# English

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Topics to learn 1) vocabulary 2) Sentence structure 3) Grammer 4) Reading Comprehension 5) idioms & phras

**Grammer:-** Correct uses of parts of speech

1) Noun
2) pronoun
3) verb
4) Adverb
5) Adjective
6) preposition
7) conjunction

**Noun:-** Noun is a naming word.

Types of noun:- 1) Proper Noun 2) common noun 3) Abstract noun / Intangible noun 4) material noun 5) collective noun 6) countable noun 7) uncountable noun

**Rule No-1)** The following Nouns always Singular, for them no direct plural (-s, -es)

Eg:- Paper, Advice, scenery, Alphabate, bread, luggage, Information, news,

Paper - Sheets of
bread :- Slices of / Loaves of
Information :- pieces of
Advice - pieces of
Alphabates :- letters
news :- Items of news
Scenery - pictures of
luggage :- bags of
offspring (childeren) childeren - progeny of

eg:- 1) my father gave me three Advices ✗
→ my father gave me three pieces of Advice ✓

2) The informer has given four informations ✗ to the police.
four pieces of information ✓

**Note:-** To make the above Nouns into plural the following phrases to be placed.

**Rule No-2)** The following nouns are alway plura so never try to use direct Singular (a, an)

gallows :-
bellows :-
scissors :-
tongs :-
pliers :-
trousers :-
shorts :-
Binaculais :-
spectacles :-
gloves :-
goggles :-

eg:- 1) She has bought three gyms jeans in a special offer
→ She has bought three pairs of jeans in a special offer

2) Chintu has broken a spectacle. ×
→ Chintu has broken a pair of spectacles.

Note:- To show singular and again multiple plurals the following phrases added before "a pair of, two pair of, 7 pairs of . . . ."

Rule No-3) The following Nouns look like plural but they are singular inside so singular verb should be used (is, was, has, does)

News
economics
statistics
physics
politics
analytics

eg:- 1) my analysis (Review) of the four movies is/are wrong.

2) Economics was/were merged into statistics once upon a time

Rule No-4) The following Nouns look like Singular But plural inside so plural verbs used (are, were, have, do)

people
public
door
cattle
police

eg:→ public was/were innocent once upon a time

2) The cattle is/are greazing.

Rule NO-5> The following knowns or material nouns for them no direct pural no direct Singular

cotton
Iron
wood
Liquids

eg:- 1) Maharashtra & gujrat are famous for a cot (cotton)

2) My sister is fond of a gold (gold).

3) Bihar is rich in an iron. (Iron)

4) The Stranger hit the casher with an Iron rod.

Rule NO-6> The following are called common nouns, they can be made Singular and pural.

A book :- books
A box :- boxes
A watch :- watches
A pen :- pens

* Note:- The following Common Noun can be made pural by not only -s, -es but also partly spelling change or leaving as it is.

A goose :- geese
a mouse :- mice
a tooth :- teeth
a fot :- feet
an ox :- oxen
a theif :- theifes
a shelf :- sheleves
a wife :- wives
a life :- lives
a belief :- Beliefes
a cheif :- cheifs
a hankercheif :- hankercheifs
a formula :- formulae
a datum :- data

a genius :- genii
a child :- childeren
a man :- men
a sheep :- sheep
a deer :- deer
an aircraft :- aircraft

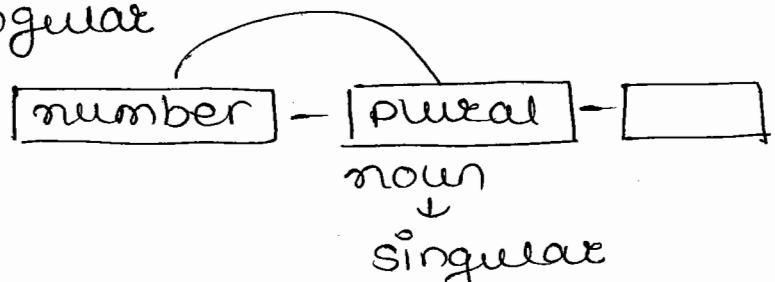
eg:-1) She has forgotten foue hankerchieves. (hankercheif)
2) The lion has killed foue sheeps. (sheep)

Rule NO-7) The complex noun can be made plural or possession as shown below

plural [s] [ ] [ ] people.
Possession [ ] [ ] [ ]'s public

eg:-) my brother should take permission from three officer's_in-charge / officer-in-charges
2) At present Iam using my brother's in-law / brother's-in-law's.

Rule NO-8) If the beginner of a complex known is a number the next plural noun becomes singular




a hundered rupees-note:- A hundered rupee note
a foue days-Seminar:- A foue day Seminar
a ten days-vaccassion:- A ten day vaccassion
a foue years-B.tech:- A foue year degree B.tech
Prabhas is a six feet tall person. (foot)

Rule NO-9) Before proper nouns no articles placed if there the sentense will be wrong
eg:-) my friend coorks in the Ahmedabad.
2) my brother is a fan of a michel-jackson
3) An Einsten is a great scientist

Rule NO-10) Before proper nouns also so articles can be placed in the following coterxts.
a) In comparisen
b) In the sense of ~~decto~~ 'dietto' or same as
c) In the sense of another, exactly

eg. 1) Koimbatur is the Ahmedabad of south-India
2) prabhudeva is a MichelJackson of India
3) Acharya Nagarjuna is an Einsten of India

Rule NO-11) when we use two nouns for one possession, we need not give 's to the 1st now
eg:→ I visited kamala's & vimala's house yesterday
→ I visited kamala & vimala's house yesterday

2) Amitabh's & superstar's gloory still is in the public
→ Amitabh & superstar's gloory still is in the publi

Rule NO-12) For the noun's already 's ending we need not give 's but '(inverted comma) is shown in written english
eg. 1) crystian's follow Jesus's path. (Jesus)
2) I am using James's bike Rightnow (James)

Rule NO-13) The following are called collective nouns they are misconceptately used as shou below

A hive of Honey bees.
A galaxy of Stars
A class of students
A batch of trenee
A crew of technicians, cellers
A bundle of flower sticks, books
A bouquet of flower
A bunch of keys, grapes
A colony of Houses, ants
A cluster of Apartments
A choir of Singers
A Juary of Judges
A team of Players
A council of ministers, members
A band of musicians

A barat of Marriage attendi peop
A mob of people of nuiscens
*A faculty of lecturers malpractices (u
A bench of Judges.

1) She has photographed a herd birds and uploded to F
(flock of birds / herd of sheep)
2) I have seen a set of performer's in the train (set of habbits/tradision/troup of perform

Rule NO-14) The following are useful as discribed beloco and important a few-few (countable) a little-little (uncountable)
a few is positive and it means some number of but few is negative it means no number of. (nill)
eg:→ there are a few/ few buses so he has booked a cab
2) There are a few / few students in the classroom (lights are on)

a little-little
a little is positive it means some amount of but little is negative it means no amount of (nill)
eg:- 1) There is a little-little petrol. (no coorg for another 20 km)
2) few students didnt donate blood. (a few)
→ A few student donated blood / a few stu

Rule NO-15) The words like few and little are naturally negatives along with them never use negations like no, not
eg:- 1) few polititions didn't give correct information.
→ (didn't = few)
→ few polititions gave correct information

# Vocabulary

1) Synonyms
2) Antonyms
3) one word substitutes
4) Idioms
5) phrases
6) phrasal verbs / words always Confusing

Idioms:- 1) Colour :-

1) yellow at heart :- Timid, not brave
2) Go Green :- take care for nature & enviorment
3) Turn into Green :- feel Jealous
4) white books :- Good opinion
5) Black books :- bad opinion
6) Grey hair :- Good experience / Rich experience.
7) white beard :- well educated, good experienced
8) Bolt from the blue :- all of a sudden / plan unexpec
9) out of the blue :- Something Special
10) Brocon study :- ~~Good~~ Research, (Sound, good, rich
11) purple :- very rich, well to do
12) pink :- Good health
13) Red tapism :- Red letter day :- Memorable day
corroupton, un-necessary late / delay at gov office
14) Black Monday :- unwanted day, unwelcoming day
15) Black day * A day of bad incident

2) clothes :-

1) hats off :- token of respect, Congratulation
2) Cap up :- to cover up, to modify, improvise
3) seethrough coloured Spectacles :- to misunderstan
4) A turn coat :- with unstable mind, to maintain do
ie standard/g
5) Below the belt :- unfair ways of Game

7) Be in the shoe of :- To work in somebody's place
8) A wolf in sheep's clothing :- A cheat, A crugal person seems to be good person.
9) Ants in pants :- feel of Irritation (pins + needles)
10) Hand & glove :- Exactly matching, made for each other
11) Laugh in sleeves :- Secret way of Laughing

3) Body Parts :-
1) Head stronge :- proudish, Haughty
2) Lose heart :- Gets depressed
3) down hearted :- discouraged
4) neck to neck :- Tight competition, heavy Competition
5) Back + Belli :- Middle class status, Average lifestyle
6) Hand to mouth :- Very low wages below middle class BPL
7) to shoulder something :- have the responsibility on
8) At an yelbow :- very close, side by side
9) on finger tips :- To have something by heart
10) on Tip toe :- Slowly walking or carefully walking
11) Pull the leg :- insult someone in public
12) hand in hand :- friendly
13) through cold water on feet :- to discourage
14) At an arm's length :- maintain distance or avoid
15) Apple of the eye :- A beloved daughter of the beloved father.
16) Poke once nose :- un-necessarily interfer into bet
17) tounge twister :- difficult word to difficult to pronounce.
18) by tooth & nail :- At any cost (by foul or fair
19) use every nerve of :- to give atmost, try very heard
20) all ears :- to listen attentively

4) Animals :-

1) Cock & bull story :- fixed, madeup stories
2) A dog in manger policy :- neither enjoy nor Let's other enjoy
3) A cat dog relation :- unfriendly relation, ex
4) A rat race [busy life] [to bell the cat] :- busy life [to do a risky j
(to do risky job)
5) Snake in a grass :- hidden problem
6) crocodile tears :- false crying
7) Monkey Spirit :- fickle minded, unstabilled
8) Straight from horse mouth :- directly, without any diversio
9) donkey's ear :- Long span of time
10) lion's share :- major share
11) Lion hearted :- very brave

Q1) Read the following & find the options given
2015 below.

Sore throat

a) bitter truth b) Infection of throat
c) Symptom of cold d) a bitter tablet

Q2) Read the following & find the erroneous par
A B C Apple
Nehru brought up | Indira almost as | an orange
of eye | because she is the only offspring |
D
no error → error (Apple)
E

1) Two split hair :- to understand in broad way
2) to face the music :- to take the punishment later
3) wash hands off :- to finish the work Abruptly, to ev
the wor
4) Spin the yarn :- telling made up stories
5) win laurels :- get fame & name
6) chew the cud :- Memorise the past
7) give enough rope :- Give scope for, give a chance to oth
8) put the cart before the horse : doing things desorderly
9) turn a blind eye :- neglect or to be careless
10) cut a sorrow figure :- give a poor performance
11) ~~Straight the~~ strike the iron when it is hot :- Do a thing
in Right time
12) see : eye to eye :- to have same opinion, to agree with

13) point blank:- very near, touching near
14) show white feather:- Accept failure, declair defet at war
15) through fire + water:- pleasures & pains
16) smell a rat:- To identify immediate danger
17) pick holes in another seat:- To find fault with others
18) fair weather friend:- Good friend
19) bossom friend:- Good friend
20) Blue Blood:- of a royal family / famous dinestic.
21) curry flavour:- To get impression by flattery / exagura
22) head & shoulder's above:- Superior
23) carry the day:- win the prise
24) In the same boat:- Have the same situation
25) keep Abreast of:- To know something already
26) make cleam swipe:- To openup telling all
27) once in a Blue moon:- very very rarely
28) from pan to fire:- make a problem bad to worste
29) Gift of the gab:- tactfull speakers
30) Burn fingers:- make a risk & get's fail
31) twen tail:- To runaway from challenge or war

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## Vocabulary

Synonyms:- The following clues are the endings of the words to guess or to estimate the parts of speech for the given words

Noun:- -ty, -tion, -sion, -ce, -cy, -sy, "g" (silent), "-t", -um, -ia, -ea -gue, -ny, Rarely -al end, -y, -my

Adjectives:- -ous, -ful, -less, -al, -able, -ive, -ic, -al, -ent, -ant -ry, -id, -ive, -al, -il

Verb:- -se, -ze, "e", -ct, -fy

Spend thrift ✗ miser (wastage)

| | Root word | | Meaning. |
|---|---|---|---|
| 1) | Veter | – | skill |
| 2) | Cac | – | Loved |
| 3) | Phon | – | Sound |
| 4) | uxo | – | wife |
| 5) | Val | – | exist |
| 6) | om | – | Bad, terror |
| 7) | cred | – | Belief |
| 8) | sup | – | win, suceed |
| 9) | A (beginner's board) | – | without |
| 10) | opt | – | eye |
| 11) | Fatig | – | tired |
| 12) | the | – | God |
| 13) | Loq | – | voice, throat |
| 14) | gl | – | Smooth |
| 15) | gou | – | mouth, eat |
| 16) | Retro | – | Back |
| 17) | spec | – | see |
| 18) | dem | – | people |
| 19) | gog | – | Leader |
| 20) | ocu | – | eye, see |
| 21) | cor | – | Right, Reform |
| 22) | nerve | – | anger, irritate |
| 23) | spic | – | Kean, deep |
| 24) | Greg | – | society |
| 25) | phleg | – | Silent, quiet |
| 26) | gen | – | Birth |
| 27) | co | – | with |
| 28) | mal | – | Bad |
| 29) | pha | – | clear |
| 30) | sheer | – | clear |
| 31) | trep | – | fear, many, much |
| 32) | antel | – | Opposite |
| 53) | path | – | liking |

35) cir - round
36) post - After
37) An - without
38) nom - normal, name
39) sem - word, meas major, meeting
40) chron - time
41) vic - popular
42) Jet - force
43) nul - Remove, delete
44) qu - cool, calm
45) one - difficult, tough
46) fract - proudish
47) Rep - Sad
48) mag - Large, huge
49) clan (क्लॅन) - hidden, covered
50) Blac - calm, soothe, cool
51) Baf - confuse

Match the following

A) GOURMET → 5
B) RETROSPECT → 4
C) DEMAGOGUE → 2
D) OCULAR → 1
E) INCORRIGIBLE → 3
F) INVETERATE → 15
G) CACOPHONY → 12
H) UXORIOUS → 6
I) PREVALENT → 10
J) INCREDIBLE → 12
K) OMINOUS → 8
L) SUPERSEDE → 9
M) ANONYMOUS → 11
N) INDEFATIGABLE → 7
O) ATHEISM → 13

1) Transperent
2) Captain
3) Unreformable
4) View of the past
5) A Greedy eater
6) To much obidient to wife
7) Energitic
8) warning, threatining
9) Grab, occupy
10) common, ordinary
11) Unclaimed
12) Unbelivable
13) Non believer of god
14) Unbearable noice
15) Habituated

52) Evit - storm, avoid
53) Fort - Brave, stronge
54) lac - Small, short
55) Jud - law
56) Jeo - murder
57) Loq Sanct - pure, holly
58) $ MOL - less
59) mun - kind, mercy
60) cord - Heart
61) Omni = pan - all
62) Sci - knowledge, know
63) Pan - all
64) Mor - depth
65) dol - sad
66) Bel - war, battle
67) car - ~~dead~~ body,
68) Bene - Good, kind
69) phil - love
70) Anthro - human being
71) Ante - Before, previous
72) Lust - Light, desire
73) Maj - Grand
74) Pro - Before
75) ~~Gen~~ frag - Rigid, break
76) euphu - happy
77) ego - self
78) Indo - nowork, vacant
79) doc - Belive, rite
80) mom - memory, note
81) ex - out, far
82) Pat - father

Match the following

1) JEOPARDISE
2) MUNIFICIENT
3) LACONIC
4) INEVITABLE
5) JUDICIOUS
6) MOLLIFY
7) EXPATRIATE
8) FORTITUDE
9) SANCTIMONIOUS
10) MOMENTUS

A) Minimise (6)
B) Memorable, temporary (10)
C) Strength, Boldness (8
D) terminate (5, 1)
E) charitable (2)

83) Incli - fall, slanty
84) Geno - Large people, masses
85) cid - kill
86) clus - Combine, add
87) secra - Blessed, holly
88) Meej assi - Hardwork
89) som - sleep
90) scri - write
91) ver - different, multi
92) tang - skin
93) tac - silent
94) ten - Rigid, Unchanged
95) trib - Give
96) Moi - noisy
97) fet - chain
98) clam - noise
99) cip - free
100) Nat - birth, natural
101) Ped - move, fot

Match the following

1) JENOCIDE → C
2) EMANCIPATE → E
3) CIRCUMSPECT → F
4) ONEROUS → A
5) TACITURN → B

A) Difficult, hard achievi
B) Emotionaly unresponsi
C) massacre
D) killing large people
E) Liberate.
F) think through, think de before decisi

Pronoun:-

Rule NO-16) The following are reflexive pronouns they should be used along with the set of verb given below

I - myself
we - ourself
they - themself
you - yourself / self
He - himself
SHe - herself
It - Itself
one - oneself

| resign |
|---|
| Avail |
| enjoy |
| behave |
| control |

eg. 1) My friend enjoyed the party yesterday.
→ My friend enjoyed the party himself yesterday

Rule NO-17) The following are distributive pronouns after them plural noun and Singular verb must

one of
None of
Neighther of
Either of
each of
every of

} plural noun - singular verb.

eg:- One of the director is underarrest (directors)

eg:- each of the girls have donated 1000 Rs.

Rule NO-18) The following pronouns are negative already and they are used as shown below.

None of for 2+ people more.
Neither of for only 2 people.

eg. 1) None of the 7 boys did not donate (doneled) blood.
2) Neither of the 4 boys has reached in time.
(None of)

Rule NO-19) The following are reciprocal pronounce they should be used as shown below

each-other used for (two)
one-another used for (more than 2)

eg. 1) Bunty & Bubbly respect - each other

Rule NO-20) The following are called relative pronouns. they are to be used as shown below which that who whom whose are relative

which - singular thing
that - plural thing
who - singular/plural Sbjective SC
whom - —11— Sb OC
whose - —11— Sb PC

eg 1) These are the books which/that I returned.
2) Jeams is the boy who/whom helped me yesterday

Rule NO-21) The following are personal pronouns and they can be expressed in 5 cases as shown below

| SC | OC | PC | APC | RC |
|---|---|---|---|---|
| I | me | my | mine | myself |
| we | us | our | our's | ourself |
| they | them | their | their's | themself |
| you | you | your | your's | yourself |
| he | him | his | his | himself |
| she | her | her | her's | herself |
| it | it | — | its | itself |

1) There is we call and here is it's key (its)
2) The property is our's. (ours)

Rule No-22) If a sentense begining with one the corrosponding pronoun should be either one's or oneself

eg:) everyone has to respect himself / oneself first.
2) one should respect his / one's country.

Rule No-23) The following SC & OC are misconcep tately use as shown below.

1) A: I Love you
   B: I too / Me too.
2) X: Who is it?
   Y: It's I / It's me

Rule No-24) The following conjuction than & prep sition are suffixed by SC or OC as shown belou

| than = SC |
| --- |
| Preposition = OC |

eg. 1) prabhas is taller than ~~me~~ / I.
2) I am cleaverer than her / she.
3) she is Junior to I / me.

Rule No-25)

101) great - free, thanks
102) pot - strength, might
103) eru - voir wise
104) mut - change
105) noc - Harm
106) vari - multi, variation
107) dog - waste
108) emu - copy
109) pen - short, small
110) spor - Irregular

112) ci - ~~cleaver~~ clever
113) fia - defeat
114) did - Learn
115) Lic - Harm
116) vi - man
117) Mel - Increase
118) Dec - clearer
119) Lag - Block, Late, wide, broad
120) vow - wide, broad
121) cyn - symbol, point
122) burg - Increase
123) crim - illfame
124) for - fear
125) res - change

Match the pair

1) IMBESILE → D
2) AMELIORATE → E
3) IMULATE → B
4) RESILENI → C
5) VIRL → A

A) Mannish, male
B) follow, immediate
C) flexible
D) fool, idiot
E) upgrade, develope

126) Insomnia - Sleeplessness
127) propensity - partiality, nepotism
128) Innocuous - Innocent
128) Compendium - Summary
129) Sporadical - ~~Aano onoff~~ On + Off, now & then, patchy
130) Enigmatic - misterious
131) docile - mild, meek
132) Fyasco fiasco - failure,
133) didactle - educational
134) Licentious - wicked, cruyal
135) Consummation - Completion, ending
136) Ostentatious - grand, pretentious
137) Boondoggle - wastage, overexpenditure
138) Laggard - Lazy, dawdler

140) Cynosure - guiding star, Cristmas star
141) Burgeoning - upcoming, mushrooming
142) Recrimination - slander, Reproach, Bad no
143) Formadable - ~~fraught overload~~ fearsum, terrable
144) Reyliant - flexible
145) Fraught - overloaded * curbside :- boundary
146) Authentic - genune * Buliamia - cronic disease
147) dire - measurable, sad * presage - foretelling eating fo astro augu
148) entice - attarct allure * promenade - road for futureg pat
149) ostracize - prohibit * infallibility - fault, unable
150) paradigm - model, example * devastate - distroy to do mistak
156) exorbitant - More than ~~necessary~~ necessary, extra expendi
157) Blistering (Blast) - Buening
158) Bleak - measurable, scrooture
159) clique - group, circle, elite.

