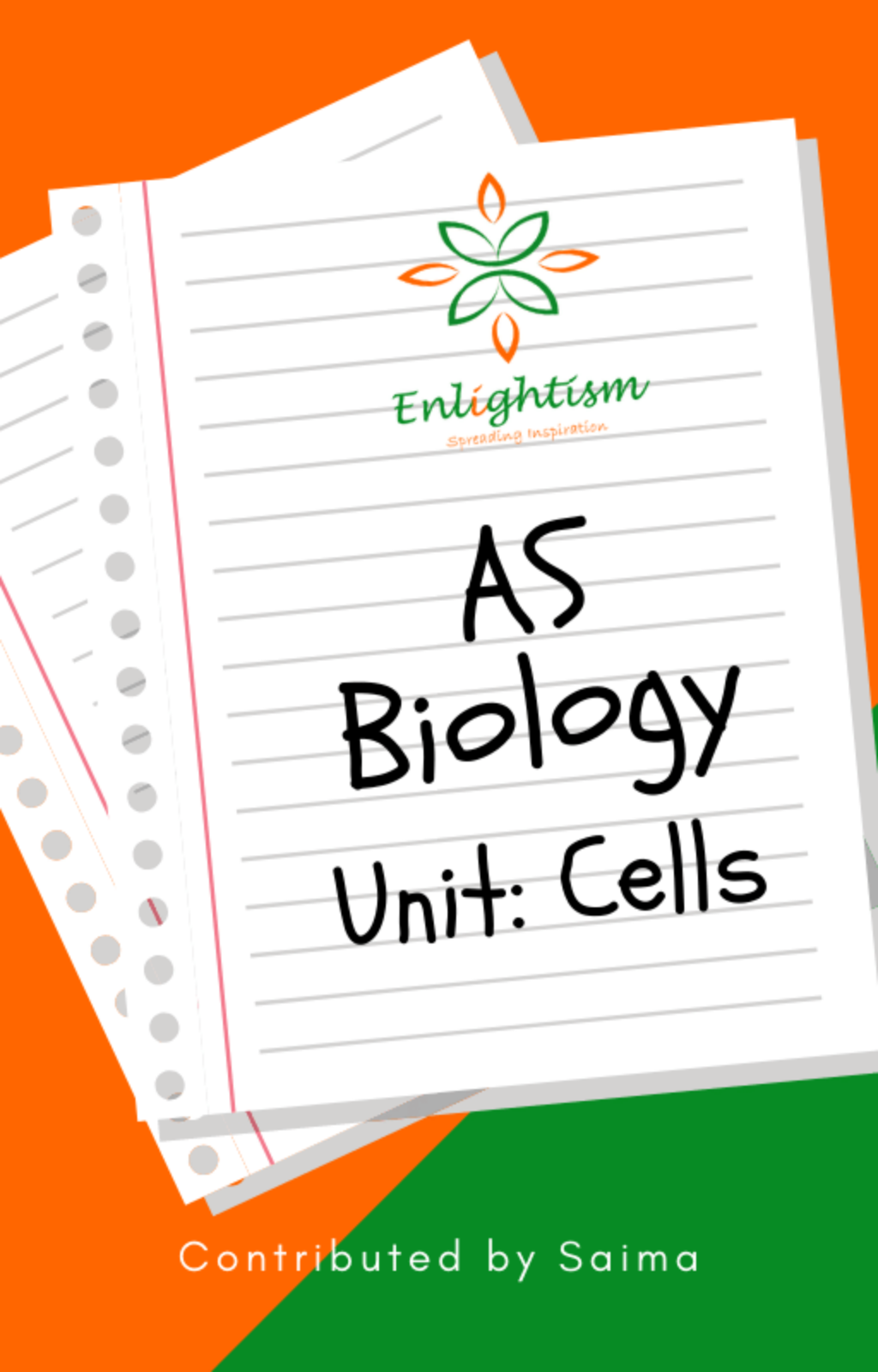

Enlightism
Spreading Inspiration
AS
Biology
Unit: Cells
Contributed by Saima

Day /

Level of organization

atoms → elements → carbohydrates, protiens, fats → compounds

system ← organs ← tissue ← cell ← organelles

organism → population → community → ecosystem → Biosphere or earth

Cells | no homologous chromosome

Prokaryote

① → Bacteria

② → Single circular DNA
→ No nuclear membrane, nuclear material free in cytoplasm (naked DNA)
→ no histone
→ never use word ~~chromosome~~ chromosome (Chromatin)

③ → both the ends close

④ → stable DNA

⑤ → No loss of gene occurs
~~No~~ ~~Telomers~~

⑥ → No telomers

⑦ → naked DNA

⑧ → Bacteria :-
• haploid
single chromosome
for one protien making a single gene req:

Eukaryote

① → plant cells, animal cells, fungi

② → Linear DNA
→ nucleus membrane present
→ histone
→ use words:-
Chromatin / chromosome

③ → both ends open

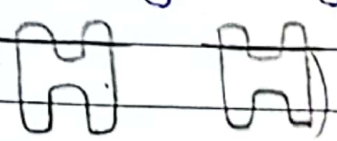
④ → unstable DNA

⑤ → loss of gene occurs

⑥ telomers present

⑦ not naked (nuclear membrane)

⑧ eukaryote :- Diploid
• pair of chromosomes
• for one protien making 2 genes



2 forms → 2 genes

Sajid

Qs Give differences b/w gram +ve and gram -ve bacteria

Date

(9) In prokaryote, no membrane bound organelles present, no mitochondria or chloroplast

(10) Only contain cell surface membrane

bacteria performing photosynthesis → autotraph

otherwise heterotraph

(11) Ribosomes = 70S (small sized ribosomes)

(12) Only 70S

(13) No ER

(14) In prokaryote, reproduction is asexual which is binary fusion

(15) Prokaryote contains bacteria and it's cell wall is composed of peptidoglycan and murein

