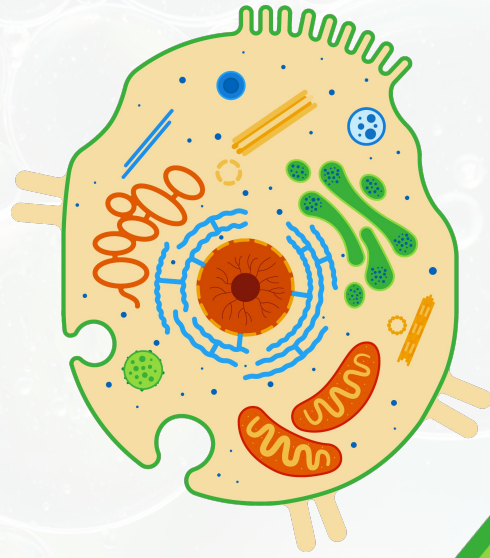




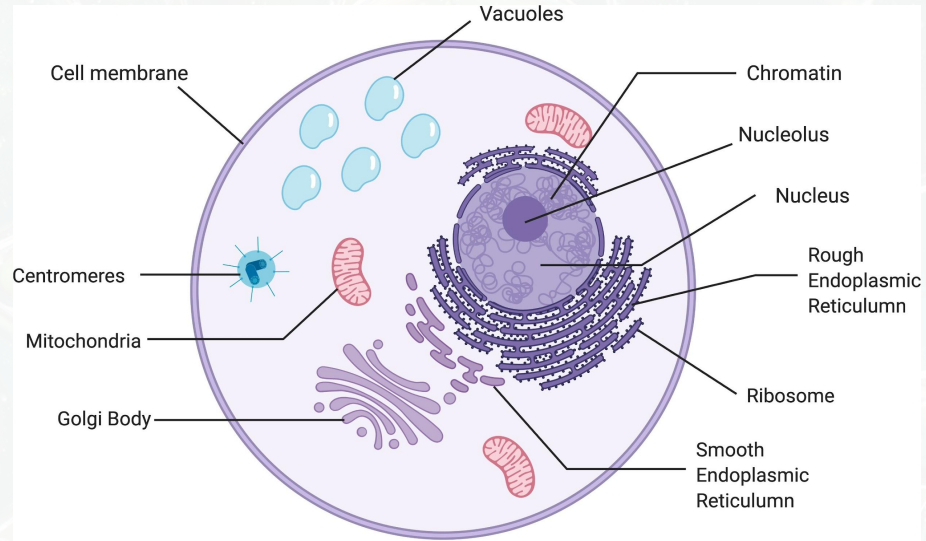
Topic 1

Cell Structure and Organisation



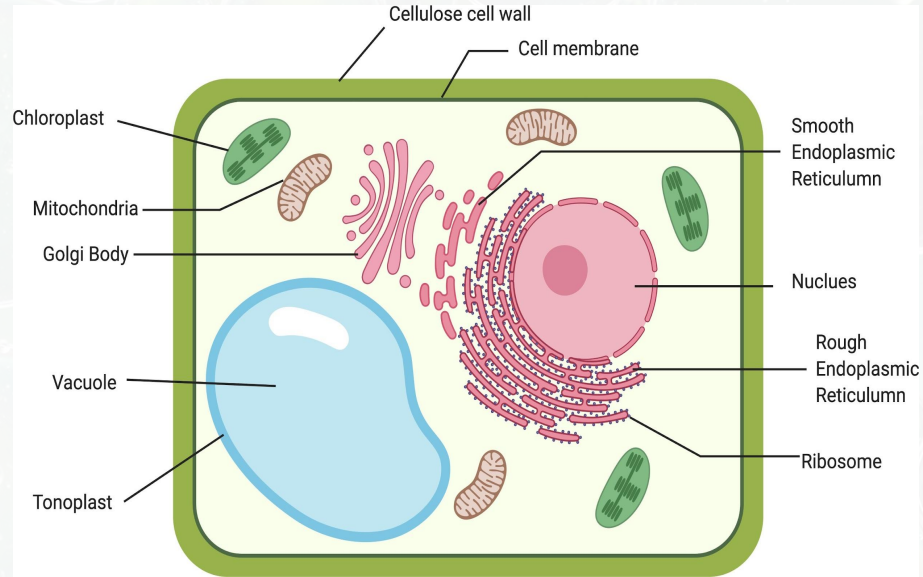


Animal cell





Plant cell





Learning outcomes

(a) Identify and state the functions of the following cell structures (including organelles) of typical **plant** and **animal** cells from diagrams, **light micrographs** and as seen under the light microscope using prepared slides and fresh material treated with an appropriate temporary staining technique