Rule No-25) The following verbs or auxilary that always placed with $V_1$ or basic verb

| | | |
|---|---|---|
| Can | Could | $V_1$ basic |
| may | might | |
| Shall | Should | |
| will | would | |
| must | had to | |

eg 1) Sarkar can solve/solved any problem in 1 hr.
2) his Brother PC sarkar could solve/solved thep
-lem in 15 mins in his child hould

Rule No-26) The following shows the good Combination of helping verb + men verb

auxily, did, does do → $V_1$
as if / as though / past time → $V_2$
indicator / it's high time → ~~$V_3$~~
have/had, has → $V_3$ (be/been (by)) past participle.

eg 1) Ravi has sang/sung ($V_3$) a bengoli song

2) The problem will be gave/given ($V_3$)/giving by my uncle

3) My sister danced as it she has/did ($V_2$) learn/learnt ($V_1$) classical dance. did + $V_1$ = $V_2$

4) It is a high time u have to meet/umet ($V_2$) the doctor.

5) They were slept ($V_3$)/sleeping when the station passed by.

6) They were gave/giving/given ($V_3$) a chance by the team leader

7) She will have been travelled/travelling ($V_4$) for 2hrs before she reches Nagpur.

Rule No 27) Generally from direct to indirect tenses will be changed (present into past) but in the following situations no tenses changed

a) Proverbs
b) Scientific truths, Regular hapening
c) Universal truths
d) Situational present, human relations

eg. 1) She said, "I am busy now!"
→ She said that she was busy then.

2) My uncle said, "Birds fly."
→ My uncle said that Birds fly.

3) My grandma before she died said, "Honesty is the best policy."
→ My grandma before she died said that honesty is best policy.

4) My cusin told me that the red fort was located in delhi.
→ My cusin told me that the red fort is located in delhi.

Rule No- 228)

egregious (Adj) – outstandingly bad
anomous ~~caeophony~~ (Adj) – Extraordinary, abnormal
an autopsy (N) – postmartum
at loquacity (N) – talkativeness
naive (Adj) – crud, uncivilised
Renervated (Adj) – Irritated
perspicacity (N) – keep in intrest.
gregarious (Adj) – sociable, friendly
Phlegmetic (Adj) – Unresponsible, Untalkative
antipathy (N) – disliking, hatred
circa intrepid (Adj) – fearless
diaphanous (Adj) – clear, transperent
malign (N) – Badname
congenital (Adj) – By Birth
Vicarious (Adj) – like to be popular
Anachronous (Adj) – untimely
Laconic (Adj) – Brief
semantic (Adj) – Belong to words, verbose
posthumous (Adj) – after death
magnanimous (Adj) – charitable
clandestine (Adj) – misterious, confedential
placate (V) – cool down, calm down
Baffling (Adj) – Confusing
Repulsive (Adj) – distractive, inattaractive
Refractory (Adj) – proudish
Onerous (Adj) – difficult
quell (V) – calm down, pacify
nullify (V) – cancel
Apprise (V) – estimate
Jettison (N) – force, discharge
Adjudicate (V) – give judgement
malediction (N) – curse
gratuitous (Adj) – Free, liberal, thankful.
Omnipotent (Adj) – Strongest of all
omniscient (Adj) – cleverest of all, all know

Impede (V) — Block, Stagnate, hinder

versatile (Adj) — Multitalent

innocuous (Adj) — Harmless, innocent

inscribe (V) → knowledgable, write ~~on~~ hard surface

erudite (Adj) ↗

malignant (Adj) → cruyal, harmful

free, liberate

Exception Emancipate (Adj) — ~~cruyal, harmful~~

Clamorous (Adj) — Noisy

unfetter (V) — free, liberate

turmoil (N) — comotion

retribution (N) — Retalation, Revenge, tit for tat

tenacious (Adj) — Rigid, sticking to, Stubborn

tangible (Adj) — Skin, material

Intact (Adj) — Safe, Undamaged

Inclination (N) — Partiality, Nepotism

panacea (N) — one medicine for all deseases

circuitous (Adj) — Round up out, not straight path

consecrate (V) — make something holy

disseminate (V) — Spread, breakout

Assiduous (Adj) — Industrious, hardworking

proscribe (V) — Restrict

erudible (V) — knowledgable

Inmate — By Birth

Bit about the bush

18/04/18

## Tenses (Time in latin) (H.V+MV+AV)

| | simple | continuous | perfect | perfect-cont |
|---|---|---|---|---|
| present | do/does | is are | have has | have been / has been |
| past | did + $V_1$ = $V_2$ | was were | $V_4$ had | had been |
| future | Shall/will | Will be | will have | will have been |
| | I / we | Shall be | | |

$V_3$ $V_4$

uses:-

| | Simple | cont | perfect | perfect cont |
|---|---|---|---|---|
| present | habit | live now (present) | completed without T.I (time interval) | still like / For / since |
| Past | completed with T.I | live then | already completed before $V_2$ | live then / period of Time |
| future | Later live at | Later (future) live at completed by | later completed by | later live / period of time |

Rule No-28) present perfect continuous tense should be used in the three contexts.

a) live now

b) Inference

c) with the time indicator like currently, right now at present

eg:-) She reads/ is reading a nowel currently

Rule No-29) The verbs mentioned below should be expressed in simple present but not in present continuos tense

Type 1) seem, look, hear, smell, sound, flavour, appear and feel

eg:- The voice Sounds/ is Sounding good

Type 2) Love, Like, Remember, forget, know, believe think, observe, hate, dislike

eg:- She is beliving in God → She belives in god.

Type 3) have, own, hold, possess, contained, comprised, consist,

eg:- The bottle is Consisting hot water

The bottle consist hot water

Rule NO-30> present perfect continuos tense always associated with either for or since (for period of time since starting point of time)

eg:- My cusin is/has been learning dance since/ for 2015

Rule NO-31> The simple past is possible in the following conditions

a> with a simple past indicator B always with as if, as though + $V_2$

=> always with It's high time + $V_2$

eg:- Ravi has acted as if he has drunken really

→ Ravi has acted as if he drank.

1) It's high time you should consult the doctor (she should have consulted even before)

→ It's high time you consulted the doctor

2) It's high time you have to receive the hallticket in another 20 min exam will coming.

→ It's high time you received the hallticket.

Rootwords

| | | |
|---|---|---|
| Phobia | – | Fear |
| epi | – | upon |
| eu | – | Good |
| il | – | not |
| mono | – | one, single |
| neo | – | new |
| per | – | through |
| poly | – | Many |
| sur | – | over, above |
| sym | – | togather |
| ab | – | away |

| | | |
|---|---|---|
| contra | - | against, into |
| quis | - | ask |
| quer | - | ask, question, enquir |
| port | - | carry |
| pac | - | piece |
| ortho | - | straight, correct |
| min | - | Small |
| man | - | Hand |
| ject | - | ~~through~~ throw |
| Gyn | - | women |
| Grad | - | step by step |
| Gam | - | marriage |
| crat | - | Rule |
| cruc, ci | - | cross |
| crypt | - | hidden |
| derm | - | skin |
| fac | - | Making |

Match the following

1) MANUFACTURE → B
2) EJECT → K
3) CRUCIFY I → I
4) AMBIDEXTROUS → N
5) EPICUREAN → F
6) AGORAPHOBIA J → J
7) MONOGLOT A → M
8) POLYANDRY → A
9) ABUCT K → G
10) PORTABILITY → E
11) CRIPTOLOGY → L
12) DERMETOLOGY → O
13) NEOLITHIC → H
14) MONOGAMY C → C
15) CONTRAVIN → D

A) married to multimen
B) Generate
C) Married to one
D) entertain
E) easily carried
F) crazy for testful perso
G) kidnap
H) new stone
I) kill someone on cross
J) fear of open places
K) throw, come out
L) the science of secret co
M) person with one Langug
O) person skilled with both hand
O) A branch of science

Imp The following are confusing verbs they may be misconceptately used as shown below.

| | | | | |
|---|---|---|---|---|
| 1) | hang (as punishment) | hanged | hanged | |
| 2) | hang | hung (not dead) | hung | |
| 3) | lie (horizontal) | lied | lied | |
| 4) | lie down | lay down | laid down | laying down |
| 5) | lay (something) | laid | laid | |
| 6) | fall | fell | fallen | |
| 7) | fell | felled | felled | |
| 8) | shoot (fire) | shooted | shooted | |
| 9) | shoot (borrow) | shoot | shot | |
| 10) | raise | rose | risen | |
| 11) | raise | raised | raised | |
| 12) | ride | rode | ridden | |
| 13) | raid | raided | raided | |
| 14) | dye | dyed | dyed | |
| 15) | die | died | died | |
| 16) | learn | learnt | Learnt | |
| 17) | learned (Adj) knowledgable person | | | |
| 18) | lose | Lost | Lost | |
| 19) | loose | loosed | loosed | |
| 20) | Find | found | Found | |
| 21) | found (start up) | founded | founded | |
| 22) | Last | Lasted | Lasted | |

15) Krishna posted / had posted the letter before I called him.

16)

1) The old man has died with Garnier. (because of colour)
→ The old man had dyed with Garnier

2) The Girl laid several times so she is a liar.
→ lied

3) Veerapan had fell a large no. of sandlewood before he died. ~~felled~~ felled
→

4) Mahatma gandhi was shooted by Godse with a rifle.
→ shot

5) My cusin has founded a hundred rupee note on the road.
→ found

6) My class has lost for 4 hrs.
→ lasted

7) IT officials rode on film actresses at their office & Recidenses at a time.
→ ~~raded~~ raided

8) The Students rose several douts over pronoun
→ raised

9) The old man was lying on the bed because of illness → ~~was~~ laying ~~laying~~ lying down

10) My sister will be / will have been in us for 3yr before she gets married. (time span)

11) She will be / will have been taking the exam at this time tommorow.

12) Ravi was / had been working for SBI for 2yrs before he ~~got~~ a went to US

13) my cusin was / had been peeforming then power went off.
finished the work.

Adverb :- It is a small word which describes a verb where, when, how, it happens

1) She walked slowly. → how
2) She came yesterday. → when
3) She sat there. → where

Types of Adverb :-

1) Adverb of Manner → Neatly, softly
2) Non 'ly' ending → fast, often, quite
3) Adverb of place → here, there
4) Adverb of time → Now, then, yesterday
5) Adverb of frequency → often, seldom, usually

Rule No-32) Whenever the following ~~words~~ verbs used Adverb shouldn't be used. but Adjective is the modifier.

seem, look, Appeared, sound, smell, feel, taste

eg. After waterwash my bike has started looking cutely. looks cute.

2) After suegery my grandma now heares perfectly perfect.

Rule No-33) The following verbs should not be use with 'as' as shown below

** appoint (make as)
consider (choose as)
elect (treat as)

eg:- they ~~treate~~ considered me as a friend.
→ they considered me a friend.

Rule No-34) The following are non 'ly' ending Adverbs they are misconceptably used as shown below.

fast, so, too, often, seldom, never hard late quite, well, ill

fast

Say Uncle leaves for mumbai Oftenly (often)

Rule No-35> The following pairs of the Adverb misconceptately used.

adj > hard - hardly → almost not, rarely
adj > fast - fastly → tightly
adj > late - Lately
adj > bad - badly

eg:- She came to the class lately. (late)
She has covered the bottle fastly with a airtight filter ✓

Rule No-36> The following pairs misconceptately used that are not in english

quite - quitely
often - oftenly
fast - fastly
seldom - seldomly

Rule No -37> so and very give almost same mean but so always goes with that at the same time too is negative it means more than necessary, over but very is positive it improvises degree
eg. The coffee is hot
The coffee is very hot.
The coffee is so hot that I can't drink it
The batchlers did too much & the owner nakked out.

Adjective :-

It's a qualifying word

Rule No 38> The following longer adjectives are only positive for them no 'cd' no 'sd' superlative de

1) perfect
2) Real
3) Excellent

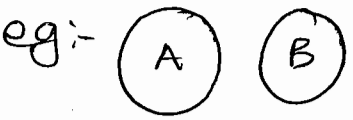
4) Unique

eg: Amir khan is more perfect than Shahrukh khan.

→ Amir khan is perfect when compared with Shahrukh khan.

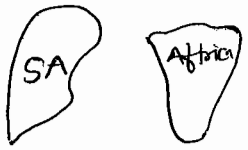
Rule No-39) The following Adjectives are only 'PD' but no 'CD' and 'SD'

Rectangular, triangular, spherical, pentagonal, elliptical,

eg:- 


A is more circular than A.

very A is circular when compared with A.




Africa is more triangular than SA.

Africa is triangular when compared with SA.

Rule No-40) The following Adjectives are already Comparative degree so never use in C.D, SD again, S.D

Note:- In this Connection than is replaced with to.

Junior
Senior
exterior
Interior
Superior
Inferior
prior
preferable

eg. 1) Inspector general is more Superior than.

D.S.P → Inspector general is superior to DSP

2) Aki is senior than AJi.

→ Aki is senior to Aji

Rule No-41) The following Adjectives are only SD & PD for them no CD

| Top PD | SD Topmost |
|---|---|
| South - Southern | Southern most |
| east - eastern | eastern most |
| west - western | western most |
| North - Northen | Northern most |

eg:- Chennai is located more suthern than vizag
→ Chennai is located very suthern when compaix with vizag
X Kanyakumari is located the most suthern among the three.
→ kanyakumari is located suthern most among the three.

Rule No-42) In the following conditions article the is a must before Comparitive degree also. (it is already must before SD)
a) With the phrase "of the two"...
b) ~~the~~ In proportional balance the+CD, the+CI

eg - Kajal & Nisha are sisters of the two, kajal is the taller.
- of the too mukesh is the Richest. (Richer) the+SD
- The higher we climb, the coolest we feel. cool
- The more we flater girls, the faster/fastest, fast will be friendly.

Rule No-43) The following are called ly ending adjectives manly, womenly, ugly, silly, jolly friendly, Costly.
eg:- My pen is costlyer than urs. (costlier)
- She behaves friendly → She is friendly.
- She looks happily → She looks happy.

Rule No-44) The following are called Irregular (Neither goes to er, est & more most)

| | | | |
|---|---|---|---|
| good & better | | best | |
| bad | worse | worst | |
| ill | worse | worst | |
| well | better | best | |
| far | farther | farthest | |
| little | less | least | |
| many | more | most | (countable nouns) |
| much | more | most | (uncountable) |

eg. Gole road is farer than dekkan circle. from Ace academy. (farther)

- Mumbai is farther/further than banglore from Pune. hyderabad.

19/04/18

Rule No 45) The PSC asperiants should know the difference bet'n the pairs given below.

elder - eldest = persons related (kith + kin) (bloodrelation)
older - oldest = persons related aswell as things

eg 1) Sanjay Datt is elder/older than priya datt.
2) Salman khan is older/elder than arjun kapor
3) That is the oldest/eldest temple in the district of thane

Conjer Subject-Verb Agrement

Rule No-46) The following Subjects look like plural but they are singular inside

GULLIVER TRAVELS Gulliver Travels (story book)
WINGS OF FIRE Wings of Fire (An autobiograph)
God of Small Things (a Novel)
Two States (A novel)

eg:) The Two States was/were best selling for the year 2014.

Rule NO-47) Before any adjective if article 'the' placed, it turns into plural personal noun.

eg:- The Rich - Rich People
The poor - Poor people
The Needy - Needy people / peoplewho are Needy
The weak - weak people

1) In India The Rich is/are becoming Richer.
2) The weak have/has to be helped by the strong

Rule NO-48) If any subject contains two posts side by side they are considered as shown below.

The post and the Post = plural
The post and post = singular.

eg:- The chairman and the principal is/are coming today.

2) The manager & cashier has/have cooperated with the customers.

Rule NO-49) In a Subject if two units are placed on the either sides of the words as shown below the first unit taken into accoun or agrees with verb

Unit I { as well as / togather with / besides / In addition to } Unit II

1) The Governer along with his Bodyguards have/has been kidnaped

2) The technicians as well as the engineer was/were Shotdead in kashmir.

Rule No-50) In a subject if the following are given with two units as shown below the second Unit should agree with verb

either / Neither / Not only } Unit I × or / nor / but also } Unit 2 ✓

1) Not only the politician but also the followers are/is dead

2) Either Actors or the director has/have paid the bill.

Rule No-51) The following subjects look like plural but they are always singular inside because each of them refers to one unit.

is/was
- amount → 10,00 Rs, 5 lakhs
- capacity → 200ml, 5 lits, 3 galleons
- weight → 40 gms, 50 kgs, 40 tonnes
- Distance → 20 miles, 45 kms,
- Length → 3 meters, 40 cms
- Fraction → three-fourths, one-eights

eg:- 1) 20 miles by four wheelers is/are not difficult. (distance- Singular)

2) three-fourths of the ten tanks was/were emptied (fraction - sing)

3) 40 gms of the oil / flour has/have been taken away

Rule No-52) The following subjects seem to be plural but they are singular inside because they refer to one unit.

- Bread and butter → food, lively hood, employment
- Bread and bacon → Breakfast
- Sum and Substence → Summary
- kith and kin → Circle (Blood relation / friend circle)

All - uncountable

eg. 1) Bread and Bacon of mine of the past two days. was/were very tasty.

2) Sum and Substance of the movies like Nayak, Gabbar, citizen. Indian is/are against corruption.

3) All is/are well

Vocabulary

Sonorous (Adj) - Echoing, Resonant, lou
Trample (V) - flatten, squash, smas
Aggravate (V) - Hig improvise, enhanc Intensify
Transgress (V) - break the Rules
Purview (N) - Arial view
estranged (V, Adj) - Actoddords, on bad terms
serenity (N) - tranquility, composur quietude
Acquittal (Adj) N - Release, exoneration
crammed (V, Adj) - overcrowded, tightpac Heaving
Mundane (Adj) - dull, ordinary, Routin humdrum (boring)
Smother (V) - Suffocate, overwhelm
Nurture (V) - Careful, Foster, look af
Mitigate (V) - alleviate, lessen, tone down (minimise)
Paradiem (N) - example, prototype
tenable (Adj) - Justicable, Reasonable
Sparse (Adj) - Meager, thin, scarce, Shortage
Leeway (N) - Freedom, Scope, margir breath taking space

Gullible (Adj) - easy to fool, too easy to be cheated

despondency (N) - hopelessness, dejection, sadness

flannel (Adj) (V,N) - sweet talk, flatter, Beguile.

Tenses:-

Rule No-53) In the following context present perfect can be used.

a) Completed action, no time Indicator.

b) completed but still impact.

c) With the phrase "not yet", "till now", "lately", "So far"

eg 1) My sister did post / has posted the Letter.

2) He has cut / did cut his finger (still painful)

3) My brother did loose / has lost his job. (Still jobless)

Grammer - If clause / condition

Still chance

* open: If + sub + $V_1$ ⟶ will / can / may $V_1$

eg: If she prepares well she will / would pass / passed in first class

Close :- If + sub + $V_2$ ⟶ would / could / might $V_1$

eg :- If my brother woke up early, he will / would attend the class in time.

2) If she did not pay the full fee, so they sent her out → If she had paid the full feel, they would not sent her out

3) If she run ~~fast~~ / ran fast she coould catch / caught the 1st bus. yesterday.

* Past probability :-

If + sub + had $V_3$ ⟶ would / could / might have $V_3$

eg:- If the driver had drove / driven carefully the accident coould not have happen / happe

2) If she had ~~sang~~ sung well, she will / would have has bag / bagged 1st prize.

* Imaginary / Impossible Condition :

If + Sub + were ⟶ would $V_1$

1) If I am / were a bird I will / would fly

2) If she were was rich she would help me last yr. (were)

3) If my father were / is multimillinear I will / would enjoy myself axe like anything.

* Imposing :-

Clause + as if were / $V_2$

eg 1) She is dancing as if she is / were trained.

2) he spends money lavisiously as if he were Rich

3) he is blowing all as if he has passed / did pass 10th class at a time.

|

## phrases :-

| | | |
|---|---|---|
| at a strech | - | Nonstop, in a single attempt |
| at a glance | - | Hanuman Normal view |
| at an elbow | - | very close to |
| at sea | - | Confused state, puzzled |
| at an eleveth hr | - | Just before Right time |
| at sixes and sevens | - | In a disorderly way |
| at odds | - | unfriendly |
| at an arm's Length | - | keep distance from |
| at a stones throw | - | very near |
| between and betwix | - | two equal shares |
| between sea and devil | - | confused to go or not |
| In a nutshell | - | very brief |
| once in a bluemoon | - | Rarely |
| Ins & outs | - | merits + demerits, full information about one |
| ups and downs | - | Both difficulties & comfort |
| up and down | - | Going & coming back |
| out of question | - | Impossible |
| out of the blue | - | sudden surprise, something special |
| Bolt from the blue | - | Sudden Surprise, all of a sudden |
| Before and Behind | - | full support |
| from pan to fire | - | Bad to worst |
| In a fix | - | confused |
| crux of the problem | - | Root cause |
| out and out | - | fully |
| well off | - | very Rich |
| well to do | - | very Rich |
| on and off | - | not Regularly |
| by and by | - | slowly |
| Little by Little | - | Gradually |
| Hanging by thread | - | very critical, sensitive |
| Let the bygones be bygones | - | past is past |
| wash hands of | - | Leave the work in the |

Leave in Lurch - Leave one to his faith
Win Laurels - get good name + fame
Spin a yarn - make up a story
Give enough Rope - Scope
Take to hills - Run away from, escape
Point Blank - very close beside
Show the white feather - declaire peace, defit
turn a blind eye - neglect, overlook
Oily tongue - one who attracts with Swe tal
carry the day - win prizes
In the same boat - same situation
Cleans sweep of - To open heart
Chew the cud - Memorise the past
fair weather friend - Good friend, belivable, sel
Bossom friend - Good, belivable selfless fr
Play second fiddle - Have the less importance
Hush money - easy money, money by corrup
take the bull by horns - Do a Risk Job knowingly
tall talk - More information about telling more ab
Underdoud - Suspetious, doughtfull

1 at laege (H) - A) difficult assignmen
2 By and large (G) - B) Spend all time lavishly, working hard too much
3 throw dust into eyes (D) - C) experienced the consi nce
4 means mince matters (F) - D) cheat, betray
5 too many irons in one fire (E) - E) Doing too hard work to bare (beyond his cal
6 Herculian task (A) - F) telling unclearly, illlo
7 face the music (C) - G) approximately cal
8 Burn candle at both the ends (B) - H) not found, uncaught
I) to frighten

Small talk - have cheatchat in a paus
J) Not proper age for

# Conjunction

20/04/18

It is a link word It connects two words and two clauses

eg:- Ravi and suresh are my classmates.

