

WEBINAR 8TH OCTOBER
2021

A+
ADD MATHS

INDEX NUMBER



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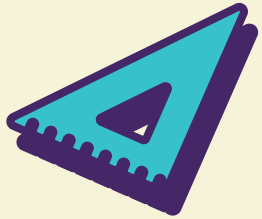


Table 8: Form 4 and 5 KSSM Additional Mathematics Content

PACKAGE	LEARNING AREA	TOPICS IN FORM FOUR	TOPICS IN FORM FIVE
Core	Algebra	<ul style="list-style-type: none"> • Functions • Quadratic Functions • Systems of Equations • Indices, Surds and Logarithms • Progressions • Linear Law 	
	Geometry	<ul style="list-style-type: none"> • Coordinate Geometry • Vectors 	<ul style="list-style-type: none"> • Circular Measure
	Calculus		<ul style="list-style-type: none"> • Differentiation • Integration
	Trigonometry		<ul style="list-style-type: none"> • Trigonometric Functions
	Statistics		<ul style="list-style-type: none"> • Permutation and Combination • Probability Distribution
Elective	Trigonometry (Application of Science and Technology)	<ul style="list-style-type: none"> • Solution of Triangles 	
	Statistics (Application of Social Science)	<ul style="list-style-type: none"> • Index Numbers 	
	Calculus (Application of Science and Technology)		<ul style="list-style-type: none"> • Kinematics of Linear Motion
	Algebra (Application of Social Science)		<ul style="list-style-type: none"> • Linear Programming



LEARNING STANDARDS

01

Define index number and describe the use of it.

02

Determine and interpret index numbers.

03

Solve problems involving index numbers.

04

Determine and interpret composite index with and without weightage.

05

Solve problems involving index numbers and composite index.



FORMULA IN THIS TOPIC



01

INDEX NUMBER

$$I = \frac{Q_1}{Q_0} \times 100$$

02

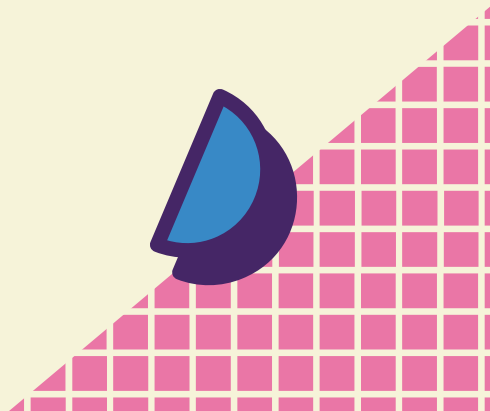
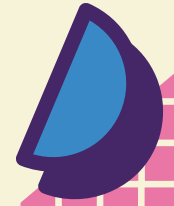
COMPOSITE INDEX

$$\bar{I} = \frac{\sum W_i I_i}{\sum W_i}$$



LET'S

WARMING UP !!





INDEX NUMBER



- ❑ A statistical measure to measure the change of a variable of a particular year as compared to another year which is considered as base year.
- ❑ Base year usually 100.
- ❑ Index number more than 100 means there will be an increase and smaller than 100 means there will be a decrease.

$$I = \frac{Q_1}{Q_0} \times 100$$

Q_1 = quantity in the specific year

Q_0 = quantity in the base year






EXAMPLE 1

The number of students who registered for the business course in a college in the years 2016, 2017 and 2018 are 200, 160 and 180 respectively. Calculate the index number of the students who registered for the business course in the college in the year 2018

(a) based on the year 2016

(b) based on the year 2017

SOLUTION (a)


$$\begin{aligned} I_{18} &= \frac{Q_{18}}{Q_{16}} \times 100 \\ &= \frac{180}{200} \times 100 \\ &= 90 \end{aligned}$$


Decrease 10%

$$\begin{aligned} &= \frac{200 - 180}{200} \times 100 \\ &= 10\% \end{aligned}$$

SOLUTION (b)

$$\begin{aligned} I_{18} &= \frac{Q_{18}}{Q_{17}} \times 100 \\ &= \frac{180}{160} \times 100 \\ &= 112.5 \end{aligned}$$

Increase 12.5%

$$\begin{aligned} &= \frac{180 - 160}{160} \times 100 \\ &= 12.5\% \end{aligned}$$




EXAMPLE 2

From the year 2008 to the year 2014, the price of a laptop decreased by 30%. If the price of the laptop in the year 2014 is RM3500, find its price in the year 2008.

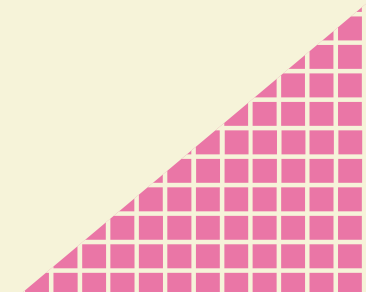
SOLUTION

$$I_{\frac{14}{08}} = 70, Q_{14} = 3500$$

$$I_{\frac{14}{08}} = \frac{Q_{14}}{Q_{08}} \times 100 = 70$$

$$\frac{3500}{Q_{08}} \times 100 = 70$$

$$Q_{08} = 5000$$





EXAMPLE 3

The price of a bicycle increased by 25% from the year 2012 to the year 2015 whereas its price increased by 10% from the year 2015 to the year 2017. Find the price index of the bicycle

- (a) in the year 2015 based on the year 2012
- (b) in the year 2017 based on the year 2015
- (c) in the year 2017 based on the year 2012



