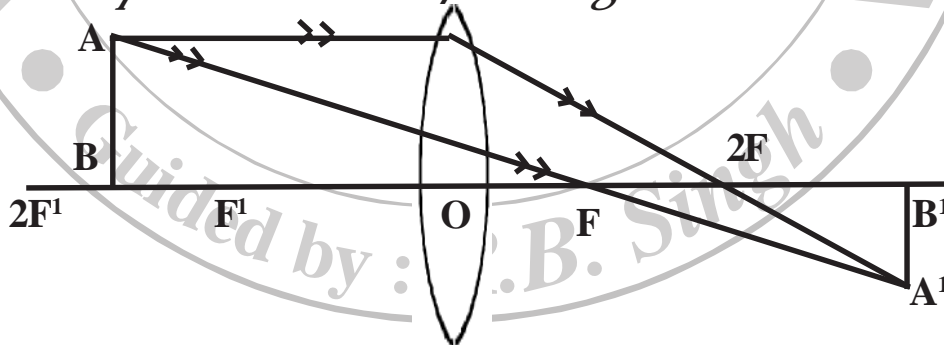
(3) *t c oLrqy dh nuh Qkll nyh ($2F'$) ij fLFkr gl*



(a) *oLrqdk i frfcl c $2F$ ij curk gl*

(b) *;g i frfcl c oLrfod/ mVvk rFlk oLrq ds cjkj glrk gl*

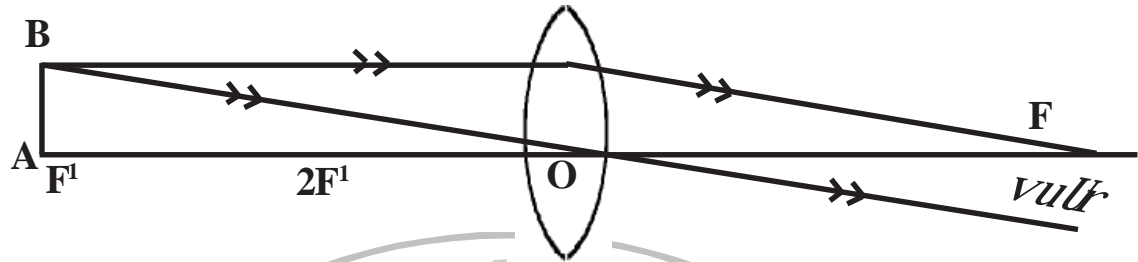
(4) *t c oLrq F' rFlk $2F'$ ds clp fLFkr gl*



(a) *oLrqdk i frfcl c $2F$ l snj curk gl*

(b) *;g i frfcl c oLrfod/ mVvk rFlk oLrq l s cMk glrk gl*

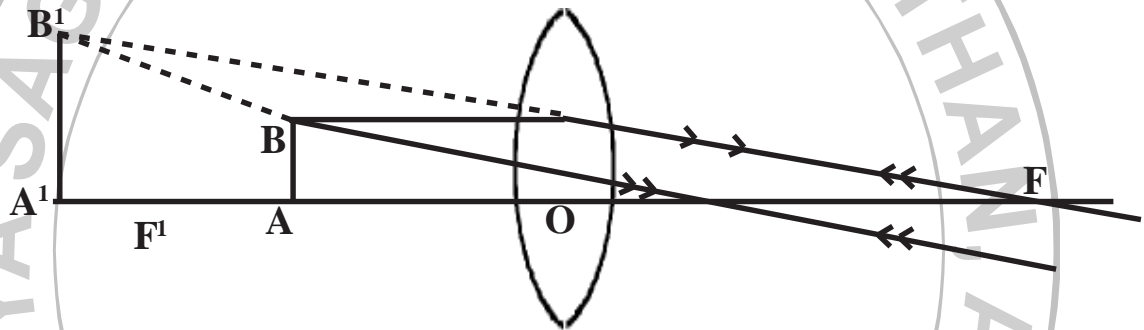
(5) *t c oLrqyđ ds Qkdl (F') ij fLFkr gkđ*