(16) Sizes 1-10 micrometes

(17) Unicellular → Bacteria

gram +ve → only peptidoglycan cell wall (penicillin works)

has proton pump

gram -ve → membr: periplasm cell wall membr:

unicellular

(9) large no. of membrane bound organelles present

i) Single membrane

ii) Double membrane

(10) Single membraned:

ER, golgi apparatus, GSMem:

Double membraned:

mitochondria, nucleus, chloroplast

Non-membranous:

ribosomes, centriole

(11) Ribosomes = 80S (well developed)

(12) eukaryotes contain 80S ribosomes but mitochondria + chloroplast in them have 70S

(13) Contains ER

(14) reproduction is sexual (meosis mitosis)

in fungi it is budding + spore formation

(15) Plant cells, animal cells, fungi

cellulose, nothing, chitin

(16) 1-40mm 1-100mm

(17) Plant cell

animal cell

fungi

yeast

bread mould

multicellular

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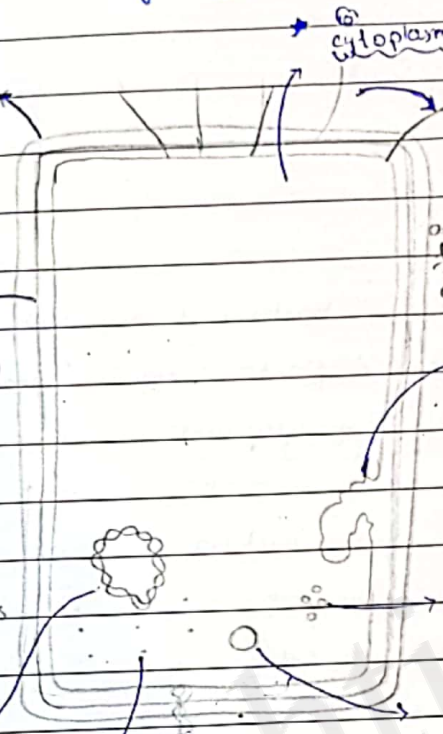
Day / Date

for A2

No ER

Structure of a single Bacterium



① Slimy capsule
(carbohydrates)
↳ polysaccharide
↳ function is protection

② cell wall (non living)
→ fully permeable
→ made of peptidoglycan
combo of protiens and carbohydrates
→ provides protection, shape and prevents bursting (lysis)

③ Single circular DNA

④ no chloroplast → enzymes for photosynthesis + resp

enzymes move freely in cytoplasm

⑤ Flagella
→ mobility
→ may be + or −
→ can have many cilia

⑥ cytoplasm

⑦ 70S ribosomes

⑧ Plasmid → they can be exchanged b/w diff bacteria. contain resistant gene

⑨ Pili (Thread like structures)
arise → help in anchoring with other from host cell + help in exchange
conj of plasmid with other bacteria
→ resistant gene can be passed
(also see pili?)

⑩ Mesosomes
Invagination of cell membrane. contain enzyme for either photosynthesis or respiration

CSM is the only membrane

→ membrane, carbohydrate phospholipids. No cholesterol

→ difference in normal cell wall due to protien

	Bacteria	Plant cell	Animal cell	fungi	Virus
cell wall	Peptidoglycan	Cellulose (only N.A. not present in bacteria)	x	Chitin	x
cell surface membrane	phospholipids + carbohydrates + proteins (B glucose 1,4 linkage)	phospholipids + proteins + carb: + small amounts of cholest:	phospholipids + protien (equal + carb: + large amounts of cholest:	phospholipids + protien + (ergosterol) fat	✓
cytoplasm	✓	✓	✓	✓	✓
DNA	single circular	linear	linear	linear	RNA or DNA linear
histone	x	✓	✓	✓	-
ribosome	70S	80S + 70S	80S + 70S	80S + 70S	x

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Day / Date

features always in bacteria

1. Cell wall
2. cell surface membrane
3. Single circular DNA
4. Cytoplasm
5. 70S ribosomes

special case

1. flagella 2. Slimy capsule
3. Mesosomes 4. Pilli
5. Plasmids 6. Enzymes for photosynthesis

Q Give features of bacteria which are present in the palisade cell / plant cell (similarities)

→ cell membrane → cytoplasm → chloroplast → 70S ribosomes

Q Give features of bacteria which are common with animal cell

→ cell membrane → cytoplasm → 70S ribosomes

Q Give differences b/w bacteria and plant cell.

	Bacteria	Plant Cell
common RNA	1. Cell wall → peptidoglycan or Murein	1. cell wall → cellulose
	2. Single circular DNA (stable)	2. linear DNA (unstable)
	3. No ER	3. ER present
	4. No nucleus	4. nucleus present
	5. No vacuole	5. vacuole present

Q Give differences b/w Plant cell & animal cell

	Animal Cell	Plant Cell
	1. No cell wall	1. Cell wall → cellulose
	2. Small temporary vacuole with no tonoplast + cell sap	2. Single large vacuole permanent with tonoplast + cell sap

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* cholesterol head is large. phospholipid tails move apart. hydrophilic interaction of phospholipids increase. fluidity of membrane increases

* cholesterol keeps tails apart decreasing phobic interaction

3. No chloroplast
4. Centrioles always present (lysosomes)
5. Glycogen is reserved food materials found in liver & muscle cells
6. Iodine test → -ve
7. memb: more fluid

3. Chloroplast
4. No centriole (no lysosomes) present
5. Starch is reserved food materials found in chloroplast, vacuole & cytoplasm
6. Iodine test → +ve
7. less fluid

* centrioles help in cell division

~ ~ • ~ ~

Units of measurements

1 m = 100 cm
1 cm = 10 mm
1 mm = 1000 µm
1 µm = 1000 nm
1 m = 10^9 nm
1 nm = 10^{-9} m

Type of microscope: light, electron

light microscopes are of different types on the basis of mag: magnification and resolution. that the image of an obj: may be viewed clearly

	feature	light	electron
* 1.	Magnification	x 1500	x 250000
* 2.	resolution	200nm (→nucleus, →vacuole, →chloroplast)	0.5nm (→ribosome (20nm), →cell membrane (7nm))
* 3.	wave length	200 - 400nm (large wavelength ↓ less energy)	1nm
4.	source of light	ordinary light	electron beam
5.	lenses	glass lens	electromagnet to attract -vely charged particles
6.	stage	glass / plastic	copper grid (+ve) to attract -vely charged particles
7.	nature of specimen	living / dead	always dead
8.	media	Air	vaccum (air prevents e⁻ from scattering)
9.	Type of image	coloured	black n white
10.	stains	Iodine sol / methylene blue	heavy metal stains
11.	cost	cheap	expensive
12.	use	average people	special technicians
13.	size	portable	not portable (large)

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Day / Date

* half of the wavelength is resolution
* larger wave length, lesser will be the energy.