SOLUTION (a)

$$I_{\frac{15}{12}} = 125$$


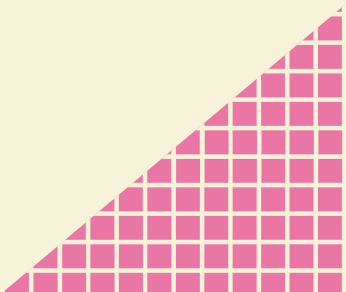
SOLUTION (b)

$$I_{\frac{17}{15}} = 110$$

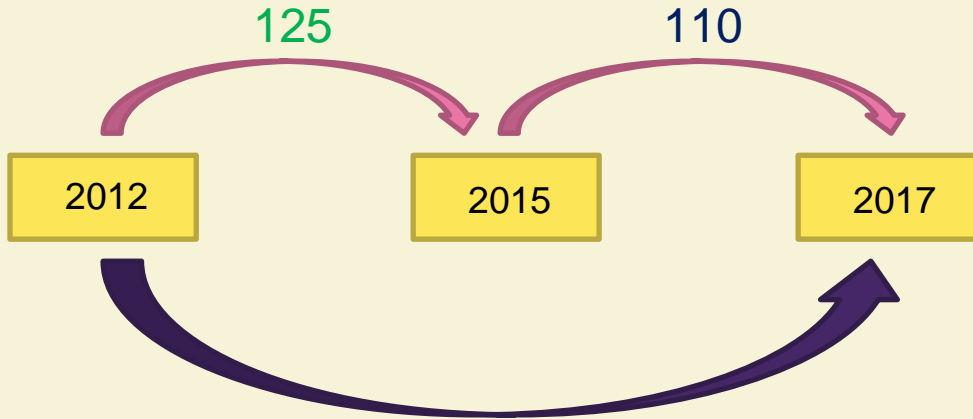
SOLUTION (c)

$$\frac{Q_{15}}{Q_{12}} = \frac{125}{100}$$

$$\frac{Q_{17}}{Q_{15}} = \frac{110}{100}$$


$$\begin{aligned} I_{\frac{17}{12}} &= \frac{Q_{17}}{Q_{12}} \times 100 \\ &= \frac{Q_{17}}{Q_{15}} \times \frac{Q_{15}}{Q_{12}} \times 100 \\ &= \frac{110}{100} \times \frac{125}{100} \times 100 \\ &= 137.5 \end{aligned}$$


ALTERNATIVE (c)



$$\frac{125 \times 110}{100} = 137.5$$

SOLUTION (c)

$$\frac{Q_{15}}{Q_{12}} = \frac{125}{100}$$

$$\frac{Q_{17}}{Q_{15}} = \frac{110}{100}$$

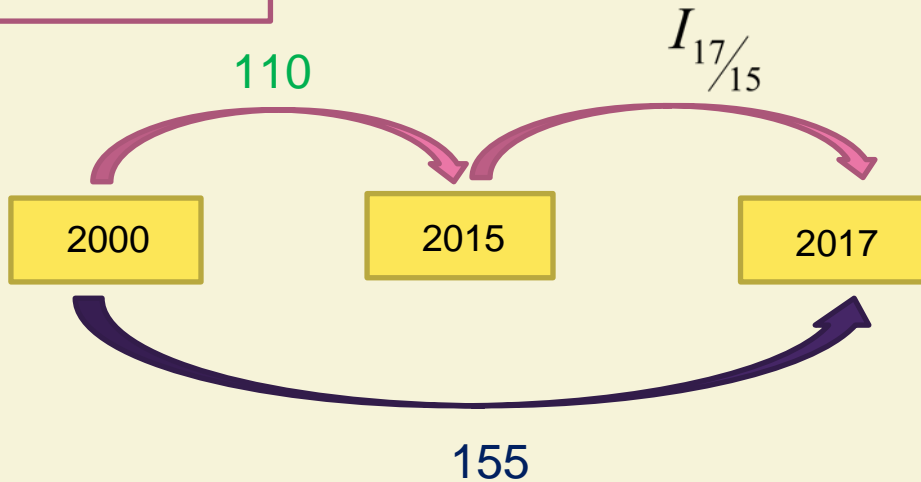
$$\begin{aligned} I_{\frac{17}{12}} &= \frac{Q_{17}}{Q_{12}} \times 100 \\ &= \frac{Q_{17}}{Q_{15}} \times \frac{Q_{15}}{Q_{12}} \times 100 \\ &= \frac{110}{100} \times \frac{125}{100} \times 100 \\ &= 137.5 \end{aligned}$$

EXAMPLE 4

The table below shows the sales index for a handbag in 2015 and 2017 with the year 2000 as the base year. Determine the sale index for the handbag in the year 2017 based on the year 2015.

Year	2015	2017
Sale index	110	155

SOLUTION



$$\frac{110 \times I_{17/15}}{100} = 155$$

$$I_{17/15} = 140.91$$

COMPOSITE INDEX

- Average price index

$$\bar{I} = \frac{\sum I_i w_i}{\sum w_i}$$

I = index number

w = weightage





EXAMPLE 5

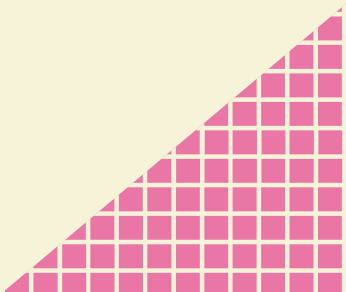
Find the composite index of the following.

ITEM	PRICE INDEX	WEIGHTAGE
<i>P</i>	110	7
<i>Q</i>	115	3
<i>R</i>	120	5
<i>S</i>	105	4



SOLUTION

$$\bar{I} = \frac{110(7) + 115(3) + 120(5) + 105(4)}{7 + 3 + 5 + 4}$$

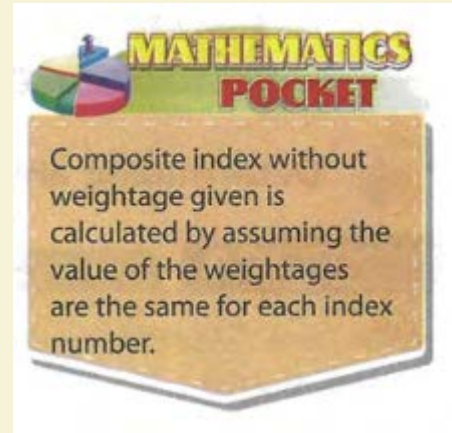
$$= 112.37$$




EXAMPLE 6

Find the composite index of the following.

ITEM	PRICE INDEX
W	98
X	120
Y	135
Z	80



SOLUTION

$$\bar{I} = \frac{98(1) + 120(1) + 135(1) + 80(1)}{1 + 1 + 1 + 1}$$
$$= 108.25$$

ALTERNATIVE:

$$\frac{98(20) + 120(20) + 135(20) + 80(20)}{20 + 20 + 20 + 20}$$
$$= 108.25$$

EXAMPLE 7

The table below shows the price and weightage for three materials P , Q and R in the year 2018 based on the year 2016.