- Cell wall
- Cell membrane
- Cytoplasm
- Nucleus
- Cell vacuoles
- chloroplasts



Organelles that can be seen under the light microscope

- Cell membrane
- Cytoplasm
- Nucleus
- Cell wall
- Large, sap-filled vacuole in plant cells
- Chloroplasts

Found in **animal** and **plant** cells

Unique to **plant** cells



Organelles function

Present in both **animal** and **plant** cells

Cell Membrane	Partially permeable, controls substances entering or leaving the cells.
Nucleus (singular) Nuclei (plural)	Controls cellular activities such as growth, repair, and cell division. Contains DNA
Cytoplasm	Made up of 90% water and contains dissolved protein, sugars, enzymes. Embedded with organelles (eg mitochondria, RER, SER, Golgi body). Sites of most cellular activities.
Vacuole	Stores water, food, dissolved mineral salts, and other substances Animal cell: small, numerous vacuoles known as <i>vesicles</i> □ <i>transport substances within and out of the cell.</i> Plant cell: one large permanent vacuole. <i>Maintain rigidity and shape of plant cells (turgor pressure)</i>



Organelles function

Present **ONLY** in **plant** cells

Organelle	Functions
Cellulose cell wall	Fully permeable. Protects cell from injury Gives the cell its regular shape, prevent it from bursting
Chloroplast	Contains chlorophyll, which traps light for photosynthesis



Learning outcomes

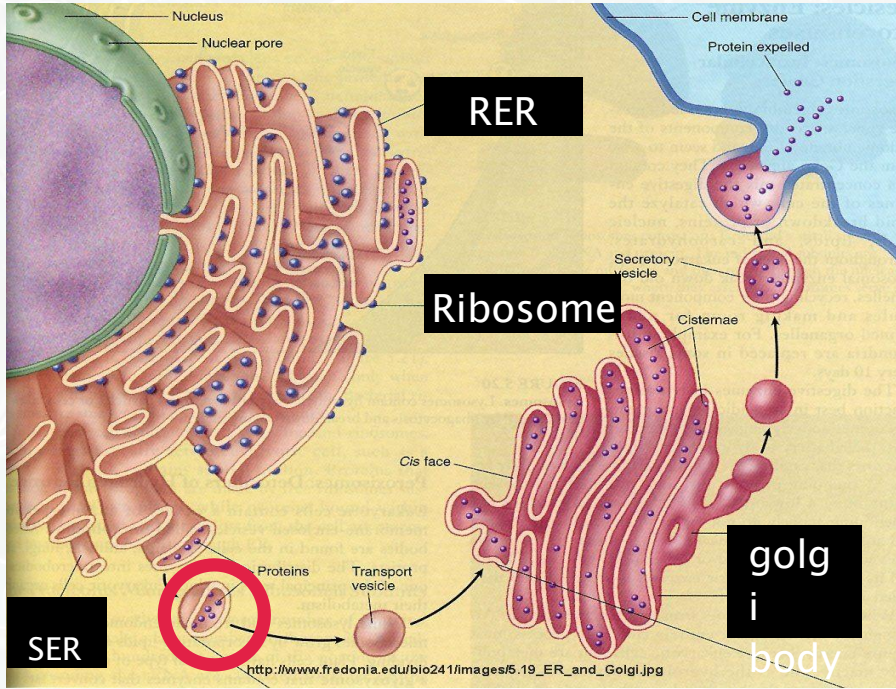
(b) Identify and state the functions of the following membrane systems and organelles from diagrams and **electron micrographs**:

- Endoplasmic reticulum
- Golgi body
- Mitochondria
- Ribosomes



Organelles function

Present in both **animal** and **plant** cells



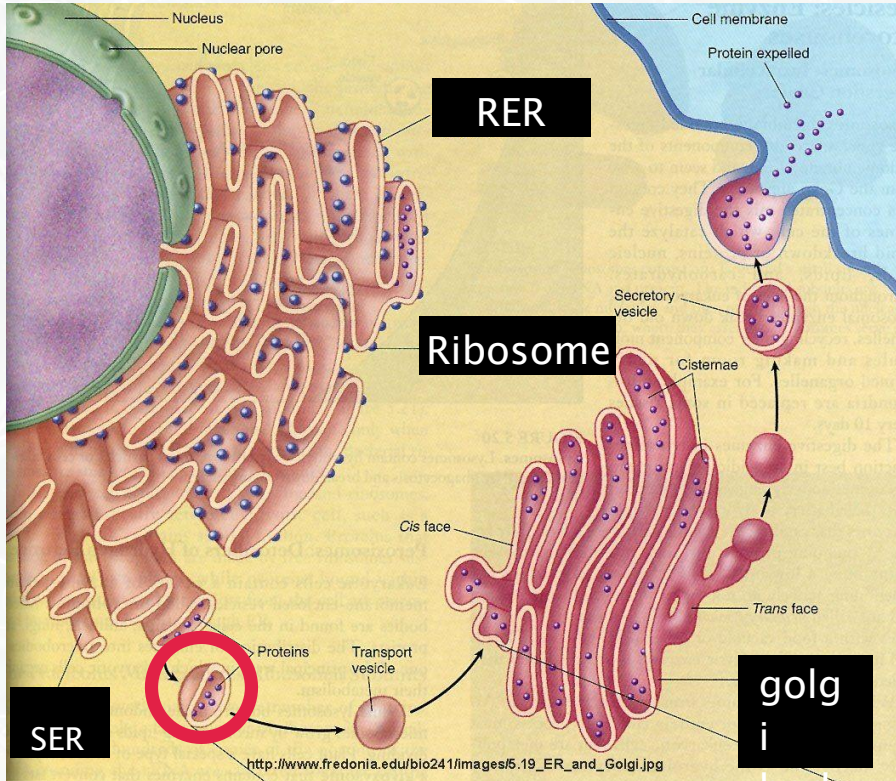
Path of protein (via vesicles):
RER > Golgi Body > Outside of the cell

Ribosomes	<ul style="list-style-type: none">• Can either be attached to RER or free floating.• Site of protein synthesis
Rough endoplasmic reticulum	<ul style="list-style-type: none">• Ribosomes are attached to the membrane (thus rough)• RER is involved in protein synthesis
Smooth endoplasmic reticulum	<ul style="list-style-type: none">• Synthesises fats and steroids such as sex hormones• also contains enzymes that detoxify drugs and poisons.
Golgi body	<ul style="list-style-type: none">• It stores, sorts and modifies substances made by the ER, and packages them in vesicles to be secreted out of the cell



Organelles function

Present In both **animal** and **plant** cells



Mitochondria

Site for cellular (aerobic) respiration to release energy ("powerhouse of the cell")

Energy is used to carry out cellular activities, including **protein synthesis**



Learning outcomes

(c) compare the structure of typical **animal** and **plant** cells



Compare the structure of typical **animal** and **plant** cells

	Animal cell	Plant cell
Cell membrane	✓	✓
Nucleus	✓	✓
Cytoplasm	✓	✓
Mitochondria	✓	✓
Ribosomes	✓	✓
Endoplasmic reticulum	✓	✓
Golgi body	✓	✓
Vacuoles	✓ Small, numerous	✓ Large, central
Cellulose cell wall	✗	✓
Chloroplast	✗	✓



Learning outcomes

(d) Explain how the structures of specialized cells are adapted to their functions