Q what are the adv: of light microscope on e⁻ microscope?
→ coloured → portable → living species can be examined
→ cheap → no special technicians required
→ ordinary light → no vaccum required

Q what are the adv: of e⁻ microscope?
all the disadv: of light points previously mentioned

Size of different cells and organelles in Plant cell and animal cells

Plant cell	40-100 μm
Animal cell	20 μm
Bacteria	1-10 μm
RBC's	7 μm
chloroplasts	6-7 μm
mitochondria	0.5-1 μm
lysosomes	0.5 μm
centriole	0.4 μm
nucleus	2-2.5 μm
cell surface memb:	7nm
Virus	50-100 nm
haemoglobin	2-3 μm
ribosomes	20-25 nm

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Day / Date

Q How do we produce electron beams?

ans We heat, metal electrons are excited, we focus electrons on the specimen.

Q Why ~~to~~ can we not observe ribosomes 20nm by light micr: ?

ans Since it is resolution power is only 200nm.

Q Why are specimens dead in e⁻ micro: ?

ans: Specimens contain water, we have to dehydrate for the purpose we dip specimen in diff conc: of alcohol. During this harsh treatment, specimens die.

⇒ In light microscope we can observe living process e.g mitosis

⇒ We can observe mortality of an organism

Q Define. Resolution: ↗ resolving power is the ability to distinguish a objects close together rather than view them as a single image The resolution of an optical microscope is defined as the shortest distance b/w 2 points on a specimen that can still be distuinguished by the observe

Magnification: def: enlargement of size of an object. # of times the image of an obj: is In physical terms it is a measure of the enlarged ability of a lens or other optical instruments to from its magnify, expressed as the ratio of the size of the original image to that of the object. size.

Microscopy: use of microscope to study structural details of organisms and organelles within the cell by magnifying the image

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ay / Date

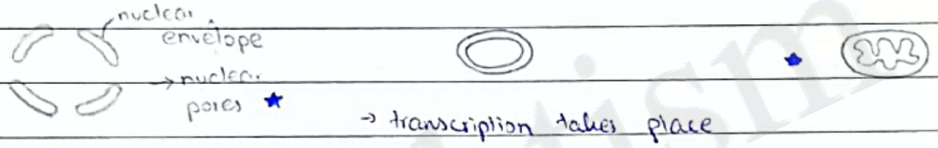
List of organelles.

- cell wall
- cell membrane
- cytoplasm
- nucleus
- chloroplast
- mitochondria
- lysosomes
- centrioles
- golgi body
- ER
- ribosomes
- vacuole
- cytoskeleton
- secretory vesicle
- cilia / flagella
- villi & micro villi

all contain ribosomes
all contain genetic material
mRNA, tRNA

double membrane bound

- nucleus
- chloroplast
- mitochondria



→ transcription takes place

single membrane bound

- cell memb:
- lysosomes
- golgi
- ER
- vacuole
- secretory vesicle

non-membranous

- cell wall
- cytoplasm
- centriole
- ribosome
- cytoskeleton

All organelles which cue double membraned → DNA → mRNA → ribosome

↓ messenger RNA

↳ protien / polypeptide

↳ translation

making an RNA copy of a gene sequence called the messenger RNA (mRNA)

↳ transcription

↳ product mRNA

use of mRNA to make protiens

↳ product polypeptide

ER = Golgi

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y / Date

	DNA	mRNA	Ribosomes	ER	Protien
Nucleus	linear → DNA + histone	✓	80S	✓	well developed
mitochondria	circular → no histone	✓	70S	X	poorly developed
chloroplast	circular → DNA + no histone	✓	70S	X	poorly developed
Prokaryote	circular → DNA + no histone	✓	70S	X	poorly developed

Cell Wall

→ non membranous
→ non living
→ carbohydrates / polysaccharide
→ freely permeable
→ funktions :

i) Protection from bursting (lysis) ii) turgidity iii) shape.

Bacteria	Plant cell	Animal cell	fungi
peptidoglycan ↓ murein ↓ carbohydrate + protien + beta glucze + 1,4 linkage + glycosidic bond + hydrogen bonding 180° rotation	↓ polysaccaride. cellulose + beta 1,4 glucoseidic bond + hydrogen bonding + 180° rotation	X	chitin ↓ carbohydrates + protien + beta glucose + 1,4 glucosidic bond + hydrogen bonding + 180° rotation.

