MAVIS
TUTORIAL CENTRE
LEARN INSPIRE ACHIEVE

Curriculum Information

SECONDARY 3

MAVIS
TUTORIAL CENTRE

LEARN INSPIRE ACHIEVE

Why Choose Mavis?

1. Mavis PRO

› *Never Miss a Lesson Again!*

Physical Lessons - Stay engaged with in-person learning
Recorded Lessons - All recorded lessons available for the whole year
Online Lessons - Learn from anywhere

2. Mavis Connect

› *Stay Connected, Stay Informed*

Students - Access past lesson records, submit assignments, watch recorded lessons and download lesson materials
Parents - Track lesson records, monitor attendance, receive teacher feedback, and make secure payments

3. Oral AI Companion

› *A revolutionary way to practise oral.*

Structured Syllabus - Cover topics from basic to advanced levels
Simplified Learning - Complex topics broken down into bite-sized sections for better understanding

4. Learning Kits

› *Hands-on Learning for Stronger Grasp of Concepts*

Interactive Tools - Learning kits, like microscope, math manipulatives and calligraphy set, make lessons more engaging

5. Mavis Miles Rewards Programme

› *Rewarding Effort, Recognising Excellence*

Motivational Learning – Inspires students to participate actively and strive for excellence
Academic Achievement – Be recognised for strong academic performance
Exclusive Rewards – Redeem miles for exciting gifts, vouchers and more

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MAVIS
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HEAR FROM OUR STUDENTS

'O' LEVELS 9As

"Mavis provided us with **targeted questions**, which really helped me **focus on my weaker topics.** As a result, my Maths grade **improved from a C6 to an A1.** The teachers at Mavis also went to great lengths to ensure **everyone enjoyed class**, which made learning feel a lot easier."

KENNETH LEE

PSLE 4AL1s

"Mavis gave me the **confidence** to excel in my PSLE, as the teachers were very **supportive** and provided plenty of **targeted practice**. They also took time out of their own schedules to give us **extra lessons,** which helped us feel more prepared."

KOH TIEN YOUNG

'O' LEVELS 8As

"I think that ultimately it is the teachers at Mavis that gave me the support needed to do well in my 'O' Levels, whenever I see them **putting their best effort to teach us**, it makes me want to **strive harder** and do my best."

FREYANN LEE

PSLE 4AL1s

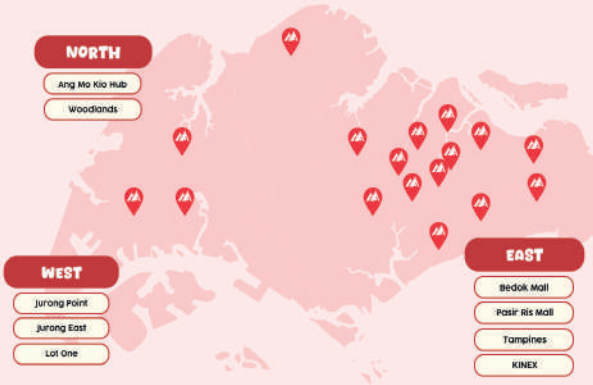
"After joining Mavis, I **felt more confident** during exams and found it easier to tackle more questions. The **comprehensive worksheets, topic summaries,** and **exam tips** made revision more effective and helped me **grasp key concepts** clearly. The teachers are also approachable and always ready to answer my questions."

GUO XINYAO

MavisPRO

Never Miss a Lesson Again!

Physical Lessons **R**ecorded Lessons **O**nline Lessons



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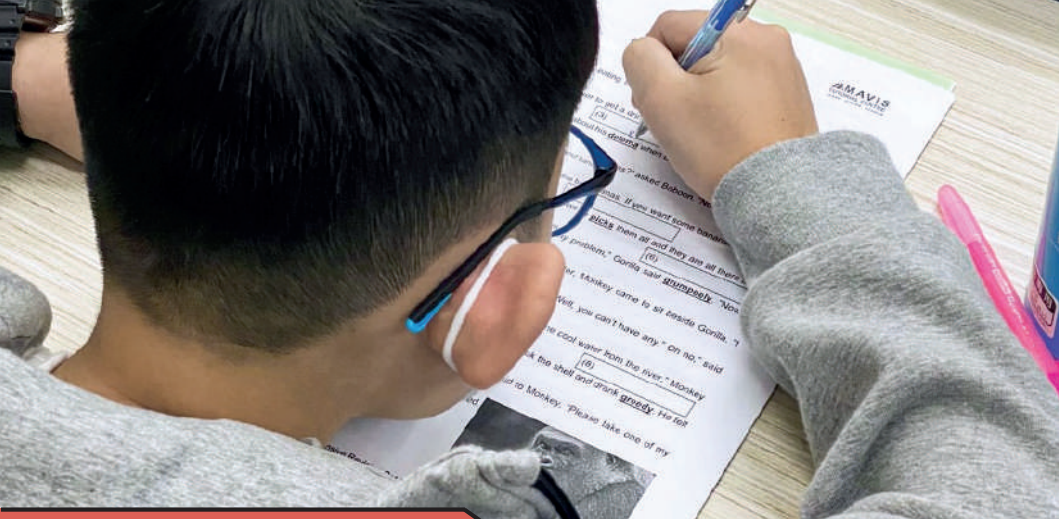

MAVIS TUTORIAL CENTRE
LEARN INSPIRE ACHIEVE

SUBJECTS OFFERED FOR SECONDARY 3 STUDENTS

Dear Parents,

Thank you for your interest in Mavis Tutorial Centre.

Since 1986, we have been dedicated to delivering exceptional education, equipping students with the knowledge, skills, and confidence to excel in crucial exams such as the PSLE, SEC examinations, and GCE 'A' Levels. Our carefully structured curriculum focuses on deep subject understanding, empowering students to perform confidently and achieve excellence in their examinations. Beyond academic success, we are committed to creating an engaging learning environment where active participation and enjoyment are at the forefront, guided by our experienced and engaging tutors.

We offer a variety of courses for our Secondary 3 students:

- English
- Mathematics
- Additional Mathematics
- Biology
- Chemistry
- Physics
- Chinese

THE MAVIS EXPERIENCE

Nov	**Lessons commence** *Give your child a head start and build confidence early.*
Dec	**Supplementary Home-Based Learning Lessons** *Keep learning consistent, even during the holidays.*
Feb	**Term 1 Revision** *Reinforce foundational knowledge for a stronger Term 2.*
Apr	**Mid-Year Revision** *Prepare with purpose – consolidate learning before exams.*
May	**Supplementary Home-Based Learning Lessons** *Keep skills sharp after exams for continued progress.*
Aug	**Term 3 Revision** *Revisit key concepts to stay ahead in the final stretch.*
Sep	**Intensive Revision Booster Classes** *Final push for excellence – maximise marks with targeted strategies*
Sep	**End-of-Year Revision** *Refine knowledge and correct misconceptions before the final exam.*

KEY FEATURES OF OUR PROGRAMME

MAVISPRO

- Offer flexible options to attend lessons in-person or online
- Enable students to revisit recorded lessons anytime for revision
- Support self-paced revision and concept reinforcement

COMPREHENSIVE WEEKLY LEARNING RESOURCES

- Align with the latest MOE syllabus
- Deliver consistently to support steady progress
- Strengthen foundational understanding