MATERIAL	P	Q	R
PRICE INDEX	80	130	140
WEIGHTAGE	x	y	z

Given the composite index for material P and Q in the year 2018 based on the year 2016 is 120 whereas the composite index for materials P and R is 125. Determine the ratio $x : y : z$.

SOLUTION

$$\frac{80x + 130y}{x + y} = 120$$

$$40x = 10y$$

$$\frac{x}{y} = \frac{1}{4}$$

$$x : y = 1 : 4$$

$$\frac{80x + 140z}{x + z} = 125$$

$$45x = 15z$$

$$\frac{x}{z} = \frac{1}{3}$$

$$x : z = 1 : 3$$

$$y : x$$

$$4 : 1$$

$$x : z$$

$$1 : 3$$

$$\therefore x : y : z = 1 : 4 : 3$$

EXAMPLE 8

The table below shows the price index and weightage for four types of materials in the year 2020 based on the year 2019.

MATERIALS	PRICE INDEX	WEIGHTAGE
<i>P</i>	107	2
<i>Q</i>	118	<i>x</i>
<i>R</i>	94	1
<i>S</i>	105	2 <i>x</i>

(a) The composite index for the materials in the year 2020 based on the year 2019 is 108. Determine the value of *x*.

SOLUTION (a)

$$\frac{107(2) + 118(x) + 94(1) + 105(2x)}{2 + x + 1 + 2x} = 108$$

$$308 + 328x = 324 + 324x$$

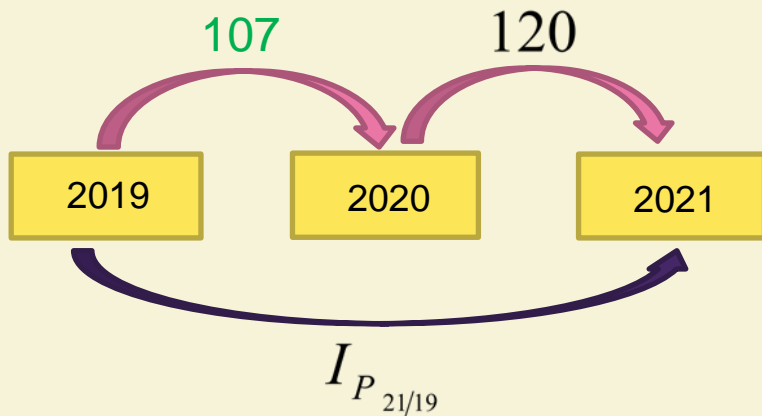
$$x = 4$$

SOLUTION (b)

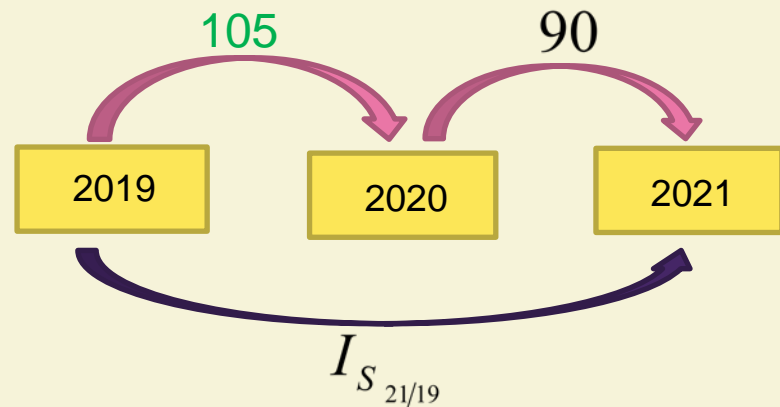
The table below shows the price index and weightage for four types of materials in the year 2020 based on the year 2019.

MATERIALS	PRICE INDEX	WEIGHTAGE
<i>P</i>	107	2
<i>Q</i>	118	<i>x</i>
<i>R</i>	94	1
<i>S</i>	105	2 <i>x</i>

(b) The price index for material *P* rises by 20% and the price index for material *S* drops by 10% in 2020 until 2021. The price index for other materials do not change. Determine the composite index for the materials in the year 2021 based on the year 2019.



$$\begin{aligned} I_P &= \frac{107 \times 120}{100} \\ &= 128.40 \end{aligned}$$
$$\begin{aligned} I_S &= \frac{105 \times 90}{100} \\ &= 94.5 \end{aligned}$$



SOLUTION (b)

The table below shows the price index and weightage for four types of materials in the year 2020 based on the year 2019.

MATERIALS	PRICE INDEX	WEIGHTAGE
<i>P</i>	107 128.40	2
<i>Q</i>	118	x 4
<i>R</i>	94	1
<i>S</i>	105 94.5	2x 8

$$I_{21/19} = \frac{128.4(2) + 118(4) + 94(1) + 94.5(8)}{2 + 4 + 1 + 8}$$
$$= 105.25$$



SPM



FORMAT QUESTIONS

EXAMPLE 9

Table 1 shows the price indices of three types of fuel for the year 2008 based on the year 2006. Diagram 1 shows a pie chart which represents the proportion of the fuel used in a factory.

Fuel	Price index for the year 2008 based on the year 2006
Diesel	150
Petrol	120
Gas	110

Table 1

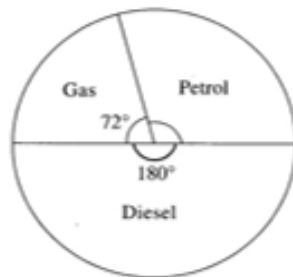


Diagram 1

- If the factory spends RM9000 per week for diesel in the year 2008, find the corresponding expenditure for diesel in the year 2006. [2 marks]
- Calculate the composite index for the fuel expenditure of the factory in the year 2008 based on the year 2006. [3 marks]
- The fuel expenditure used by the factory is RM30000 per week in the year 2006. Calculate its corresponding fuel expenditure in the year 2008. [2 marks]
- The price of diesel increases by 30%, the price of petrol increases by 20% while the price of gas remains unchanged from the year 2008 to the year 2010. Calculate the composite index for the fuel expenditure of the factory in the year 2010 based on the year 2006. [3 marks]

Table 1 shows the price indices of three types of fuel for the year 2008 based on the year 2006. Diagram 1 shows a pie chart which represents the proportion of the fuel used in a factory.