If she comes Late, she will miss the begining of the lesson.

Types of conjunction

1) Subordinate
2) co-ordinate

1) Subordinate

If :- In case of
Unless :- If not
As :- Because of
Since (also a preposition) :- By the reason of
When :- on the event of
While :- At the time of
Though :- Inspite of
Until :- upto

2) Co-ordinate :-

and
or
but
Still
yet
then
so (also an adverb)
therefore
hence
because (because of is a phrase)

Types of sentences :- Clause (1 sub + 1 verb)

1) Simple
2) complex
3) compound

1) Simple :- one clause + no conjunction

eg:- Inspite of her good preparation, she got failed.

2) complex:- two clauses & one Sub-ordinate Conjunct

1) Though she prepared well, she got failed.
(C S V S V)

3) compound:- two clauses + one co-ordinate conjun

eg:- She prepared well but she got failed.
(S V C S V)

Interchange of sentences :-

| complex | Compound |
|---|---|
| If | or / otherwise |
| Unless | or / otherwise |
| As | so / therefore / because |
| Since | hence / therfere / because |
| when | then |
| while | then |
| though | but / yet / still |
| until | till |

eg:- Unless you run fast, you can't catch the trai

→ You runfast otherwise you can't catch the tra

2) While she was dancing, she collapsed.

→ She was dancing then she collapsed.

| Simple | | complex |
|---|---|---|
| without | noun phrase | — If |
| without | verb + ing | — Unless |
| Because of / due to | adj / being + adj | — As |
| owing to / By dint of | | - since |
| on the eve of | | - when |
| during / At the time of | | - while |
| despite / Inspite of | | - though |
| upto | | - until |

7) while she was applying, she forgot testing stamp.

→ @ At the time of application she forgot testing stamp.

→ during the time application she forgot testing stamp

Co-relative conjunctions:-

Both - and

(Otherwise) * Lest - should (will)

Neither - Nor

Eigther - or

Notonly - but also

What to speak of - even

Whether - or

No sooner - than

Hardly - when

Scarcely - when

would rather - than

1) What to speak of getting bumper majority. He couldn't get atleast deposit x (even) ✓

2) No sooner did she finish the exam - she Rushed home.

a) then b) than ✓ c) when d) None

3) we have to put on helmates while driving otherwise the traffic police man should finase. x
(Lest) ✓

4) Hardly had she received her 1st salary then (when) she visited Shirdi.

5) My friend would rather suffer but lie (than)

6) I would rather fail than copying. (Copy)
(fail-copy) (Failing - copying).

## Non co-relative conjunctions

despite – of x

As soon as – when / then / then x

Since – so / therefore / hence x

As – so / therefore / hence x

Lest – will x

Hardly – than x

No sooner – when x

## one word substitutes

Stoic :- A person who react same to pain or plea

epicurean :- one who is given to physical pleasure (food

cannibal :- A cread are one who kill & eats the same cla

Casino :- A large place where table laid for gamblin

Reformatory :- A house where child offender kept

callose :- A person who is stone hearted & cruel inside

Glutton :- one who eats joyfully

Alimony :- Some amount given to ex wife after dive.

beguile :- one who is easily cheated.

bookworm :- one who always keeps reading book (Bibliop

Fastidious :- A per same meaning stoic A person react same to pain or pleasure

Polyglot :- one who knows several languages

Arstiocrat :- A government by a group of elderly peop

Hamlet :- A group of small houses remote from a villa

pesimist :- One who sees everything negative side.

Legible :- Something can be easily red.

carcass :- A deadbody of unclaimed animal.

cosmopolitan :- one who feels the entire world is a fam or hous

Feminist :- one who supports women & their feelings.

misogynist :- one who hates women

misanthrope :- one who hates human being

parasite :- one who lives on others

teetotaller :- one who avoids smoking & drinking habbi

Bilinguist :- one who is expert in two languages

philatelist :- one who collects postal stamps as a hobby
lexicographer :- one who composes dictionary.
kleptomania :- Attitude of stilling for no reason.
epilogue :- The last and final speech at the end of drama
prologue :- some speech at the begining of a drama.
epitaph :- Something written on the top of the tomb.
paleography :- an art of desiphering the antient script
Calligraphy :- an art of beautiful handwritting (Mohammad bin Asghar)
Ordination :- The ceremoney of declairing someone a priest
bigot :- one who is very rigid in his thoughts
dogmatic :- one who is very Rigid in his thoughts
Celibate :- one who abstains from women
extempore :- a speech without previous preparation
Somnambulist :- one who walks in sleep.
Somnoloquist :- one who talks in sleep.
Utopia :- some feeling or thought which is in practicle
fatal :- A disease which ends with death.
honarary :- A job without salary.

Topics to learn

1) phrasal verbs
2) Compulsory prepasitions
3) Prepasitional phrases
4) optional preposition
5) confusing prepositions

Rule No-5) The following verbs are misconceptaly used with misassociation. of the give prepositions

| | | |
|---|---|---|
| | describe | about x |
| | discuss | about x |
| wait for | await | for x |
| | avoid | from x |
| | join | with x |
| | return | back x |
| | enter | into x |
| ask for | order | for x |

1) She has (ask for) ordered for (x) three cups of coffee. (ordered

2) She is (wait for) awaiting for (x) the rply from her beloved. (awaiting

Rule No-55) whenever the following verbs used don't give to before second verb

Let
make → to x (before) 2nd verb
help

eg. 1) Parents make busty to do (x) the homework.

2) My friend helped me to (x) come out of my problems last year.

Rule No-56) propose = to ✓ x
Return = to ✓ x

1) my friend has proposed to the girl / the girl to Mr Ravi for employment.

2) I am going to propose geeta for marriage (a flower in hand) [propose to]

Rule No-57) The following verbs are not at all associated with 'to'

- tell
- call
- give
- inform
- suggest
- advise
- command
- request

1) I Suggested to (x) him yesterday.

# Phrasal verb

→Look at :- To see
Look for :- Search for
Look forward to :- wait eagerly
look into :- Interfere
Look through :- find fault with others
*Look upto :- Refering to dictionary
Look to :- wait anxiously
Look up :- Respect
Look down :- Insult
Look down upon :- pull the leg in Public.
→act for :- To work in Somebodys place
act on :- to show impact
act upon :- work acording to
→Bring down :- defit & keep under control
Bring up :- Raise childeren
Bring to light :- make Something public
Bring forword to :- Convey
→Cut up :- To reach the expectation.
cut down :- To minimize, lessen
Cut in :- To disturb, to interupt
Cut out for :- perfect matching
→put down :- contrat Bring down :- defit + keepunder control
Put for :- Convey Reserve for later use
Put in :- to increase slowly
Put out :- keep lamps OFF
Put up with :- To have patience, to endure.
Put off :- postpone
Put by :- to save money, to saving
put forward to :- Bring forward to :- convey
Set on :- to inspire, anchorage
Set off :- to start for
Set down :- to start up Something
Set in :- to start up something
Set for :- to start for
Set aside :- to reject

→ call on :- call To visit formaly
Call out/ call in :- To have dispute with
call for :- demand for
call up :- dial, make a phone call
* Call off :- cancel, withdraw from bund; strike
call at :- visit informally
→ fall on :- To attack, waige war against
fall for :- start liking
fall off :- sleep down, fall down
fall in/out :- call in, call out (pick up quarrel)
fall back :- To withdraw from war, challenge
Fall to :- get ready for eating.
fall for :- start liking
→ Go on :- Continue, happen
Go up :- Rise
Go down :- Fall down
Go through :- Read
Go by :- time spans back
→ Get on :- prolong, maintain (neigther profit nor loss
Get off :- To maintain distance, to come out of any
Get over :- To overcome (challenges)
Get through :- To pass, succed.
→ keep off :- Avoid
keep up :- To sustained, to maintained the same
keep back :- To maintain a secrete
keep for :- Reserve for, put for
** → Run out of :- To expire money or time with us
Run into :- meet unexpectadely
Run down :- have upper hand in orgument, use harsh word
* Run over on :- hit and crashed (smashed by a heavy veh or heavy body
Run out :- To have middle drop.
→ work on :- act on, to show impact
work for :- To do favour
work upon :- act upon, work according to
** work into :- To have seat/ place/ admission very hardl
work down :- make some work easy

Workup :- set in :- to inspire, anchorage

Break

Breakup :- get seperated from

Breakdown :- A Sudden collapse in a machine

Break in :- cut in :- To distrub, to intrupt

Breakthrough :- a tuening point, Suncesser

Break into :- Stilling, theft, enter unnoticed

Break off :- a cut in paper or cloth or thread

Break open :- Open Something by breaking

Break out :- Spread of gossips, disease

Give

Give up :- Sacrifice, Stop a Practice of

Give out :- release

Given to :- fully involved

Give in :- to Surrender, to yield

Give away :- to distribute

Given to :- fully involved

Taken

Take off :- To remove cloths or ornaments from, a rising point from ground

Take for :- To understand

Take to heels :- to runaway from, escape

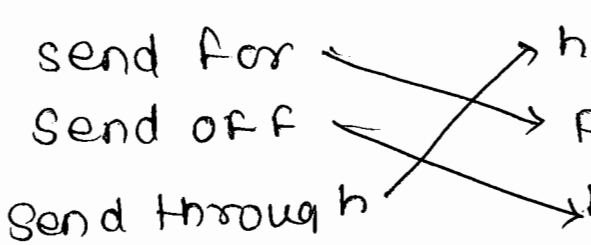
Taken aback :- Got Shocked, Surprised

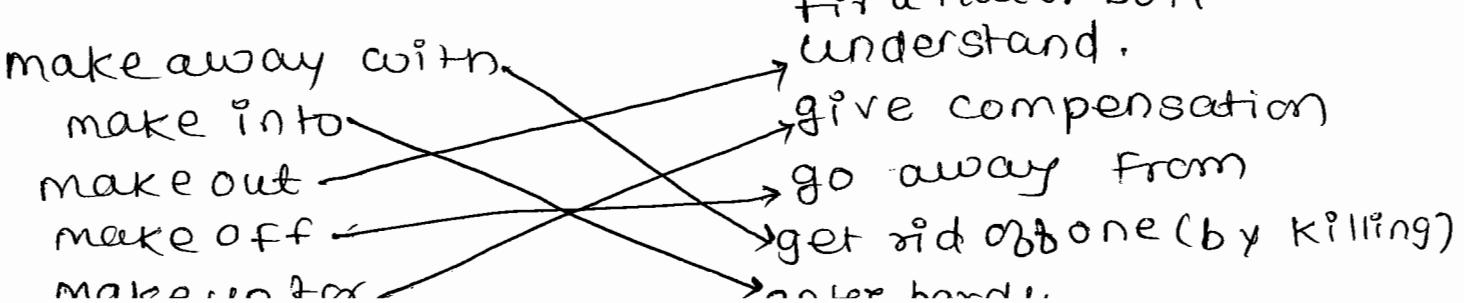
Take after :- have resemblence, similarity

Taken into :- fully involved

Take down :- writedown while dectation

Match the following



1) My cusin has recently worked — IIT kharagpur by cracking Gate-18.

a) to ✓ b) into c) for d) with e) none

## Opposite words (Antonyms)

| | | |
|---|---|---|
| Languish | × | Growfat |
| commiserate | × | complain |
| Abhor | × | admire |
| condone | × | punish |
| Importune | × | please |
| Grovel | × | Standupright |
| Covet | × | passive, inactive |
| Malinger | × | Befair |
| Susceptible | × | skeptical (doughtful) |
| Animosity (Love) | × | Hatred |
| Flagrant (famous) | × | Infamous, unpopular |
| augment (decrease) | × | decrease |
| Supercilious | × | respectful |
| Resurrect | × | perish, deminish |
| Sophistry | × | Faultless, infallible (NO mistak |

## Compulsory preposition :-

At : aim*, Rejoice, arrive, Stay, steare, gaze, wink, Blink, mock, laugh, smile, throw, peck point o criticiz wonder, frown

On : demand for Insist, rely*, impose, invest, comment, compliment, force, pressure, Based, depend

to : Belong, pertain, accustomed, addicted, clos next, listen, speak, talk,

~~to~~ : ~~Belong~~

for : wait, desire, zeal, aspire, crave, happy

from : stop, Restrict, abstain, refrain (avoid), Forbid, prohibit, exile, Banish, dessist → keep away from

of : fond, accuse (keep away from, prohibit), convict, acquiet, dispose, Boast, Relive (take, make someone guilty), think, awareof, beware, avail

by : Stand, abide (obey: work according to → be obidient), against

against : Reble, level, lean, Loan, Reserve (for), cancel, (Revolt against)

over : preside, turnover, makeover, hangover, takeover

in :- belive, come, absorbed, sink (Boat sink / swam), drown, plunge (go down), absorbed, involved, Submerged, soke

1) My Sister is fond OF. sweet (✓OF/for)
2) The medicine has given me relif from (of) Stomachache

optional prepositions :-

1) deal _ in = something
   out = problem
   with = somebody

2) blind _ to (care of)
3) Agree _ at to with
4) part-from somebody with somebody
5) Angry _ with sombody, at something
6) familier to with
7) complain _ to, for, against
- Responsible _ to somebody for something
- Account _ for, to answerable
- answerable _ to, for
- pray _ to God, for something
- compaire (person) _ to, with
- around positive, Negative

blind to → careless, neglectivey
of → really blind.

Angry at → something
with → somebody

Agree with → somebody to → somthing

Complain to → receiver against → accused

21/04/18

Antonyms :-

| | | |
|---|---|---|
| Abnegation | × | Acceptance |
| Susceptible | × | skeptical (doughtful) |
| Indomitable | × | unbending |
| An Invincible | × | Achievable |
| ponderous | × | Lively |
| Insurgent | × | Loyal |
| perfidious | × | faithfull |
| efface | × | Retain, keepup the sam |
| Inflate | × | deflate |
| abjure | × | keep |
| Affluent | × | poor, not rich |
| divulge (open) | × | close |
| Illustrious | × | notorious (famous) |
| Involve (Include) | × | exclude |
| concur (agree) | × | disagree |
| conspicuous | × | Invisible |
| Inducement (N) | × | dissuasion |
| Inhibit | × | allow |
| Succumb | × | resist |
| Lavish | × | meagre |
| allocate | × | keep away |
| ostracize | × | include |
| Repudiate | × | admite |
| Rebut | × | confirm |
| Reseciend | × | enforce |
| Confute | × | prove |
| nullify | × | make useful, avail |
| proscribe | × | allow |
| Accepted | × | Rejected |
| Anger | × | Love, friendliness |
| Loved | × | hated |
| Obey | × | disobey |

| | | |
|---|---|---|
| Vividly | × | Unimpressively |
| deviate | × | concentrate |
| Latent | × | hidden |

## Direct and Indirect speech

Sentence

- Asserative
- Imperative
- Introgative
- Exclametory

Direct speech is the actual words or version of the speaker

eg:- She said, "I am busy"

→ She said that she was busy

Indirect speech is Combination of reporting & Reported part of one sentence.

**Rule No-58)** At the time of changing from direct into indirect link words are misconceptately given

suggest - suggested to
Request - requested to
command - comanded to

Sentence

- Asserative — "Statment" P/N — that
- Imperative — "Giving work" — to
- Introgative — "asking?" — Wh / if / whether — WH ques Y/N
- Exclametory — "expressim!" — that

eg i) My sister Requested me humbly that bring her to dose two dozen mangoes as it is the Summer Season, No error (Imperative sentence)

1 2 3 4 5

2) My principal enquired me If that I was Going to my native place the next day on account of diwali, No error (Introgative sentence) Yes/No question

1 2 3 4 5

3) The bus conductor questioned me that × × Where I would go after getting down the bus.
No error. 2
5

Indirect speech (ends with fullstop) 3 4 all Indirect speech are sente

Rule No - 59) The following changes take place while changing from D.S into ID.S

| D.S | ID.S |
|---|---|
| Now | then |
| here | there |
| today | that day |
| yesterday | the previous day |
| tommorow | the next day, the following day |
| can | could |
| may | might |
| Shall | should, would |
| will | would |
| must | had to |

say-say
says-says
said-said
said to-told

1st & 2nd person pronouns :- 3rd person pronoun
present tense :- past tense
past tense :- past perfect tense
Present Continuos :- past continuos
present perfect :- past perfect
present perfect continuos tense :- past perfect cont ten
past Continuos tense :- past perfect continuos tens
Request - you are Requested Sugession - you are suggested / adviced to
Active voice to passive voice command :- you are camanded / ordered

Active voice is Subject based but passive voice is object based thereare three changes chiefly found in passive voice such as 'by' preposit
A.C S.C into O.C (objective case) mostly the verb is a centre of attaraction i.e. $V_3$

Rule 60) The one + only preposition is 'by' but in the following case two to is placed in the place of 'by'.
Know → to not by
eg :- my contact no is known to all & sundry eventho

Remember Remember, No error
5

Rule No-61) In passive voice only past participle or $V_3$ should be used (however active voice takes $V_1, V_2, V_3, V_4$)

eg:- The Regional Language Marathi is spoke (spoken $V_3$) by most of the people in and around pune ; No error.
1 2 3 4 5 ($V_2$)

A.V ⟷ P.V

$V_1$ — is/are $V_3$ by

$V_2$ — was/were $V_3$ by

has/have $V_3$ — has been / have been $V_3$ by

am/are/is $V_4$ — is/are/am being $V_3$ by

were/was $V_4$ — was/were being $V_3$ by

had $V_3$ — had been $V_3$ by

can $V_1$ — can be $V_3$ by

eg. 1) The student has drawn three diagrams
→ three diagrams have been drawn by the student.

2) Shiva can solve the five problems
→ five problems can be solved by shiva.

3) They are laying a new road to Gole centre at present.
→ A new road is being laid to Gole centre by them at present.

4) A new road was/is being/been liad/laid to/for Gole circle. by/bye they/them at present.

Rule No-62) The passive voice for Imperative sentence will be as follows

eg:- please, stop smoking.
→ you are requested to stop smoking

| | | |
|---|---|---|
| Apposite | × | Inappropriate |
| probity | × | dese· dishonesty |
| cessation (end) | × | Commence (begin) |
| chivalry (brave) | × | Cowardish (timid) |
| dismal (dull) | × | bright |
| Imperial | × | Safeguard |
| Shallow | × | deep |
| immune | × | vaulnerable (weak) |
| Insolent | × | Humble |
| Vague | × | clear |
| Sucessor | × | predecessor |
| geneal | × | Unkind |
| despair | × | Hope |
| Vindicative | × | forgiving |
| embellish | × | Spoil |
| Meticulous | × | careless |
| Commotion अशांती | × | tranquility (शांती) |
| monotony | × | Varrity |
| diligent | × | lazy |
| Philistine | × | Cultured |
| Laceration | × | Healing |
| Glossy (dark) | × | dull |
| Gloomy | × | Radiant (bright, happy) |
| Strife | × | peace (shanti) |
| Antique | × | Recent |
| Autonomy | × | dependence |
| awkward | × | graceful |
| Flamvoyant | × | unshowy, Simple |

Note:- If Imperative is not request or suggesion or command the beginee of passive is Let + Obj + be, if crown is not the Let + obj + be $V_3$

eg:- help the poor :- Let the poor be helped

## Comprehension Passage

It is ment for ur reading capacity & understanding capacity by giving a medium size text followed by five questions (Q15 to 20) out of that 2 or 3 on the matter or content involved in the text remaining 2 or 3 will be on meanings of hard word, Idioms & phrases, opposite word or Antonyms.

Do's :- 1) Read the passage twice
2) pointout major issues when they are repeated
3) Read the questions given below
4) be back again to passage third time (while conferming answers by ticking passage itself)
5) Ignore If there is tongue twister.

Don't :-
1) Don't give direct option
2) Don't forget ruleout method while selecting
3) Don't stay at the question too difficult to solve.
4) Don't forget taking count on words, Idioms, phrases if there are.