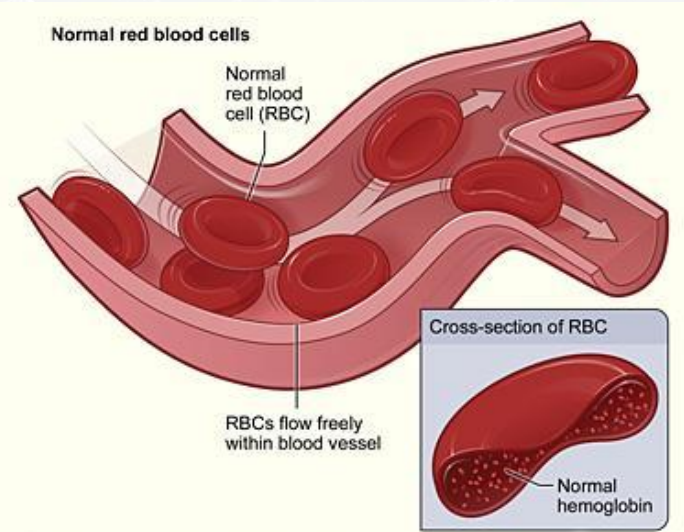


Specialised Cells

RED BLOOD CELLS

Function

Contains hemoglobin, which binds with oxygen and transports it from the lungs to all parts of the body / other body tissues

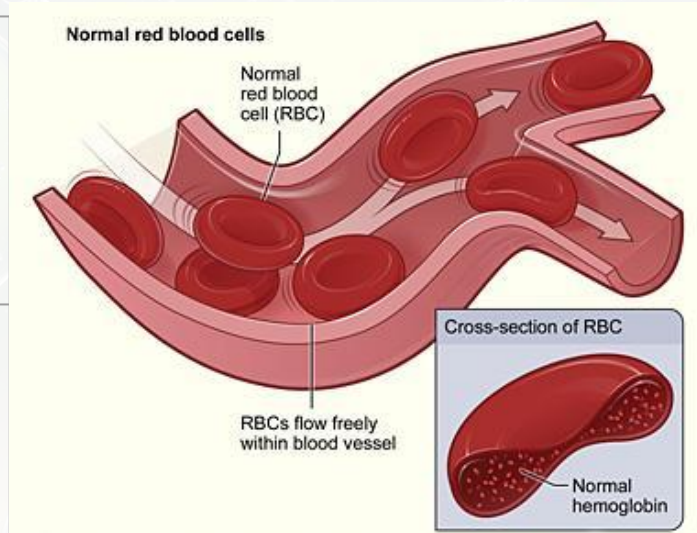




Specialised Cells

RED BLOOD CELLS

Adaptation	Lacks nucleus and other organelles	Greater capacity for more hemoglobin > High concentration of hemoglobin > Allows it to transport more oxygen
	Flattened, biconcave shape	Increases surface area to volume ratio for faster/ efficient diffusion of oxygen Renders flexibility, allows RBC to squeeze through narrow blood capillaries > Reach all tissues > Ensures efficient and adequate oxygen delivery

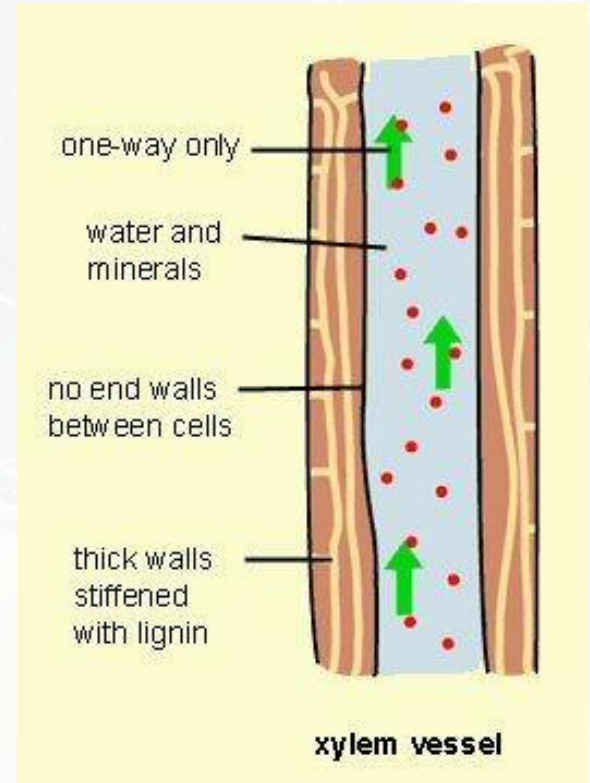




Specialised Cells

XYLEM

Function	Conduct water and mineral salts from the roots to the leaves of the plant
	Mechanical support of plants