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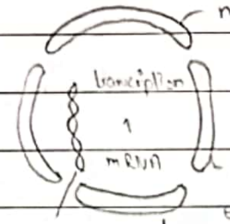
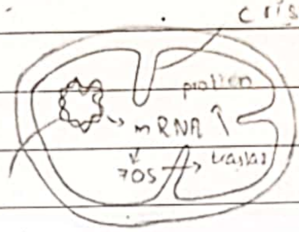
Nucleus



ER made of protien

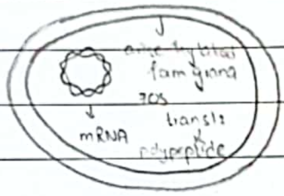
mitochondria



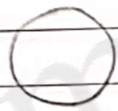
sources

entering nucleus
→ nucleotides (ADP)
→ stimuli
→ protiens
→ ATP + ADP + AMP

chloroplast



lysosome



leave nucleus
→ RNA
→ ribosomes
→ AMP / ADP

⇒ diff

envelope	membrane
• double	• single
• present in eukaryote	• present in prokaryote

another function to assemble layer and smaller subunit of ribosomes

ribosomes work as work benches for protien synthesis.

transcription
tRNA, rRNA made.
protien from nuclear pore, merge in

disintegrates in prophase. reforms during telophase in each daughter cell

NUCLEUS

nucleolus — DNA — ribosome — nucleolus with rRNA — formed small and large subunit joined

→ controls protiens synthesis, cellular activity

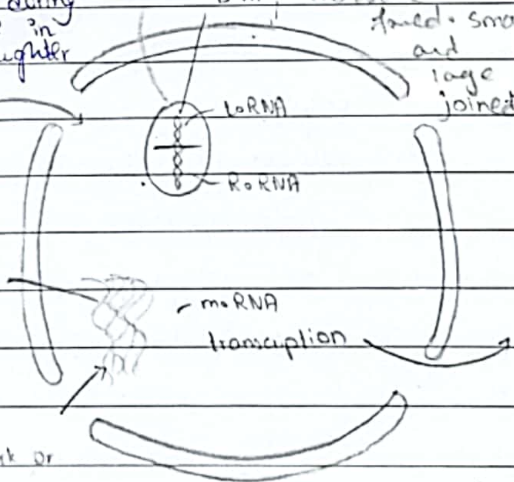
heredity (imp for inheritance)

→ produces diff types of RNA
m.RNA

chromosomes during cell division. Otherwise chromatin network (longer and thinner)

nucleoplasm

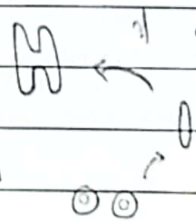
linear DNA + protien (histone)



chromatin network or chromosome

cell not dividing → protien synthesis longer + thinner

chromosome at the time of cell division (mitosis)



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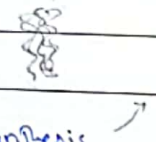
Chromatin

	hetero chromatin	euchromatin
	denser	v.v
	more stains	v.v
	v.v	involve in protien synthesis

diff b/w

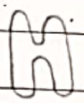
chromatin network

- When cell is not dividing
- Thinner
- longer
- protien synthesis



chromosome

- when cell is dividing
- Thick, visible
- condensed, more coiled
- no protien synthesis



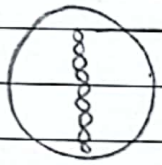
Chromatin network

→ darkly stained → hetero chromatin → condensed
no protien synthesis ← inactive genes ← DNA

↓

light stained → euchromatin → loosely coiled
protien synthesis ← active genes

T. RNA



→ t. RNA → move into the ribsome, free roaming
↓
trasciption

★ 3rd DNA → r. RNA → (transcription) → r. RNA remains in nucleus

↓

product ← protien + merger r. RNA ← proteins come from outside (cytoplasm)

ribosome

↳ They leave nucleolus → go to nucleoplasm → leave the nuclear pore

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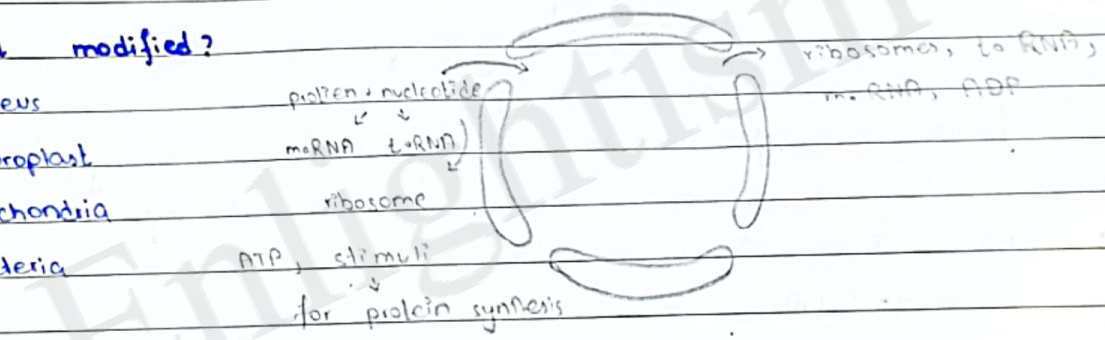
y / Date

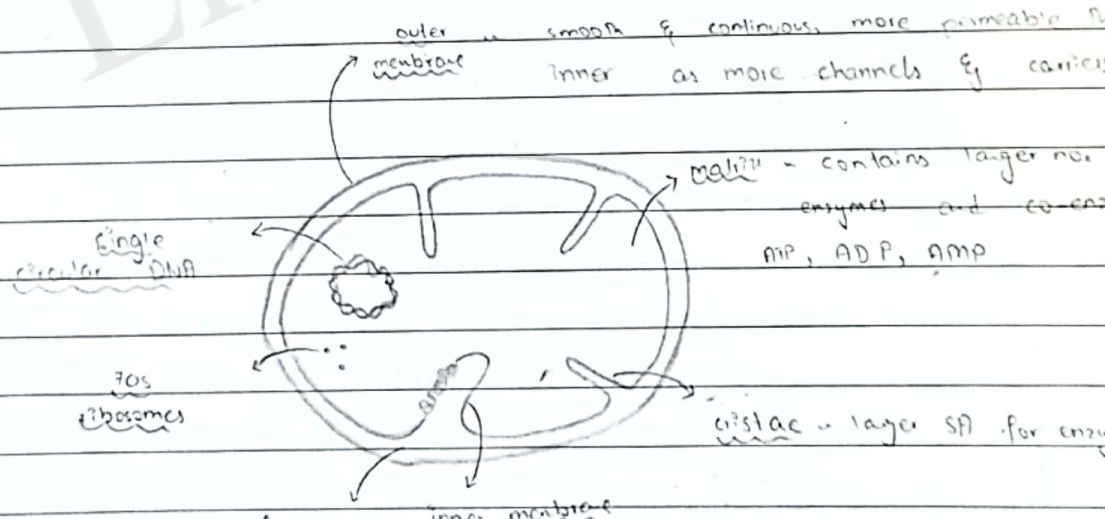
★ When t-RNA comes into the cytoplasm it's free roaming, it capture specific amino acids from cytoplasm, brings on the surface of ribosomes, where m-RNA was awaited. It means helps in protien synthesis.