EXPERIENTIAL LEARNING

- Engage students through hands-on activities
- Make learning interactive and enjoyable
- Deepen understanding through active participation

REVISION MATERIALS

- Reinforce key academic concepts
- Train students in effective answering techniques
- Prepare students for exam success

INTENSIVE REVISION

- Deliver targeted practice for difficult topics
- Refine answering strategies with expert guidance
- Build exam confidence through focused revision

EXTRA SUPPORT

- Include past-year examination papers & AI quizzing
- Provide additional practice opportunities
- Familiarise students with real exam formats

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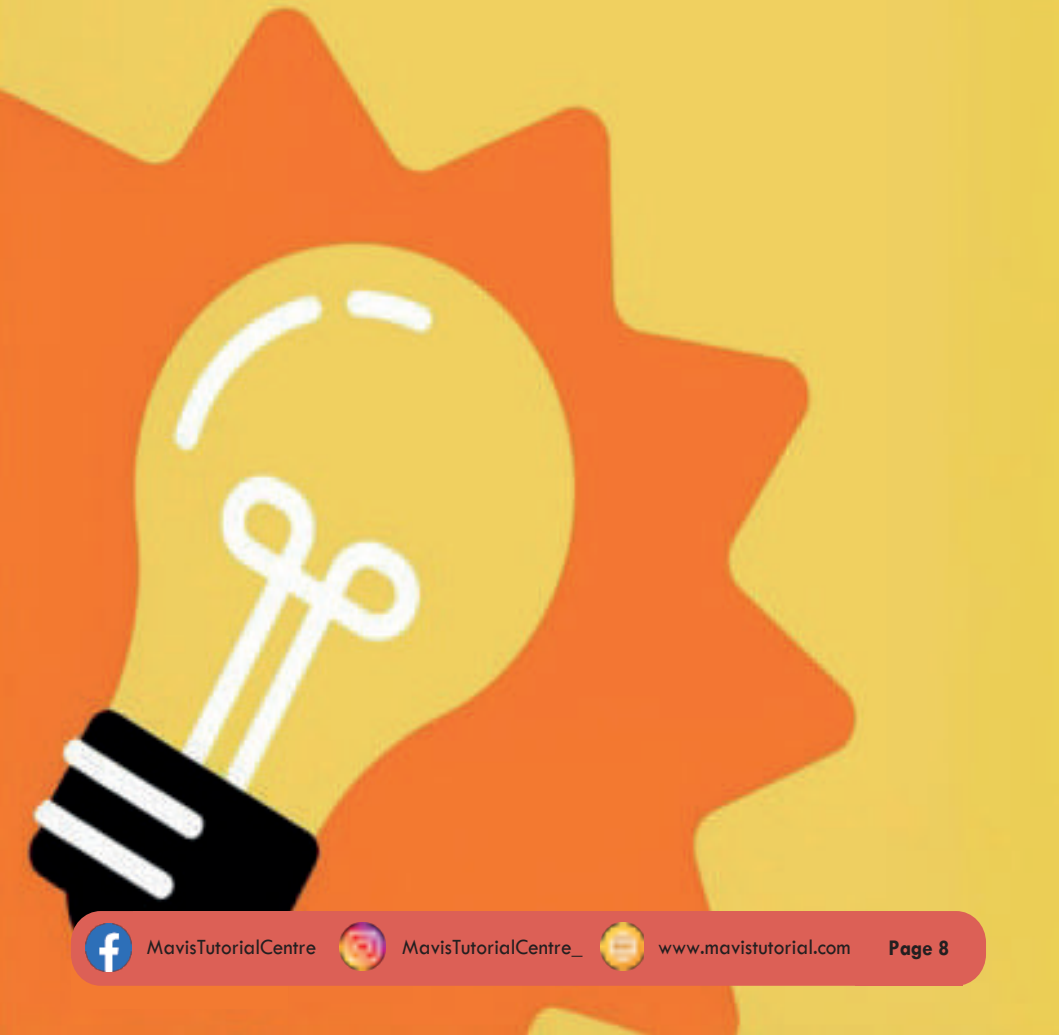
SECONDARY 3

ENGLISH



SECONDARY ENGLISH

The MOE English Curriculum aims to enable students to:

1. speak, write and represent in standard English appropriate for different purposes.
2. use English to communicate meaning and achieve impact.

1 LISTENING SKILLS

Ability to comprehend and interpret spoken language

2 SPEAKING SKILLS

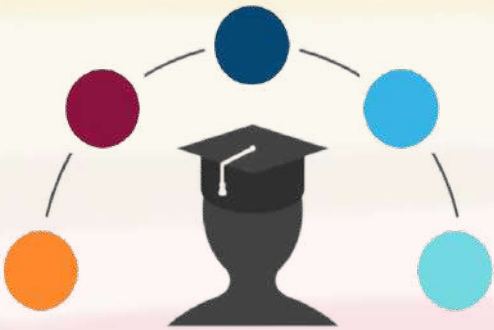
Communication through verbal expression and articulation

3 READING SKILLS

Understand variety of texts, analyse literal and inferential meaning

4 WRITING SKILLS

Expressing thoughts and ideas through written communication



S3 ENGLISH CLASSES (CURRICULUM STRUCTURE)

Key feature 1

Well-structured & progressive curriculum

- closely aligned to latest MOE syllabus
- comprehensive list of formats for Paper 1

Key feature 2

Regular updates on current affairs

- broaden general knowledge
- enhance comprehension of various contexts

Key feature 3

Thorough exam preparation

- revision booklets with tips and pointers on how to tackle different types of questions

OUR CURRICULUM

HOW WILL STUDENTS BENEFIT

WRITING

- Write clearly for the intended audience with appropriate vocabulary
- Organise thoughts to present ideas logically

COMPREHENSION

- Develop close reading & analytical skills
- Identify and summarise key information

ORAL & LISTENING

- Communicate opinions clearly
- Listen texts to identify details

Situational Writing – Speech

For speech, you write it as though you are presenting it in front of an audience. You will have to convey ideas in a **persuasive and compelling manner**.

Pointers to note when crafting or writing a speech

1) When writing, bear in mind the **[P]urpose** of your speech, the profile of your **[A]udience** and the **[C]ontext** of your speech's content (PAC).

2) The introduction and conclusion must reflect the **purpose** for delivering the speech.

3) There is **no need** for a title.

4) Every paragraph must be flushed to the **left margin** with **one line spacing** after each.

5) **Reasons** for your choice(s) and **justification** of how the activities would support your reason must be stated clearly in your body paragraphs.

6) Most likely, you will be required to **weigh** the pros and cons between a few possibilities (e.g. suggestions, ideas, etc) being put forth. In doing so, use information from the visual to **convince** your audience why you feel one is the more appropriate choice out of the rest.

7) There is **no need** for the writer's name or signature at the end. Just remember to **thank** the audience for their kind attention after reinforcing the purpose of your speech.

Section A - Editing (10 marks)

Carefully read the text below, consisting of 12 lines, about the life of a dedicated, young woman whose life was turned upside down after a careless mistake. The first and last lines are correct. For eight of the lines, there is one grammatical error in each line. There are two lines with no errors.