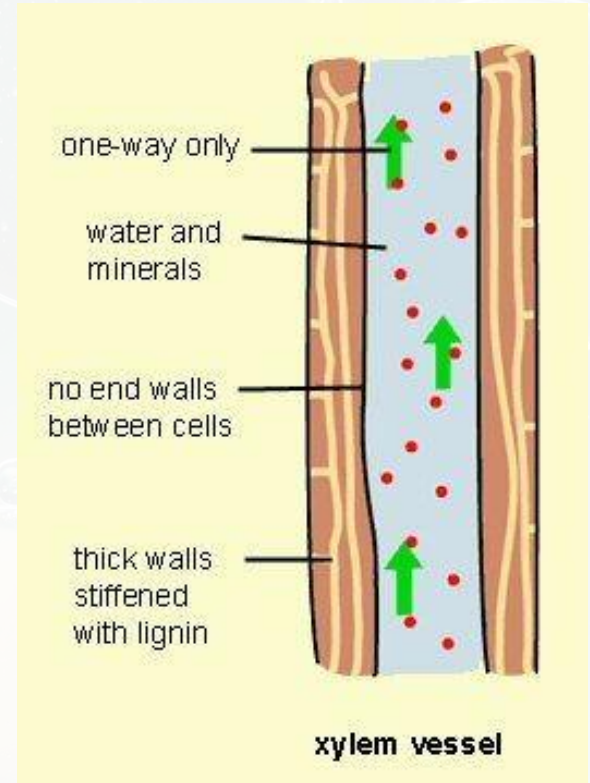




Specialised Cells

XYLEM

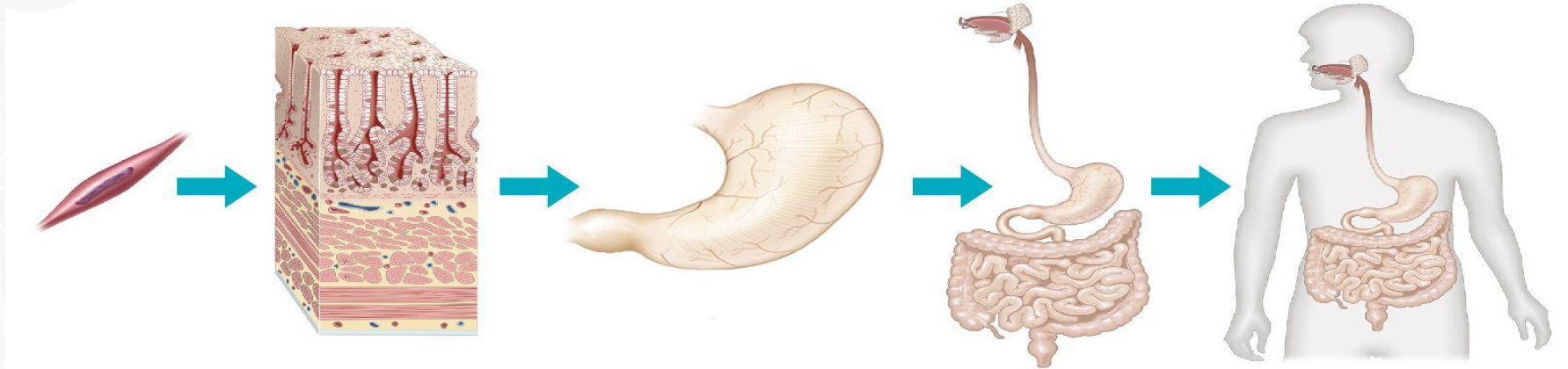
Adaptation	Absence of protoplasm and cross-walls	Ensure continuous and smooth passage of water through the lumen
	Deposition of lignin on the cell walls	Strengthens vessel walls, prevents vessel from collapsing





Organ System

© Hee Xin Wei



Cell

Tissue

Organ

Organ system

Organism

The most basic unit of a living organism



A group of cells of the same type that are found near each other and carry out the same function



Different tissues working together to perform a specific function or a group of functions



A group of functionally-related organs



Different organ systems work together for survival

MEET THE OVERMUGGED TEAM

MEET OUR ALL-STAR TUTORS

All our tutors have between **7-13 years of teaching experience** and have guided countless batches of students to excel at 'O' Levels & 'A' Levels.

**UNLOCK YOUR FULL
POTENTIAL.**



07

LOCATIONS

We have classes across 7 locations in Singapore, with **3 main branches**.