Ribosomes in → cytoplasm
↓ ↓ ↘ → golgi
nucleus nucleolus outer membrane of nucleus

most modified?

1. Nucleus
2. chloroplast
3. mitochondria
4. Bacteria





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Date

difference & similarities b/w mitochondria & bacteria

(100% wale feature)

diff

→ bacteria has cytoplasm & mitochondria has matrix

→ bacteria has single membrane

→ 0.5 - 1 μm 1 - 10 μm

→ bacteria has a cell wall

→ no imf in bacteria

→ mitochondria has cristea

similarities

→ single circular DNA

→ 70S ribosomes

→ no histone

→ no golgi

→ no ER

→ no nucleus

→ contain membrane

Date

ATP → ADP → uses phosphate → returns to mitochondria for refueling

cell surface membrane is impermeable for ATP

when DNA is present, ribosomes are always present to make proteins

transcription → ribosome → translation

RNA made

cation:

2ATP
Glycolysis
cytoplasm / cytosol
fluid space

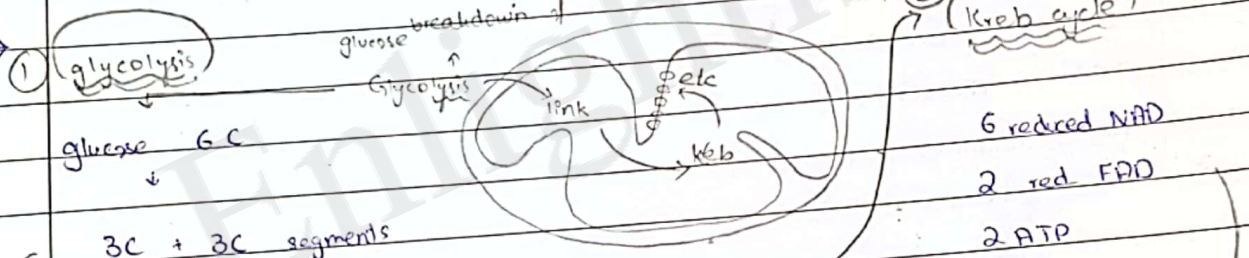
② Link reaction
matrix

2ATP
② Kreb cycle
matrix

① cfc
inner membrane of mitochondria

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + 38ATP$

robic
spiration



glucose 6C

3C + 3C segments

(2x pyruvate)

hydrogen reduced captured by NAD

hydrogen carrier

2 reduced NAD

2ATP

Link reaction

2 pyruvate (3C)
↓ converted
2 acetyle
2 × 2C
↓
2 reduced NAD + $2CO_2$

$3C \rightarrow 2C + 2CO_2$

6 reduced NAD
2 red FAD
2 ATP
$4CO_2$

10 Red NAD + 2 red FAD

④ etc (electron transfer chain)

1 red NAD = 3 ATP
10 red NAD = 30ATP
+
1 red FAD = 2ATP
2 red FAD = 4 ATP

Day / Date

	ATP	Red NAD	Red FAD	CO_2
Glycolysis	2	2	x	x
Link	x	2	x	2
Kreb	2	6	2	4
	4 ATP	10 Red NAD	2 Red FAD	$6CO_2$

ATP synthase is on the inner membrane

Red NAD + FAD → on the inner membrane → using energy of electrons, protons of hydrogen ions are pumped into imf from matrix

ATP synthase acts as turbine which turns when they return down the grad:
↳ synthesises ATP

imf -> buffer zone for protons
maintaining pH for matrix
→ synthesising to make atp

CHLOROPLAST :

1. Double membrane
2. 6-7 μm - light microscope (not internal details, only an outline)
3. Photosynthesis ~ but bacteria does not contain even when it shows photosynthesis. That means enzymes and pigments free in cytoplasm.

Sajid

Mitochondria & chloroplast

similarities

- atp synthase
- double membraned
- no ER
- 70s
- Single circular DNA
- 70s ribosome
- inner membrane always
- cristae
- outer membrane is more permeable
- media is present
- both have NAD
- low level proteins
- inorganic phosphate grains

diff.

- → the vaginations of inner membr. of chloroplast break off to make thylakoid
- → chloroplast use most of the atp synthesized themselves while mitochondria gives it away
- → chloroplast performs photosynthesis
- → chloroplast has starch grains
- → FAD is not found in chloroplasts
- → chloroplast is larger in size
- → chloroplast contains pigment
- → one has matrix, one in stroma
- → in mitochondria, no membrane bound organelles but chloroplasts have thylakoid
- → chloroplast in plant cells

Why does mitochondria have circular DNA and 70S ribosome?

1. Protein synthesis → enzymes (atp synthase) + co-enzymes → free in matrix & membrane
2. Mitochondria can self replicate

Why do chloroplasts have Circular DNA and 70S ribosome?