There are two more lines with no errors.
If there is NO error in a line, put a tick (✓) in the space provided.
If the line is incorrect, circle the incorrect word and write the correct word in the space provided.
The correct word you provide must not change the original meaning of the sentence.

Examples:
I arrived to my destination at 2 p.m. ……at……
My mother always wears sensible clothes. ……✓……

Books are about the interior journey; the fluid back-and-forth between writer and
The word "reader" has been mentioned previously.
reader. The ability to draw a reader into the writer's world is every author's goal 1……the……
Plural form is needed
when writing a book. Some people read fiction work to immerse themselves 2……works……
an adjective is needed here to modify "world" (noun)
in the imagination world so as to temporarily detach themselves from the 3……imaginative/ imaginary……

stress they face in reality. When I look at my books now, arranged from shelf 4……✓……
"books" is in the plural form so pronoun used must match it
to shelf in its pleasing order, what I see are not just the narratives they 5……their……
correlative conjunction
represent and also as symbols of my growing up years. I enjoyed reading comics 6……but……

when I was younger but after been chided by my teachers to stop reading them 7……being……
it is a fact that comics contain broken English
as they contained broken English, I turned to fantasy game books. I felt a sense 8……contain……

of control as I was able to make my own choices while reading them. Again, I 9……✓……

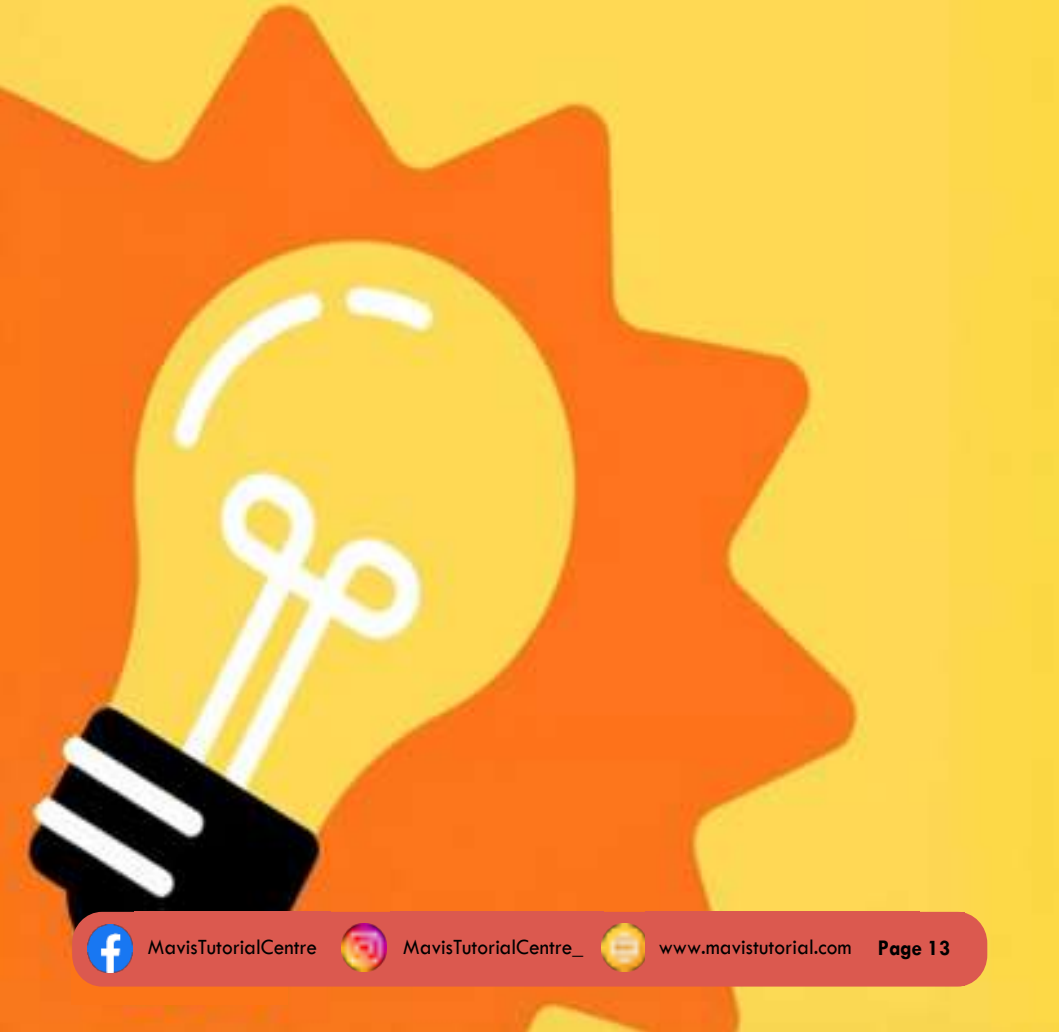
was advised not to read those as according to my parents, they are too 10……were……

unrealistic. After some reluctance, I stopped and turned to reading novels.

SECONDARY 3

MATHEMATICS

ADDITIONAL MATHEMATICS



SECONDARY MATHEMATICS

The MOE Mathematics Curriculum aims to enable students to:

1. develop reasoning through problem solving skills
2. connect ideas between Mathematics and other subjects through applications of Mathematics
3. build confidence and foster interest in Mathematics

OUR FOCUS

- Understand the concepts and drill different question types
- Focus on accuracy and avoid common mistakes
- Gain exposure to problems in real-world context
- Master exam techniques and receive targeted support

S3 MATHEMATICS CLASSES (CURRICULUM STRUCTURE)

Key feature 1

Robust curriculum for strong foundation

- designed in varying difficulty levels to cater to all students of different calibre

Key feature 2

Wide exposure to various types of questions

- learn to identify key cues, recognise concepts & solve word problems more efficiently

Key feature 3

Targeted revision materials for exam preparation

- revision papers/booklets with summary notes and commonly tested questions to reinforce concepts learnt

TOPICS COVERED IN SECONDARY 3

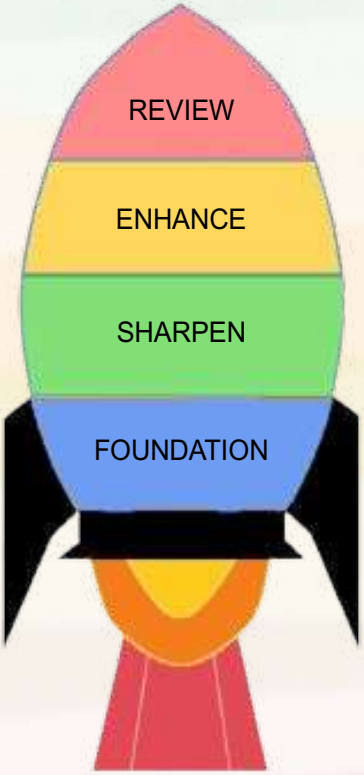
Number & Algebra

- Quadratic Equations & Functions
- Linear Inequalities
- Indices
- Functions & Graphs

Geometry & Measurement

- Coordinate Geometry
- Congruence & Similarity
- Trigonometry
- Applications of Trigonometry
- Circular Measure
- Properties of Circles

LEARNING JOURNEY FOR MATHEMATICS



4

Quarterly Revision Worksheets
- Targeted content
- Challenging questions

3

Maths Learning Aids
- Enhance learning experience
- Support hands-on learning

2

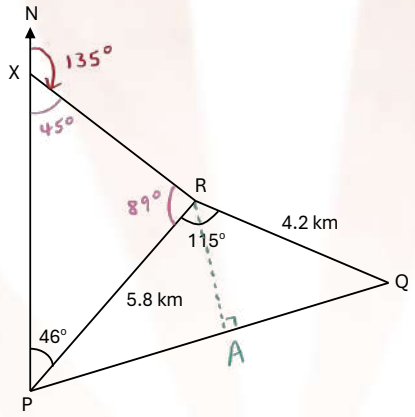
Got a Test Summary Notes
- Sharpen skills in various topics
- Identify and strengthen weak topics

1

Topical curriculum
- Build a strong foundation
- Gain confidence in solving

Example 2

The diagram below shows the position of a post office P and three stations X, R and Q on a level ground. X is due north of P and the bearing of R from P is 046°. Angle PRQ = 115°, PR = 5.8 km and RQ = 4.2 km.



