MAVIS
TUTORIAL CENTRE
LEARN INSPIRE ACHIEVE

Curriculum Information

SECONDARY 4

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 - 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

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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

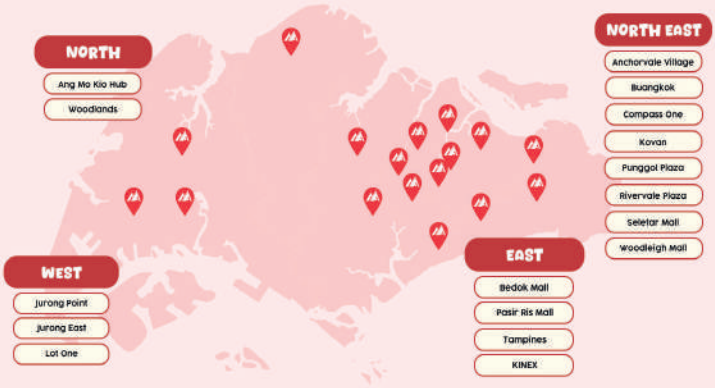
"After joining Mavis, I **felt more confident** during exams and found it easier to tackle more questions. The **comprehensive worksheets, topic summaries,** and **exam tips** made revision more effective and helped me **grasp key concepts** clearly. The teachers are also approachable and always ready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

GUO XINYAO

MavisPRO

Never Miss a Lesson Again!

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



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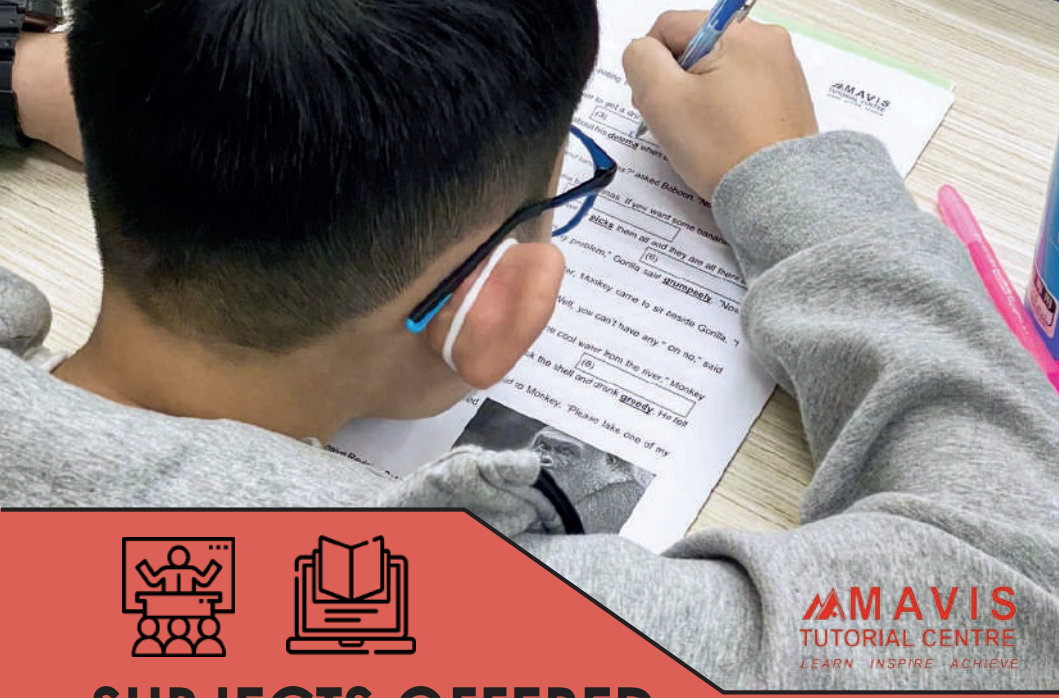


MAVIS TUTORIAL CENTRE
LEARN INSPIRE ACHIEVE

SUBJECTS OFFERED FOR SECONDARY 4 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 4 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	**Intensive Revision for 'O' Levels Chinese**	*Equip your child with the confidence and strategies to excel in the exam.*
May	**Supplementary Home-Based Learning Lessons**	*Keep skills sharp after exams for continued progress.*
Jun	**Intensive Revision Booster Classes**	*Fill learning gaps and reinforce mastery for a confident finish.*
Aug	**'O' Levels Revision**	*Refine knowledge and correct misconceptions before the final exam.*
Sep	**Preliminary Exam Course**	*Simulate exam conditions and receive targeted feedback for optimal readiness.*

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

TABLE OF CONTENTS

SECONDARY 4

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

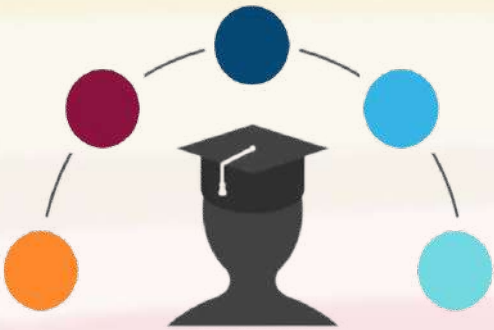
Communication through verbal expression and articulation

3 READING SKILLS

Understand variety of texts, analyse literal and inferential meaning

4 WRITING SKILLS

Expressing thoughts and ideas through written communication



S4 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

Pointers for Spoken Interaction (15 marks)

Candidates view a visual stimulus, which is thematically linked to the text in Part 1, in order to engage in a discussion with the examiners.

In an Oral English Examination, a good student will show a quick response to the question posed and enter into a sensible discussion or rapport with the examiner, giving his or her opinion on the topic of conversation.

Of course while, commenting or sharing opinions, the candidate needs to

1) keep within the scope of the topic, and
2) present intelligent opinions and views.

The candidate who secures the most marks will obviously be the 'intelligent conversationalist' speaking up

1) confidently,
2) delivering ideas clearly, and
3) focusing on the key requirements of the questions posed and staying relevant.