(a) *oLrqdk iŕfcŁc vutŕ ij curk gđ*

(b) *; g iŕfcŁc okŕfodŕ mŕVŕ rFŁk oLrqŕ scMŁk gŁrk gđ*

(6) *t c oLrqyđ dseŕ; Qkdl rFŁk yđ dsclp fLFkr gkđ*



(a) *oLrqdk iŕfcŁc yđ ds iŕNs curk gđ*

(b) *; g iŕfcŁc dkŕifudŕ l hŁk rFŁk oLrqŕ scMŁk gŁrk gđ*

izu 20- yđ dhŁŕk (Power of Lens) D; k gđŕ bl dk ek=d fy/lđ

mŁk&fdl h yđ dhŁŕk ml yđ ds Qkdl Łŕj dk Q đŁe gŁrk gđ

; fn yđ dhŁŕk (P) rFŁk Qkdl Łŕj (f) gŁrk

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

*SI i) fr eayđ dhŁŕk dke=d MŁvŁŕj (Diopter) gŁrk gđ
bl đ l sl ŕŕ đŕsgđ bl selŕj eŁek t Łrk gđ mŁk yđ dhŁŕk
ekŁŁed rFŁk vory yđ dhŁŕk_ . ŁŁed gŁrh gđ*

izu 21- 1 Diopter dh iŕfŁŁŁŁŁŁŁŁ

mŁk & Diopter – 1 Diopter ml yđ dhŁŕk gđŕ l dh Qkdl nyŕŁ m gŁrh gđ

$$1 \text{ Diopter} = 1 \text{ D} = 1 \text{ m}^{-1}$$

izu 22- yđ ds lŁkt u dhŁŕk l svŁi D; k l e>rs gđŕ bl dk l ŕ fy/lđ

*mĭkj&t c vud irysy~~l~~ l~~o~~ds, d&nĭjsdsl Eī dZēj/[lk t krk gSrksl a kt u
dh{lerkmu y~~l~~ l~~o~~dsvyx&vyx {lerkvl~~o~~dsclt l~~l~~ ; l~~o~~ dscjkj glrk g~~l~~
; fn vud y~~l~~ ft udh{lerk~~l~~ aŌe 'kP₁, P₂, P₃ gksvkj mlg~~l~~
ijLij l Eī dZēj/[lk t k rksl a kt u dh{lerk*

$$P = P_1 + P_2 + P_3 + \dots$$

*y~~l~~ l~~o~~ds, l sl a kt u dk mi; l~~o~~/ dējk l ſen'kZrFlk nyichu e~~l~~
fd; k t krk g~~l~~*

*izu 23-mĭky y~~l~~ rFlk vory y~~l~~ dsnk~~l~~nksmi; l~~o~~ crl~~o~~
mĭkj &mĭky y~~l~~ dsmi; l~~o~~&*

- (i) *bl dk mi; l~~o~~ l ſen'kZ nyichu rFlk QkVks dējk e~~l~~fd; k t krk g~~l~~*
- (ii) *nh?ZnĭV nk'k dks nyj djuse~~l~~bl dk mi; l~~o~~ glrk g~~l~~
vory y~~l~~ dsmi; l~~o~~&*

- (i) *bl dk mi; l~~o~~ xſy; l dsnjichu e~~l~~uſ=dk ds: i e~~l~~glrk g~~l~~*
- (ii) *bl dk mi; l~~o~~ fudV nĭVnk'k nyj djuse~~l~~fd; k t krk g~~l~~*

*izu 24-vk'k dks, d mĭky/ vory rFlk dlp dh lyV nh x; h g~~l~~ mudh l rg~~l~~
dksfcuk Nq dſ sigph~~l~~us*

*mĭkj &fcuk Li 'kZfd; smĭky/ vory rFlk dlp dh lyV dksigph~~l~~usdsfy,
clj&cljh l ſfdl h iſrd ds, d i "B dsfudV ykrsg~~l~~ Nisv{lj~~l~~adk
fujh'k k djrsg~~l~~*