## Articles

Uses of a :- 1) before concenant beginers
eg:- a book, a fan.
2) before any noun to show singularity
eg:- She wanted a slate (one slate)
3) before any noun for the meaning any

4) placed before owels also not because of spelling but only pronounciation. exclusively the sounds of "yoo" (यू) & "va" (वा)
eg. a university, a unit, a one rupee coin, a one legged man

Uses of 'An':-
1) before owel beginers eg:- an apple, an african an orange.
2) An can be placed before even consonant also. when its pronounciation is 'अ', 'आ' 'Aa', 'A' 'ई'
eg an honour, an honest man, an honorary an hoH
3) placed before abrivation. whose beginer is oval sound (Irrespective of spelling)
eg an FIR, an M.P, an MLA, an IITIAM,
eg: Bahubali is a/an Rajmauli cinema.
2) Rowdy Rathore is a/an S.S. Rajamauli movie.
3) ~~On~~ vanday mataram is a Rahemans album.

Uses of 'The':-
Rule No-63) Before material nouns article 'The' is not given / placed.
eg:- The cotton, the sand, the milk,
Note:- But article 'The' can be given before material when Specified.
eg: The cotton from maharashtra, gajrat & punjab is of Superior quality.
Rule No-64) Before abstract nouns article 'the' is prohibited.
The wisidem, the happiness, the knowledge
Note:- When Abstract noun specified article the placed before

eg:- 1) we can buy things with money but we can't buy the happiness with money. (X)

2) The happiness on the face of the little girl made me elated when I offered a new dress (✓)

## Words often confused :-

### Homophens :-

1) Accept (V) – Receive
   except (P) – without
2) acess (N) – Reachability, gain
   excess (N) – More than enough
3) adapt (V) – Adjust to
   adopt (V) – Raise a child legaly
   adept (Adj) – skillfull, expert
4) adverse (Adj) – unfavourable
   averse (Adj) – unwilling
5) affect (V) – To show impact, actor, coarkon
   effect (V,N) – Impact
6) altar (N) – space before statue of god
   alter (V) – change
7) amible (Adj) human – affectionate, friendly
   amicable (Adj) things – Suitable, comfortable
8) Biannual (Adj) – happening twice in 1 yr
   Binniel (Adj) – happening once in 2 yr
9) antipathy (N) – disliking
   abhtay (N) – Indifferent, blind to, carless
10) apposite (Adj) – Suitable
    opposite (Adj) – rival
11) artist (N) – Painter
    artiste (N) – actor
12) artisan (N) – A person of handicraft
13) assay (V,N) – assignment, to test
    essay (N) – a large piece of paragraph
14) aught (Ad) – anything
    ought (Auxilary V) – Should
15) bail (N,V) – security, helpout

banish (V) – prohibit, forcefully sento
15) exile (V) – hide oneself voluntari
16) berth (N) – space for sleeping
birth. (N) –
17) beside (P) – by the side of
besides (conjunction) – In addition to
18) bridal (Adj) – of a bride
bridle (N) लगाम – controlling ropes of horse
19) Canvas (N) – thick cloth for tents or paint
Canvass (V) – publicity
20) Check (V) – test
Cheque (N) – Cheque book to receive money
21) Childish (Adj) – Silly, mentally immatured
Childlike (Adj) – Bodily immatured (dwarf
22) Choir (N) – Group of singer
Coir (N) – fiber of coconute
23) Cite (N) V) – to give example
Site (N) – a place for Construction
Sight (N) – vision
24) Coarse (Adj) – of Interior quality
Course (Adj) – span of time
25) Compliment (N) – words of a praise/admi rati
complement (N) – finishing, ending clima

# Mechanics

22/04/18

Mechanics :- A science that deals with predicting the states of Rest and motion of Bodies under the influence of forces.

Mechanics
- Rest (Static)
- Motion (Dynamics)

Body :- Anything which has the property of Inertia is known as body.

Inertia
- Linear Inertia $F = m.a$
- Rotational Inertia $\tau = I.\alpha$

The property which Resists any kind of Change in the state of Rest or uniform motion along the Straight line of a body is known as Inertia.

The Representative of Linear Inertia is mass the Representative of Rotational inertia is mass moment of Inertia.

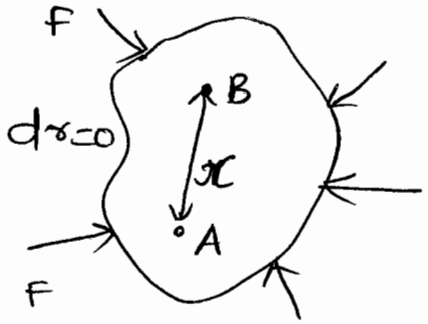
2017 IM mass moment of Inertia depends on
1. Mass of the body
2. Distribution of the mass w.r to the point of Rotation.

Body
- Non-deformable (Rigid body) (Particle) → Nodia
- Deformable body

Engg mechanics deals only with Rigid body

**Rigid body** :- A body in which the distance bet^n any two points does not change upon the application of any amount of load is known as a Rigid body.

A Rigid body with neglisible diamensions is known as particle. (concurrent)




**Properties**:-

1) Strain $\epsilon = \frac{dr}{r} = 0$

2) Elastic Modulus $E = \frac{\text{Stress}}{\text{Strain}} = \frac{\text{stress}}{0} = \infty$ (Infinite)

**Force**:- Force is a vector quantity which changes or tries to change the state of Rest or uniform motion along a straight line of a body

| | Scalar | Mag ✓ | dir × |
|---|---|---|---|
| Force → | vector | ✓ | 1 |
| Stress → | Tensor | ✓ | 1+ |

$\overline{F} = f_x\hat{i} + f_y\hat{j} + f_z\hat{k}$

$|F| = \sqrt{f_x^2 + f_y^2 + f_z^2}$

**Units** CGS SI - $N = 1kg \cdot \frac{1m}{s^2}$ $[MLT^{-2}]$

CGS $1 \cdot dyne = 1gm \cdot \frac{1cm}{s^2} = 10^{-5}N$

$$\boxed{1\ dyne = 10^{-5}N}$$

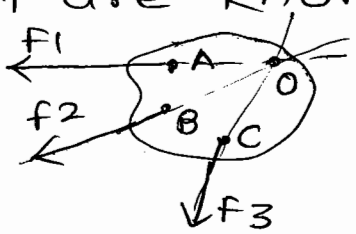
System of forces:-

1) collinear forces & Non-collinear forces :-
Along the straight line.

2) Like and unlike forces.
forces having same direction scense are known as like forces. ($\rightrightarrows$)
forces having diff direction scense known as unlike forces ($\rightleftarrows$)

3) Concurrent & Nonconcurrent forces.

A set of forces whose lines of action coinsides at a common point are known as Concurrent forces.




4) * Coplanee & Noncoplanee forces.

A set of forces lying on a common plane are known as Coplaner forces.

(Non-coplanee forces not necessary for study)

Principles in Mechanics

1) Law of transmissibility of forces :-
2) Concept of Resultant.
3) } Newtons Law's of Motion
4) }
5) }
6) Newtons Law of gravitation

1) Law of transmissibility of forces :-

The net effect of a force acting on a rigid body does not change when it is represented anywhere along its Line of action, in the same direction

3) Newton's 1st law of motion (def of force)

An external force has to be applied in order to change the state of Rest or Uniform motion along the Straight line of a body

It is also known as Law of Inertia.

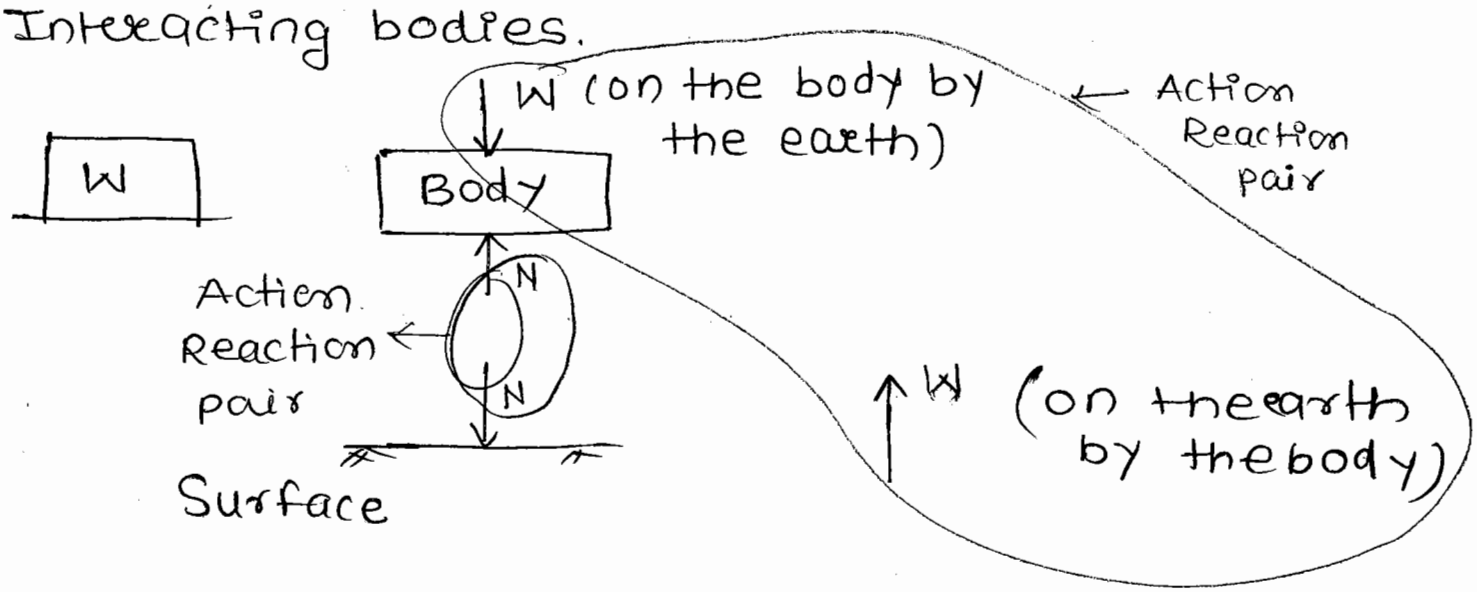
4) Newton's second Law of motion

$$\vec{F} = m.\vec{a}$$

5) Newton's third Law of motion

for every action there is an equal & opposite Reaction bet^n the two bodies in Interaction.

Therefore action Reaction pair can never exist on a single body. It has to exist beth two Interacting bodies.

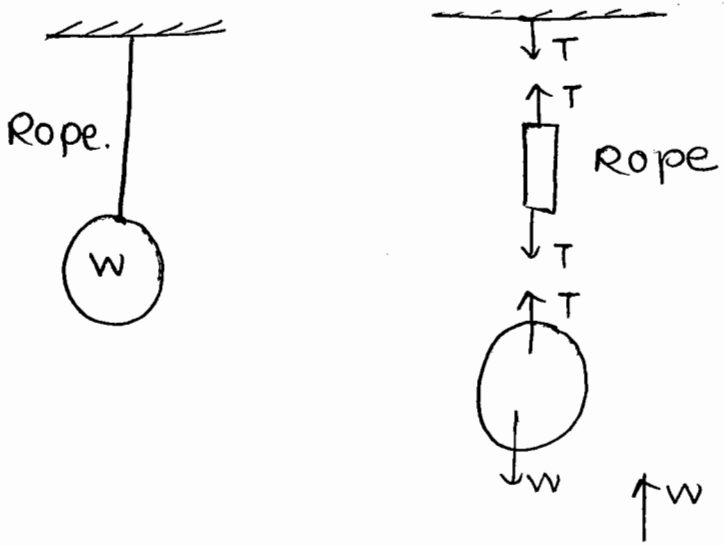



few important Reaction forces :-

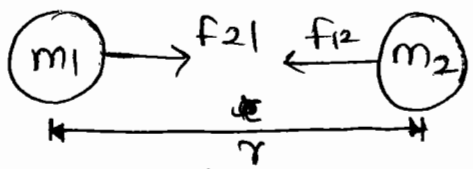
1) Normal :→ Contact forces

ii) perpendicular to common tangent

2) Tension :- Acts away from the body along the line of the Rope




6) Newton's Law of Gravitation




$f_{12}$ :- force by ① on ②

$$|f_{12}| = |f_{21}| \propto \frac{m_1 m_2}{r^2}$$

$$|f_{12}| = |f_{21}| = \frac{G m_1 m_2}{r^2}$$

G = Gravitational Constant


$M_E$ = mass of earth
$m$ = mass of body
$R_E$ = mean Radius of earth

$$F_{EB} = F_{BE} = \frac{G M_E m}{R_E^2}$$

$$g = 9.81\ m/s^2$$

$$W = mg$$

Mass is a property of Body alone.
but weight depends on the other body (earth) and the distance beth them.

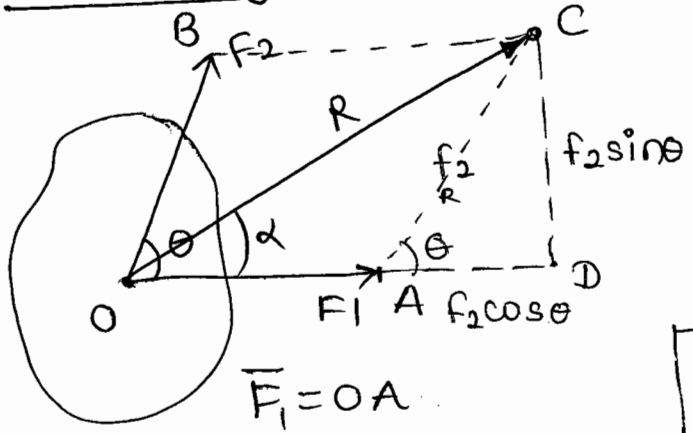
## Resultant

A single force which can replace a system of forces and has the same translatory and Rotational effect is known as Resultant

There are three laws of Resultant

1) parallelgram law
2) Triangle law
3) Polygon Law

### 1) parallelgram law :-




$\overline{F_1} = OA$
$\overline{F_2} = OB$
$R = OC$

from $\Delta OCD$

$$R^2 = (f_1 + f_2\cos\theta)^2 + f_2^2\sin^2\theta$$

$$= f_1^2 + f_2^2\cos^2\theta + 2f_1f_2\cos + f_2^2\sin^2\theta$$

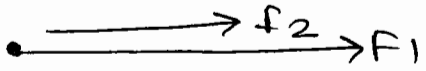
$$R^2 = f_1^2 + 2f_1f_2\cos\theta + f_2^2$$

$$\boxed{R = \sqrt{f_1^2 + f_2^2 + 2f_1f_2\cos\theta}}$$

$$\boxed{\alpha = \tan^{-1}\left(\frac{f_2\sin\theta}{f_1 + f_2\cos\theta}\right)}$$

i) Maxm value of R

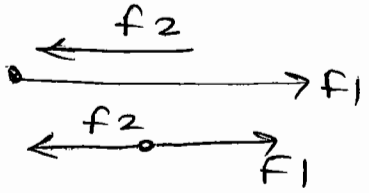
$\theta = 0$ $\boxed{R = f_1 + f_2}$




R = Sum of f1 + f2

ii) minm value of R

$\theta = 180^\circ$ $\boxed{R = F_1 - F_2}$




R = diff of f1 + f2

Q1. Two forces of magnitude 3 KN & 4 KN act on a particle. Which of the following forces (Concurrent) cannot be its resultant.

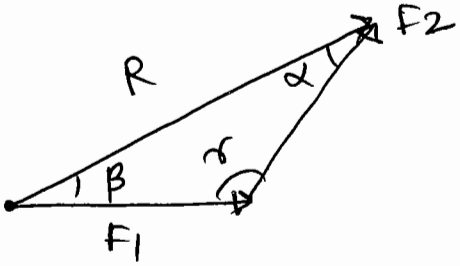
→ a) 1 KN b) 3 KN c) 6 KN ✓d) 9 KN

minm Resultant $R_{min} = 4 - 3 = 1$

maxm Resultant $R_{max} = 4 + 3 = 7$

Range = $[1, 7]$ (min, max) including 1 & 7

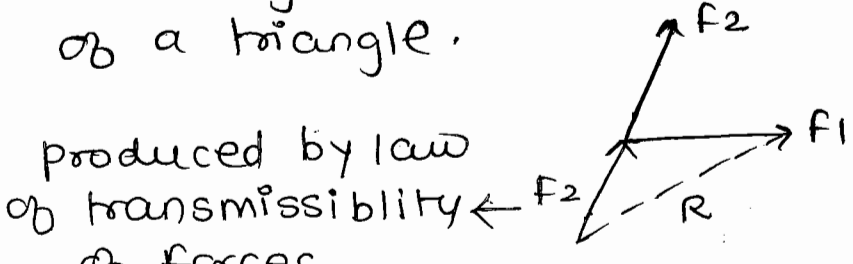
2) Triangle law :-




By sine rule

$$\frac{f_1}{\sin\alpha} = \frac{f_2}{\sin\beta} = \frac{R_3}{\sin\gamma}$$

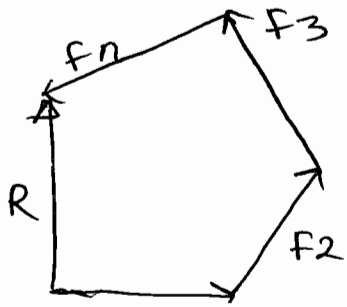
When two forces are in the form of sides of a triangle then closing side is a Resultant of a triangle.



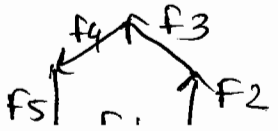

produced by law of transmissiblity of forces

3) Polygon Law :- The closing side of the polygon Represents the Resultant.

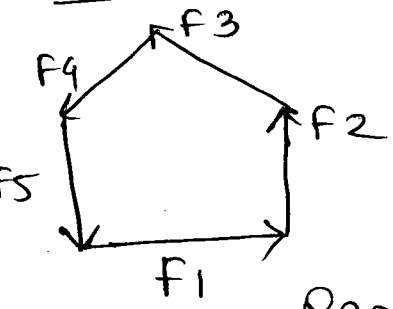
Polygon Law is obtained by applying consicutive triangle laws




* - The Resultant of forces creating a closeloop is always equal to zero !



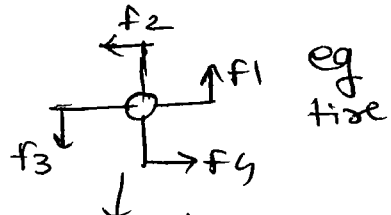
But the net moment is not equal to zero.
A net nonzero moment where the Resultant Force is zero is known as Couple equivalent Moment.



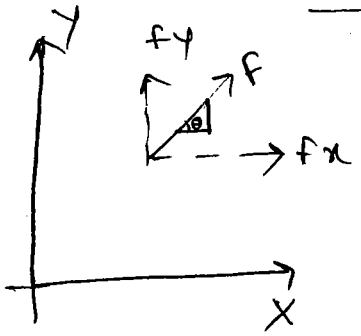

$\Sigma F = 0$

$\Sigma M \neq 0$

↑ couple equivalent Moment




## Resolution of forces




$f_x = F\cos\theta$

$f_y = f\sin\theta$

if 'n' no. of forces exist

$f_1 \rightarrow f_{1x}, f_{1y} \cdots$

$f_2 \rightarrow f_{2x}, f_{2y} \cdots$

$\vdots$

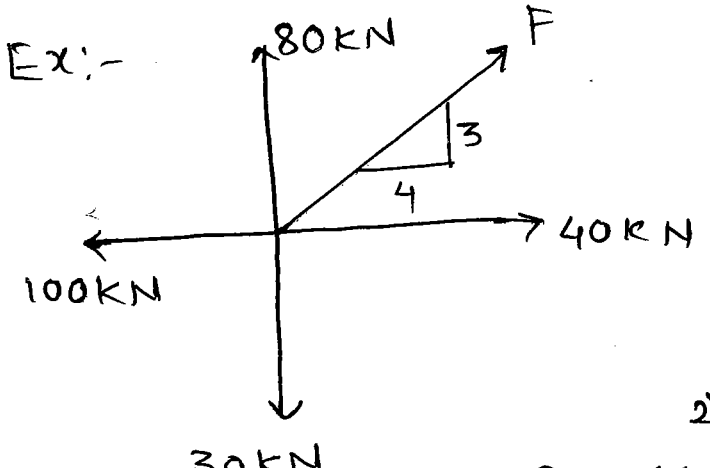
$f_n \rightarrow f_{nx}, f_{ny}$

$\Sigma f_x = f_{1x} + f_{2x} \cdots$

$\Sigma f_y = f_{1y} + f_{2y} \cdots$

$R = \sqrt{\Sigma f_x^2 + \Sigma f_y^2}$ $\quad \theta = \tan^{-1}\left(\frac{\Sigma f_y}{\Sigma f_x}\right)$

Ex:-



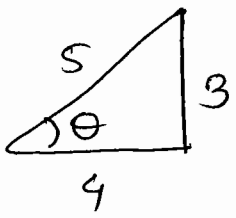

$\Sigma f_x = 40 - 100 + F\cos\theta$

$\Sigma f_y = 80 - 30 + f\sin\theta$

Q1) find the value of F such that Resultant is completely vertical.

2) Find the value of Resultant using value of f from Q1.