(a) (i) Calculate the length of PQ.

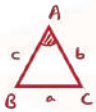
$PQ^2 = 5.8^2 + 4.2^2 - 2(5.8)(4.2)\cos 115°$

$PQ = \sqrt{5.8^2 + 4.2^2 - 2(5.8)(4.2)\cos 115°}$

$= 8.48$ km (3 s.f)

Remember!

cosine rule: $a^2 = b^2 + c^2 - 2bc\cos A$



(ii) Calculate the area of triangle PRQ.

Area $\Delta PRQ = \frac{1}{2}(5.8)(4.2)\sin 115°$

$= 11.0$ km^2 (3 s.f)

Remember!

Area $\Delta = \frac{1}{2}(a)(b)\sin C$

Homework Level 2

2. Simplify the following, leaving your answers in positive indices.

(b) $\dfrac{(xy)^2}{5x^2y^{-1}} \times \dfrac{(25x^3y)^{-1}}{2(xy^3)^{-2}}$

$= \dfrac{x^2y^2}{5x^2y^{-1}} \times \dfrac{25^{-1}x^{-3}y^{-1}}{2x^{-2}y^{-6}}$ use $(a^m)^n = a^{mn}$

$= \dfrac{25^{-1}x^{-1}y^{1}}{10x^{0}y^{-7}}$ use $a^m \times a^n = a^{m+n}$

$= \dfrac{1x^{-1}y^{8}}{250}$ use $a^m \div a^n = a^{m-n}$

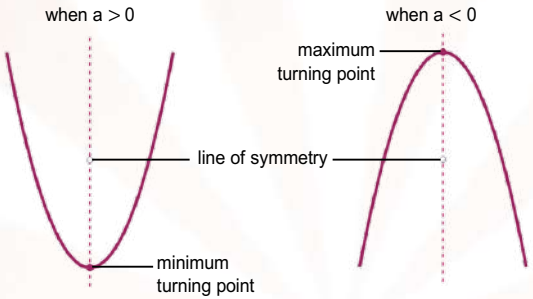
$= \dfrac{y^8}{250x}$ use $a^{-n} = \dfrac{1}{a^n}$

OUR "GOT A TEST" SUMMARY

Quick Notes

1. (a) For sketching graphs of the completed square form : $y = \pm (x - h)^2 + k$,
   (i) + curve opens upwards, - curve opens downwards
   (ii) Coordinates of min or max point = (h, k)
   (iii) Find the x-intercept(s) and y-intercept

   (b) For sketching graphs of the factorised form : $y = \pm (x - p)(x - q)$,
   (i) + curve opens upwards, - curve opens downwards
   (ii) Find the x-intercept(s) and y-intercept.
   (iii) Find the line of symmetry, i.e. $x = \frac{x_1 + x_2}{2}$
   (iv) Find the coordinates of the min or max point.



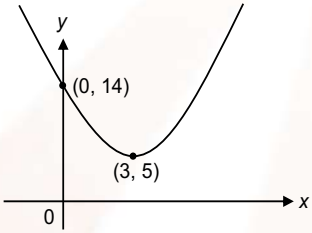
Actual Exam Questions

1. (a) Express $y = x^2 - 6x + 14$ in the form $y = (x - h)^2 + k$, where h and k are constants.
   (b) Hence, sketch the graph of $y = x^2 - 6x + 14$. Show the y-intercept and turning point clearly.

Answers:

1. (a) $y = (x - 3)^2 + 5$

   (b)



S3 ADDITIONAL MATHEMATICS CLASSES (CURRICULUM STRUCTURE)

Key feature 1

Robust curriculum for strong foundation

- designed in varying difficulty levels to cater to all students of different calibre

Key feature 2

Wide exposure to various types of questions

- learn to identify key cues, recognise concepts & solve word problems more efficiently

Key feature 3

Targeted revision materials for exam preparation

- revision papers/booklets with summary notes and commonly tested questions to reinforce concepts learnt

TOPICS COVERED IN SECONDARY 3

Algebra

- Simultaneous Equations
- Quadratic Functions & Inequalities
- Surds
- Polynomials & Partial Fractions
- Binomial Theorem
- Exponential & Logarithmic functions

Geometry & Trigonometry

- Trigonometry
- Coordinate Geometry
- Circles
- Linear Law

Example 17

Solve the following equations.

$\log_2 8 = \log_2 2^3 = 3\log_2 2 = 3 \quad (\log_2 2 = 1)$

$\log_2 4 = \log_2 2^2 = 2\log_2 2 = 2 \quad (\log_2 2 = 1)$

(b) $1 + \log_8 (4-x)^3 = 2\log_4 (5x^2) - \log_2 (1-x)$

$1 + \log_8 (4-x)^3 = 2\log_4 (5x^2) - \log_2 (1-x)$

$\log_2 2 + \dfrac{\log_2 (4-x)^3}{\log_2 8} = 2\left[\dfrac{\log_2 (5x^2)}{\log_2 4}\right] - \log_2 (1-x)$ Change base

$\log_2 2 + \dfrac{1}{3}\log_2 (4-x)^3 = \log_2 (5x^2) - \log_2 (1-x)$

$\log_2 2 + \log_2 (4-x) = \log_2 (5x^2) - \log_2 (1-x)$ power Law

$\log_2 2(4-x) = \log_2 \left[\dfrac{5x^2}{1-x}\right]$ product/quotient Law

$2(4-x) = \dfrac{5x^2}{1-x}$ compare and solve

$(8-2x)(1-x) = 5x^2$

$8 - 8x - 2x + 2x^2 = 5x^2$

$0 = 5x^2 - 2x^2 + 8x + 2x - 8$

$0 = 3x^2 + 10x - 8$

$(3x-2)(x+4) = 0$

$3x - 2 = 0 \quad \text{or} \quad x + 4 = 0$

$x = \dfrac{2}{3} \quad \text{or} \quad x = -4$

Homework Level 2

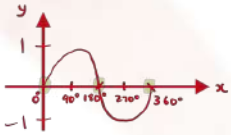
2. Find all the angles within the given range which satisfy the following equations.