In presenting their personal response, candidates are strongly encouraged to

1) develop on the question asked,
2) use precise and appropriate vocabulary, and
3) make their expressions easy to understand, interesting and logical.

Most importantly, the candidate has to sustain the conversation, yet know how to bring it to a proper close/end.

Also avoid using monosyllables, e.g. 'yes and 'no' nor short casual expressions, e.g., 'I think so.'

Answer all questions completely – Do not begin your answers with 'Because', 'But', etc. Singlish will not be tolerated.

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. ……✓……

Mr Rick Tan has been drawing stares from strangers on his commute to and fro

work through the last ten months. His choice of vehicle is an electric unicycle – 1……for……

a curious hybrid between a pedal-driven, single-wheel cycle and motorized 2……✓……

Segway vehicle. A sight of Mr Tan straddling the single-wheel upright and gliding 3……The……

hands-free through crowds are a vision of the future of travel that has arrived. 4……is……

He is not alone with turning to the one-wheel unicycles as an alternative to the 5……in……

crowded public transport system here. Since electric unicycles are not allowed on 6……Although……

roads, parks, park connectors and the authorities frowned on their use on 7……frown……

pavements, the battery-powered vehicles are nonetheless catching up here. 8……on……

Its growing popularity here follows the rise in electric unicycles in countries 9……of……

such as China and Australia. While it may take practice for riders to find their 10……✓……

balance on the vehicle, users praise it for being nimble and cool-looking.

singular

set phrase

The text is in present tense.