$\Sigma f_x = 0 \qquad -60 + F\cos\theta = 0$




$\cos\theta = 4/5$

$\sin\theta = 3/5$

$\Sigma fx = 0 \qquad F\cos\theta + 40 - 100 = 0$

$\frac{4}{5}F = 60 \qquad F = \frac{300}{4}$

$$\boxed{F = 75\ kN}$$

2) $\Sigma fx = 75 \times \frac{4}{5} + 40 - 100 = 60 + 40 - 100 = 0$

$\Sigma fy = 80 - 30 + \frac{3}{5} \times 75 = 80 - 30 + 45$

$= 50 + 45$

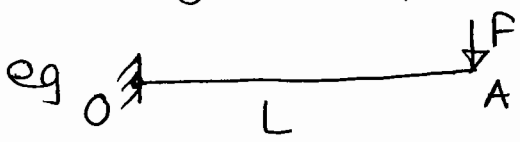
$= 95$

$R = \sqrt{\Sigma Fx^2 + \Sigma fy^2} = fy = 95\ kN$

---

## Moment

The Rotational effect created by a force about a point is known as Moment of force. It is a vector quantity. It's direction scense are given by clockwise & anticlockwise



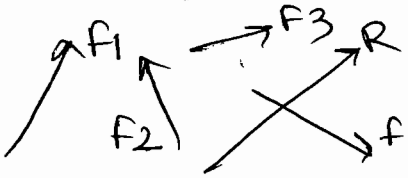

$M_O^f = f \times$ (perpendicular distance)

$= f \times L$

Units $= N \cdot m \rightarrow kg \cdot m^2/s^2$

Diam $= [ML^2T^{-2}]$

## * Varignon's theorem :-

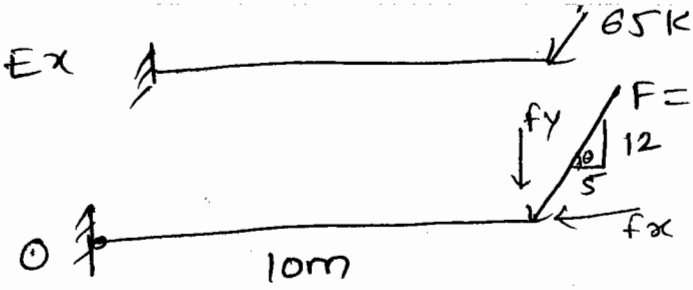



$$\boxed{\sum_{i=1}^{n} M_O^{fi} = M_O^R}$$

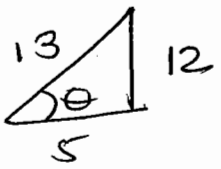
Stat :- The Sum of moments of forces in a system about a point is equal to the moment of their Resultant about the same point

In other words Sum of moment = moment of sum (Resultant)

Ex




find $M_O^f$ if +ve ↺ (NM)



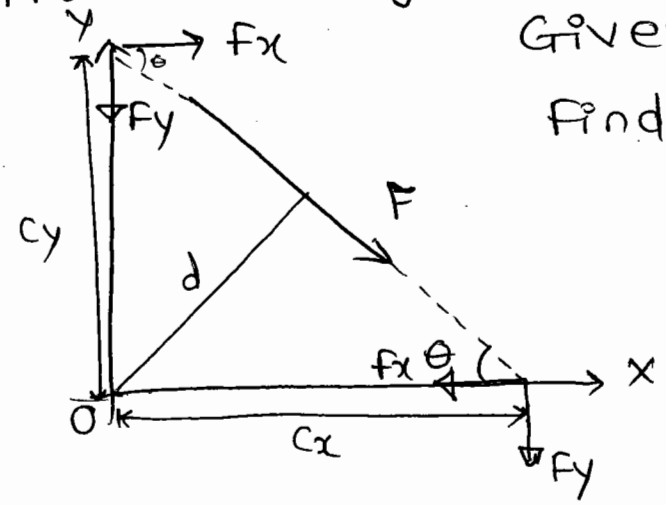

$\sin\theta = \frac{12}{13}$

$\cos\theta = \frac{5}{13}$

$$M_O^f = M_O^{fx} + M_O^{fy}$$

$$= 65 \times \frac{12}{13} \times 10 = 600 \text{ kN.m} = 600{,}000 \text{ N}$$

★ Intercept of a force when its perp distan from the origin is given.




Given : F, d, θ

Find: cx & cy

$$M_O^F = Fx \cdot cy = F \cdot d$$

$$cy = \frac{F \cdot d}{Fx}$$

$$= \frac{f \cdot d}{F\cos\theta}$$

$$\boxed{cy = \frac{d}{\cos\theta}}$$

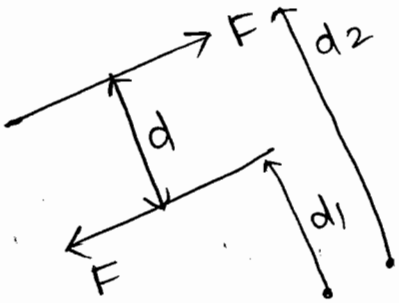
$$M_O^f = fy \cdot cx = f \cdot d$$

$$cx = \frac{F \cdot d}{fy} = \frac{F \cdot d}{f\sin\theta}$$

$$\boxed{cx = \frac{d}{\sin\theta}}$$

***IMP **Couple**

When two forces, equal in magnitude and opposite in direction are seperated by some eccentricity, then a special moment known as Couple is generated.




$$C = F \cdot d \circlearrowright$$

$$C = F \cdot d_2 \circlearrowright + F \cdot d_1 \circlearrowleft$$

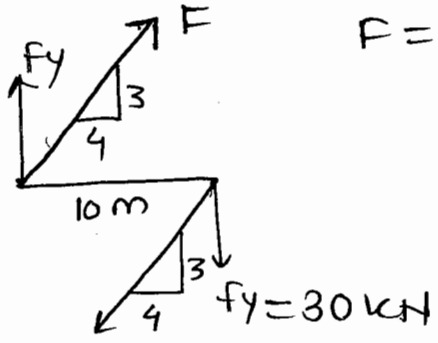
$$= F \cdot d \circlearrowright$$

1) The value of 'C' remains same when taken along any point in the plane

** 2) The translatory effect of a Couple (only rotational effect) is zero

3) varignon's theorem should not be applied in the case of a Couple.

4) If a System of forces have a zero Resultant, but a nonzero moment, then those forces are known as Couple equivalent forces.

Eg:- 


F = 50 kN. find the value of C

i in (KNm)

$C = fy \times 10$

$C = 30 \times (10)$

$= 300 \text{ KN.m} \circlearrowright$

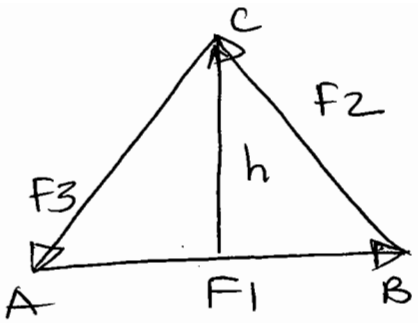
---

Eg:- three forces form a closed loop (triangle). the net moment due these three forces is equal to

a) ½ X Area of $\Delta^{le}$ b) Area of $\Delta^{le}$

c) 2 X Area of $\Delta^{le}$ d) 4 X Area of $\Delta^{le}$

e) 0




$$\Sigma M_C = F_1 \times h$$
$$= 2 \times \left(\frac{1}{2} \times F_1 \times h\right)$$
$$= 2 \times \left(\frac{1}{2} \times \text{base} \times \text{height}\right)$$
$$= 2 \times (\text{Area of triangle})$$

## Equillibrium

A condition in which the net unbalanced forces & the net unbalanced moments acting on a body are equal to zero. is known as equillibrium.

$$\Sigma \bar{F} = 0 \quad \bar{a} = 0$$
$$\Sigma \bar{M} = 0 \quad \bar{\alpha} = 0$$

$\Rightarrow$ Linear momentum = Cons
$\Rightarrow$ Angular momentum = Cons

* Conditions of equillibrium for Coplaner concurre System of forces.

$$\Sigma fx = 0$$
$$\Sigma fy = 0$$

Coplaner Non-concurrent System of forces :-
(moment is thru)

$$\Sigma fx = 0$$
$$\Sigma fy = 0$$
$$\Sigma M_z = 0$$

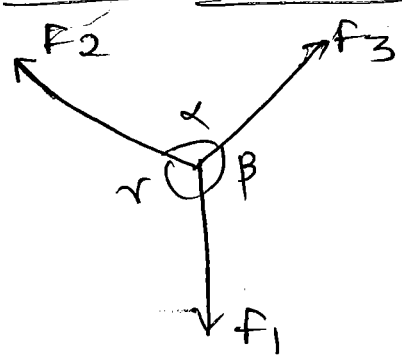
Non-coplaner concurrent System of forces :-
(No unbalanced moment)

$$\Sigma fx = 0$$
$$\Sigma fy = 0$$
$$\Sigma fz = 0$$

Non-coplaner Non-concurrent system of forces:

$$\Sigma fx = 0 \qquad \Sigma Mx = 0$$
$$\Sigma fy = 0 \qquad \Sigma My = 0$$
$$\Sigma fz = 0 \qquad \Sigma Mz = 0$$

## Lami's theorem :- ** Imp

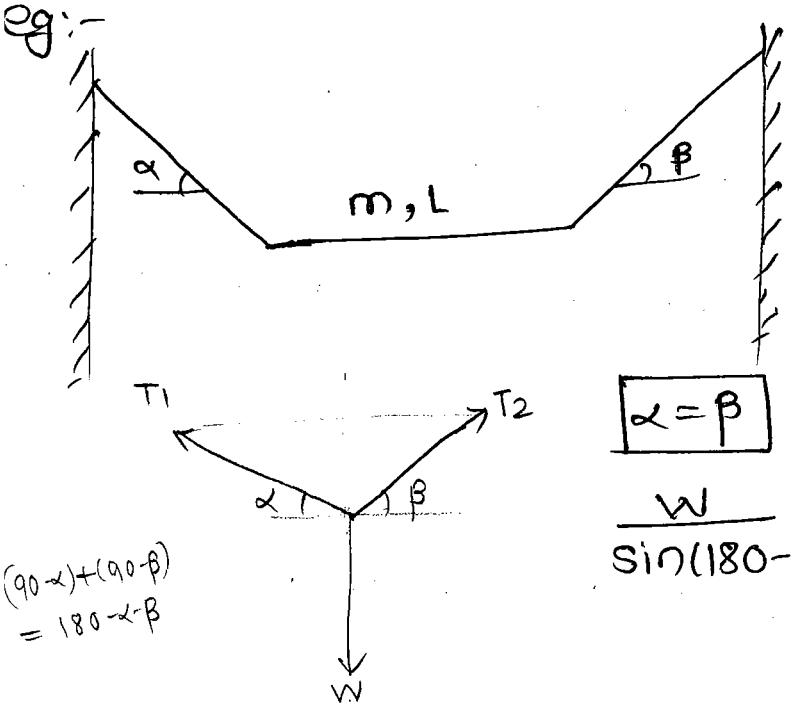



$$\frac{F1}{\sin\alpha} = \frac{f2}{\sin\beta} = \frac{f3}{\sin\gamma}$$

Cond$^n$:- three coplaner and concurrent forces are in equillibrium.

Note:- If three non-parallel forces are in equillibrium, then they have to be Coplaner & Concurrent in nature. 23/04/18

eg:-




Establish a relationship (inequality) bet$^n$ α & β

1) C.O.G of the rod is exactly @ centre

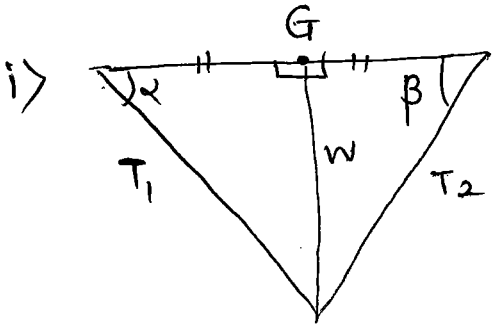
2) C.O.G of the rod is polarised towards right of center

$\alpha = \beta$



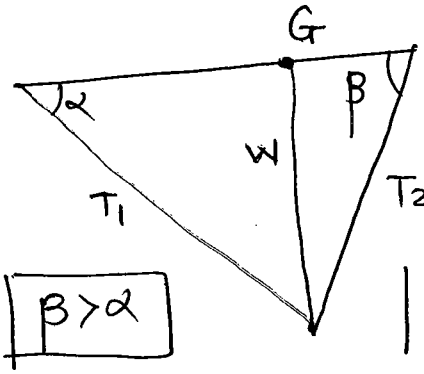

$$\frac{W}{\sin(180-(\alpha+\beta))} = \frac{T_1}{\sin(90+\beta)} = \frac{T_2}{\sin(90+\alpha)}$$

i)




$\alpha = \beta$

ii)



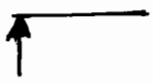
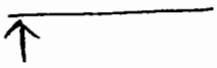

$\beta > \alpha$

$\alpha \not> \beta$

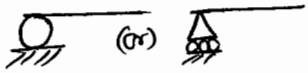
# * Beams *

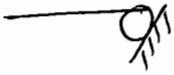
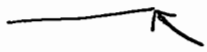
## Types of Supports in Beams :-

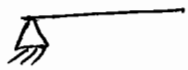
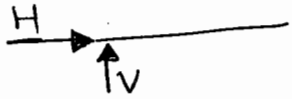
1) Simple support :-

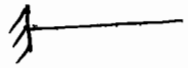
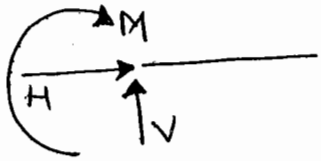
Rep  No. of Reaction = 1 FBD 

2) Roller support :-

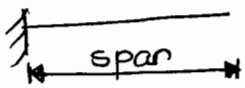
Rep  1 

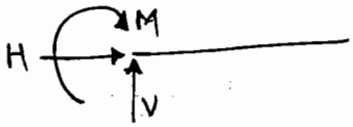
 1 

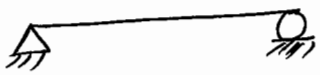
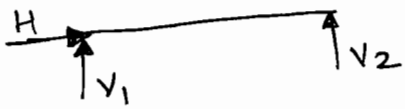
3) Hinge / pin  2 

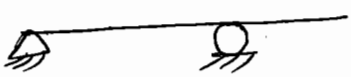
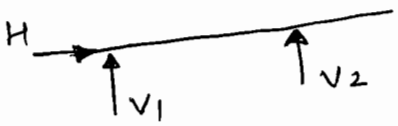

4) Fixed  3 

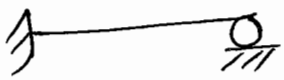
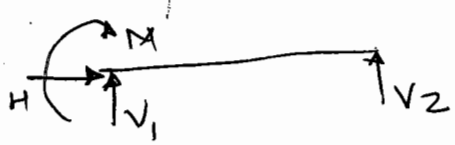

## Types of Beams :-

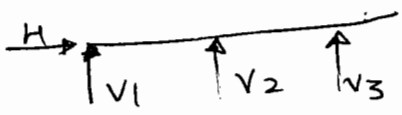
1) cantilever Beam 

No. of Reaction = 3 F.BD 


2) Simply Supported Beam 
3 


3) Overhang beam 
3 


4) proped cantilever 
4 


5) Continuous beam 
3+ 

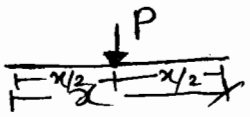
## Statically Determinate & Indeterminate Beams:-

The No. of static equillibrium eq's possible in the analysis of beams are equal to three ($\Sigma fx = 0$, $\Sigma Fy = 0$, $\Sigma M_z = 0$)

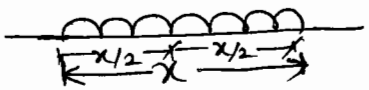
2017 *** If the no. of Reactions are more than the no. of static equillibrium equations, then such Beams are reffered to as Statically Indeterminate Beams.

## Types of loadings:

1) point load (or) concentrated load



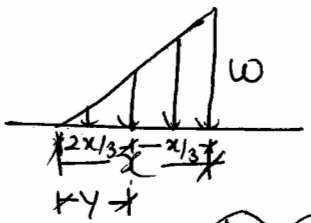

2) Uniformly distributed Load (udl)




Total load :- $\omega x$

Point at which total load is concentrate :- @ the centre of x

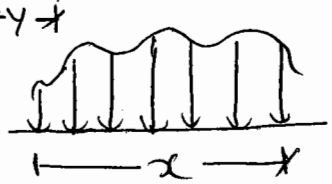
3) Uniformly varrying load (UVL)



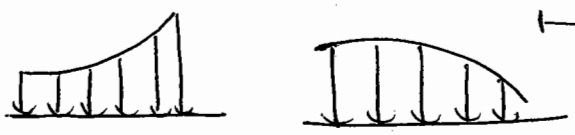

Total load $= \frac{1}{2}\omega x$

$y = 2x/3$

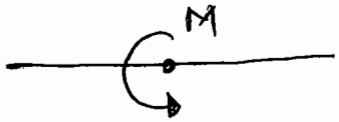
4) General loading



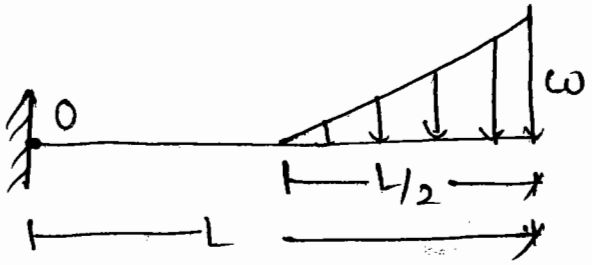

Total load = area under the curve.



5) concentrated Moment



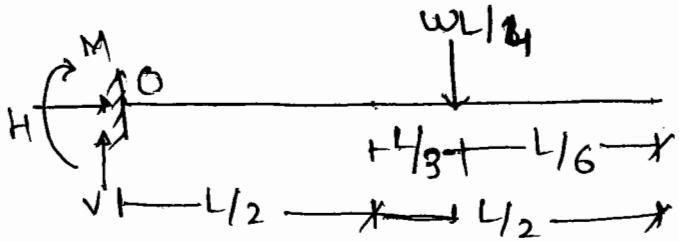

Ex




find Reaction at pt o.

total load $= \frac{1}{2} \times \omega \times L/2$

$\Sigma M_0 = \frac{\omega L}{4} \times \frac{5L}{6} = \frac{5\omega L^2}{24}$




$\Sigma f_x = 0$

$H = 0$

$\Sigma f_y = 0$ $\quad V = \frac{WL}{4}$

# * Analysis of frames *

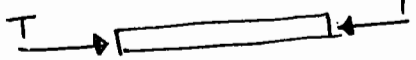
frames are structures formed by joining uniform slender rods in the form of continuous triangles by using pin joints.

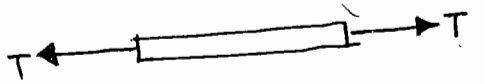
1) The weight of every member in a frame is neglected in its analysis.

2) Every pin joint connecting the members in a frame is assume to be frictionless in nature.

3) If every member in a frame experiences only axial loading, then such a frame is known as truss. this implies truss member do not experienced bending loads.

If a member experienced

Compression  strut

tension  tie/tierod

The Condition for a perfect truss to exist is given by $\boxed{2j = m+3}$ or $\boxed{m = 2j-3}$

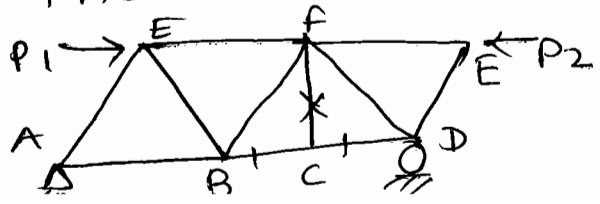
j :- No of joint m :- No. of member

If a truss has an extra member (more than required member) then it is called as Redundent link / Redundent Member.

The loading in a Redundent link is always equal to zero.

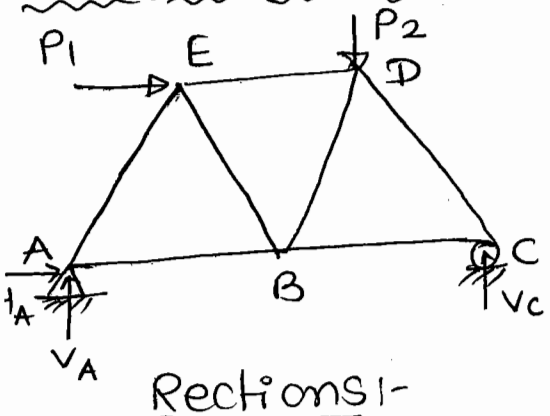
eg of Redundent link :-

If a truss system has a joint at which only three loadings are acting, amongst which two are collinear and the third is perpendicular then the third member is Redundent.




3 loading
2 collinear (⊥er) then
third member is zero

## Analysis of truss :-




1st step :- Identify the Reaction on support.

2nd step :- Draw the F.B.D

3rd step :- Use the suitable method of analysis.

### Rections :-

1) $\Sigma M_A = 0$ ($V_C = V$)
2) $\Sigma F_x = 0$ ($H_A = V$)
3) $\Sigma F_y = 0$ ($V_A = V$)

There are three ways of Analysing trusses

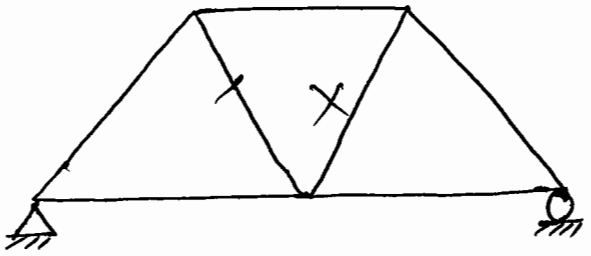
1) Method of Joints
2) Method of sections.
3) Graphical method / Logical method.