1. Protein synthesis → enzymes (atp synthase) + coenzymes + pigments (chlorophyll)
2. Self replication

Sajid

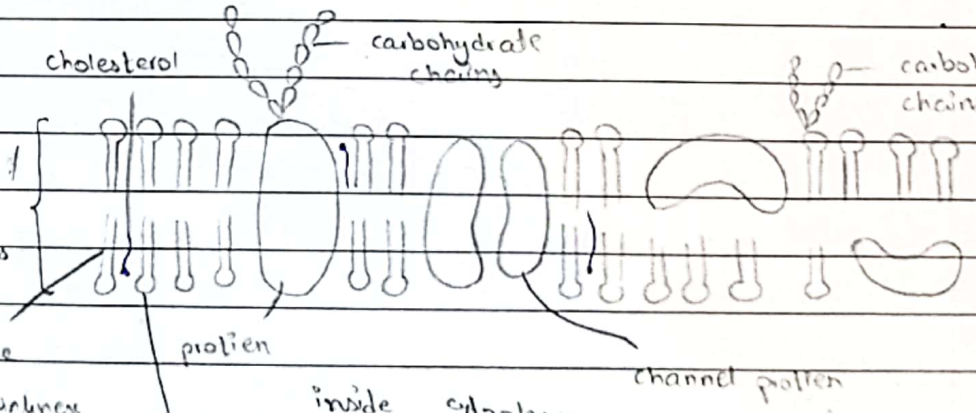
Date

* Wherever double membraned organelle
↓
r.RNA ← singlular cir cular DNA → transcription t.RNA
↓ ↓ ↓
protien from outside m.RNA cytoplasm
↓ ↓ ↓
merger occurs Ribosome captures amino acids
↓ ↓ ↓
ribosomes are made translation brings to surface of ribosomes
↓ ↓ ↓
get into cytoplasm Polypeptides (protiens) helps in protien synthesis
↓
site for protien synthesis

Single membraned structures

ER secretory vesicles
golgi vacuole *major part of cholesterol is b/w the heads
Lysosomes cell membrane

cell membrane outside (tissue fluid)



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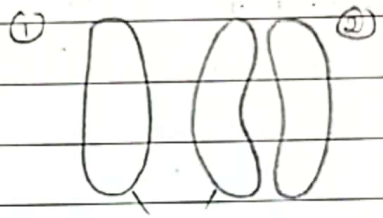


both are → intrinsic / ① Integral / ② channel

transmembranous

covering both layers of phospholipids

extrinsic

↓

either inside or outside

↓

peripheral ← covering single monolayer

endoplasmic Reticulum

→ Single memb.

double memb 2 bilayers
↳ 4 monolayers

1. Series of flattened membranar sacs which arise from outside of nuclear memb.

composition same as CS Memb.

2. The gap of sac is called cisternae (fluid filled)

3. Vesicles arise from nucleas → bud off → produce ER (outer memb)

4. Single membrane

RER	SER
 ribosomes	
• ribosomes on surface	• no ribosomes
• protien synthesis + transport to golgi	• show lipid & steroid synthesis as well as transport to golgi (lipids & other stuff)
• site for translation	

→ Cells which contain RER

*related Q's come in paper

1. Cells present on lining of small intestine intestinal track

enzymes: more RER + mito.
on villi: maltase + lactase

2. Cells secreting mucus

goblet
↓
ER + mito.
↓
mucus
↓
prot: + carbs

3. Antibody producing aka lymphocytes

4. hormone producing
→ insuline
→ FSH
→ LH etc.

Sajid

Cells which secrete lipids / triglycerids / steroid / cholesterol have more SER

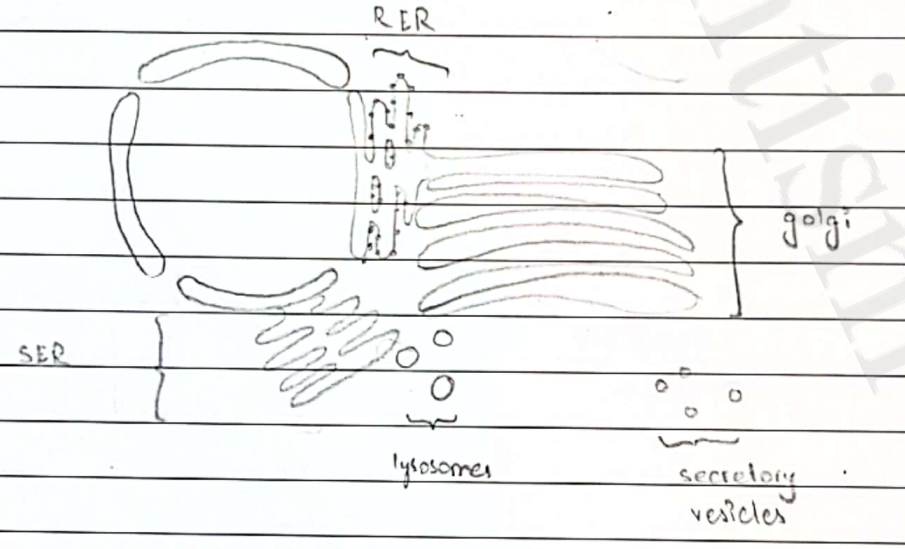
Funfact:

RBC's initially have nucleus + other organelles which disintegrate with the passage of time.

Day / Date

Triglyceride → steroid synthesis / lipid synthesis

SER



from nuclear membrane → vesicles bud off → ER

① SER ② RER

vesicles bud off ① → lysosomes → can be used ↗ inside ↘ outside

golgi

② secretory vesicle → always pour their secretion outside via cell membrane

Sajid

sacks

Functions of golgi

*antibodies are glycoproteins

all these mixings are glycosylation

① Receives proteins from RER, checks modifies them, labels & sends them to ~~golgi~~ lysosomes / secretory vesicle → proteins on cell

② Recieves lipids & steroids from SER, modifies, labels packs them & sends them to ~~golgi~~ lysosomes / secretory ves.