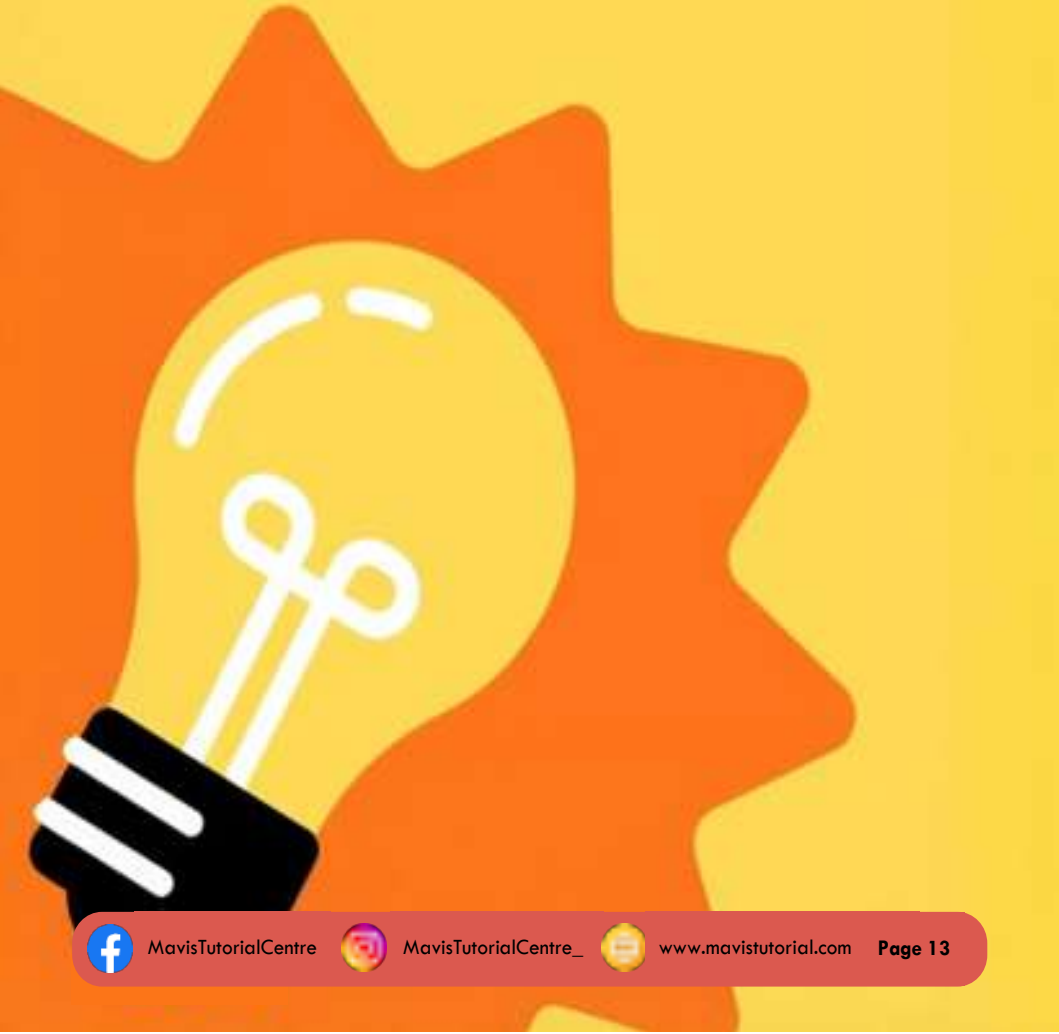
catching on → gaining popularity

Contrast between both clauses; hence conjunction used has to reflect that

SECONDARY 4

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

S4 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 4

Number & Algebra

- Set Language & Notation
- Matrices

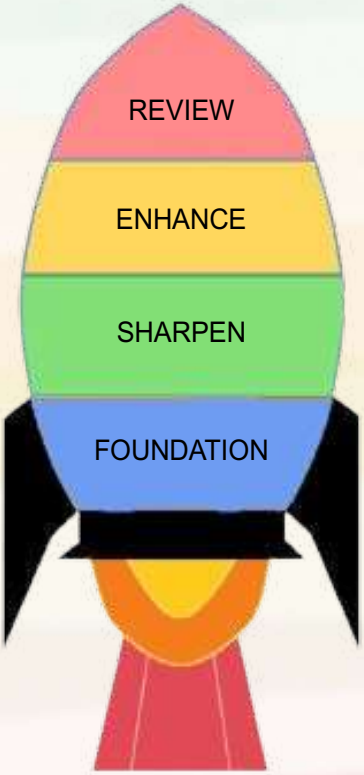
Geometry & Measurement

- Vectors in 2 dimensions

Statistics & Probability

- Cumulative Frequency Diagram
- Standard Deviation
- Probability

LEARNING JOURNEY FOR MATHEMATICS



4

Quarterly Revision Worksheets
- Targeted content
- Challenging questions

3

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

2

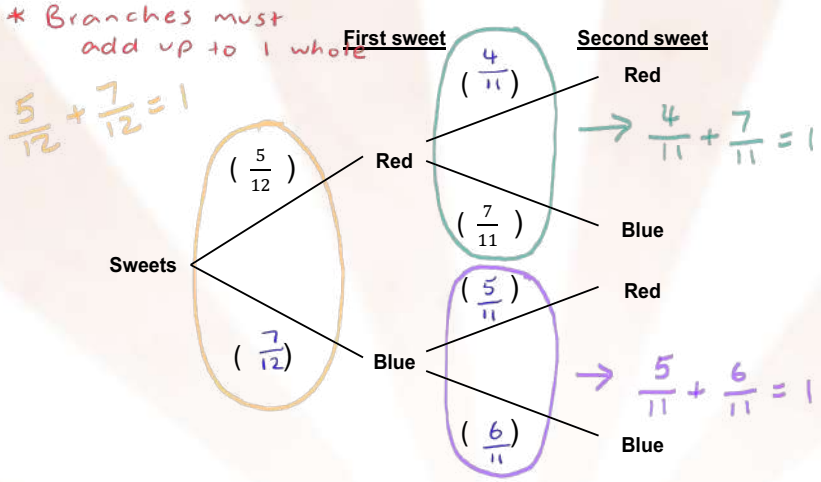
Got a Test Summary Notes
- Sharpen skills in various topics
- Identify and strengthen weak topics

1

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

Example 17

A box contains 12 sweets, 5 of which are red and the other 7 are blue. Jane takes two sweets from the box, one after the other.



(a) Complete the tree diagram above.

(b) Find the probability that

(i) the first sweet is blue and the second is red,

use multiply

$\left(\frac{7}{12}\right) \times \left(\frac{5}{11}\right) = \frac{35}{132}$

(ii) the two sweets have different colours,

use multiply use addition use multiply

Red, then blue OR Blue, then red

$\left(\frac{5}{12}\right) \times \left(\frac{7}{11}\right) + \left(\frac{7}{12}\right) \times \left(\frac{5}{11}\right) = \frac{35}{66}$

(iii) the second sweet chosen is red.

use multiply use addition use multiply

Red, then red OR Blue, then red

$\left(\frac{5}{12}\right) \times \left(\frac{4}{11}\right) + \left(\frac{7}{12}\right) \times \left(\frac{5}{11}\right) = \frac{5}{12}$

Homework Level 1

1 In the diagram, $\overrightarrow{OP}$ = 9**p**, $\overrightarrow{OQ}$ = 3**q**, $\overrightarrow{OR} = \frac{1}{3}\overrightarrow{OP}$ and $\overrightarrow{OS} = \frac{1}{2}\overrightarrow{OQ}$.

(i) Find the vectors $\overrightarrow{PQ}$ and $\overrightarrow{RS}$ in terms of **p** and **q**.

(ii) Given that $\overrightarrow{RT} = \frac{1}{4}\overrightarrow{RQ}$, express the vector $\overrightarrow{TS}$ in terms of **p** and **q**.

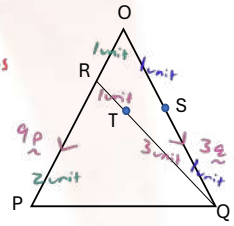
$\overrightarrow{OR} = 3\underset{\sim}{p}$

$\overrightarrow{RP} = 6\underset{\sim}{p}$

$\overrightarrow{OS} = \frac{3}{2}\underset{\sim}{q}$

$\overrightarrow{SQ} = \frac{3}{2}\underset{\sim}{q}$

* Remember to switch signs when changing directions



i) $\overrightarrow{PQ} = \overrightarrow{PO} + \overrightarrow{OQ}$ ($\overrightarrow{PO} = -\overrightarrow{OP}$)

$= -9\underset{\sim}{p} + 3\underset{\sim}{q}$

$\overrightarrow{RS} = \overrightarrow{RO} + \overrightarrow{OS}$ ($\overrightarrow{RO} = -\overrightarrow{OR}$)

$= -3\underset{\sim}{p} + \frac{3}{2}\underset{\sim}{q}$

ii) $\overrightarrow{RQ} = \overrightarrow{RO} + \overrightarrow{OQ}$ ($\overrightarrow{RO} = -\overrightarrow{OR}$)

$= -3\underset{\sim}{p} + 3\underset{\sim}{q}$

$\overrightarrow{TS} = \overrightarrow{TQ} + \overrightarrow{QS}$ ($\overrightarrow{QS} = -\overrightarrow{SQ}$)

$= \frac{3}{4}\overrightarrow{RQ} - \frac{3}{2}\underset{\sim}{q}$

$= \frac{3}{4}(-3\underset{\sim}{p} + 3\underset{\sim}{q}) - \frac{3}{2}\underset{\sim}{q}$

$= -\frac{9}{4}\underset{\sim}{p} + \frac{9}{4}\underset{\sim}{q} - \frac{3}{2}\underset{\sim}{q}$

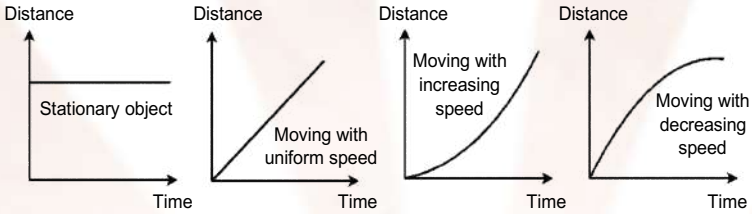
$= -\frac{9}{4}\underset{\sim}{p} + \frac{3}{4}\underset{\sim}{q}$