1) **Method of Joints :-** It is Suitable when the Loading in every Member has to be Identified Each Joint in the truss system is maintained in equillibrium by using the equations For Coplaner Concurrent System of forces.

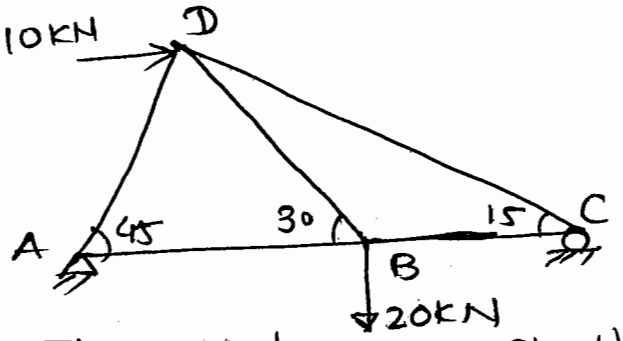
$\Sigma f_x = 0$ ; $\Sigma f_y = 0$

### Steps :-

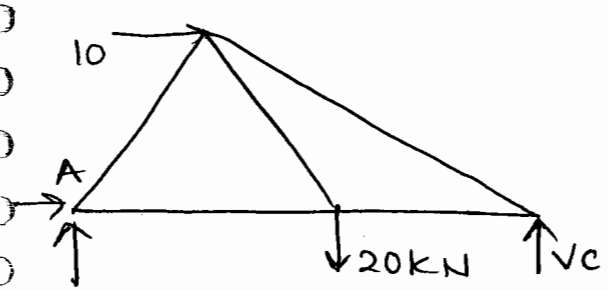
1) Choose a Joint having a maxm of two unknown Loadings
2) Use the eq's of equillibrium. to Identify the unknown loadings.
3) Use the foundout Loadings as known quantities for the adjucent Joints



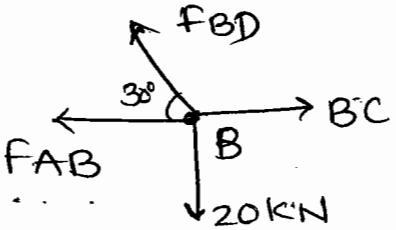
Ex:-




Find the Loading in BD (+:-Tie memb, -ve:-Strut)




FBD of Joint B




$\Sigma fy = 0$

$f_{BD}\sin 30 = 20$

$f_{BD} \times \frac{1}{2} = 20$

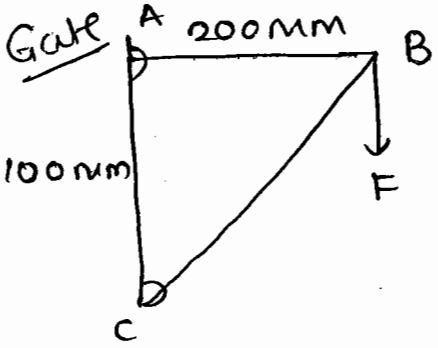
$f_{BD} = 40\,KN$ (T)

away from joint :- tensile (Tie)

towards the joint :- Compressive (Strut)

---

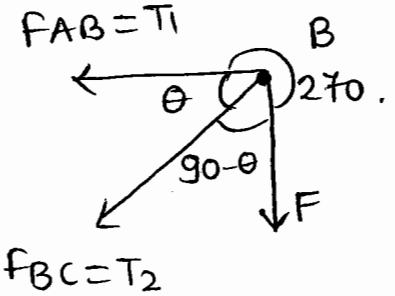
Gate




Find the Loading in AB ?

FB. of Joint B

By Lami's theo




$\frac{F}{\sin\theta} = \frac{T_1}{\sin(90-\theta)} = \frac{T_2}{\sin(2}$

$\frac{f_1}{\sin\theta} = \frac{T_1}{\cos\theta}$

$T_1 = \frac{f}{\tan\theta} = \frac{f}{1/2}$

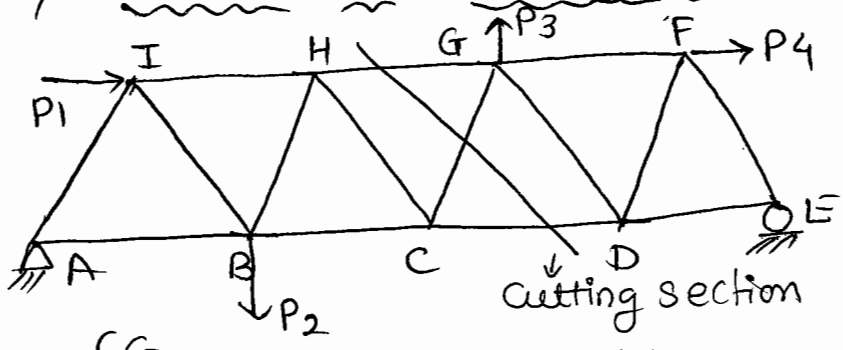
$\tan\theta = \frac{100}{200}$

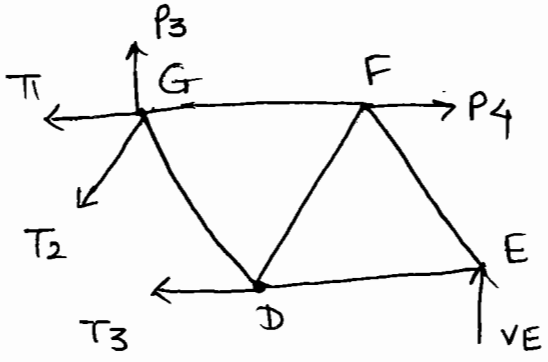
$\therefore \tan\theta = 1/2$

| AB = | $T_1 = 2F$ | (T) |
|---|---|---|

---

2) Method of Sections :-




CG

3 truss Member

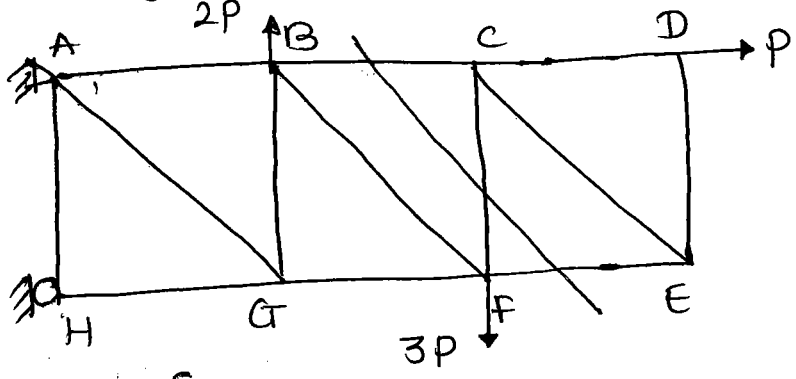
Method of sections is preferable when the loading in any random intermediate member has to be identified.

Step 1) Use a cutting section to cut the subject member and two more truss members.

choose either of the two parts of the truss and draw its FBD.

Findout the unknowns using the equations of equillibrium for coplaner Non-concurrent System of forces. ($\Sigma f_x=0$, $\Sigma F_y=0$, $\Sigma M_z=0$)

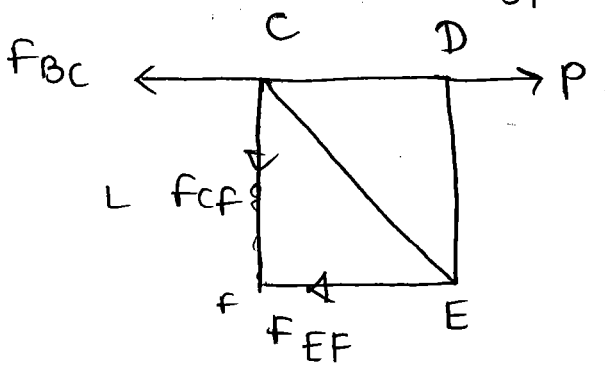
Ex:-




Find the loading in 1) CF → 0

ii) EF → 0

iii) CB → P




$\Sigma M_C=0$

$F_{FE}=0$ $\boxed{F_{EF}=0}$

$\Sigma f_x=0$

$F_{BC}+F_{EF}-P=0$

$\boxed{F_{BC}=P}$

$\Sigma f_y=0$

$\boxed{F_{CF}=0}$

# * Friction

The Resisting nature against Relative motion bet^n two Bodies in Contact is known as friction. friction always also is a Contact force like Normal.

friction takes place due to the Surface Roughne bet^n the bodies in Contact

Friction

- Dry friction (Coloumbs friction)
- Wet friction (lubricating friction viscous friction)

Columbs Laws of dry friction :-

1) frictional force is Independent of the area of Contact bet^n the two bodies
2) frictional force is proportional to the Normal action Reaction forces bet^n the two bodies in Contact.

$F \propto N$

$\boxed{F = \mu N}$

(Tangent of Angle of Friction)

$\mu$ :- coeff of friction

Coeff of friction is a binary property. It is defined for both the bodies in Contact.

when a force is applied to a body and the body remains in static state w.r to the Surface in Contact, then a frictional force known as static friction is developed.

- Static friction is a nonconstant seltadjusting force which tries to establish static equillibriu
- The maxm value of static friction is known as limiting static friction. which is given by $F_s$.

$F_s = \mu_s \cdot N$

$\mu_s$ :- coeff of Limiting static friction.

- If the body is in dynamic state w.r to the Surface in Contact, then the friction force

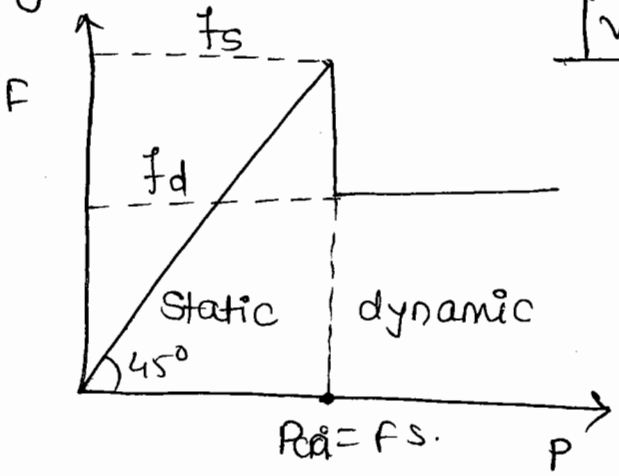
It is less than limiting static friction and Remains a constant.

$f_d = \mu_d \cdot N$ $\quad \mu_d$ :- coeff of dynamic friction

$f_s > f_d$

$\Rightarrow \mu_s N > \mu_d N \Rightarrow \boxed{\mu_s > \mu_d}$

- Dynamic friction decreases slightly at extremely high velocities

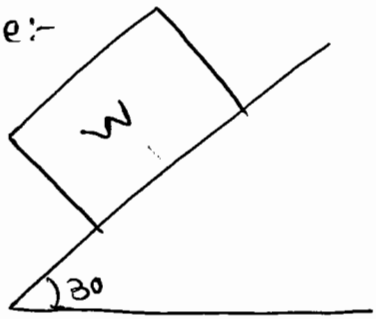




The angle has to be 45° slope = 1 tan(45°)

$\therefore \boxed{P_{crit} = F_s}$

Que:-



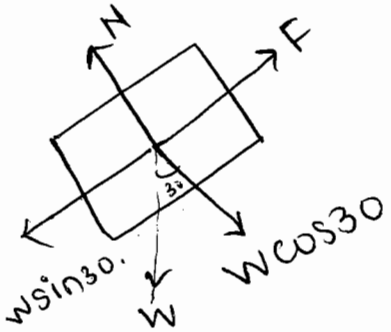

coeff of static friction = 0.6

find value of frictional force = ?

$\Sigma F_y = 0$

$N - W\cos 30 = 0$

$N = W\cos 30$ $\quad \boxed{N = W \times \frac{\sqrt{3}}{2}}$




$F = \mu \times N$

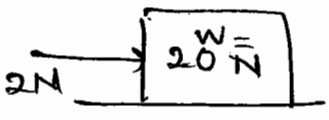
$= 0.6 \times W \times \frac{\sqrt{3}}{2}$

$= \frac{6}{10} \times W \times \frac{\sqrt{3}}{2}$

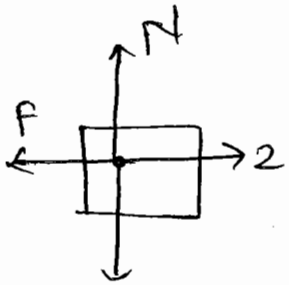
$\boxed{F = W/2}$

— 11 —

Que:-



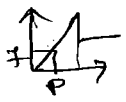

$\mu = 0.2$



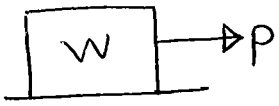

$\Sigma F_y = 0$ $\quad \boxed{N = 20}$

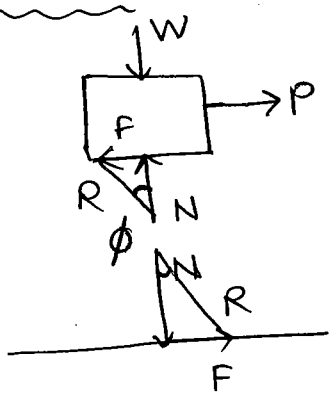
$\Sigma F_x = 0$

$F - 2 = 0$ $\quad F = 2$

$P < P_{crit}$ $f = P$ $\boxed{f = 2kN}$ By Graph 

## Angle of friction :-



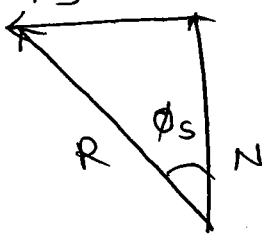




ϕ :- angle of friction.

The angle made by the Normal force & the Resultant of Normal & frictional force is know as angle of friction (ϕ)

The

### Case I :- Limiting static friction

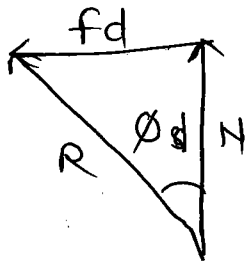



$$\tan\phi_s = \frac{f_s}{N} = \frac{\mu_s \cdot N}{N}$$

$$\tan\phi_s = \mu_s$$

$$\boxed{\phi_s = \tan^{-1}(\mu_s)}$$

### Case II :- Dynamic friction




$$\tan\phi_d = \frac{f_d}{N} = \frac{\mu_d \cdot N}{N}$$

$$\tan\phi_d = \mu_d$$

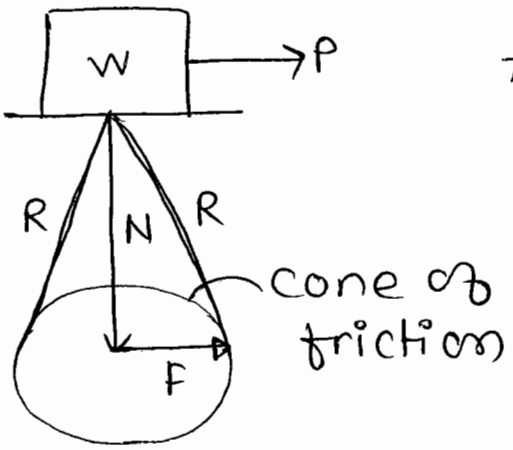
$$\boxed{\phi_d = \tan^{-1}(\mu_d)}$$

$\mu_s > \mu_d$ $\tan^{-1}(\mu_s) > \tan^{-1}(\mu_d)$

$$\boxed{\phi_s > \phi_d}$$

## Cone of friction :-

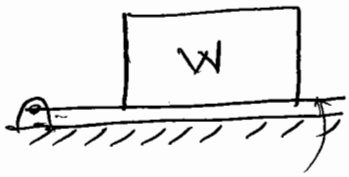
A cone formed by taking Normal as height and friction has Radius is known as cone of friction.

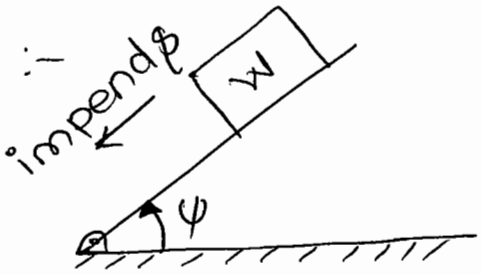



The slant height of cone of friction is represented / given by R. The biggest cone of friction corrosponds to fs.

$$V = \frac{1}{3}\pi r^2 h$$
$$= \frac{1}{3}\pi (f_s)^2 (N)$$
$$= \frac{1}{3}\pi (\mu_s N)^2 N$$
$$V = \frac{\pi}{3}\mu_s^2 N^3$$

Angle of Repose :-

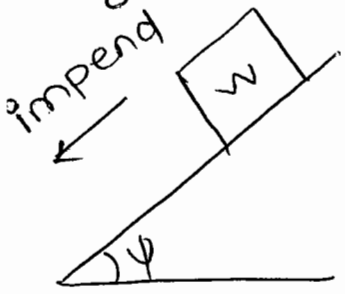


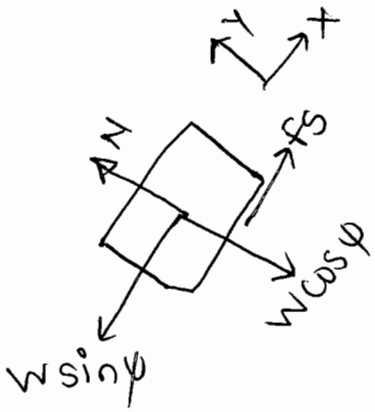




The angle of inclination at which a body Impends to slide down an inclined surface is known as angle of repose.

eg:- The angle made by a heap of grains with a horizontal surface.

Relationship betn angle of repose and angle of friction




By eqm

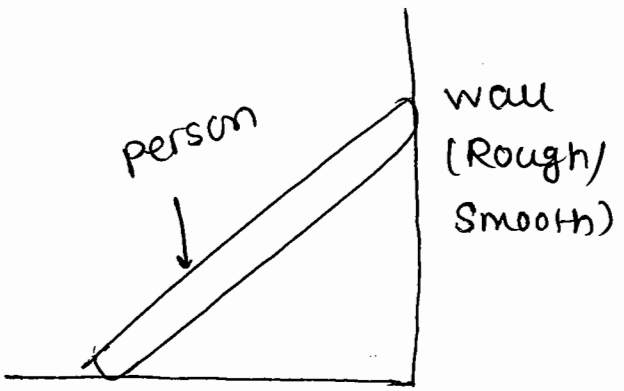
$$\Sigma f_y = 0$$
$$N - W\cos\psi = 0$$
$$N = W\cos\psi$$
$$f_s = \mu_s N$$
$$= \mu_s W\cos\psi$$

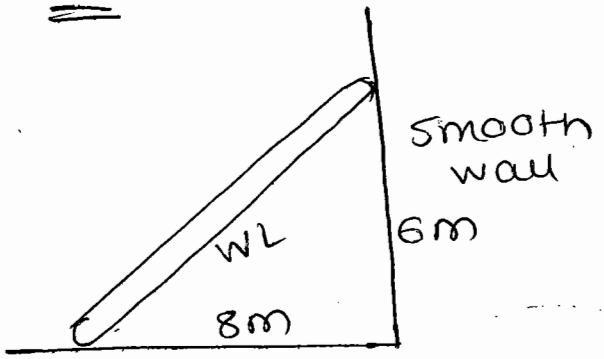
$$\Sigma f_x = 0 \qquad f_s - W\sin\psi = 0 \qquad f_s = W\sin\psi$$

$$\mu_s \cdot W\cos\psi = W\sin\psi$$
$$\mu_s = \tan\psi$$
$$\tan\phi_s = \tan\psi$$

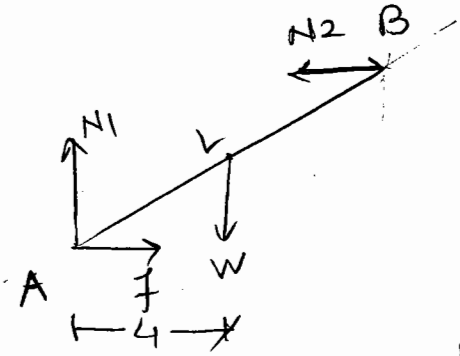
$$\boxed{\phi_s = \psi}$$

Ex:-




find the coeff of friction.




$\Sigma fx = 0$

$N_2 - F = 0$

$N_2 = F$

$\Sigma fy = 0$

$N_1 - W = 0$

$N_1 = W$

$\Sigma M_A = 0$

$W \times (4) - N_2 (6) = 0$

$N_1 \times (4) - f (6) = 0$ $\quad 4N_1 - \mu N_1 (6) = 0$

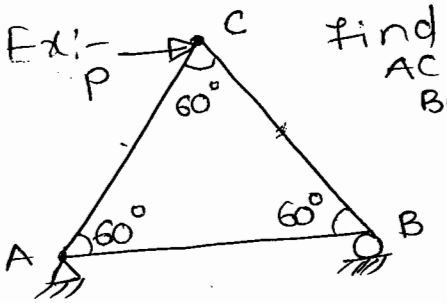
$\boxed{\mu = 6/4 = 3/2}$

———— 11 ————

24104117

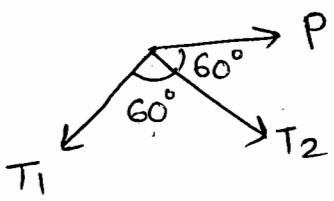
380
120
280

Ex:-




find AC & BC ?