③ It's own function is carbohydrate metabolism

↓

captures glucose

↓

joins them, makes carbohydrates

④ Recieves proteins from RER, carbohydrates are personal, mixes them to form glycoprotein

↓

⑤ Lipids + carb mine in SER

↓

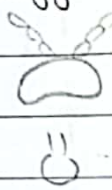
glycolipids

↓

⑥ protein RER, lipids SER carbohydrates

↓

glyco calix



diff b/w RER & golgi

RER has ribosomes

golgi is for ff

sim b/w RER & golgi

same origin (from memb.)

fluid filled

single membrane

have cisternae

↓

⑦ When protiens come to golgi → Inactive

↓

protien activated ← Removes it's first amino acid (methionine)

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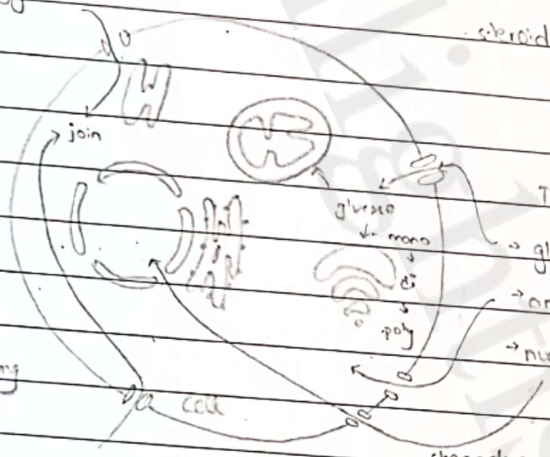
* tRNA catches amino acids from cytoplasm where ribosome joins them together

*chloroplast is a protien which is marked with magnesium by golgi.

*when tRNA is not known, amino acid is always sent to RER

fatty acids & glycerol both enter the cell separately but join inside and first go to SER for lipid & then steroid synthesis



amino acid enters cell membrane via channels is captured by tRNA which takes it to ribosome which joins them making polypeptides

Tissue fluid
→ glucose ~ radioactive
→ aminoacids ~ radioactive
→ nucleotide
will enter nucleus via channels where is a pool of nucleotides

fatty acids

Lysosomes

→ enzymes which work in watery media are called hydrolytic enzymes

1. 0.5 μm in size
2. Arise from golgi bodies
3. Another name is golgi vesicles
4. Each lysosome contains more than 50 hydrolytic enzymes
5. Work inside as well as outside

* outside pH is 8

enzymes

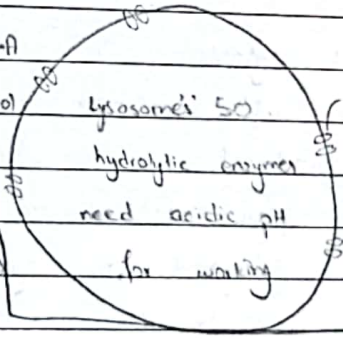
Protein → proteases → A.A

fats / lipids → lipases → FA + glycerol

starch → amylase → monosaccharide

DNA & RNA ← nucleic acid → nuclease → nucleotides

nucleases are made up of nucleotides as well. All other enzymes are protein in nature



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Q What are lysosomes. where are they produced & what do they contain? [4]

- single membrane
- sac
- golgi vesicles
- digestion
- golgi body
- 50 hydrolytic enzymes

⇒ Working of lysosomes:

inside	outside
1 → Remove worn out parts of cell	→ Sperm (acrosome) helps in penetration within egg. Is a type of lysosome
2 → Phagocytes show phagocytosis ∴ within the cell certain organelles are losing efficiency. Lysosomes remove them making more space for new organelles (eg mitochondria)	→ In mammary glands those cells which secrete milk are removed by lysosomes (surrounding cell lysosomes) • creating more space for new lacteal cell
∴ • more phagocytes • cell membrane engulfs pathogens • this is endocytosis • lysosomes fuse with pathogen • phagosome produced • digestion → complex substances into simple • simple subs: absorbed in cytoplasm • waste given outside via exocytosis	→ In new born babies, cartilage replaced by bone via lysosome

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*RBC's are destroyed in spleen & liver where cells having large # of lysosomes break them down

Secretory Vesicle / Golgi Vesicle / Exocytotic Vesicle

single membraned

contain steroids / protiens packed within

always pours it's secretion outside via exocytosis

more in cells which secrete:
- i) hormones
- ii) enzymes
- iii) antibodies

*

goblet cells in trachea have large # of vesicles

sizes vary. Small cuz they have to fit into CS membr. to pour secretion

Vacuole

↓

plant cell

single membraned

(composition is same as cell membr + vari in prop:)

In plant cell no lysosomes.

Vacuole acts as lysosomes

contain
- H_2O
- Salts
- Starch
- pigments
- enzymes

give colours to fruits & vegetables

large single with tonoplast

cell sap is permanent

↓

animal cell

↳ contractile → expell excess water

② food vacuole ameoba (temporary)

③ Phagocytic vacuole

④ Phagocyte

⑤ Phagosome (temporary)

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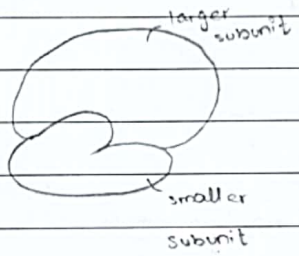
Ribosomes

→ Non-membranous

→ present in eukaryotic cells
- free in cytoplasm
- attached on ER
- attached on outer membrane of nucleus
- within chloroplast
- within mitochondria

Types



70S
molecule of r.RNA +
21 protien molecules
2 molecules of m.RNA,
34 molly of protien
Prokaryotic

80S
smaller
2 molly of r.RNA
34 molly of prot:
3 molly of m.RNA
39 molly of protiens

common functions of smaller subunit

Synthesizes an enzyme which keeps on joining A.A to make protien
larger gives site for maRNA for translation

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animal cells have a pair of centrioles

Cytoskeleton

→ It is a network of tubes ; microtubules composed of protien tubulin)

↓

tubulin exists in 2 monomers

↓

Alpha Tubulin — Beta Tubulin

1 α + 1 β = dimer

↓

many dimers join in chains

↓

Make protofilaments

↓

13 such protofilaments join side by side

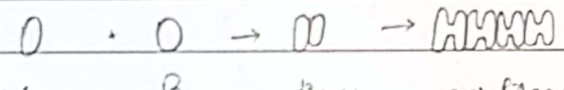
↓

monomer → tubulin

polymer → tubulin Making long hollow tubules

↓

Microtubules



α β dimer protofilaments

hollow tube

microtubules arise from

centrioles in animal cell

↓

Present near nucleus membrane in the form of pair

✓ MTO → microtubule organization center in plant cell

↓

where apparently no centride MTO makes spindle fibres during cell division

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hydrolysis → break down w water

condensation → amino acids join up

→ cytoskeleton is separate from nuclear membrane.