* Remember to put ~ below letters for vectors

OUR "GOT A TEST" SUMMARY

Quick Notes

1. (a) Gradient of a distance time graph = speed
   (b) Gradient of a speed time graph = acceleration
   (c) Area under a speed time graph = distance travelled

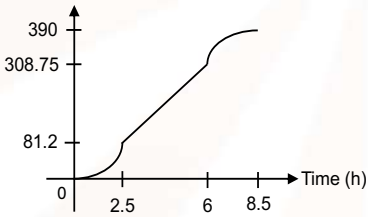


Actual Exam Questions

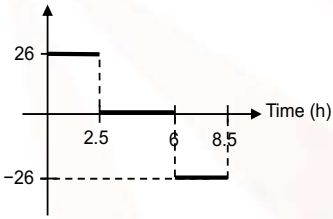
4. (a) A car starts from rest and accelerates uniformly to a speed of v km/h. It then travels at v km/h for 3.5 hours and decelerates uniformly to rest. Given that the total time taken is 8.5 hours and total distance travelled is 390 km, find the value of v.
   (b) Convert the answer in (a) to m/s.
   (c) Given that the time taken for the uniform acceleration is the same as the time taken for the uniform deceleration, sketch
      (i) the distance-time graph,
      (ii) and acceleration-time graph of the car for the whole journey.

Answers:

4. (a) 65
   (b) $18\frac{1}{18}$ m/s
   (c) (i) Distance (km)



(ii) Acceleration (m/s^2)



S4 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 4

Calculus

- Differentiation
- Integration
- Kinematics

Geometry & Trigonometry

- Proofs in Plane Geometry

Example 4

A particle moves in a straight line so that, t seconds after passing through a fixed point O, its velocity, v m s^{-1}, is given by $v = 3t^2 - 30t + 72$. Find

when $s = 0$, $t = 0$

(a) the initial acceleration of the particle,

→ $t = 0$

$\frac{dv}{dt} = 6t - 30$

when $t = 0$, $\frac{dv}{dt} = 6(0) - 30$

$= -30 \text{ m/s}^2$

(b) the values of t when the particle is at instantaneous rest,

→ $v = 0$

When $v = 0$, $0 = 3t^2 - 30t + 72$

$0 = 3(t - 6)(t - 4)$

$t - 6 = 0$ or $t - 4 = 0$

$t = 6$ or $t = 4$

(c) the distance moved by the particle during the interval between these two values,

→ need to integrate

$s = \int_4^6 3t^2 - 30t + 72 \, dt$

$= \left[3\left(\frac{t^3}{3}\right) - 30\left(\frac{t^2}{2}\right) + 72t\right]_4^6$

$= \left[t^3 - 15t^2 + 72t\right]_4^6$

$= \left[6^3 - 15(6)^2 + 72(6)\right] - \left[4^3 - 15(4)^2 + 72(4)\right]$

$= -4$

Dist moved $= 4$ m

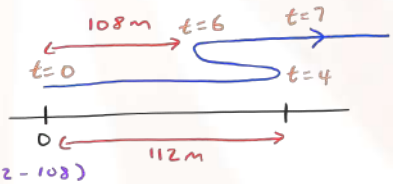
(d) the total distance moved by the particle between $t = 0$ and $t = 7$.

At $t = 0$, $s = 0$ m from O

At $t = 4$, $s = 112$ m from O

At $t = 6$, $s = 108$ m from O

At $t = 7$, $s = 112$ m from O



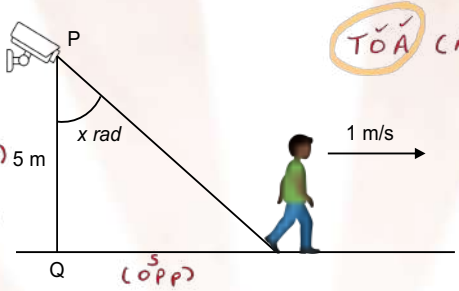
Total dist $= (112 - 0) + (112 - 108) + (112 - 108)$

$= 120$ m

Homework Level 2

$\frac{ds}{dt} = 1$ m/s

2 The diagram shows a boy walking away from the surveillance camera on a straight path. He is moving at a constant speed of 1 m/s. The surveillance camera is mounted at a point P which is 5 m vertically above a point Q along the path. The camera follows the motion of the boy rotating at P with an angle of x radian.



TOA CAH SOH

(adj) 5 m

(opp)

(i) Express the distance, s metres, moved by the boy from Q in terms of x.

i) (5) $\tan x = \frac{s}{5}$ (5)

$s = 5 \tan x$

(ii) Hence, find the rate of change in the angle of rotation of the surveillance camera when the boy is 7 m from Q.

$\frac{dx}{dt}$

$s = 7$ m

ii)