(a) $3 \sin x = 5 \sin x \cos x$ for $0^\circ \le x \le 360^\circ$

a) $3 \sin x - 5 \sin x \cos x = 0$ ← Do not cancel sin x on both sides

$\sin x (3 - 5 \cos x) = 0$

$\sin x = 0$ or $3 - 5 \cos x = 0$



$x = 0^\circ, 180^\circ, 360^\circ$

$\cos x = \frac{3}{5}$

$\alpha = 53.13010235^\circ$

→ 1st quadrant → 4th quadrant

$x = \alpha, 360^\circ - \alpha$

$= 53.1^\circ, 306.9^\circ$ (1 d.p)

S A T C

Quick Notes

1. (a) When $\frac{f(x)}{g(x)}$ is proper, factorise g(x) completely and write down the form of the partial fractions as follows:

(i) Linear factor:

Partial fraction form : $\frac{A}{ax+b}$

(ii) Linear factor repeated:

Partial fraction form : $\frac{A}{ax+b}+\frac{B}{(ax+b)^2}$

(iii) Quadratic factor that cannot be factorised:

Partial fraction form : $\frac{Ax+B}{x^2+c^2}$

(b) When $\frac{f(x)}{g(x)}$ is improper (i.e. degree of numerator ≥ degree of denominator), use long division to convert it to a proper fraction and express the resulting proper fraction in partial fractions.

Actual Exam Questions

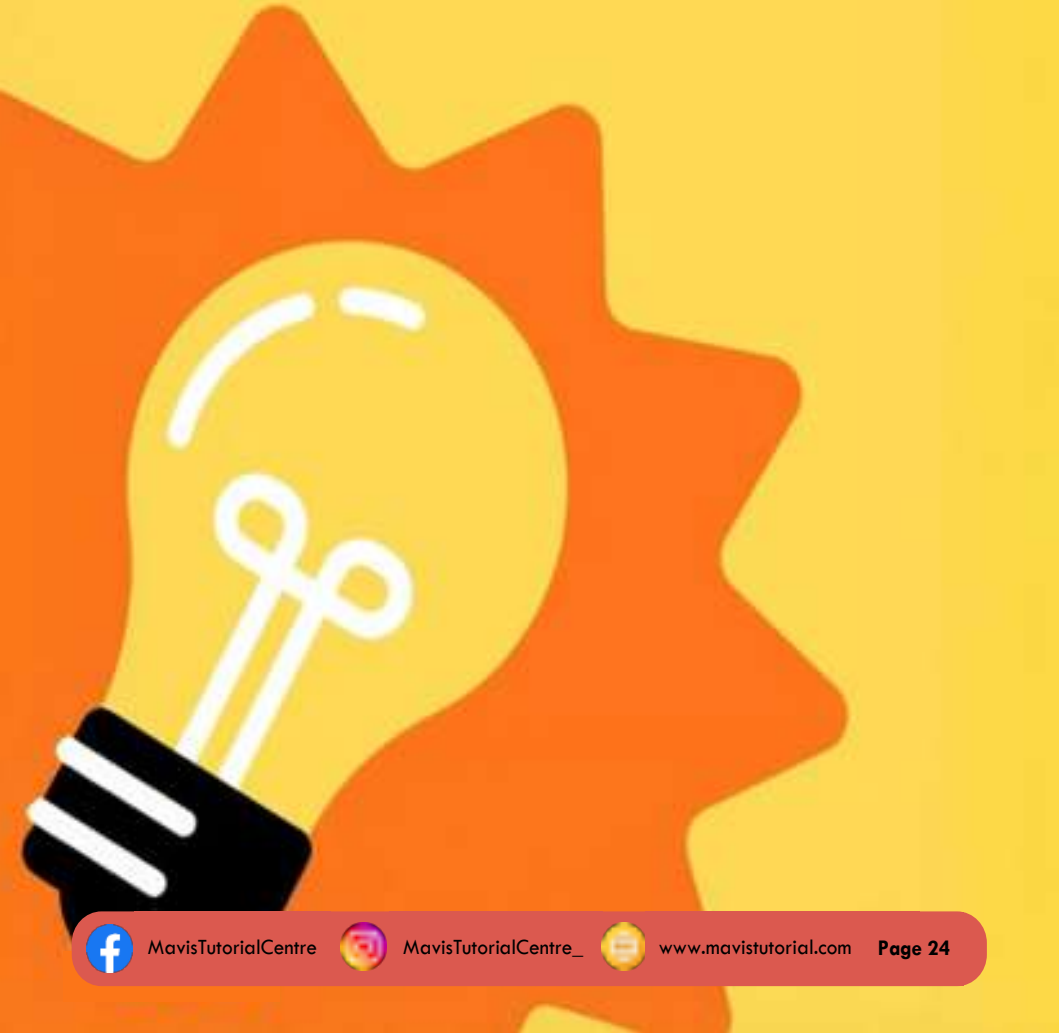
1. Given that $\frac{5x^2-2x+1}{(2x-1)(x^2+1)}=\frac{A}{2x-1}+\frac{Bx+C}{x^2+1}$, where A, B and C are constants, find the values of A, B and C. [5]

Answers:

1 [A = 1, B = 2, C = 0]

SECONDARY 3

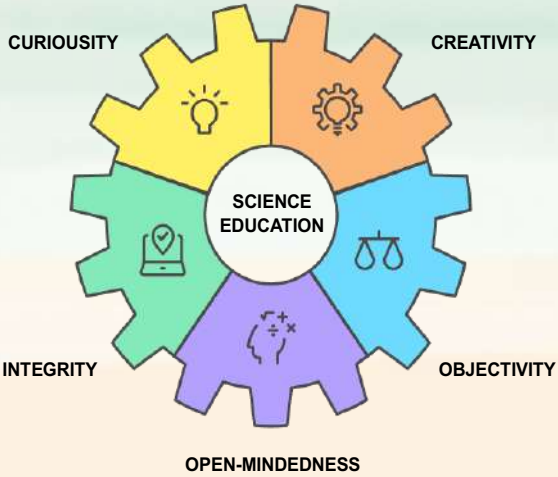
BIOLOGY **CHEMISTRY** **PHYSICS**

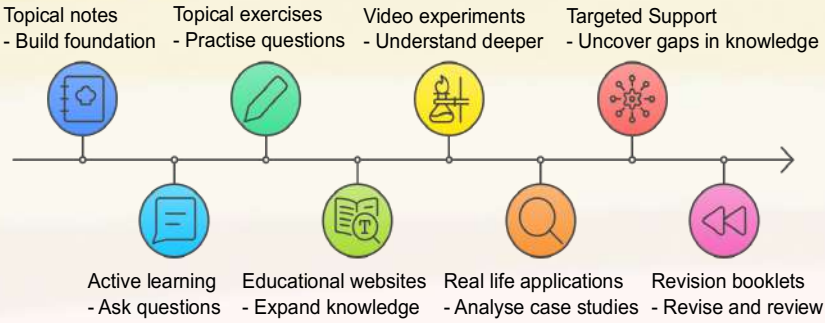


SECONDARY SCIENCE

The MOE Science Curriculum aims to enable students to:

1. be curious – desire to explore the environment
2. be creative – seek innovative ways to solve problems
3. be upright – communicate data with honesty
4. be objective – seek information to validate observations
5. be open-minded – willing to change views if the evidence is convincing





S3 BIOLOGY CLASSES (CURRICULUM STRUCTURE)