20+

TUTORS

We have a team of 20+ tutors, each specialising in their respective subjects.

70%

RESULTS

About **70%** of OVERMUGGED students score an A1/A2 at 'O' Levels/'A' Levels.

700+

STUDENT UNDER OUR CARE

We have about 700+ students under our care which we work closely with on a week-on-week basis!

SOME STATS

SG FASTEST GROWING TUITION BRAND

We believe in uplifting the student community!



OVERMUGGED, 'O' Levels Channel
6,214 subscribers



OVERMUGGED, 'A' Levels Channel
2,778 subscribers

One of SG largest Telegram student community

LEADERS IN THE CHANGING EDUCATION LANDSCAPE

FEATURED ON STRAITS TIMES

Our efforts to go out of our way to support our students were captured by local new publications.

OVERMUGGED was SG first tuition center to host large scale mock exam!

Our student's needs comes first!

TODAY
June 16 at 5:49 PM · 🌐

One Primary 6 student who is sitting mock exams told TODAY: "I feel stress didn't do any exams all the way until prelims and PSLE... I'll be unfamiliar with environment and I cannot concentrate."

TODAYONLINE.COM
Hundreds sign up for tuition centre mock exams costing up scrapping of all mid-year school exams

👍👍👍 53

👍 Like

Vulcan Post
12h · 🌐

Overmugged launched a tuition subscription plan for 'O' Levels subjects to make education more affordable and accessible, and has achieved a six-figure revenue in its first year.

VULCANPOST.COM
OVERMUGGED: This 28-year-old built S'pore's first online tuition subscription service

You and 8 others
1 comment 5 shares
👍 Like Comment 🔄 Share

With midterms scrapped, students take mock exams at tuition centres



Many in Primary 6 and Secondary 2 seek to build experience ahead of national exams

Students are flocking to tuition centres for mock exams as the Singapore Education System (SES) scraps mid-year school exams. The move is seen as a way to help students build confidence and experience before the national exams.

Overmugged, a tuition subscription service, has seen a surge in sign-ups for its 'O' Level mock exams. The service offers a comprehensive curriculum and experienced teachers to guide students through the process.

Parents are also flocking to tuition centres for their children's mock exams. Many parents are concerned about their children's performance in the national exams and want to ensure they are well-prepared.

Overmugged's founder, Wong Shihing, says the company's goal is to provide a high-quality, affordable education for all students. The company's subscription model allows parents to pay a fixed fee for a set period, making it easier to budget for their child's education.

Overmugged has achieved a six-figure revenue in its first year, a testament to the demand for quality education in Singapore. The company plans to continue to expand its services and reach more students in the future.

P6 and Sec 4 students flock to tuition centres for mock exams after scrapping of school midterms



He has continued to provide...
...to help students build confidence...
...and experience before the national exams...
...the company's goal is to provide a high-quality, affordable education for all students...
...the company plans to continue to expand its services and reach more students in the future...

OUR LOCATIONS



BUKIT TIMAH

Tan Kah Kee

2 min walk from Tan Kah Kee MRT.



Kovan

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5min walk from Kovan MRT.



MARINE PARADE

PARKWAY CENTER

Upcoming TE line in 2024.



TOA PAYOH CLASSROOM

Conveniently located near Toa Payoh MRT



JURONG EAST CLASSROOM

Right beside Jurong East MRT



WOODLANDS CLASSROOM

Right beside Woodlands MRT



TAMPINES READY IN 2024

Right beside Tampines MRT



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because we know that when it comes time for
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IF YOU THOUGHT THE FREE MATERIALS ARE GOOD,

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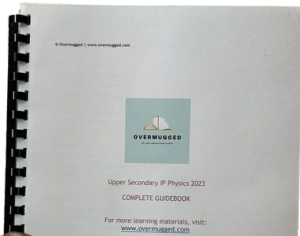
WEEKLY WORKSHEETS