- (i) *; fn Nisv{lj viusoklrfod vkdkj l scM~~l~~fn/[k~~l~~oZi M~~l~~sg~~l~~srks; g
mĭky y~~l~~ glrk g~~l~~*
- (ii) *; fn Nisv{lj viusoklrfod vkdkj l sNkVsf~~l~~n/[k~~l~~oZi M~~l~~sg~~l~~srks; g
vory y~~l~~ glrk g~~l~~*
- (iii) *; fn Nisv{lj viusoklrfod vkdkj dscjkj fn/[k~~l~~oZi M~~l~~k gSrks
; g dlp dh lyV glrk g~~l~~*

izu 25-iku dk viorZkal 1.33 gA bl dFlu dk D; k rkr; ZgS

mukj & iku dk viorZkal = $\frac{\text{gok eaçdk'k dh phy}}{\text{iku eaçdk'k dh phy}}$

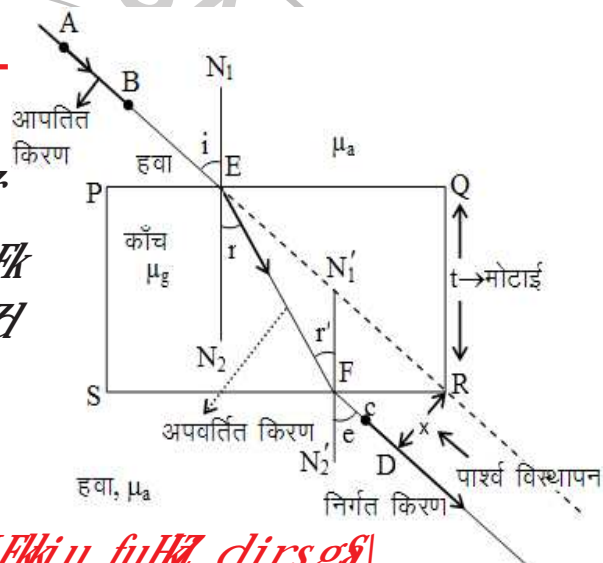
$$n_w = \frac{300000 \text{ Km/s}}{225000 \text{ Km/s}} = \frac{412}{300} = \frac{4}{3} = 1.33$$

gok eizlk'k dh phy iku eizlk'k dh phy ds 1.33 vFlkZ $\sim \frac{4}{3}$ xqih

gkrh gA
izu 26-ik'ozl foLFkiu (Lateral Displacement) Isvki D; k l e> rsgA

mukj & dlp LyS Is fudyus okyh fuxZ
fdj. k rFlk vki fr fdj. k dsew iFl
ds clp ykFcd nyh dks ik'ozl
foLFkiu dgrsgA

fp = eDR = x ik'Zd foLFkiu gA



izu 27-fdu&fdu dkjdaij ik'ozl foLFkiu fuHjZ djrsgA

mukj & fuEu dkjdaij ik'ozl foLFkiu fuHjZ djrsgA

- (i) ik'ozl foLFkiu dlp LyS dsew/bZdk l hkk l ekuqkrh gkrk gA
- (ii) ik'ozl foLFkiu vki ru dsk dk l hkk l ekuqkrh gkrk gA
- (iii) ik'ozl foLFkiu dlp ds viorZkal dk l hkk l ekuqkrh gkrk gA
- (iv) ik'ozl foLFkiu vki fr fdj. k dsrjans; Zdk Q Dekuqkrh gkrk gA

izu 28- muky yA eaf) dja fd $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

vFlkZ fdl h muky yA eolrqdh nyh(u), ifrfcE dh nyh(v) rFlk
Qkd l nyh(f) eal xak LFkfr dja

mukj & ekufd fp = eMN, d muky yA gA 2F' Isvulr nyh ij oLrq PQ
fLFkr gA ft l dk ifrfcE IB ij curk gA