FBD of Jt C




$\sin(180+\theta) = -\sin\theta$

$$\frac{P}{\sin 60} = \frac{T_1}{\sin 60} = \frac{T_2}{\sin 60}$$

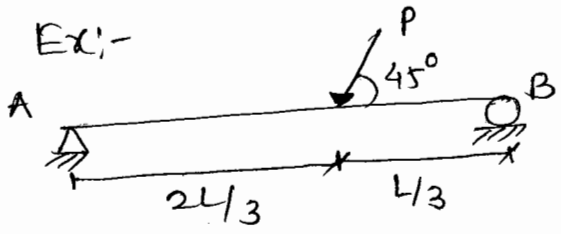
$$\frac{T_1}{\sin 60} = \frac{P}{\sin 60} \qquad \boxed{T_1 = AC = P}$$

$$\frac{T_2}{\sin(240)} = \frac{P}{\sin 60} \qquad \boxed{T_2 = BC = -P}$$

$\sin(180+60) = -\sin 60$

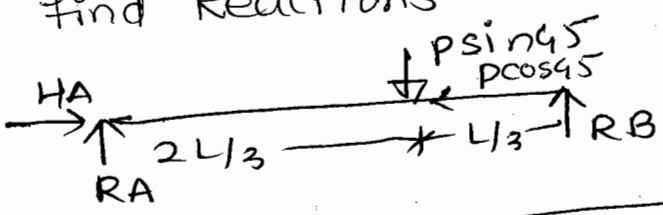
———— 11 ————

Ex:-




L-L/3

find Reactions




$\Sigma MA = 0$

$P\sin45 \times \frac{2L}{3} - RB\,L = 0$ $\quad RB = \frac{2L}{3} \times \frac{P}{\sqrt{2}}$ $\quad \boxed{RB = \frac{\sqrt{2}PL}{3}}$

$\Sigma fy = 0$ $\quad RA + RB = P\sin45$

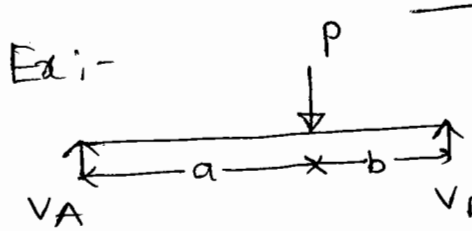
$RA = \frac{P}{\sqrt{2}} - \frac{\sqrt{2}P}{3} = \frac{3P-2P}{3\sqrt{2}} = \frac{P}{3\sqrt{2}}$

$\boxed{RA = \frac{P}{3\sqrt{2}}}$

$\Sigma fx = 0$ $\quad HA - P\cos45 = 0$ $\quad \boxed{HA = P/\sqrt{2}}$

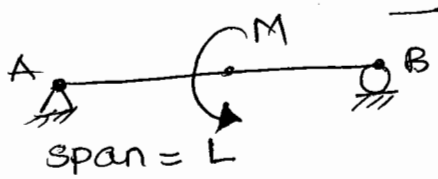
---

Ex:-

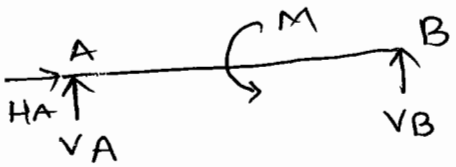



$VA = \frac{Pb}{L}$ $\quad VB = \frac{Pa}{L}$

---




$VA = M/L$ $\quad VB = M/L$




$\Sigma fx = 0$ $\quad HA = 0$

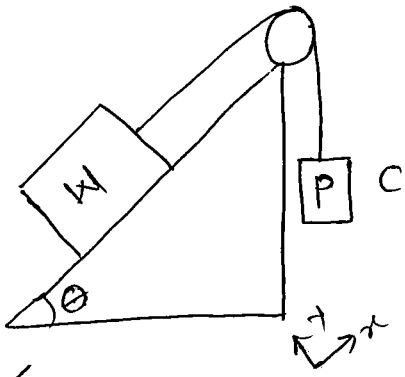
$\Sigma fy = 0$ $\quad VA + VB = 0$

$\Sigma MA = 0$ $\quad -M - VB \cdot L = 0$ $\quad VB = -M/L$ $\quad \boxed{VB = \frac{M}{L}(\downarrow)}$

$VA = -VB = -\left(\frac{-M}{L}\right)$ $\quad \boxed{VA = M/L\uparrow}$

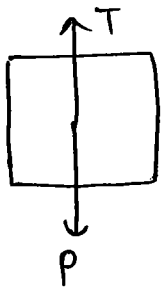
---

## * problems on inclined Surface *




find the minm & maxm value of P such that the system is in equilibri coeff of static friction $\mu$.

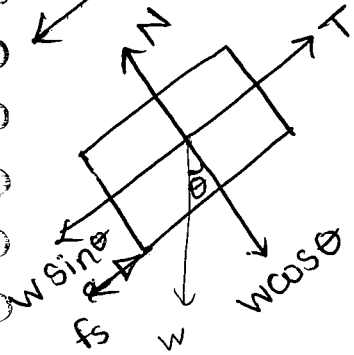
1) for $P_{min}$




$\Sigma f_y = 0$

$P - T = 0$ $\quad \boxed{P = T}$

$T = P_{min}$




for $P_{min}$ body slide down

$\Sigma f_x = 0$ $\quad T - W\sin\theta + f_s = 0$

$\Sigma f_y = 0$ $\quad N - W\cos\theta = 0$

$N = W\cos\theta$

$T = W\sin\theta + f_s$

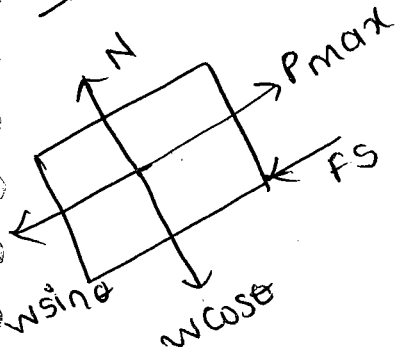
$= W\sin\theta + \mu_s N$

$= W\sin\theta + \mu_s W\cos\theta$

$P_{min} = T = W\sin\theta(1 + \mu_s)$

$\boxed{P_{min} = W\sin\theta(1 - \mu_s)}$

body slide up




$P_{min} = W\sin\theta + \mu_s W\cos\theta$

$\boxed{P_{min} = W(\sin\theta + \mu_s\cos\theta)}$

$\Sigma f_y = 0$ $\quad N - W\cos\theta = 0$

$N = W\cos\theta$

$\Sigma f_y = 0$ $\quad P_{max} - f_s - W\sin\theta = 0$

$f_s = \mu_s N = \mu_s W\cos\theta$

$P_{max} = W\sin\theta + \mu_s W\cos\theta$

$\boxed{P_{max} = W(\sin\theta + \mu_s\cos\theta)}$

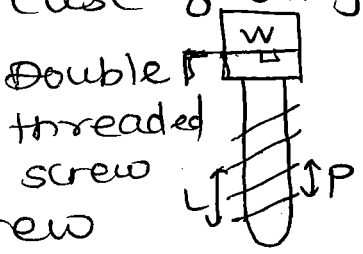
## *Screw :-

**Pitch:-** The distance betn two consecutive threadings in a screw is known as pitch of a screw.

**Lead :-** The displacement of a screw when it is given one complete revolution is known as Lead of a screw (L)

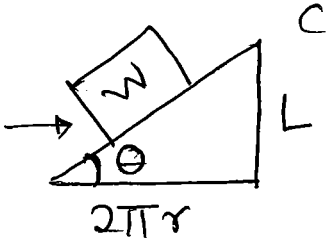
Lead is equal to pitch in the case of single threaded screw only

$L = (n \text{ thread screw}) \cdot P$




When the threading in a screw is unwounded then it appears to be like inclined surface. for one revolution

Case I):-




θ :- Lead angle

$\theta < \phi_s$ (screw jack always having a self locking nature).

If the Lead angle in a screw is less than the angle of static friction ($\psi$ - angle of repose) then such a screw is known as self locking screw. (Load always act in horizontal dirn)

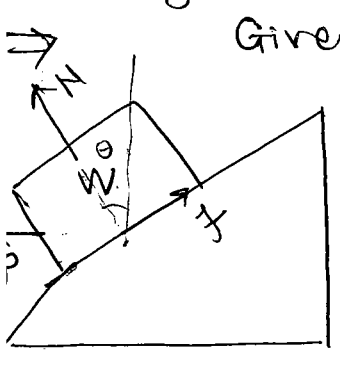
Case

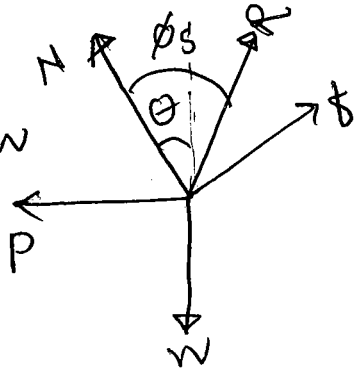
Q. Find the force required to unlift a body of weight W in the case of self locking screw

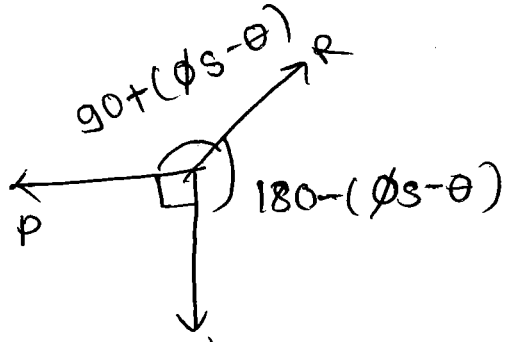
Given:- ~~$\phi_s < \alpha$~~

$\theta < \phi_s$

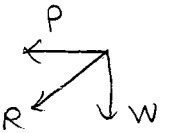
Load = W




$$\frac{P}{\sin(180-(\phi_s-\theta))} = \frac{W}{\sin(90+(\phi_s-\theta))} = \frac{RW}{\sin(90)}$$




$$\frac{P}{\sin(\phi_s-\theta)} = \frac{W}{\cos(\phi_s-\theta)}$$

$$P = W \frac{\sin(\phi_s-\theta)}{\cos(\phi_s-\theta)}$$

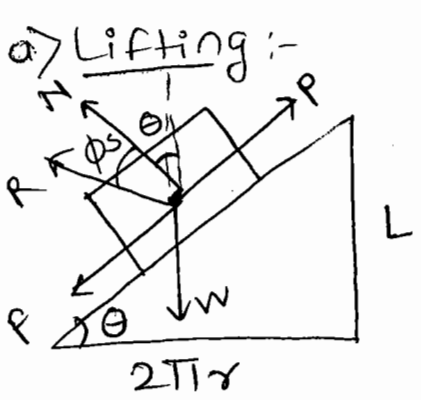
for lifting case $P = W\tan(\phi_s+\theta)$

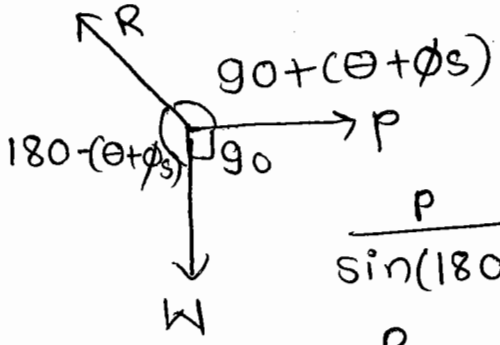
$$\boxed{P = W\tan(\phi_s-\theta)}$$

## Case II :- $\theta > \phi_s$ (Lead angle is greater than angle of static friction)

(Non-Selflocking)

a) Lifting :-



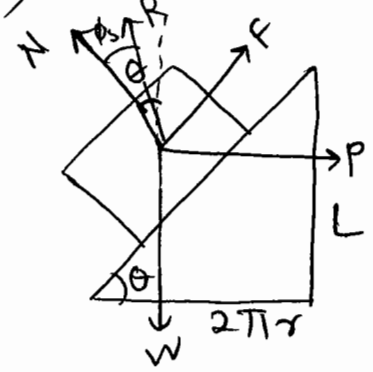



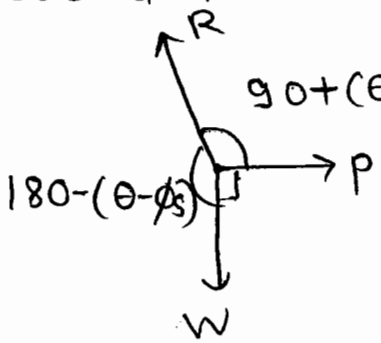

$$\frac{P}{\sin(180-(\theta+\phi_s))} = \frac{W}{\sin(90+(\theta+\phi$$

$$\frac{P}{\sin(\theta+\phi_s)} = \frac{W}{\cos(\theta+\phi_s)}$$

$$\boxed{P = W\tan(\theta+\phi_s)}$$

b) Avoid downward Motion




$$\frac{P}{\sin(180-(\theta-\phi_s))} = \frac{W}{\sin(90+(\theta-$$

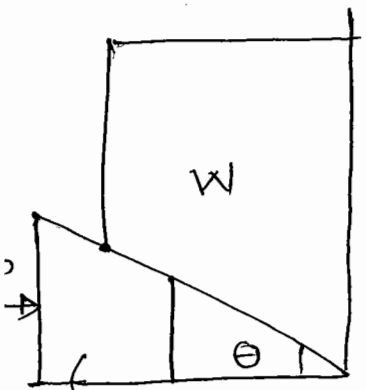
$$\frac{P}{\sin(\theta-\phi_s)} = \frac{W}{\cos(\theta-\phi_s)}$$

$$\boxed{P = W\tan(\theta-\phi_s)}$$

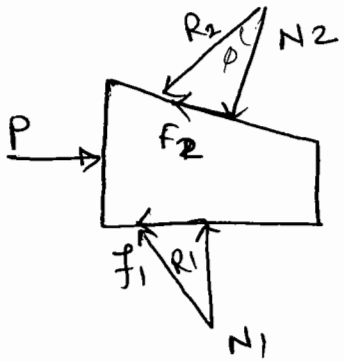
| | Unlift | Lifting |
|---|---|---|
| Self Locking ($\phi_s > \theta$) | $P = W\tan(\phi_s-\theta)$ | $P = W\tan(\theta+\phi_s)$ |
| Non-self Locking ($\theta > \phi_s$) | $P = W\tan(\theta-\phi_s)$ (just to avoid sliding down) | $P = W\tan(\theta+\phi_s)$ |

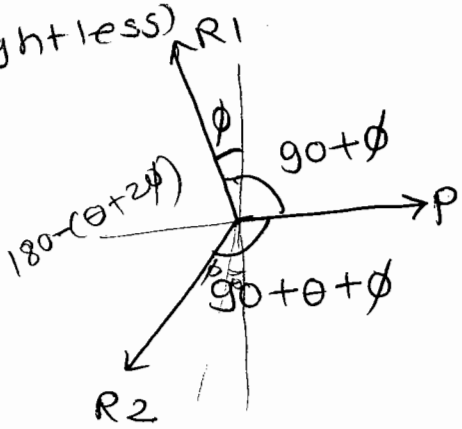
## * Wedge *

Wedges are small weightless pieces which are used for lifting heavy bodies or applying forces to displace heavy bodies. the analysis of force to be applied on a wedge comes down to analysis of lami's theorem. as shown in the example below.

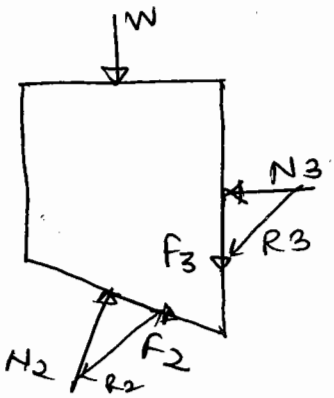


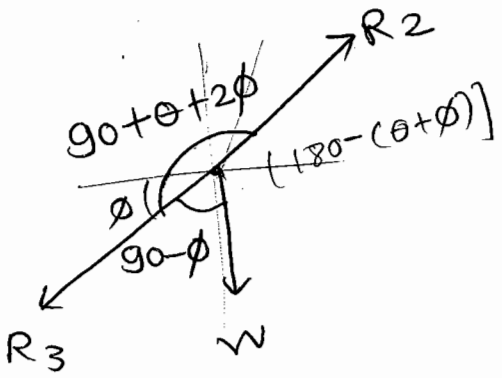

Wedge. (weightless)




Block




Step 1) Lami's from block $\frac{W}{\sin(90+\theta+2\phi)} = \frac{R_2}{\sin(90-\phi)}$

$R_2 = ?$

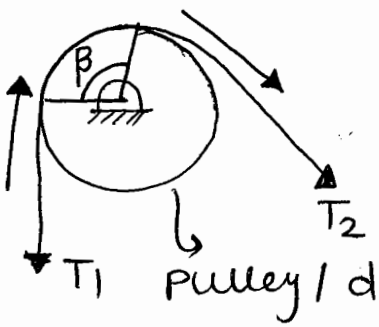
Step 2) Lami's from wedge $\frac{R_2}{\sin(90+\phi)} = \frac{P}{\sin(180-(\theta+2\phi))}$

$P = ?$

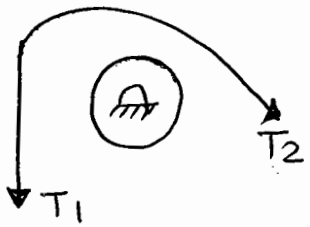
## * Belt friction *

When the Surface of pulley (drum) and the rope is rough, then belt friction is produced. The tension on either side of the ropes are unequal in the presence of Belt friction.

Note:- When the belt drives the pulley, then the tension is higher on the side of the rope which moves away from the pulley




Case I:- friction is absent

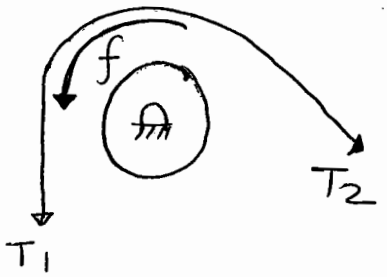



from eqn

$$T_1 = T_2 = T$$

β:- angle of Lap

Case II:- friction is present




from eqn $T_2 = T_1 + f$ ✗

$T_2 > T_1$

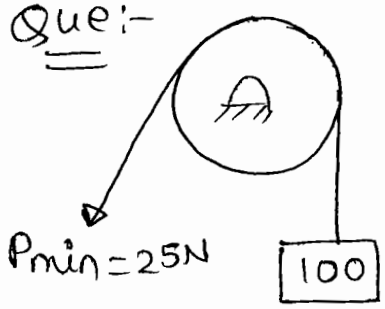
$$\frac{\text{Higher tension}}{\text{Lower tension}} = e^{\mu\beta}$$

$\mu$ :- coeff of friction

$\beta$ :- Angle of Lap (radians)

---

Que:-




What is the value of Pmax=?

$$\frac{H \cdot T}{L \cdot T} = e^{\mu\beta} \qquad \frac{100}{25} = e^{\mu\beta}$$

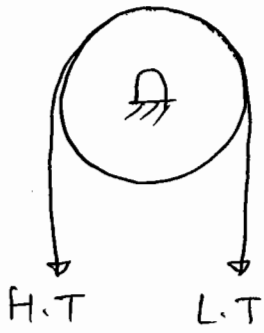
$$e^{\mu\beta} = 4$$

for Pmax; $H \cdot T = P_{max}$ $L \cdot T = P_{min}$

$$\frac{H \cdot T}{L \cdot T} = e^{\mu\beta} \qquad \frac{P_{max}}{100} = 4$$

$$P_{max} = 400$$

3. find the Ratio of Higher tension to Lower tension.
If the rope is wrapped for one Complete and a half revolution.