Topical, Thematic, Mock Test, Mock Exam, Prelim Prep, Practical Prep



EXCLUSIVE CHEATSHEETS

Revision booklets, extra cheatsheets, Practical Assessment booklet



TOPIC: KINEMATICS			
type	Definition	Formulae	Remarks
Linear motion	Object that is moving in a straight line 1-D motion	$v = u + at$ $s = ut + \frac{1}{2}at^2$ $v^2 = u^2 + 2as$	<ul style="list-style-type: none"> Motion can be represented! (upwards or right) or -ve (down or left) sign Equations can only be used when acceleration is constant
Motion	Object that is moving in a plane 2-D motion	Horizontal motion (acceleration = 0) $v_x = u_x$ $s_x = u_x t$	<ul style="list-style-type: none"> Acceleration always act down Projectile will form a parabolic of concave is neg 
	Acceleration is experienced in both axes Vertical and horizontal motion are independent of each other	Vertical motion (uniform vertical acceleration = g) $v_y = u_y + at$ $s_y = u_y t + \frac{1}{2}at^2$ $v_y^2 = u_y^2 + 2as$	
Vectors	Analyse the horizontal and vertical motion separately	For a vector V pointing at an angle θ from the horizontal:  $v = \sqrt{v_x^2 + v_y^2}$ $\tan \theta = \frac{v_y}{v_x} \Rightarrow \theta = \tan^{-1} \left(\frac{v_y}{v_x} \right)$	<ul style="list-style-type: none"> $v_x = v \cos(\theta)$ (horizontal) $v_y = v \sin(\theta)$ (vertical)

MARCH PRACTICE QUESTIONS 2023
SECONDARY 4 EXPRESS
SECONDARY 3 NORMAL ACADEMIC

ELEMENTARY MATHEMATICS 404801

Specimen Paper
Date: 8 March 2021
Duration: 90 min
Candidates answer on separate writing paper

READ THESE INSTRUCTIONS FIRST

Answer all questions.
Working is needed for any question & must be shown with the answer.
Diagrams of assumed geometry need not be drawn.
You are expected to use a scientific calculator to evaluate eight numerical expressions.
If the degree of accuracy is not specified in the question, use 4 figures for final answers.
Give final answers in three significant figures.
Give answers in degrees to one decimal place.
For a question your calculator reads 0.142, write the question requires the answer to three d.p.

Your names will be listed above each question for your benefit and review.

Upon completion of solutions:
Each candidate must exactly & neatly submit their solutions.
Take a picture or scan the digital copies of your solutions to email (skibet) via Telegram channels, Matrix or WhatsApp: @MSB776.
Ensure that all writings are clear and legible.
Solutions will be marked based on your presentation, accuracy and completeness of your solutions.
A 'master' report and the full solutions will be provided at the end of the month.

Setion: Ong Kai Hin
The question paper consists of 6 printed pages including the cover page.

it reached in a
and
ny $v_y = 0$

$$v^2 = (u \sin \theta)^2 - 2gH$$

$$\therefore H = \frac{v^2 - u^2 \sin^2 \theta}{-2g}$$

With air resistance,

- Drag force acts in the same as the weight of object.
- Net acceleration $>> g$
- Maximum height reached lowest.