Given $\frac{ds}{dt} = 1$ m/s, $\frac{dx}{dt} = ?$, $s = 7$ m

Formula $s = 5 \tan x$

Remember the acronym

Girl Friend Don't Care

Differentiate $\frac{ds}{dx} = 5 \sec^2 x$

Calculate when $s = 7$, $7 = 5 \tan x$

$\tan x = \frac{7}{5}$

$x = 0.950546840 8$ rad

$\frac{ds}{dx} = 14.8$

$\frac{ds}{dt} = \frac{ds}{dx} \times \frac{dx}{dt}$

$1 = 14.8 \left(\frac{dx}{dt}\right)$

$\frac{dx}{dt} = \frac{5}{74}$ rad/s

Quick Notes

1. Rules for definite integrals

(a) $\int_a^a f(x)dx = 0$

(b) $\int_a^b f(x)dx = -\int_b^a f(x)dx$

(c) $\int_a^b cf(x)dx = c\int_a^b f(x)dx$

(d) $\int_a^b f(x)dx = \int_a^m f(x)dx + \int_m^b f(x)dx$

Actual Exam Questions

3. Given that, $\int_1^5 f(x)\,dx = 12$, evaluate

(a) $\int_1^5 \frac{3}{2} f(x)\,dx$

(b) $\int_5^1 -2f(x)\,dx$

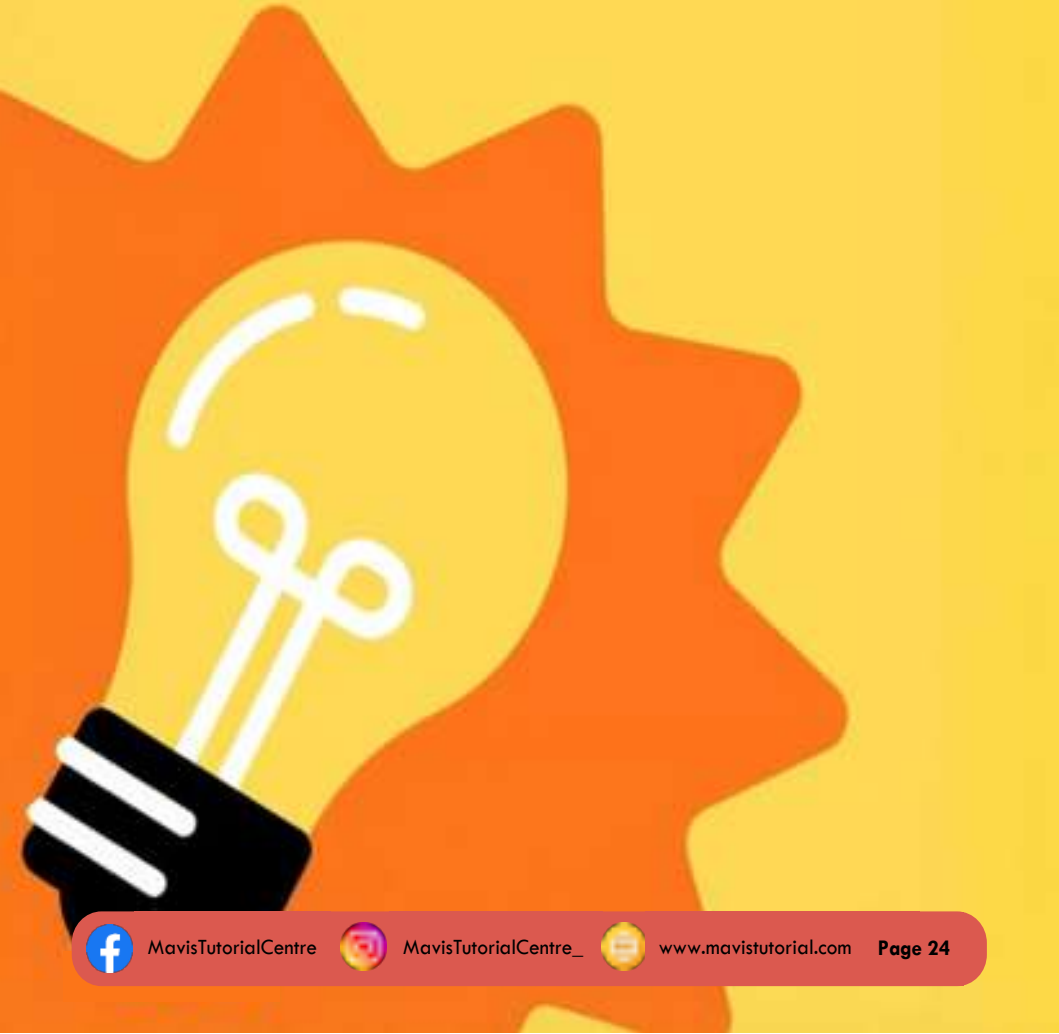
(c) $\int_1^3 f(x)\,dx + \int_3^5 [f(x)+3]\,dx$

Answers:

3. (a) 18 (b) 24 (c) 18

SECONDARY 4

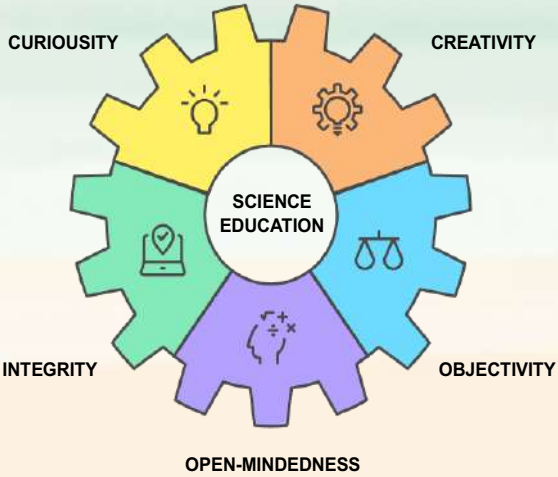
BIOLOGY **CHEMISTRY** **PHYSICS**

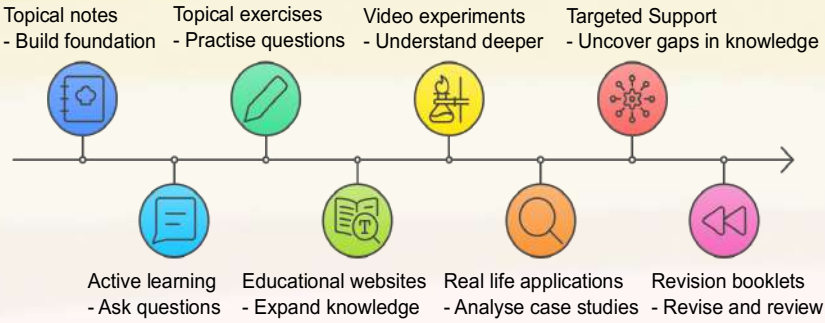


SECONDARY SCIENCE

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





S4 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 4 BIOLOGY

The Human Body

- Homeostasis, Co-ordination & Response in Humans
- Infectious Diseases in Humans