Key feature 1

Comprehensive notes & checkpoint questions

- closely aligned to latest MOE syllabus
- understand the topic thoroughly & relate content to questions

Key feature 2

Master process skills & answering techniques

- highlight relevant keywords
- learn template answers
- avoid common mistakes

Key feature 3

In-depth exam revision & useful strategies

- revision papers/booklets with commonly tested questions & essential concepts

TOPICS COVERED IN SECONDARY 3 BIOLOGY

The Human Body

- Nutrition in Humans
- Transport in Humans
- Respiration in Humans
- Excretion in Humans

Cells & Chemistry of Life

- Cell Structure & Organisation
- Movement of Substances
- Biological Molecules

3. Four strips were cut from a celery stalk. The length of each strip was measured. One strip was placed in water and the others in different sucrose concentrations. After an hour, the lengths of the strips were measured again as shown in the table.

highest water potential

cells lose most water by osmosis

Shrink in size

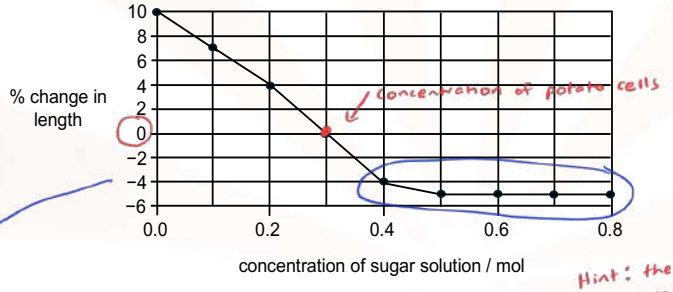
Which of the following strips was placed in the most concentrated sucrose solution?

Strip	Original length of strip (mm)	Final length of strip (mm)
A	75	75
B	80	78
C	85	80
D	88	90

distilled water

(C)

4. Strips of potato were placed in different concentrations of a sugar solution. The graph shows the percentage change in length of the strips of potato.



Which solutions have lower water potential than the potato strips?

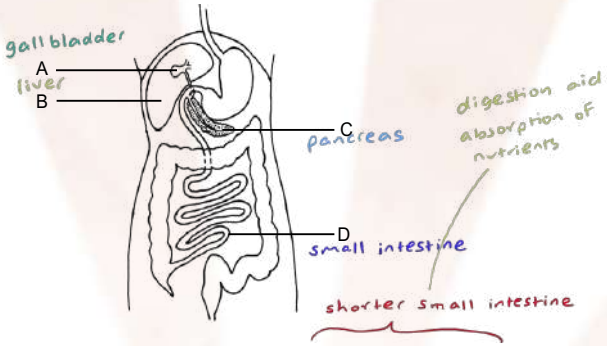
Hint: the concentration of potato cells itself is when 0% change in length

decrease in length (due to osmosis out of cells)

A 0.1 and 0.2 mol
B 0.1 and 0.3 mol
C 0.3 and 0.5 mol
D 0.5 and 0.7 mol

(D)

1. The diagram below shows part of the human digestive system.



(a) An obese person had a surgical operation to remove part of structure **D**. Explain why this method may lead to a significant reduction to his body weight several months after the operation.

Give reason

Small intestine is the site of digestion and absorption of nutrients into the bloodstream. As the small intestine becomes shorter, less digested food is absorbed into the bloodstream and less of them are available for assimilation by the body.

(b) (i) Name one substance that is secreted by structure **C** directly into the bloodstream.

hormone — pancreas

Insulin (OR) Glucagon

(ii) If a person failed to produce this substance, how would the function of structure **B** be affected? Give a reason for your answer.

liver

Lack of insulin prevents the liver cells / cells of structure B from absorbing excess glucose from blood and storing them as glycogen. Insulin signals the liver cells to absorb excess glucose rapidly from the blood.

S3 CHEMISTRY CLASSES (CURRICULUM STRUCTURE)

Key feature 1

Comprehensive notes & checkpoint questions

- closely aligned to latest MOE syllabus
- understand the topic thoroughly & relate content to questions

Key feature 2

Master process skills & answering techniques

- highlight relevant keywords
- learn template answers
- avoid common mistakes

Key feature 3

In-depth exam revision & useful strategies

- revision papers/booklets with commonly tested questions & essential concepts

TOPICS COVERED IN SECONDARY 3 CHEMISTRY

Chemical Reactions

- Chemical Calculations
- Acid-Base Chemistry
- Qualitative Chemistry
- Patterns in the Periodic Table

Matter : Structures & Properties

- Experimental Chemistry
- The Particulate Nature of Matter
- Chemical Bonding and Structure

15. Elements **P** and **Q** form a compound with formula PQ_3. This compound exists as a liquid at room temperature. What are the electron arrangements of atoms **P** and **Q**?

↳ low m.p. = simple covalent structure

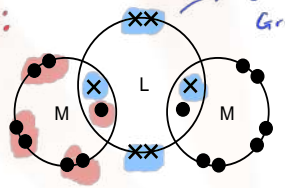
	P	Q (non-metal + non-metal)
A	1	2.3
B	× 2.1 → Li	× 2.8.3 → Al
C	× 2.8.3 → Al	2.7
(D)	2.8.5	2.8.7

(D)

16. The diagram below shows the arrangement of electrons in the outer shells of the atoms in the compound ***LM***$_2$.

7 valence e⁻: Group 17

6 valence e⁻: Group 16



Key

× : Electrons of ***L***

● : Electrons of ***M***

Which pair of elements could be ***L*** and ***M***?

	L	M
A	calcium × G2	fluorine ✓
B	carbon × G14	sulfur ✓
C	oxygen	hydrogen ×
D	sulfur ✓	chlorine ✓

H: one valence e⁻

(D)

17. Two elements, **P** and **Q** with proton numbers 11 and 8 respectively, combine to form a compound. Which of the following shows the correct formula and bonding in the compound?

P⁺ ion ← Group 1 ← 2.8.1

2.6 → Group 16 → Q^{2-} ion

	Formula	Type of bond
A	PQ	covalent ×
B	P_2Q_3	covalent ×
C	P_2Q	ionic ✓
D	PQ	ionic ✓

∴ need two P^+ to balance the charge on one Q^{2-}

metal + non-metal

(C)

5. (a) Complete the following table which gives information about two ions.

particles in nucleus (p+n)

formed when an atom of F GAINED one e⁻

Ion	Number of protons	Number of neutrons	Number of electrons	Nucleon number
F^-	9	10	10	19
Mg^{2+}	12	12	10	24

formed when an atom of Mg LOST 2e⁻

After losing 2e⁻

(b) Draw a 'dot-and-cross' diagram to show the bonding present in the compound formed between magnesium and fluorine.

→ IONIC (draw all e⁻)

(c) A student wrote "carbon dioxide has a low melting and boiling point because the covalent bonding in the molecule is weak."

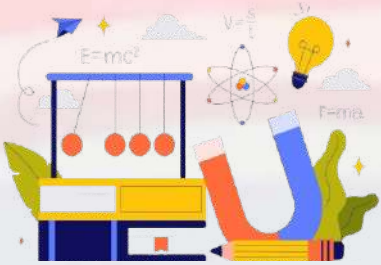
covalent bonds are STRONG!