Fuel	Price index for the year 2008 based on the year 2006
Diesel	150
Petrol	120
Gas	110

Table 1

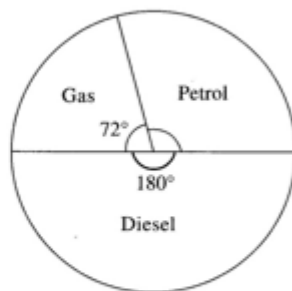


Diagram 1

- (a) If the factory spends RM9000 per week for diesel in the year 2008, find the corresponding expenditure for diesel in the year 2006. [2 marks]

SOLUTION

$$\frac{9000}{Q_{06}} \times 100 = 150 \quad \checkmark_1$$

$$Q_{06} = 6000 \quad \checkmark_1$$

Table 1 shows the price indices of three types of fuel for the year 2008 based on the year 2006. Diagram 1 shows a pie chart which represents the proportion of the fuel used in a factory.

Fuel	Price index for the year 2008 based on the year 2006
Diesel	150
Petrol	120
Gas	110

Table 1

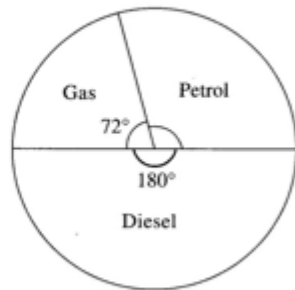


Diagram 1

- (b) Calculate the composite index for the fuel expenditure of the factory in the year 2008 based on the year 2006. [3 marks]

SOLUTION

$$\angle \text{Petrol} = 360 - 180 - 72 = 108 \quad \checkmark_1$$

$$\frac{150(180) + 120(108) + 110(72)}{360} \quad \checkmark_1$$

$$= 133 \quad \checkmark_1$$

Table 1 shows the price indices of three types of fuel for the year 2008 based on the year 2006. Diagram 1 shows a pie chart which represents the proportion of the fuel used in a factory.

Fuel	Price index for the year 2008 based on the year 2006
Diesel	150
Petrol	120
Gas	110

Table 1

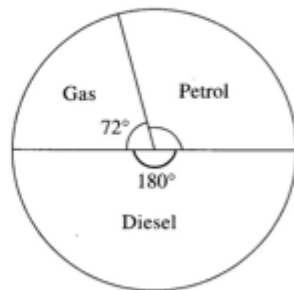


Diagram 1

- (b) Calculate the composite index for the fuel expenditure of the factory in the year 2008 based on the year 2006. [3 marks]

SOLUTION

$$\begin{aligned} \angle \text{Petrol} &= 360 - 180 - 72 = 108 \\ \frac{150(180) + 120(108) + 110(72)}{360} \\ &= 133 \end{aligned}$$

- (c) The fuel expenditure used by the factory is RM30000 per week in the year 2006. Calculate its corresponding fuel expenditure in the year 2008. [2 marks]

SOLUTION

$$\frac{Q_{08}}{30000} \times 100 = 133 \quad \checkmark_1$$

$$Q_{08} = 39900 \quad \checkmark_1$$

Table 1 shows the price indices of three types of fuel for the year 2008 based on the year 2006. Diagram 1 shows a pie chart which represents the proportion of the fuel used in a factory.

Fuel	Price index for the year 2008 based on the year 2006	
Diesel	150	195
Petrol	120	144
Gas	110	

Table 1

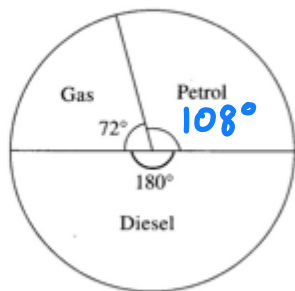


Diagram 1

$$I_D = \frac{150 \times 130}{100} = 195$$

$$I_P = \frac{120 \times 120}{100} = 144$$

- (d) The price of diesel increases by 30%, the price of petrol increases by 20% while the price of gas remains unchanged from the year 2008 to the year 2010. Calculate the composite index for the fuel expenditure of the factory in the year 2010 based on the year 2006. [3 marks]

SOLUTION

$$\frac{195(180) + 144(108) + 110(72)}{360}$$

$$= 162.7$$

EXAMPLE 10

Table 2 shows the price indices, changes in price indices and weightages of four items A , B , C and D which are the main items used to make a tin of biscuit.

Item	Price index for the year 2012 based on the year 2010	Change in price index from the year 2012 to the year 2014	Weightage
A	112	No change	1
B	140	10% decrease	4
C	x	No change	2
D	130	5% increase	3

Table 2

- (a) Calculate:
- the price of item B in the year 2010 if its price in the year 2012 is RM8.40.
 - the price of item D in the year 2012 if its price in the year 2010 is RM4.50. [3 marks]
- (b) The composite index for the cost of making a tin biscuit in the year 2012 based on the year 2010 is 132. Calculate the value of x . [2 marks]
- (c) Hence, calculate the composite index for the cost of making a tin biscuit in the year 2014 based on the year 2010. [3 marks]
- (d) Calculate the cost of making a tin biscuit in the year 2014 if the corresponding cost in the year 2010 is RM20. [2 marks]

Table 2 shows the price indices, changes in price indices and weightages of four items *A*, *B*, *C* and *D* which are the main items used to make a tin of biscuit.

Item	Price index for the year 2012 based on the year 2010	Change in price index from the year 2012 to the year 2014	Weightage
<i>A</i>	112	No change	1
<i>B</i>	140	10% decrease	4
<i>C</i>	<i>x</i>	No change	2
<i>D</i>	130	5% increase	3

Table 2

(a) Calculate:

- (i) the price of item *B* in the year 2010 if its price in the year 2012 is RM8.40.
- (ii) the price of item *D* in the year 2012 if its price in the year 2010 is RM4.50. [3 marks]

SOLUTION

$$\frac{8.40}{Q_{10}} \times 100 = 140 \quad \checkmark_1$$

$$Q_{10} = RM 6.00 \quad \checkmark_1$$

$$\frac{Q_{12}}{4.50} \times 100 = 130$$

$$Q_{12} = RM 5.85 \quad \checkmark_1$$

Table 2 shows the price indices, changes in price indices and weightages of four items A , B , C and D which are the main items used to make a tin of biscuit.