Plants, Animals & Ecosystem

- Nutrition and Transport in Flowering Plants
- Organisms and Their Environment

Continuity of Life

- Molecular Genetics
- Reproduction
- Inheritance

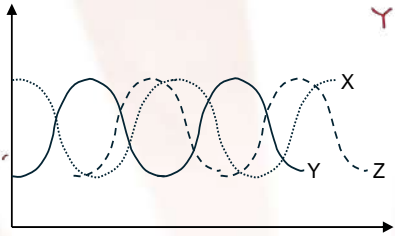
8. In a pond, variations in the population of producers, the population of consumers and the amount of dissolved mineral salts were measured over a period of two years. The graph below shows the results.

sequence

Y → Z → X → Y

Compare peaks

peak for salts should be before producer, producer before consumer



Key:
X
Y
Z

What does each line represent?

needed by

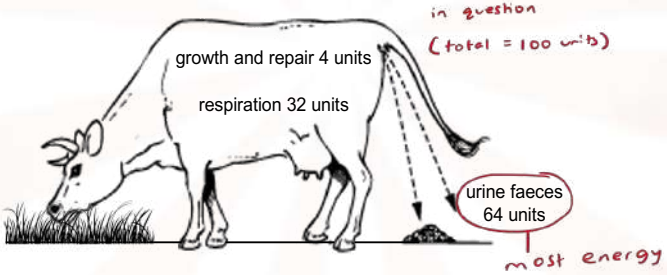
eaten by

	Dissolved mineral salts	Producer population	Consumer population
A	Z	Y	X
B	Y	Z	X
C	Z	X	Y
D	X	Y	Z

(B)

9. The diagram shows how energy from food is used by cattle.

compare units mentioned in question (total = 100 units)



most energy

Most of the energy in the food a cow eats is _____.

64 units

A passed to decomposers

B used for growth and repair → only 4 units

C used for movement

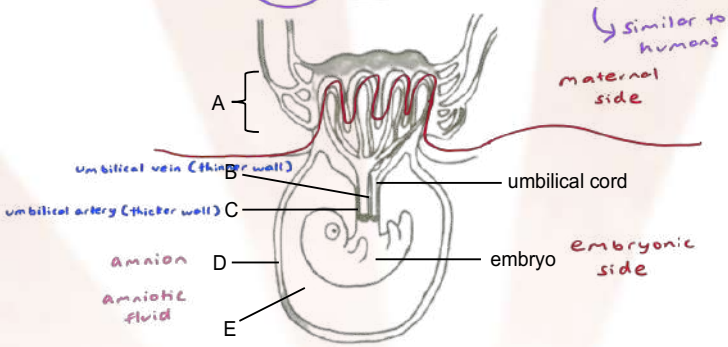
D used to maintain body temperature

(urine and faeces)

} respiration : 32 units

(A)

3. The diagram below shows a foetus developing inside the uterus of a monkey.



(a) (i) Name structure A.

placenta

(ii) The structure found in A were discovered to be malformed. Explain how this may affect the development of the embryo. (growth)

→ not formed properly

Problems in A can lead to the embryo becoming smaller than usual as the malformed A lead to reduction in diffusion of amino acids and fat digestion products needed for growth and cell division in embryo and also reduced diffusion of glucose and oxygen needed for aerobic respiration in embryo's body cells to produce energy for their function.

(b) Using the letters in the diagram, state the blood vessel in the umbilical cord that carries blood rich in the following substances:

(i) nutrients and oxygen (from mother → embryo)

B

(ii) carbon dioxide and urea (from embryo → mother)

C

S4 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 4 CHEMISTRY

Chemical Reactions

- Redox Chemistry
- Patterns in the Periodic Table
- Chemical Energetics
- Rate of Reactions

Chemistry in a Sustainable World

- Organic Chemistry
- Maintaining Air Quality

1. In an experiment, 200 cm^3 of 1.00 mol/dm^3 hydrochloric acid (solution) was added to 200 cm^3 of 1.00 mol/dm^3 sodium thiosulfate (solution). Sulfur is precipitated in the reaction.

Which of the following changes will **not** increase the rate of reaction?

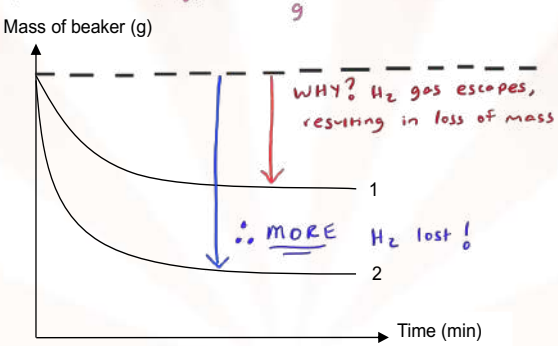
A Increasing the temperature of the reaction mixture.
B Increasing the pressure of the reaction mixture. (only affects if GASEOUS reactants)
C Increasing the concentration of the hydrochloric acid.
D Increasing the concentration of the sodium thiosulfate.

(B)

LIMITING REAGENT

2. Excess magnesium was added to a beaker of dilute hydrochloric acid on a balance. A graph of the mass of the beaker and contents was plotted against time and labelled as curve **1.**

$Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$



What change in the experiment could give curve **2**?

(i) The same mass of magnesium but in smaller pieces. (affects rate, but not yield)
(ii) The same volume of a more concentrated solution of hydrochloric acid.
(iii) A lower temperature. (affects rate, but not yield)

A (i) only
B (ii) only
C (i) and (ii) only
D (ii) and (iii) only

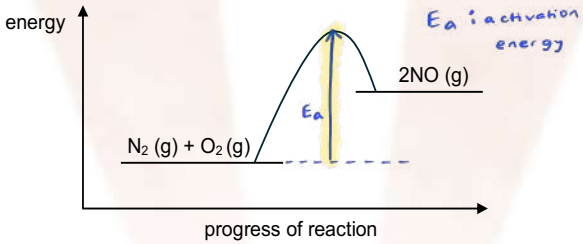
∴ must increase the no. of mol of limiting reagent, HCl

(B)

$n_{HCl} = V_{HCl} \times C_{HCl}$

no. of mol; INCREASE
volume; Same
Conc; Increase

2. Nitrogen reacts with oxygen to form nitrogen (II) oxide. The energy profile diagram for the reaction is shown below.



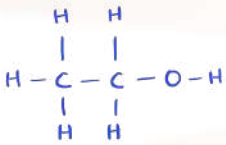
(a) Is the reaction exothermic or endothermic? Explain your answer.

endothermic, energy level of products is higher than the energy level of reactants

(b) On the diagram above, label the activation energy for the reaction.