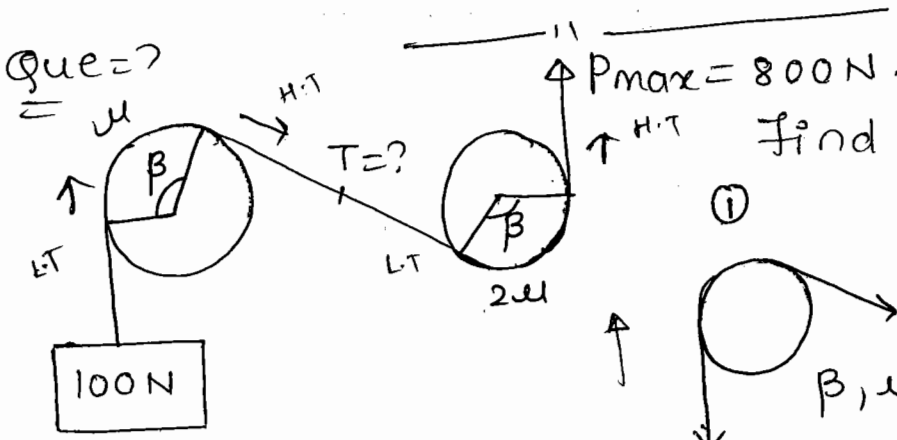

$$\frac{H.T}{L.T} = e^{\mu\beta}$$

$$\beta = 2\pi + \pi = 3\pi$$

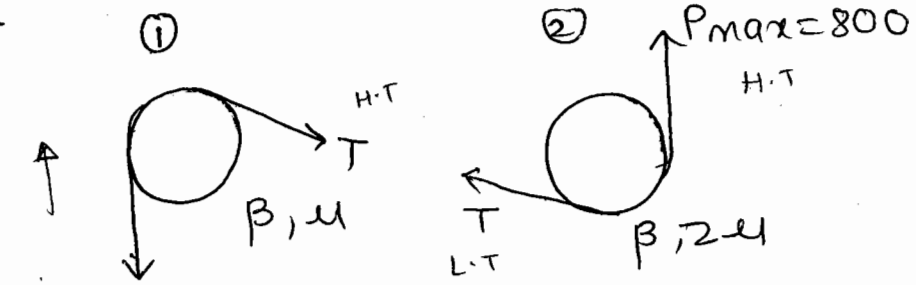
$$\boxed{\frac{H.T}{L.T} = e^{3\pi\mu}}$$

$$* \quad \frac{T_2}{T_1} = e^{3\pi\mu}$$

Que=? $= \mu$




Find the value of T=?




pulley ①

$$\frac{L.T}{H.T} = e^{\mu\beta} \qquad \frac{T}{100} = e^{\mu\beta}$$

$$T = 100e^{\mu\beta}$$

pulley ②

$$\frac{800}{T} = e^{2\mu\beta}$$

$$\frac{800}{T} = (e^{\mu\beta})^2$$

$$\frac{800}{T} = \left(\frac{T}{100}\right)^2$$

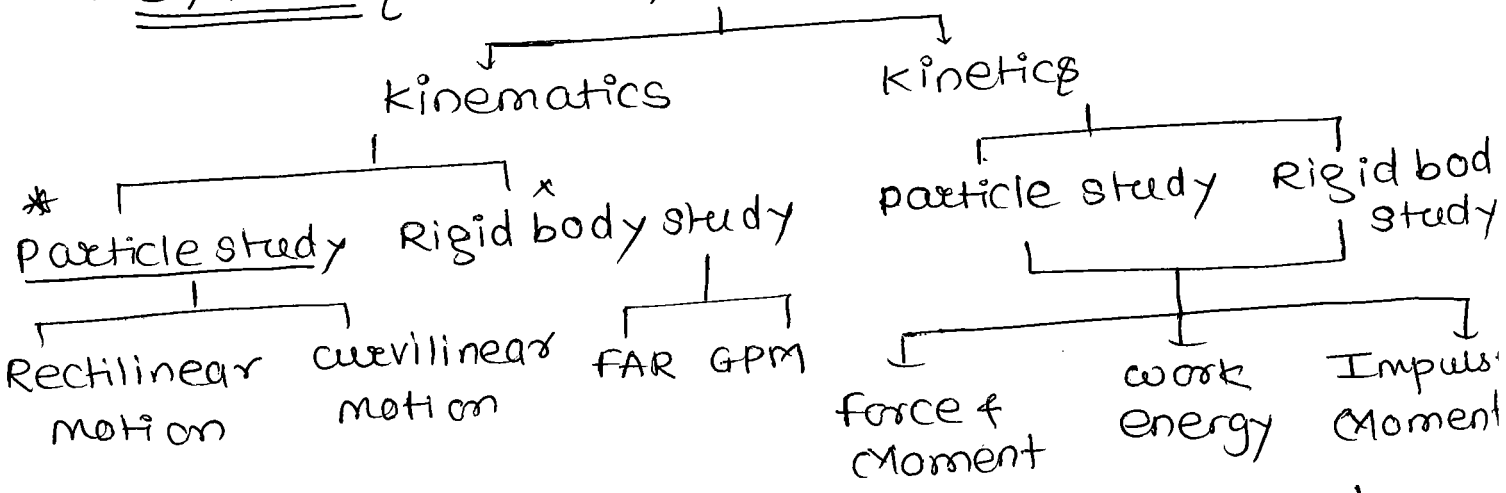
$$\frac{800}{T} = \frac{T^2}{100^2}$$

$$T^3 = 800 \times 100^2$$

$$T^3 = 8 \times 10^6$$

$$\boxed{T = 200\,N}$$

## * Dynamics




**Kinematics** :- The study of motion of a body without considering its inertia. is known as kinematics. (If inertia is not considered, mass is also not considered & hence force is also not considered.)

Every kinematic parameter will have ~~these~~ $[M^0L^aT^b]$ These dimensions.

**Kinetics** :- The study of motion of a body while considering its inertia (hence mass & forces.) is known as kinetics.

**Rectilinear Motion** :- The motion of a particle along a straight line is known as Rectilinear motion. (1-translational degree of freedom)

**Curvilinear motion** :- Motion of a particle along a curved path is known as Curvilinear motion.
eg :- projectile motion.

**Rectilinear Motion** :-

| Parameter | Defn | Math definition | Units & dia |
|---|---|---|---|
| displacement | Vectorial change in position | | m [L] |
| velocity | Rate of change in dispt w.r to time | $v = \frac{d\bar{s}}{dt}$ | m/s $[LT^{-1}]$ |
| Accn | Rate of change of | $a = \frac{d\bar{v}}{dt}$ | $m/s^2$ $[LT^{-2}]$ |

## * Constant / Uniform Accn Motion

$a = c$

$$a = \frac{dv}{dt}$$

$$\int_u^v dv = \int_0^t a\,dt \qquad \boxed{v = u + at}$$

(u = initial velo)

$$v = \frac{ds}{dt} \qquad ds = v\,dt$$

$$v = u + at$$

$$\int_0^s ds = u\int_0^t dt + a\int_0^t t\,dt$$

$$\boxed{s = ut + \tfrac{1}{2}at^2}$$

$$a = \frac{dv}{dt} \qquad dv = a\,dt$$

$$a = \frac{dv}{ds}\cdot\frac{ds}{dt} \qquad a = \frac{dv}{ds}\cdot v \rightarrow \boxed{v\,dv = a\,ds}$$

$$\int_u^v v\,dv = a\int_0^s ds \qquad \boxed{v^2 - u^2 = 2as}$$

### Eqns of Motion :-

| $a = c$ | $a \neq c$ |
|---|---|
| 1) $v = u + at$ | 1) $v = \frac{ds}{dt}$ |
| 2) $s = ut + \frac{1}{2}at^2$ | 2) $a = \frac{dv}{dt}$ $\{a = f(v),\ a = f(t)\}$ |
| 3) $v^2 - u^2 = 2as$ | 3) $v\,dv = a\cdot ds$ $(a = f(s))$ |

Que The displacement of particle in x-axis is given by $x = x_0 \sin(\omega t)$ where $x_0$ & $\omega$ are Constants. find the velocity & acceleration?

⇒ $x = x_0 \sin(\omega t)$

$$v = \frac{dx}{dt} \qquad v = x_0 \cos(\omega t)\,\omega \qquad v = x_0\omega\cos(\omega t)$$

$$a = \frac{dv}{} \qquad a = x_0\omega(-\sin\omega t)\,\omega \qquad a = -x_0\omega^2\sin(\omega t)$$

Que:- $x = 3t^2 - 2t + 4$ Find velocity & acc$^n$ at $t = 2$sec

$x = 3t^2 - 2t + 4$

$v = \frac{dx}{dt}$ $\therefore v = 6t - 2$ $v = 6(2) - 2 = 10\ m/s$

$\boxed{v = 10\ m/s}$

$a = \frac{dv}{dt} = 6$ $\boxed{a = 6\ m/s^2}$

Ex:- $x = 3t^3 - 2t^2 + 4t + 5$ find min$^m$ value of velo

$x = 3t^3 - 2t^2 + 4t + 5$

$v = \frac{dx}{dt} = 9t^2 - 4t + 4$

$a = \frac{dv}{dt} = 18t - 4$ for min$^m$ velocity (inflection / max / min)

for extremum $\frac{dv}{dt} = 0$

$18t - 4 = 0$ $t = 4/18 = 2/9$

$v = 9 \times \left(\frac{2}{9}\right)^2 - 4\left(\frac{2}{9}\right) + 4 = 9 \times \frac{4}{81} - \frac{8}{9} + 4$

$= \frac{4 - 8 + 36}{9} = \frac{-9 \times 36 - 64 + 4 \times 81}{81} = \frac{32}{9}$

36 −64 134 17 −64 126/81

S-t, v-t & a-t curves :-

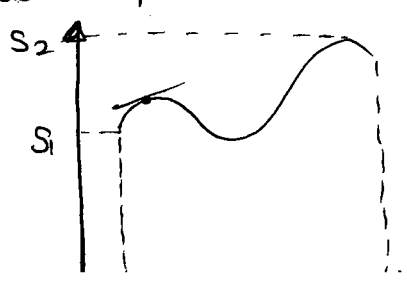
S-t curve :-

1) The slope of an s-t curve at any instant represents instantaneous velocity at that instant.

2) Average velocity is equal to $\frac{\text{total displacement}}{\text{total time}}$ **

$v_{avg} = \frac{\Delta s}{\Delta t} = \frac{s_2 - s_1}{t_2 - t_1}$

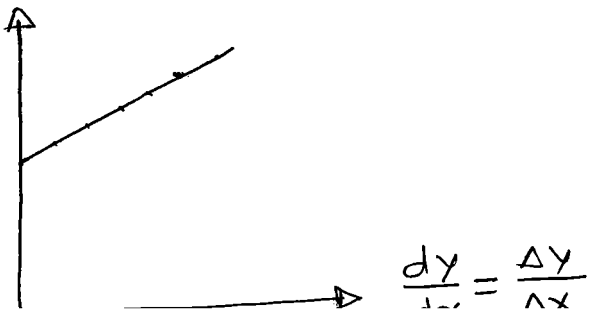
Instantaneous velocity & avg velocity are equa when the displacement varries linearly w.r to time



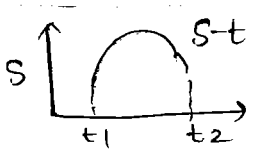

$v = \frac{ds}{dt}$

$v_{avg} = \frac{\Delta s}{\Delta t}$

$= \frac{s_2 - s_1}{}$




$\frac{dy}{} = \frac{\Delta y}{\Delta x}$



s-t curve

Avg Speed = $\frac{\text{total distance}}{\text{total time}}$ **

eg :- A particle takes 10 secs to rotate arround a circle of radius 70 cm find the avg velocity & avg speed after one Complete cycle.

⇒ t = 10 ses  R = 70cm = 0.7m  $\pi = 22/7$

avg velocity = 0 (dispt = 0)  $\frac{\text{avg velo}}{\text{rotatin}} = \frac{0}{t} = 0$

avg speed = $\frac{\text{total dist}}{\text{total time}} = \frac{2\pi R}{t} = \frac{2 \times 22/7 \times 70}{10}$

= 44 cm/s

——— 11 ———

Que :- find the Avg velocity & avg speed in the above problem after half a cycle. t = 5sec.

⇒ avg velocity = $\frac{\text{total dispt}}{\text{total time}} = \frac{2 \times 70}{5} = \frac{140}{5}$ cm/s

distance = ciram

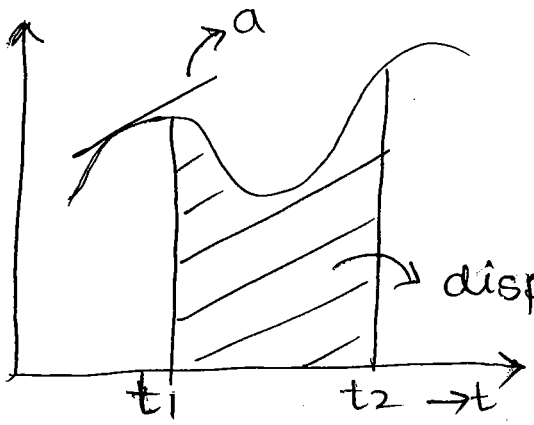
total displacement = $\pi R = \frac{22}{7} \times 70 = 220$ cm

avg speed = $\frac{\text{total distance}}{\text{total time}} = \frac{\pi R}{t} = \frac{22/7 \times 70}{5}$

= $\frac{220}{5}$ cm/s

——— 11 ———

V-t curve :-




slope = $\frac{dv}{dt} = a$

Area = $\int_{t_1}^{t_2} v \cdot dt$

$v = \frac{ds}{dt}$

$ds = v dt$

$s = \int v \cdot dt$

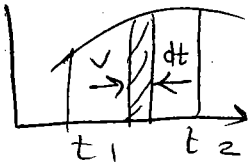
$\Delta s$ from $t_1$ to $t_2$

$a = \frac{dv}{dt}$

$v = \frac{ds}{dt}$

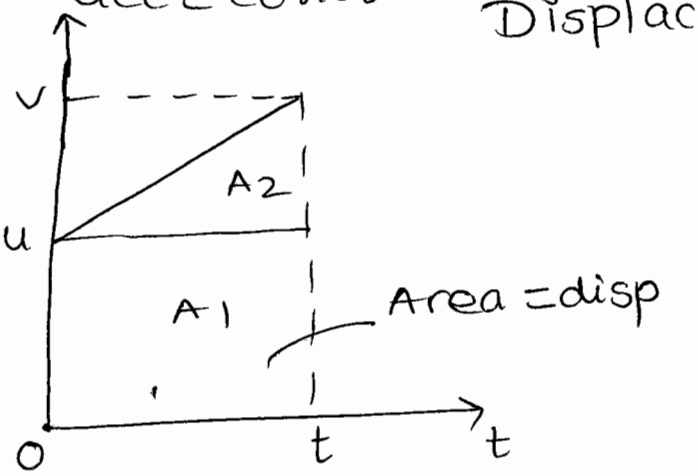
$\int ds = \int_{t_1}^{t_2} v dt$

$\Delta s$ from ($t_1$ to $t_2$)



If v varies linearly w.r to time

acc = const




Displacement $= A_1 + A_2$

$= ut + \frac{1}{2}(t)(v-u)$

$v - u = at$

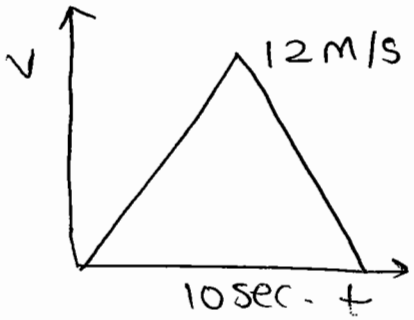
$= ut + \frac{1}{2}(t)(at)$

$\Rightarrow \boxed{s = ut + \frac{1}{2}at^2}$

---

Que:- A particle starts from rest with a uniform acceleration and reaches a max$^m$ velocity of 12 m/s It Immediately starts to decelerate uniformly and eventually comes back to rest. the complete time taken by the particle is 10 secs. find the displacement of the particle.

$\Rightarrow u = 0 \quad v_{max} = 12\ m/s \quad t = 10\ sec.$



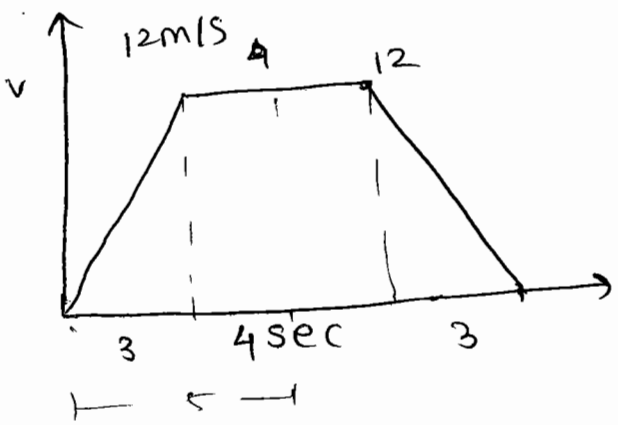

Area = displacement of particle

$= \frac{1}{2} \times 10 \times 12$

$s = 60\ m$

---

Que:- find the displacement in the above problem If the particle maintains its max$^m$ velocity for 4 secs. before starting to deaccelerate.




displacement = Area of the particle.

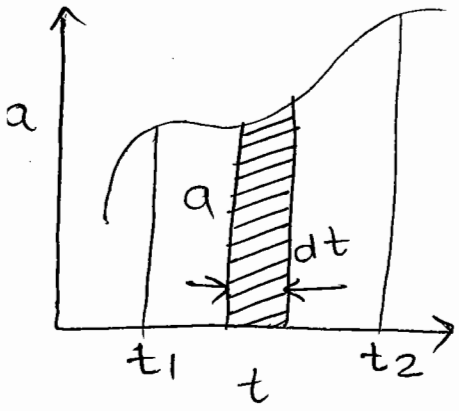
$= \frac{12}{2}(4+10) = 84m$

$= 2 \times (\frac{1}{2} \times 12 \times 3) + 4 \times 12$

$= 36 + 48$

$= 84\ m$

## a-t graph :-




$$a = \frac{dv}{dt} \qquad dv = a \cdot dt$$

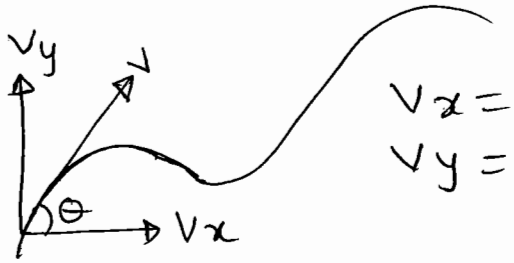
$$\Delta v \Big|_{t_1}^{t_2} = \int_{t_1}^{t_2} a \cdot dt$$

Area under a-t curve represents the change in velocity in the corrosponding time.

## Curvilinear Motion

The velocity of a particle at any instant is always tangential to its path

Displacement [x, y]
velocity [vx, vy]
Acceleration [ax, ay]

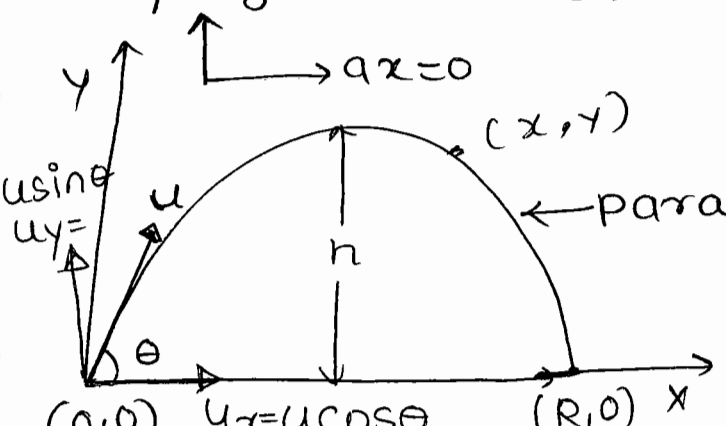



$v_x = v\cos\theta$
$v_y = v\sin\theta$

| if $a_x = c$ | $a_x \neq c$ |
|---|---|
| 1) $v_x = u_x + a_x t$ | $v_x = \frac{dx}{dt}$ |
| 2) $x = u_x t + \frac{1}{2} a_x t^2$ | $a_x = \frac{dv_x}{dt}$ |
| 3) $v_x^2 - u_x^2 = 2 a_x x$ | $a\,dx = v_x\,dv_x$ |

## * Projectile motion :-

1) A projectile motion is a case of curvilinear motion in a plane experiencing uniform acceleration of $a_x = 0$ and $a_y = -g\ m/s^2$
2) The trajectory of a projectile is always parabolic in nature.
3) The initial & final velocities in a projectile are Identical in magnitude




u :- Initial velocity
θ :- Angle of projection

1) Eqn of projectile :-

$$x = u_x t + \frac{1}{2} a_x \cdot t^2$$

$$t = \frac{x}{u_x}$$

$$y = u_y t + \frac{1}{2} a_y t^2$$

$$y = u_y \cdot \frac{x}{u_x} + \frac{1}{2}(-g)\left(\frac{x}{u_x}\right)^2$$

$$y = x\tan\theta - \frac{g}{2} \cdot \frac{x^2}{u^2\cos^2\theta} = x\tan\theta - \frac{g}{2u^2}\sec^2\theta \cdot x^2$$

$$\boxed{y = \frac{-gx^2}{2u^2}\sec^2\theta + x\tan\theta}$$

2) Maxm height :- $\boxed{H = \frac{u^2\sin^2\theta}{2g}}$

3) Range :- $\boxed{R = \frac{u^2\sin 2\theta}{g}}$

4) Time of flight :- $\boxed{T = \frac{2u\sin\theta}{g}}$

Que :- what is a angle at which the Range is Maxm for a given velocity.

$$\Rightarrow R = \frac{u^2\sin(2\theta)}{g}$$

for $\sin 2\theta = 1$, $2\theta = 90^\circ$, $\boxed{\theta = 45^\circ}$

$u^2/g \rightarrow$ const.

Que :- find the angle at which the Range of a projectile is equal to twice the maxm height.

$$\Rightarrow \frac{u^2\sin 2\theta}{g} = 2 \times \frac{u^2\sin^2\theta}{2g}$$

- $\sin 2\theta = \sin^2\theta$
- $\sin 2\theta = (1 - \cos^2\theta)$
- ~~$\sin 2\theta = x$~~ $(\cos 2\theta)$

$2\sin\theta\cos\theta = \sin^2\theta$

$2 = \tan\theta$