Item	Price index for the year 2012 based on the year 2010	Change in price index from the year 2012 to the year 2014	Weightage
A	112	No change	1
B	140	10% decrease	4
C	x	No change	2
D	130	5% increase	3

Table 2

- (b) The composite index for the cost of making a tin biscuit in the year 2012 based on the year 2010 is 132. Calculate the value of x . [2 marks]

SOLUTION

$$\frac{112(1) + 140(4) + x(2) + 130(3)}{1 + 4 + 2 + 3} = 132 \quad \checkmark_1$$
$$x = 129 \quad \checkmark_1$$

Table 2 shows the price indices, changes in price indices and weightages of four items A , B , C and D which are the main items used to make a tin of biscuit.

Item	Price index for the year 2012 based on the year 2010	Change in price index from the year 2012 to the year 2014	Weightage
A	112	No change	1
B	140	10% decrease	4
C	130 129	No change	2
D	130	5% increase	3

Table 2

- (c) Hence, calculate the composite index for the cost of making a tin biscuit in the year 2014 based on the year 2010. [3 marks]

$$I_B = \frac{140 \times 90}{100} = 126$$

$$I_D = \frac{130 \times 105}{100} = 136.5$$

SOLUTION

$$\frac{112(1) + 126(4) + 129(2) + 136.5(3)}{10} = 128.35$$

Table 2 shows the price indices, changes in price indices and weightages of four items *A*, *B*, *C* and *D* which are the main items used to make a tin of biscuit.

Item	Price index for the year 2012 based on the year 2010	Change in price index from the year 2012 to the year 2014	Weightage
<i>A</i>	112	No change	1
<i>B</i>	140	10% decrease	4
<i>C</i>	<i>x</i>	No change	2
<i>D</i>	130	5% increase	3

Table 2



- (c) Hence, calculate the composite index for the cost of making a tin biscuit in the year 2014 based on the year 2010. [3 marks]

SOLUTION

$$\frac{112(1) + 126(4) + 129(2) + 136.5(3)}{10} = 128.35 \quad \checkmark_1$$

- (d) Calculate the cost of making a tin biscuit in the year 2014 if the corresponding cost in the year 2010 is RM20. [2 marks]

SOLUTION

$$\frac{Q_{14}}{20} \times 100 = 128.35 \quad \checkmark_1$$

$$Q_{14} = 25.67 \quad \checkmark_1$$

EXAMPLE 11

Table 3 shows the prices indices of three types of ingredients A , B and C used in the production of a type of fish ball.

Ingredient	Price (RM) per kg for the year		Price index for the year 2016 based on the year 2014	Weightage
	2014	2016		
A	5.00	6.64	132.8	50
B	y	3.00	x	20
C	0.50	0.95	190	1

Table 3

- (a) The price of ingredient B is increased by 20% from the year 2014 to the year 2016.
- State the value of x .
 - Find the value of y . [3 marks]
- (b) Calculate the composite index for the cost of making the fish balls for the year 2016 based on the year 2014. [2 marks]
- (c) It is given that the composite index for the cost of making the fish balls increased by 40% from the year 2012 to the year 2016.
- Calculate the composite index for the cost of making the fish balls in the year 2014 based on the year 2012.
 - The cost of making a fish ball is 10 sen in the year 2012. Find the maximum number of fish balls that can be produced using an allocation of RM80 in the year 2016. [5 marks]

Table 3 shows the prices indices of three types of ingredients A , B and C used in the production of a type of fish ball.

Ingredient	Price (RM) per kg for the year		Price index for the year 2016 based on the year 2014	Weightage
	2014	2016		
A	5.00	6.64	132.8	50
B	y	3.00	x	20
C	0.50	0.95	190	1

Table 3

- (a) The price of ingredient B is increased by 20% from the year 2014 to the year 2016.
- (i) State the value of x .
- (ii) Find the value of y . [3 marks]

SOLUTION (I)

$$x = 120 \quad \checkmark_1$$

SOLUTION (II)

$$\frac{3}{y} \times 100 = 120 \quad \checkmark_1$$

$$y = 2.50 \quad \checkmark_1$$

Table 3 shows the prices indices of three types of ingredients A , B and C used in the production of a type of fish ball.

Ingredient	Price (RM) per kg for the year		Price index for the year 2016 based on the year 2014	Weightage
	2014	2016		
A	5.00	6.64	132.8	50
B	y	3.00	y 120	20
C	0.50	0.95	190	1

Table 3

- (b) Calculate the composite index for the cost of making the fish balls for the year 2016 based on the year 2014. [2 marks]

SOLUTION

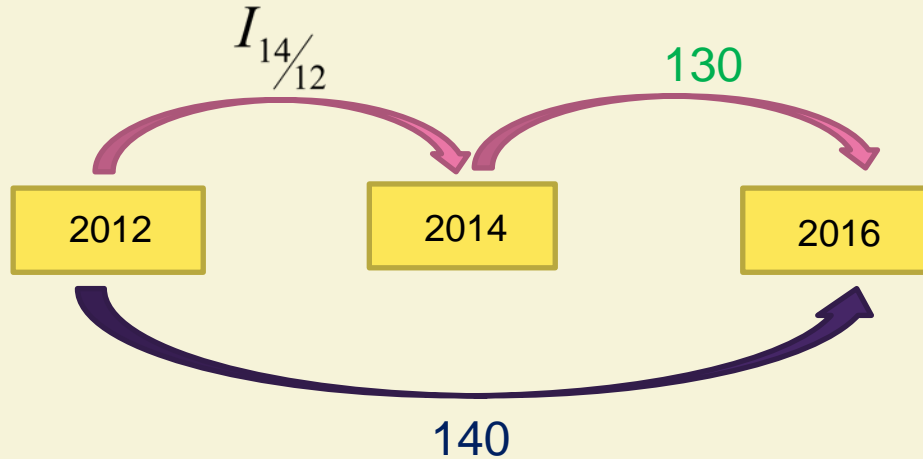
$$\frac{132.8(50) + 120(20) + 190(1)}{50 + 20 + 1}$$
$$= 130$$



(c) It is given that the composite index for the cost of making the fish balls increased by 40% from the year 2012 to the year 2016.