3. The following table gives the bond energies of some covalent bonds.

Structure :



Bond	Bond energy in kJ/mol
C–H	412
C=O	743
O=O	496
O–H	463
C–C	348
C–O	358

The equation for the combustion of ethanol is given below.

$C_2H_5OH\ (l) + 3O_2\ (g) \rightarrow 2CO_2\ (g) + 3H_2O\ (l)$

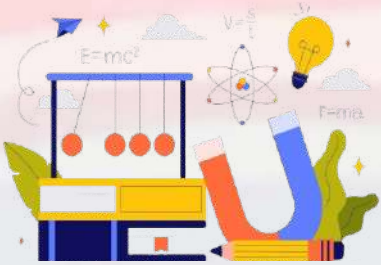
(a) Find the enthalpy change for the combustion of ethanol.

break : 5 x C-H, 1 x C-H, 1 x C-O, 1 x O-H, 3 x O=O

form : 4 x C=O, 6 x O-H

$\Delta H = [5(412) + 348 + 358 + 463 + 3(496)] - [4(743) + 6(463)]$

$= -1033\ kJ/mol$



S4 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 4 PHYSICS

Electricity

- Static Electricity
- Current of Electricity
- D.C. Circuits
- Practical Electricity

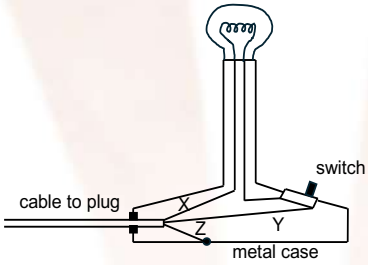
Magnetism

- Magnetism
- Electromagnetism
- Electromagnetic Induction

Radioactivity

- Radioactivity

22. The diagram shows the wiring of a mains electric lamp. The lamp has a metal case and a switch. There are 3 wires X, Y and Z in the mains cable connected to the plug.



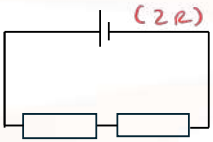
What is the correct arrangement of wires in the lamp?

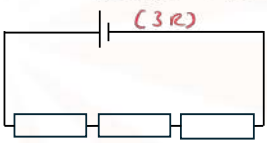
	Wire X	Wire Y	Wire Z
A	live	earth	neutral
B	live	neutral	earth
C	neutral	earth	live
D	neutral	live	earth

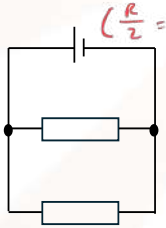
(D)

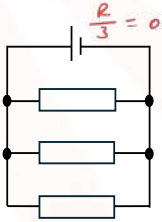
23. The circuit shows a cell joined to different combinations of identical resistors. In which circuit is electrical energy transformed at the greatest rate?

maximum power, P?

A 

B 

C 

D 

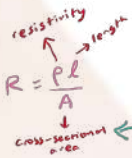
$P = \frac{V^2}{R}$

max ↑ $P = \frac{V^2}{R}$ ↓ min

(D)

$R_T = \left(\frac{1}{R_1} + \frac{1}{R_2} + \dots\right)^{-1}$

1. (a) Explain why the metal case of electrical equipment which is operated from the mains supply should be earthed.
(Your answer should mention the need for a fuse.)



In the event when the metal case becomes 'live', the earth wire allows current to flow to the ground. This surge of current causes the fuse to melt and cut off the electrical supply to the equipment.

(b) Explain why thin wire should not be used in the electrical system of an office building, even though this would be cheap.

Thin wires have higher resistance resulting in lesser current carried the office building. The voltage supply has to be increased to provide more current in the thin wires which may result in overheating and starting a fire.