ny $v_y = 0$

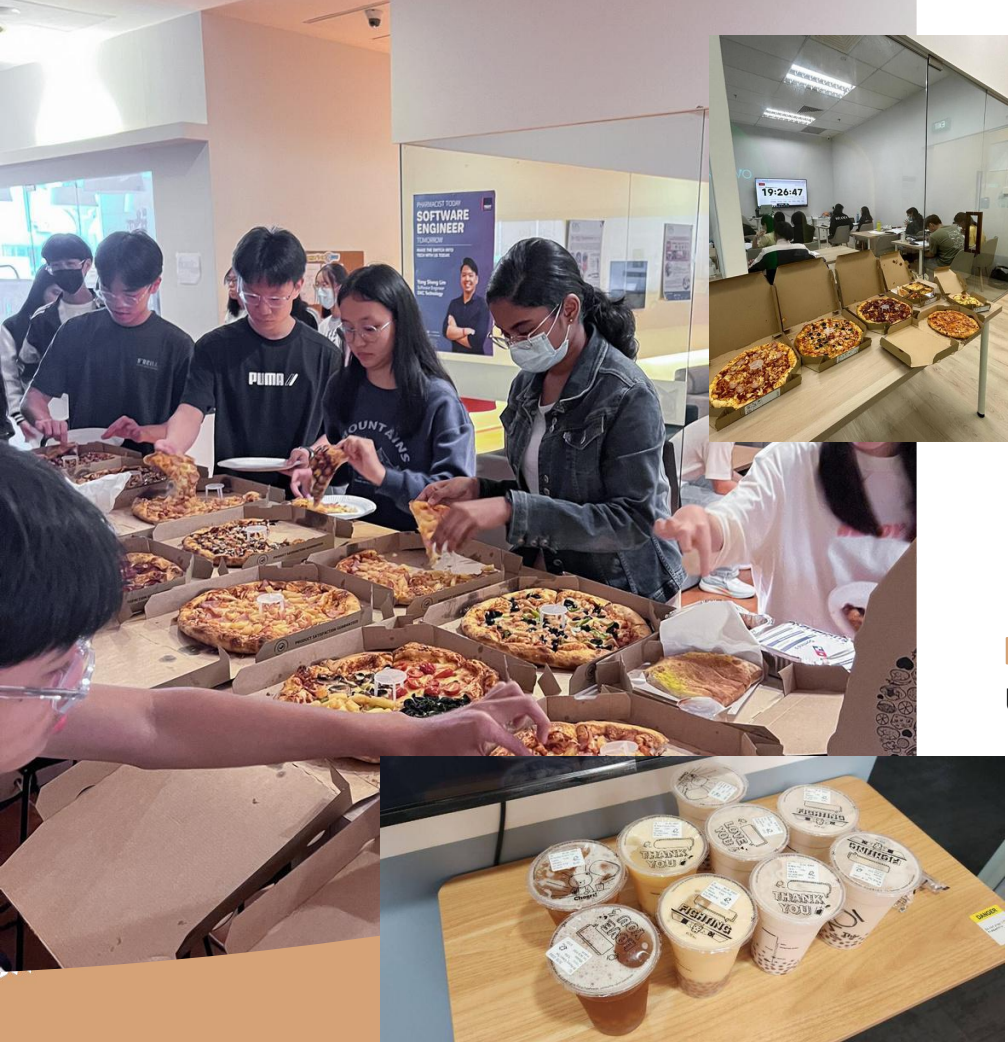
$$v_y = u \sin \theta - g t_{\text{up}}$$

$$\therefore t_{\text{up}} = \frac{u \sin \theta}{g}$$

With air resistance,

- Drag force acts in the same as the weight of object.
- Net acceleration $>> g$
- Final vertical speed smaller than vertical speed.
- Average speed upwards $>>$

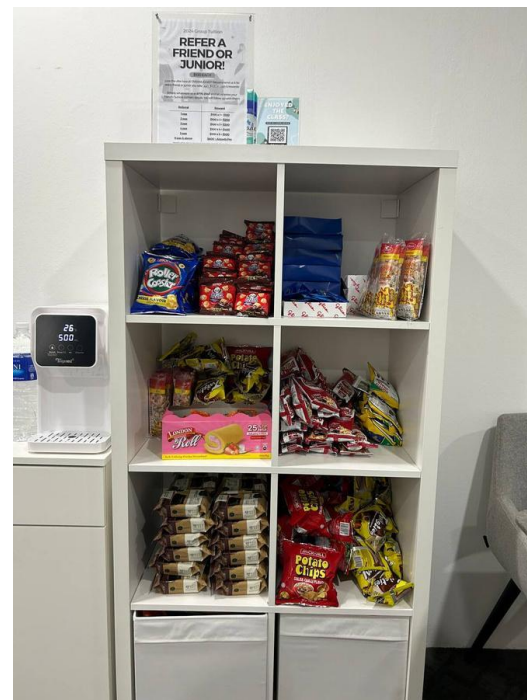




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INTEGRATED PROGRAM

\$90/lesson

\$95/lesson (weekend)

'A' LEVELS

\$100/lesson

\$105/lesson (weekend)

10% if signing up for 2 'A' Levels subject & above

**Fees are collected at the start of the term
(every 3 months).**

ACADEMIC YEAR

TERM 1: NOV – JAN

Topical Recaps

Key highlight: Christmas Party

TERM 2: FEB – APR

Topical Mastery

Key highlight: March Holiday Cohesion Program

TERM 3: MAY – JUL

Prelim/EOY Preparation

Key highlight: Mock Prelim/EOY

TERM 4: AUG – OCT

'O' Levels / 'A' Levels Preparation

Key highlight: Mock Exams, Science Practical Assessment





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