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during mitosis spindle fibre arises from centriole.

their formation is condensation and hydrolysis after some time.

functions of cytoskeleton

① shapes the cell

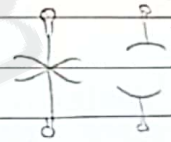
② skeleton of cell

③ helps in movement of organelles within cell

④ during cell division

They break chromosomes & pull sister chromatids towards pole-

2 sides opp: ↓ centriole move opp: ↓ each centriole in one a pole



during phagocytosis ← ↙ ↙ ↓

secretory vesicles when are from golgi, pinch outside via exocytosis via cytoskeleton

pull the membrane for endocytosis

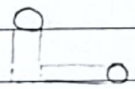
push waste via exocytosis ↓

e.g during photosynthesis ↓ chloroplasts pulled towards light for photosynthesis not damaged enzyme not denatured

breaks chromosome

Centriole

1. Present in animal cell
2. Present in the form of pair. location is centrosome
3. composed of 9 triplets of microtubules → 27 microtubules



hollow tube

cross section:

4. during cell division helps in spindle formation

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Flagella

9 + 2 → motility → animal cell → sperm tail
↳ bacteria

29 microtubule
→ 2 in center

Cilia

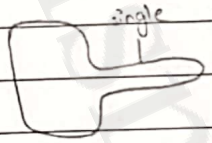
Single microtubule

basal body

↓ in trachea ↓ oviduct ↓ sperm duct ↓ ureter

Villi

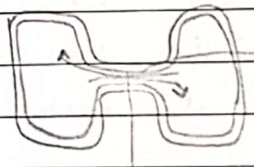
Small intestine
↓
absorbtion
↓
Increase SA for absorption



single protuberus

microvilli

Plasmodismata



connecting tubule

plasmodesmata

→ Present in plant cell
→ Connections b/w 2 cells
→ no cell wall and cell membrane at these points
→ exchange of material (cytoplasmic contacts) b/w cells
→ More no. of Plasmodesmata, more exchange

Virus

→ Parasites always lives within host

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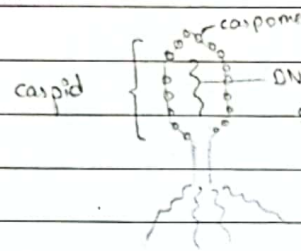
→ Outer proten coat caspid (caspomere)

→ Inside DNA or RNA presed

double single . } single strand



* always needs a living host therefore it is not saprophite. it is a parasite.

→ no cell wall
→ no cell S. Memb:
→ No cytoplasm
→ No organelle
→ does not respire outside host cel

Functions of membranes

① exchange of material → glucose & A.A enter in; waste product CO_2 diffuse out

② ATP synthesized → ATP synthase → mitochondria inner memb: ; chloro thylatoid memb:

③ exchange of ATP → mitochondria memb:

④ contains channels → carriers → exchange

⑤ contains → glyco proteins → receptor for protien ; glycolipid → receptor for lipids or steroids

⑥ Toxic material of one organelle do not effect others → mitochondria ; chloro:

⑦ rate of reaction can be controlled within a boundary

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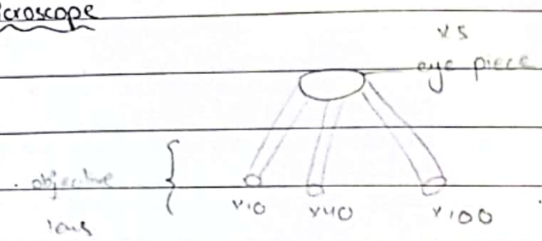
Microscope



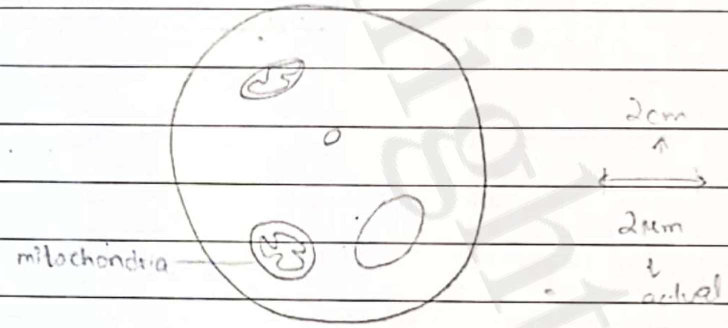
$M = \frac{I}{A}$

→ μm

↑ no. of ↓

area of field of view is larger

more cell



$M = \frac{2cm}{2\mu m}$

Magnification

microscope

↓

2 lens

magnification of a microscope = eye piece lens × objective lens

read & write

MH

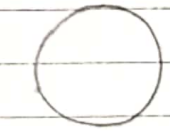
f:10

microscope covered

Date

② We want to increase area of field of view to count max. no of cells. we use low power microscope

③ Magnification = $\frac{\text{image size}}{\text{actual}}$ = always in 'μm'

④ 

mag = measure the bar & convert into μm

bar to calc: mag: 2cm : $\frac{20\,000}{2\,\mu m}$

: ×10 000

⑤ 1 cell Rbc = 7 μm. How many cells can be in 1 cm (10 000 μm)

1 cell : 7 μm

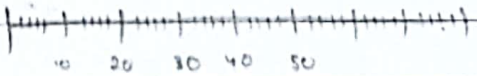
~~10000~~ x cells : 10 000 μm

$x = \frac{10\,000}{7}$: 1429 cells can be in one cm

Calliberation

Stage micrometer graticule scale

no unit ←



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