(i) Calculate the composite index for the cost of making the fish balls in the year 2014 based on the year 2012.

SOLUTION



(b) Calculate the composite index for the cost of making the fish balls for the year 2016 based on the year 2014. [2 marks]

SOLUTION

$$\frac{132.8(50) + 120(20) + 190(1)}{50 + 20 + 1}$$
$$= 130$$

$$\frac{I_{14/12} \times 130}{100} = 140$$

$$I_{14/12} = 107.69$$

- (c) It is given that the composite index for the cost of making the fish balls increased by 40% from the year 2012 to the year 2016.
- (i) Calculate the composite index for the cost of making the fish balls in the year 2014 based on the year 2012.
- (ii) The cost of making a fish ball is 10 sen in the year 2012. Find the maximum number of fish balls that can be produced using an allocation of RM80 in the year 2016. [5 marks]

SOLUTION

$$\frac{Q_{16}}{0.10} \times 100 = 140 \quad \checkmark_1$$
$$= 0.14$$

Number of fish balls

$$= \frac{80}{0.14} \quad \checkmark_1$$
$$= 571.4$$

Maximum number of fish balls is 571 ✓₁

ALTERNATIVE (c)

- (c) It is given that the composite index for the cost of making the fish balls increased by 40% from the year 2012 to the year 2016.
- (i) Calculate the composite index for the cost of making the fish balls in the year 2014 based on the year 2012.
- (ii) The cost of making a fish ball is 10 sen in the year 2012. Find the maximum number of fish balls that can be produced using an allocation of RM80 in the year 2016. [5 marks]

SOLUTION

$$\frac{80}{Q_{12}} \times 100 = 140 \quad \checkmark_1$$
$$= 57.14$$

Number of fish balls

$$= \frac{57.14}{0.10} \quad \checkmark_1$$
$$= 571.4$$

Maximum number of fish balls is 571 ✓₁

EXAMPLE 12

Table 4 shows the information related to four ingredients P , Q , R and S used in the production of a type of noodle.

Ingredient	Change in price index from the year 2013 to the year 2017	Percentage of usage (%)
P	40% increase	10
Q	20% increase	10
R	60% increase	
S	10% decrease	50

Table 4

The production cost for this noodle is RM47 600 in the year 2017.

- (a) If the price of ingredient Q in the year 2013 is RM4.20, find its price in the year 2017. [2 marks]
- (b) Percentage of usage for several ingredients were given in Table 4. Calculate the corresponding production cost in the year 2013. [5 marks]
- (c) The production cost is expected to increase by 50% from the year 2017 to the year 2019. Calculate the percentage of changes in production cost from the year 2013 to the year 2019. [3 marks]

Table 4 shows the information related to four ingredients P , Q , R and S used in the production of a type of noodle.

Ingredient	Change in price index from the year 2013 to the year 2017	Percentage of usage (%)
P	40% increase	10
Q	20% increase	10
R	60% increase	
S	10% decrease	50

Table 4

The production cost for this noodle is RM47 600 in the year 2017.

- (a) If the price of ingredient Q in the year 2013 is RM4.20, find its price in the year 2017. [2 marks]

SOLUTION

$$\frac{Q_{17}}{4.20} \times 100 = 120 \quad \checkmark_1$$

$$Q_{17} = \text{RM}5.04 \quad \checkmark_1$$

Table 4 shows the information related to four ingredients P , Q , R and S used in the production of a type of noodle.

Ingredient	Change in price index from the year 2013 to the year 2017	Percentage of usage (%)
P	40% increase	10
Q	20% increase	10
R	60% increase	
S	10% decrease	50

Table 4

- (b) Percentage of usage for several ingredients were given in Table 4. Calculate the corresponding production cost in the year 2013. [5 marks]

SOLUTION

$$\text{Percentage } R = 100 - 50 - 10 - 10 = 30\% \quad \checkmark_1$$

$$\frac{140(10) + 120(10) + 160(30) + 90(50)}{100} \quad \checkmark_1$$

$$= 119 \quad \checkmark_1$$

$$\frac{47600}{Q_{13}} \times 100 = 119 \quad \checkmark_1$$

$$Q_{13} = 40000 \quad \checkmark_1$$

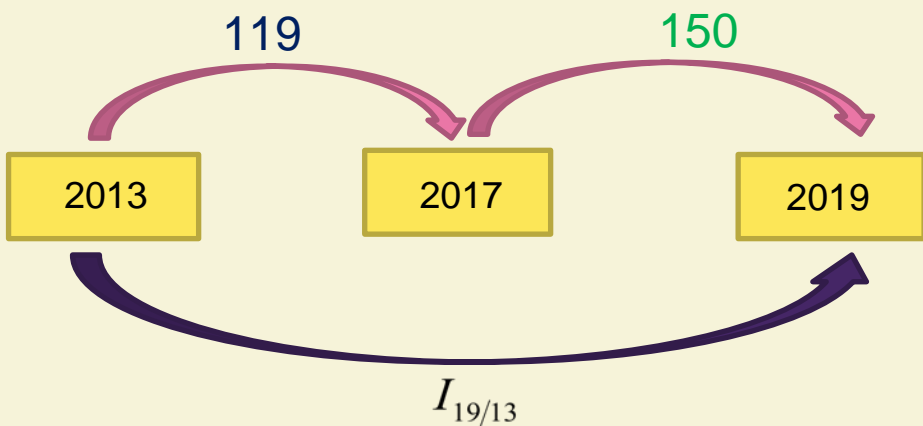
Table 4 shows the information related to four ingredients P , Q , R and S used in the production of a type of noodle.