2. An electrical light bulb draws a current of 0.5 A when connected to the 240 V mains supply.

(a) Calculate the power of the filament of the bulb

$P = IV = (0.5\ A)(240\ V)$

$= 120\ W$

Power = 120 W

(b) Calculate the resistance of the filament of the bulb

$V = IR$

$R = \frac{V}{I} = \frac{240}{0.5} = 480\ \Omega$

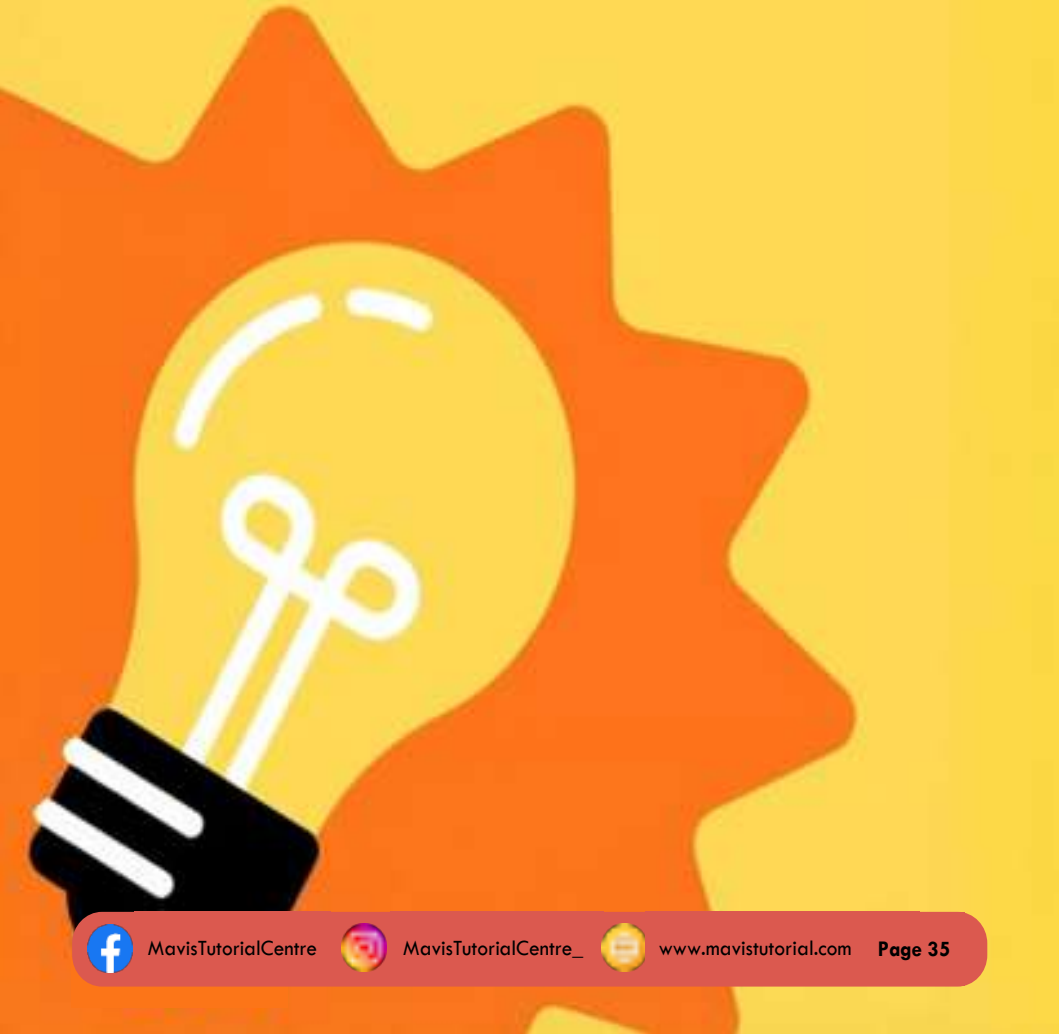
Resistance = 480 Ω

(c) Explain why the filament reaches a constant temperature, even though heat is produced continually as current flows through the bulb.

The filament reaches a constant temperature when the rate of increase by the filament (heating effect of electricity) is equal of thermal energy to the rate of thermal energy loss by the filament to the surrounding. The filament is said to have reached thermal equilibrium

SECONDARY 4

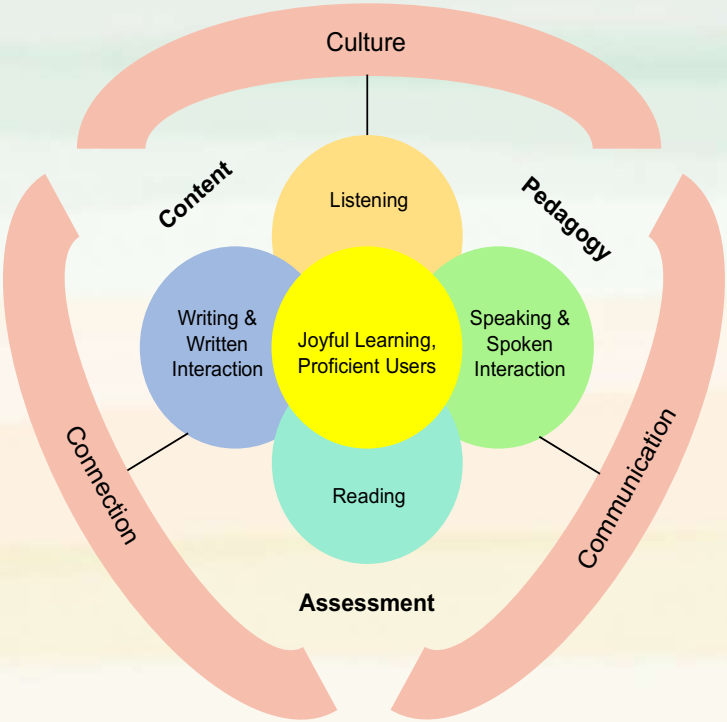
CHINESE



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



S4 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 and listening comprehension
- Reading aloud, Oral discussion
- listening comprehension

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，从括号中选出适当的词语，然后把代表它的数字，填写在下面的括号里。

1 美国 IBM 公司 Q1(1 培训 2 缔造 3 编织 4 研制)的人工智能超级电脑“沃森”，同美国知名智力竞赛节目《危险边缘》的两名常胜将军——蝉联第 74 期冠军的詹宁斯和 Q2(1 赢取 2 挑战 3 汲取 4 擅长)近 330 万美元奖金的拉特比赛斗智。结果，“沃森”以优越表现胜出，Q3(1 反映 2 颠覆 3 分析 4 佐证)出人类并非“万物之灵”，人脑输给电脑。

2 “沃森”体积为 10 个冰箱大小，由 10 台 IBM 服务器 Q4(1 缔造 2 组成 3 链接 4 编织)。这些服务器存储了大量的百科全书、词典、图书、新闻和电影剧本资料，相当于 2 亿页纸的内容。这一系统没有连接互联网，因此不会通过网络进行 Q5(1 磋商 2 佐证 3 搜索 4 阐述)，仅靠内存资料库作答。

Q1. (4) Q2. (1) Q3. (1) Q4. (2) Q5. (3)

B 组 词语替换（每题 2 分，共占 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面的格子里。

1 美国人柯(kē)里培育的辣椒，创下世界最辣的辣椒(6)记载。

2 这种辣椒取名“死神”，它长得一身通红，其辛辣(7)程序足以跟警察使用的最强辣椒喷雾(wù)相比。

3 美国一所大学的教授(8)显示：能够使辣椒产生刺激性和烧灼(zhuó)感的化学物质是辣椒素。辣椒素的成分越高，辣椒就会越辣。

4 “最辣的辣椒”培植人柯里从小便对辣椒产生(9)兴味，吃东西越辣越好。他(10)计算开设“死神辣椒园”，大量种植“死神”，给美国消费者提供世界上最辣的辣椒。

Q6. 记录	Q7. 程度	Q8. 表示	Q9. 兴趣	Q10. 打算

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