$\Delta POQ \sim \Delta IOB$ *le: i ga* Q

$$\frac{IB}{PQ} = \frac{OI}{OP} \dots (i)$$

$\Delta AOF \sim \Delta BIF$ *le: i ga* P

$$\frac{IB}{OA} = \frac{IF}{OF} \dots (ii)$$

(PQ = OA)

le: (i) ~ le: (ii) I

$$\frac{OI}{OP} = \frac{IF}{OF}$$

$$\frac{OI}{OP} = \frac{OI - OF}{OF}$$

$$\frac{v}{-u} = \frac{v - f}{f}$$

$$vf = -u(v - f)$$

$$vf = -uv + uf$$

nkurj Q u, v, f I shx nsi j/

$$\frac{vf}{uvf} = \frac{-uv}{uvf} + \frac{uf}{uvf}$$

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

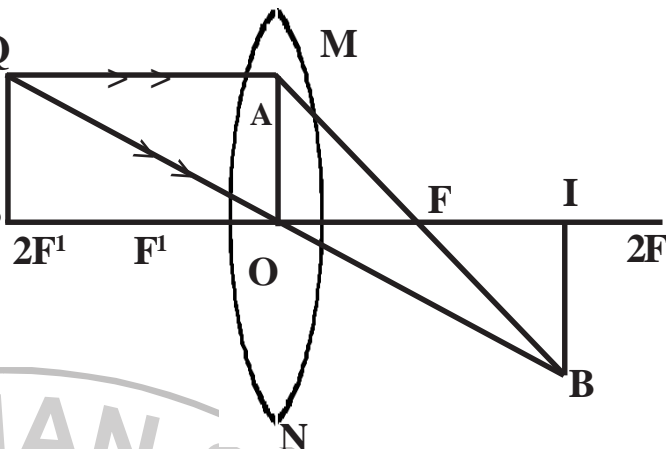
$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\boxed{\frac{1}{v} - \frac{1}{u} = \frac{1}{f}}$$

izu 30 vory ya eaf) dja d $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

vFlkh fdl h vory ya eafLrqdh njh(u), i frfEc dh njh(v) rFlk QkdI njh(f) eaf xak LFkfr dja

mLj & ekuf fd PQ, d vory ya ga bl dk izlk'kr dhnz(O) rFlk F, oa



fplg~ifjikh l s/

$$OI = +v$$

$$OP = -u$$

$$OF = +f$$

F' i fte, oaf}rh Qkdl gA F lsdN nyh ij oLrqAB j[lh x; hgs ft l dk i frcfc A'B' ij curkgA

ledsk $\triangle OAB$ rFlk $\triangle OA'B'$ le: i gA (A-A-A) h e: irkieS lS

$$\frac{AB}{A'B'} = \frac{OB}{OB'} \quad \dots (i)$$

bl h izlkj/ ledsk $\triangle FOM$ rFlk $\triangle A'B'F$ le: i gA

$$\frac{OM}{A'B'} = \frac{OF}{B'F} \quad (OM = AB)$$

$$\frac{AB}{A'B'} = \frac{OF}{B'F} \quad \dots (ii)$$

leh (i) rFlk leh (ii) lS

$$\frac{OB}{OB'} = \frac{OF}{B'F}$$

$$\frac{OB}{OB'} = \frac{OF}{OF - OB'}$$

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

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

$$u(v - f) = -vf$$

$$uv - uf = -vf$$

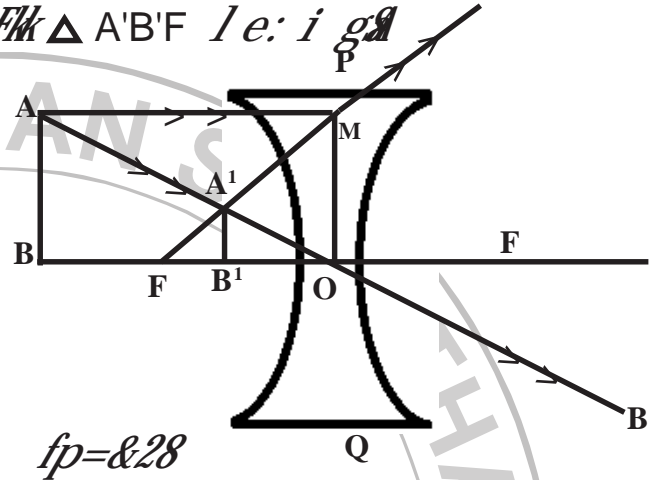
nkikarjQ u, v, f l sHlx nsisij/

$$\frac{uv}{uvf} - \frac{uf}{uvf} = \frac{-vf}{uvf}$$

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

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

$$\boxed{\frac{1}{u} - \frac{1}{v} = \frac{1}{f}}$$



fp=28

fp lg~ i fji kh lS

$$OF = -f$$

$$OB = -u$$

$$OB' = -v$$

izu 29-vloekZ fdl sdgrsgA\ xkyh yA dsl # ij vlektjr vloekZ dkl # LFkkr dja

mukhy ya ds } kjk cus i frfE dh ApkZ(h₂) , o lrqdh ApkZ(h₁) ds vuqkr dks vloekZ dgk t krk gA