Ingredient	Change in price index from the year 2013 to the year 2017	Percentage of usage (%)
P	40% increase	10
Q	20% increase	10
R	60% increase	
S	10% decrease	50

Table 4

- (c) The production cost is expected to increase by 50% from the year 2017 to the year 2019. Calculate the percentage of changes in production cost from the year 2013 to the year 2019. [3 marks]

SOLUTION



$$I_{19/13} = \frac{119 \times 150}{100} \quad \checkmark_1$$

$$= 178.5 \quad \checkmark_1$$

Percentage of changes is 78.5% \checkmark_1

- (b) Percentage of usage for several ingredients were given in Table 4. Calculate the corresponding production cost in the year 2013. [5 marks]

SOLUTION

$$\text{Percentage } R = 100 - 50 - 10 - 10 = 30\% \quad \checkmark_1$$

$$\frac{140(10) + 120(10) + 160(30) + 90(50)}{100} \quad \checkmark_1$$

$$= 119 \quad \checkmark_1$$

EXAMPLE 13

Table 5 shows information related to five cake ingredients J , K , L , M and N used by a baker in his business.

Ingredients	Price index for the year 2018 to the year 2016	Change in price index from the year 2018 to the year 2020	Price index for the year 2020 based on the year 2016	Weightage
J	124	No change	124	5
K	115	40% increase	x	6
L	130	No change	130	p
M	140	10% decrease	y	4
N	120	No change	120	2

The composite index for the cost of making the cakes in the year 2020 based on the year 2016 is 136.

- (a)(i) Find the value of x and y .
- (ii) Calculate the price for ingredient M in the year 2016 if the price in the year 2020 is RM6.30. [4 marks]
- (b) Calculate the value of p . [3 marks]
- (c) The cost of baking a cake in the year 2016 is RM25. Find the selling price of cake made in the year 2020, if the baker intends to make a profit of 80%. [3 marks]

Table 5 shows information related to five cake ingredients J , K , L , M and N used by a baker in his business.

Ingredients	Price index for the year 2018 to the year 2016	Change in price index from the year 2018 to the year 2020	Price index for the year 2020 based on the year 2016	Weightage
J	124	No change	124	5
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L	130	No change	130	p
M	140	10% decrease	y	4
N	120	No change	120	2

The composite index for the cost of making the cakes in the year 2020 based on the year 2016 is 136.

(a)(i) Find the value of x and y .

(ii) Calculate the price for ingredient M in the year 2016 if the price in the year 2020 is RM6.30. [4 marks]

SOLUTION (i)

$$x = \frac{115 \times 140}{100}$$

$$= 161 \quad \checkmark_1$$

$$y = \frac{140 \times 90}{100}$$

$$= 126 \quad \checkmark_1$$

Ingredients	Price index for the year 2018 to the year 2016	Change in price index from the year 2018 to the year 2020	Price index for the year 2020 based on the year 2016	Weightage
<i>J</i>	124	No change	124	5
<i>K</i>	115	40% increase	115 161	6
<i>L</i>	130	No change	130	<i>p</i>
<i>M</i>	140	10% decrease	140 126	4
<i>N</i>	120	No change	120	2

The composite index for the cost of making the cakes in the year 2020 based on the year 2016 is 136.

(a)(i) Find the value of *x* and *y*.

(ii) Calculate the price for ingredient *M* in the year 2016 if the price in the year 2020 is RM6.30.

[4 marks]

SOLUTION (ii)

$$\frac{6.30}{Q_{16}} \times 100 = 126 \quad \checkmark_1$$

$$Q_{16} = 5 \quad \checkmark_1$$

Ingredients	Price index for the year 2018 to the year 2016	Change in price index from the year 2018 to the year 2020	Price index for the year 2020 based on the year 2016	Weightage
<i>J</i>	124	No change	124	5
<i>K</i>	115	40% increase	115 161	6
<i>L</i>	130	No change	130	<i>p</i>
<i>M</i>	140	10% decrease	140 126	4
<i>N</i>	120	No change	120	2

The composite index for the cost of making the cakes in the year 2020 based on the year 2016 is 136.

(b) Calculate the value of *p*.

[3 marks]

SOLUTION (b)

$$\frac{124(5) + 161(6) + 130p + 126(4) + 120(2)}{5 + 6 + p + 4 + 2} = 136$$

$$p = 3$$

Ingredients	Price index for the year 2018 to the year 2016	Change in price index from the year 2018 to the year 2020	Price index for the year 2020 based on the year 2016	Weightage
<i>J</i>	124	No change	124	5
<i>K</i>	115	40% increase	<i>x</i>	6
<i>L</i>	130	No change	130	<i>p</i>
<i>M</i>	140	10% decrease	<i>y</i>	4
<i>N</i>	120	No change	120	2

The composite index for the cost of making the cakes in the year 2020 based on the year 2016 is 136.

SOLUTION (c)

Cost price of the cake

$$\frac{Q_{20}}{25} \times 100 = 136 \quad \checkmark_1$$

$$Q_{20} = 34.00$$

(c) The cost of baking a cake in the year 2016 is RM25. Find the selling price of cake made in the year 2020, if the baker intends to make a profit of 80%.

[3 marks]

$$\begin{aligned} & \frac{180}{100} \times 34 \quad \checkmark_1 \\ & = 61.20 \quad \checkmark_1 \end{aligned}$$

Ingredients	Price index for the year 2018 to the year 2016	Change in price index from the year 2018 to the year 2020	Price index for the year 2020 based on the year 2016	Weightage
<i>J</i>	124	No change	124	5
<i>K</i>	115	40% increase	<i>x</i>	6
<i>L</i>	130	No change	130	<i>p</i>
<i>M</i>	140	10% decrease	<i>y</i>	4
<i>N</i>	120	No change	120	2

ALTERNATIVE (c)

(c) The cost of baking a cake in the year 2016 is RM25. Find the selling price of cake made in the year 2020, if the baker intends to make a profit of 80%.

[3 marks]

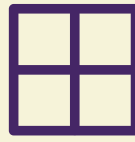
The composite index for the cost of making the cakes in the year 2020 based on the year 2016 is 136.