Do you agree? Explain your answer.

simple molecular structure → weak IMFOA

① Disagree. CO_2 has a low m.p. and b.p. because the weak intermolecular forces of attraction between CO_2 molecules require only a small amount of energy to overcome.

② the strong covalent bonds within the CO_2 molecules are not broken during change of state.



S3 PHYSICS CLASSES (CURRICULUM STRUCTURE)

Key feature 1

Comprehensive notes & checkpoint questions

- closely aligned to latest MOE syllabus
- understand the topic thoroughly & relate content to questions

Key feature 2

Master process skills & answering techniques

- highlight relevant keywords
- learn template answers
- avoid common mistakes

Key feature 3

In-depth exam revision & useful strategies

- revision papers/booklets with commonly tested questions & essential concepts

TOPICS COVERED IN SECONDARY 3 PHYSICS

Measurement

- Physical Quantities, Units & Measurement

Newtonian Mechanics

- Kinematics
- Dynamics
- Turning Effect of Forces
- Pressure
- Energy

Thermal Physics

- Kinetic Model of Matter
- Thermal Processes
- Thermal Properties of Matter

Waves

- General properties of Waves
- Electromagnetic (EM) Spectrum
- Light

Equations for Motion

There are several common equations to use when we encounter problems related to motion with uniform acceleration, a.

Here is a summary of some useful equations to facilitate your study.

u: initial speed (velocity)
v: final speed (velocity)
a: uniform acceleration

t: time
s: distance (displacement)

1. Speed at end = speed at start + (acceleration × time)
   Or in symbol form, $v = u + at$
2. $v^2 = u^2 + 2as$
3. Distance = average speed × time
   Or in symbol form, $s = \frac{(u+v)t}{2}$
4. $s = ut + \frac{1}{2}at^2$

ONLY when acceleration is constant

(a) $u = 0$ m/s, $a = 10$ m/s^2, $s = 15.0$ m

$v^2 = u^2 + 2as$

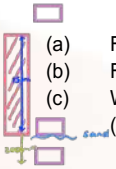
$v^2 = 0^2 + 2(10)(15.0)$

$v = 17.3205$ m/s

$= 17.3$ m/s (3 s.f.)

Example 1

A brick falls off the top of a wall under construction and drops into a bed of sand 15.0 m below. It makes a 200 mm deep dent in the sand.



(a) Find the speed of the brick just before it hits the sand.
(b) Find its deceleration in the sand.
(c) What would happen to a person undergoing that deceleration?
(Take g = 10 ms^{-2})

(b) $u = 17.3205$ m/s, $v = 0$ m/s

$a = ?$ $s = 200$ mm $= 0.2$ m

$v^2 = u^2 + 2as$

$0^2 = (17.3205)^2 + 2(a)(0.2)$

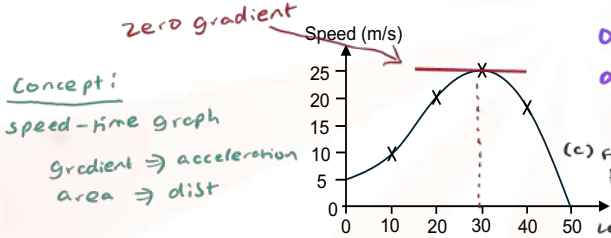
$a = -749.9993$ m/s^2

$= -750$ m/s^2

(c) Force = mass × acceleration
$F = ma$
Let's say a person has a mass of 60 kg
Force $= 60 \times 750$
$= 45000$ N
The force of 45000 N is fatal

Example 2

Below is a speed-time graph for a car.



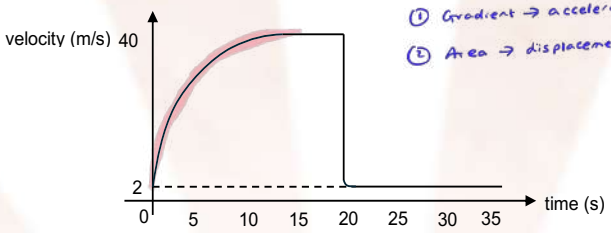
Concept:
speed-time graph
gradient ⇒ acceleration
area ⇒ dist

What is the acceleration of the car when the time is 30 s?

Ans: 0 ms^{-2}

10. In an army war exercise, 50 kg crate of ammunition was dropped from high altitude. The parachutes were only deployed 20.0 s after the crate was released. The graph below shows the velocity-time pattern of motion of the crate. The crate touched down 35.0 s after its release.

velocity-time
① Gradient → acceleration
② Area → displacement



(a) Describe the motion of the crate from 0 to 35 s.

From 0s to 15s, the acceleration of the crate is decreasing.
From 15s to 20s, the crate is falling at terminal velocity.
At 21s, the crate experiences a great deceleration.
From 21s to 35s, the crate falls at a lower terminal velocity.

$F_{net} = ma$
$= m(0)$
$= 0\ N$
(balanced forces)

(b) Explain how the net force acting on the crate changes from 15 to 20 s.

There is no net force acting as the acceleration is zero.

(c) Comment on the net force acting on the crate from 0 to 15 s.

The net force decreases as the air resistance increases but the weight remains the same.

(d) From the graph, state the speed of the crate just before it lands.

2 m/s

(e) Calculate the impact force on the crate upon landing if it sinks 2 cm into the ground before coming to a stop fully.

→ $F = ma$

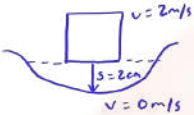
$s = 2$ cm (displacement)