$$m = \frac{h_2}{h_1}$$

fp= eamukhy ya } kjk oLrqAB dk i frfE A'B' ij curk gA

ΔAOB rFl $\Delta A'OB'$ le: i gA

$$\frac{AB}{A'B'} = \frac{OB}{OB'} \dots (i)$$

$$\frac{h_1}{-h_2} = \frac{-u}{v}$$

$$\frac{h_1}{h_2} = \frac{u}{v}$$

$$\frac{h_2}{h_1} = \frac{v}{u}$$

$$m = \frac{v}{u}$$

ya l # l\$

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

nkukrjQv l sxqkk djus ij/

$$\frac{x}{y} - \frac{v}{u} = \frac{v}{f}$$

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

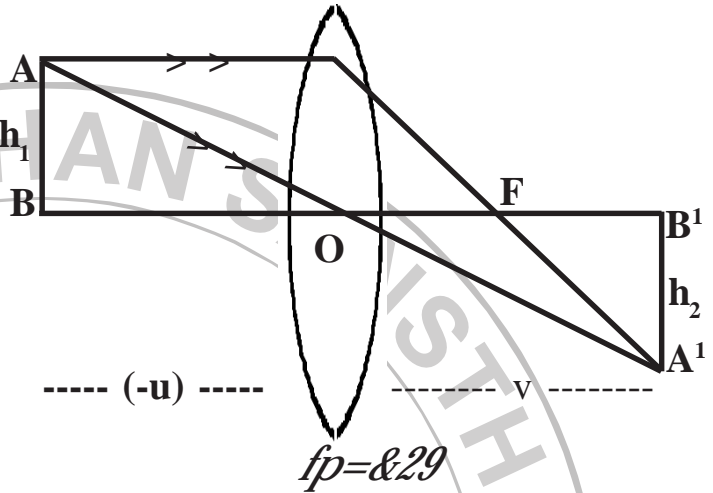
$$-\frac{v}{u} = \frac{v}{f} - 1$$

$$-\frac{v}{u} = \left(1 - \frac{v}{f}\right)$$

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

$$\left(m = \frac{v}{u}\right)$$

$$m = 1 - \frac{v}{f}$$



fpLg~ifjikWh l\$

$$A'B' = -h_2$$

$$AB = h_1$$

$$OB = -u$$

$$OB' = v$$

Guided by : R.B. Singh

izu 30-Ølærd dsk lsvki D; k l e>rs g

*mÛkj & t c izlk'k dhfdj. k l ?ku elè; e l sfojy elè; e l sin'sk djrhgS
rksfrjNhgkst krhg bl voLFkk eaviorzi dsk vkiru dsk l scMk gk
t krkg t c vkiru dsk dsk < k kt krkgSrksviorzi dsk Hh c < + t krk
g , d l e; ; g dsk 90° dk gkst krkg bl viorzi dsk dsfy,
vkiru dsk dkeku 90° dk gkst krkg St l s Ølærd dsk dgykrkg bl s
c l sl fpr fd; k t krkg*

izu 31-iwZvkrfjd ijkorzi lsvki D; k l e>rs g

*mÛkj & ; fn l ?ku elè; e l sfojy elè; e dh vly vkifrr fdj. k dsfy,
ijkorzi dsk dkeku Ølærd dsk l s FksMk Hh vfèd gkst krkgSrks izlk'k
dhfdj. k i q % l ?ku elè; e eaykV t krhg bl ?kVuk dsk iwZvkrfjd
ijkorzi dgrsg*

*gljk dk peduk rjla dk fVefVekuk rFkk eèejlfpdk dh ?kVuk
izlk'k dsk iwZvkrfjd ijkorzi dsdlj. k ?kVr gkrhg*

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