① $v = u + at$

② $v^2 = u^2 + 2as$

③ $s = ut + \frac{1}{2}at^2$

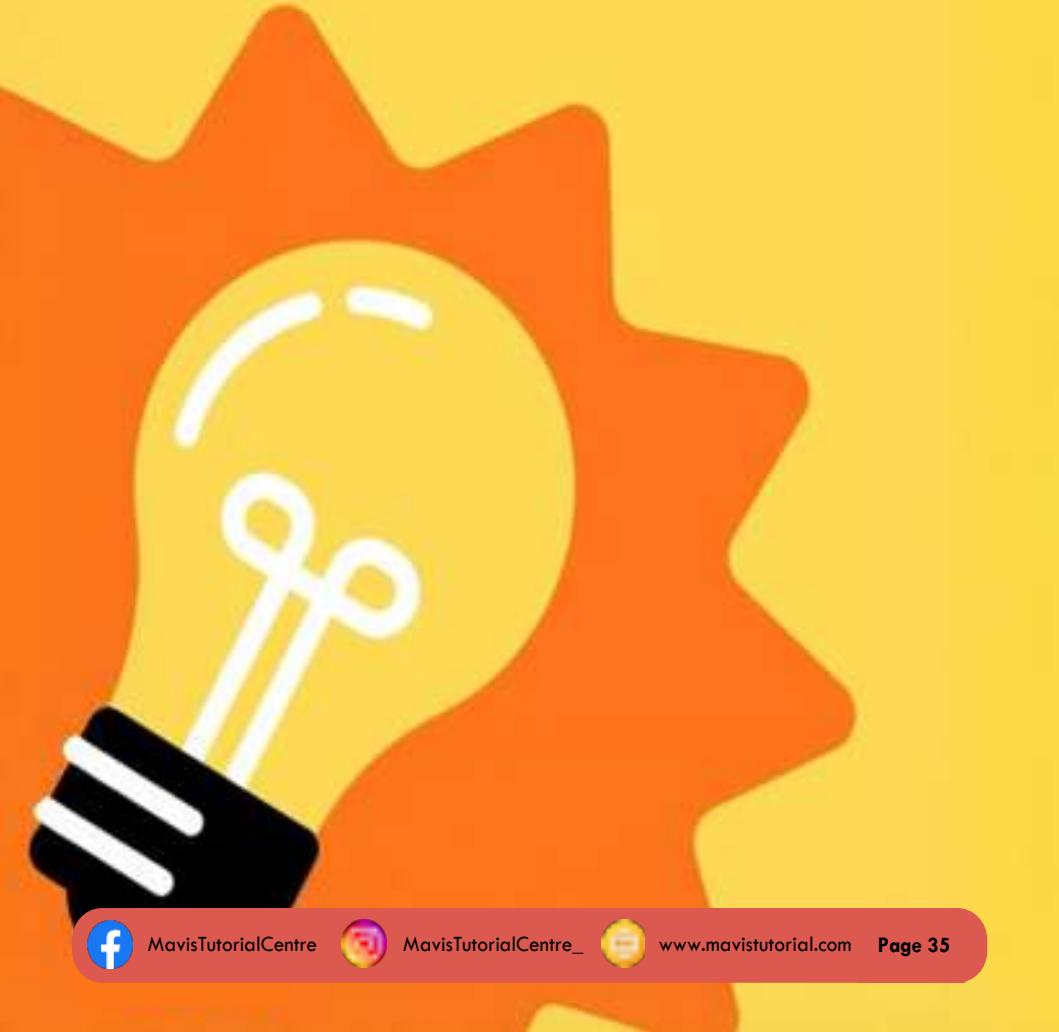
$0^2 = 2^2 + 2(a)(0.02)$
$0 = 4 + 0.04a$
$0.04a = -4$
$a = -100\ m/s^2$
$F = ma = 50(100) = 5000\ N$



Force = 5000 N

SECONDARY 3

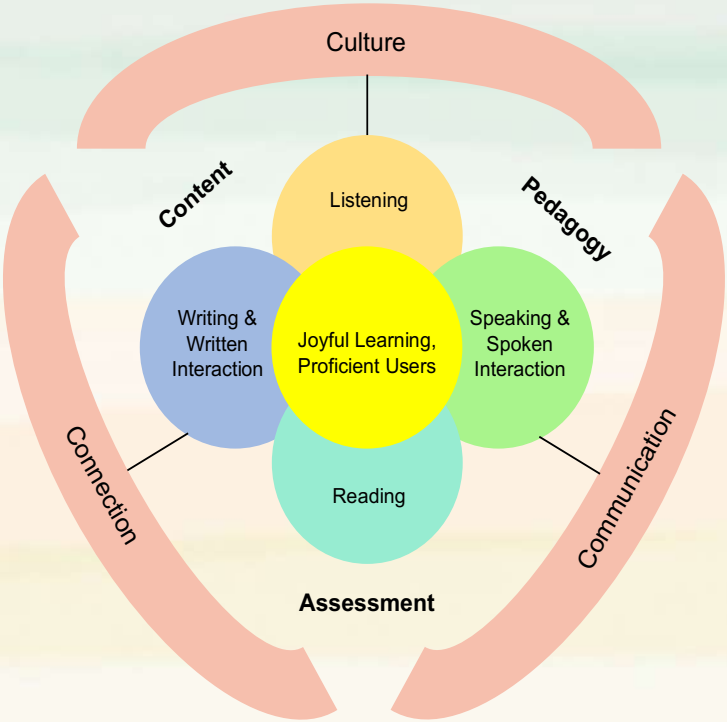
CHINESE



SECONDARY CHINESE

The MOE Chinese Curriculum aims to enable students to:

1. foster communication & cognitive skills
2. become proficient users of Chinese in everyday context
3. enhance connection to Chinese Language and culture



S3 CHINESE CLASSES (CURRICULUM STRUCTURE)

Key feature 1

Build strong foundation (progressive learning)

- expand vocabulary
- master grammar/ sentence structures

Key feature 2

Targeted answering techniques for exams

- identify keywords to break down question & organise answers

Key feature 3

Fun activities & stories to aid in learning

- cultivate interest & gain better appreciation for Chinese culture

Writing
- Situational writing
- Essay writing

Comprehension
- Cloze passage
- Vocabulary corrections
- Comprehension passages 1 & 2

Oral Practice
- Reading aloud
- Oral discussion

A 组 综合填空（每题 1 分，共 5 分）

根据短文的内容和上下文的意思，选出括号中最适当的词语，然后把代表它的数字写在下方的括号里。

1 为了参加全国少年太极拳比赛，我天天不怕辛苦地练习。

2 比赛那天，我迈着 Q1.（1. 清晰　2. 流淌　3. 轻盈　4. 焕发）的步伐来到了“战场”，我在心里告诉自己：“只要 3 分钟就成功了，要努力！”

3 开始时，我 Q2.（1. 一丝不苟　2. 提心吊胆　3. 抑扬顿挫　4. 循规蹈矩）地做着每一个动作。可是到了“提膝亮掌”的动作，我不由得颤了一下，右脚很快落地，我心想：完了，这里肯定扣分了！做完之后，我站在一旁，心里 Q3.（1. 祈祷　2. 衡量　3. 默契　4. 遐想）着希望能获得高分。

4 “369 号，8.4 分。”我听了，不太满意，低着头想：这么低分，能拿到冠军吗？正在我 Q4.（1. 胡思乱想　2. 提心吊胆　3. 心力交瘁　4. 异乎寻常）时，林教练走了过来，对我说：“Good!”说完，还竖起了一只大拇指。

5 到了宣布名次的时候，我竖起耳朵听：“冠军王建华。”

6 我大吃一惊，差点儿跳了起来。我赢了！

7 颁奖台上，我想着过去的辛苦练习，又看着手中的奖杯，终于落下了 Q5.（1. 纯洁　2. 热忱　3. 雀跃　4. 珍贵）的眼泪。

Q1.（ 3 ）Q2.（ 1 ）Q3.（ 1 ）Q4.（ 1 ）Q5.（ 4 ）

B 组 词语替换（每题 2 分，共 10 分）

根据短文的内容和上下文的意思，替换画线词语的其中一个字，并把正确的词语写在下方相应的格子里。

Lease Buyback Scheme

1 政府考虑 Q6. 张大现有的“屋契回购”计划，让住在四房和五房式组屋的年长居民，通过组屋套现，取得更多现金养老。

2 据一些住在较大型组屋的年长居民 Q7. 反应，孩子长大后搬出去组织新家庭，家里只剩下两个老人，房子太大很难打理，不过已经熟悉了周围 Q8. 处境，也有了邻里感情，加上周末子女会回家聚会，所以老人家都不 Q9. 如意换去较小的组屋生活。政府因此考虑让这群年长居民加入“屋契回购”计划。

3 过去，政府只限住在三房式组屋或更小单位的合格居民加入“屋契回购”计划。屋主只须把部分屋契卖给政府，以填补退休收入，他们还是可以 Q10. 连续住在原来的屋子里。

Q6. 扩大	Q7. 反映	Q8. 环境	Q9. 愿意	Q10. 继续

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