SOLUTION (c)

$$\frac{180 \times 136}{100} = 244.80$$

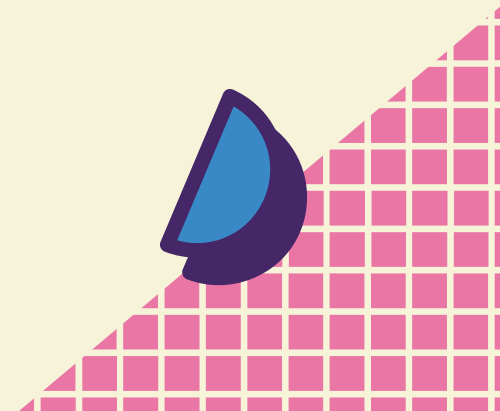
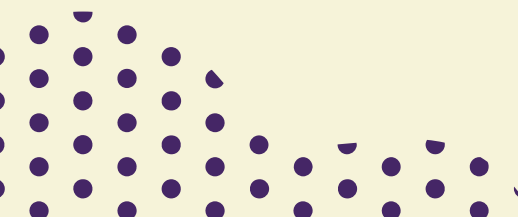
$$\frac{Q_{20}}{25} \times 100 = 244.80$$

$$Q_{25} = 61.20$$



BONUS

TIPS!!!



PAPER FORMAT

		PAPER 1		PAPER 2	
DURATION		2 HOURS		2 HOURS 30 MINUTES	
NUMBER OF QUESTONS		15 QUESTIONS		15 QUESTIONS	
TOTAL MARKS		80 MARKS		100 MARKS	
SECTIONS/ OPTIONS TO ANSWER	SECTIONS	2		SECTIONS	3
	A	12 QUESTIONS		A	7 QUESTIONS
		64 MARKS			50 MARKS
		ANSWER ALL			ANSWER ALL
	B	3 QUESTIONS		B	4 QUESTIONS
		16 MARKS			30 MARKS
		ANSWER 2			ANSWER 3
	C	3 QUESTIONS		C	4 QUESTIONS
		16 MARKS			20 MARKS
ANSWER 2		ANSWER 2			

Before exam....

- Strong basic mathematics especially algebra manipulations.
- You have to answer add maths question everyday.
- Example : Everyday 1 question from Paper 1 and 1 question from Paper 2.
- Always consult your teacher if you have any problem.
- Study group will always work!
- Familiar yourself with the formula-print and laminate

SENARAI RUMUS

$$1 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$2 \quad \log_a b = \frac{\log_c b}{\log_c a}$$

$$3 \quad T_n = a + (n-1)d$$

$$4 \quad T_n = ar^{n-1}$$

$$5 \quad S_n = \frac{n}{2}[2a + (n-1)d]$$

$$6 \quad S_n = \frac{a(r^n - 1)}{r - 1} = \frac{a(1 - r^n)}{1 - r}, \quad r \neq 1$$

$$7 \quad Z = \frac{X - \mu}{\sigma}$$

$$8 \quad P(X=r) = {}^n C_r p^r q^{n-r}, \quad p + q = 1$$

$$9 \quad {}^n P_r = \frac{n!}{(n-r)!}$$

$$10 \quad {}^n C_r = \frac{n!}{(n-r)!r!}$$

$$11 \quad I = \frac{Q_1}{Q_0} \times 100$$

$$12 \quad \bar{I} = \frac{\sum W_i I_i}{\sum W_i}$$

$$13 \quad \sin^2 A + \cos^2 A = 1$$

$$\sin^2 A + \cos^2 A = 1$$

$$14 \quad \sec^2 A = 1 + \tan^2 A$$

$$\sec^2 A = 1 + \tan^2 A$$

$$15 \quad \operatorname{cosec}^2 A = 1 + \cot^2 A$$

$$\operatorname{cosec}^2 A = 1 + \cot^2 A$$

$$16 \quad \sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$17 \quad \cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$18 \quad \tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

$$19 \quad \sin 2A = 2 \sin A \cos A$$

$$\sin 2A = 2 \sin A \cos A$$

$$20 \quad \cos 2A = \cos^2 A - \sin^2 A$$

$$= 2 \cos^2 A - 1$$

$$= 1 - 2 \sin^2 A$$

$$\cos 2A = \cos^2 A - \sin^2 A$$

$$= 2 \cos^2 A - 1$$

$$= 1 - 2 \sin^2 A$$

$$21 \quad \tan 2A = \frac{2 \tan A}{1 - \tan^2 A}$$

$$22 \quad \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$23 \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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

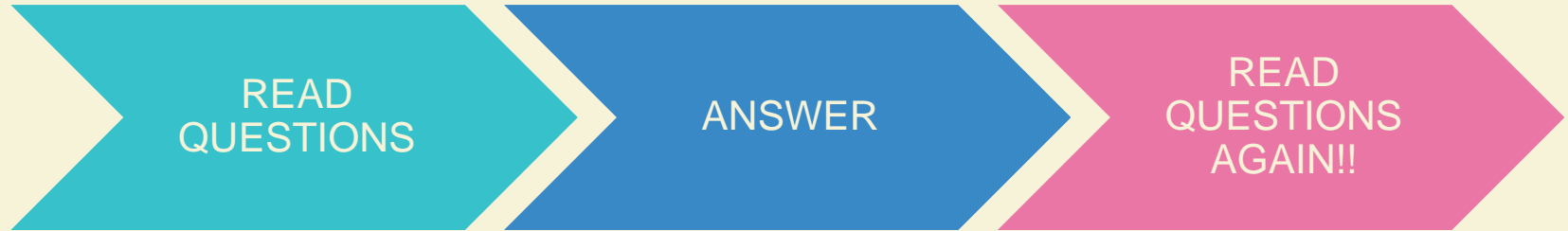
$$24 \quad \text{Area of triangle / Luas segi tiga}$$

$$= \frac{1}{2} ab \sin C$$

REVISION BY PHASE

PHASE 1	PHASE 2	PHASE 3
<ol style="list-style-type: none">1. Functions2. Quadratic Functions3. Systems of Equations4. Indices, Surds and Logarithms5. Linear Law6. Coordinate Geometry7. Solution of Triangle8. Index Number9. Trigonometric graph	<ol style="list-style-type: none">1. Indices, Surds and Logarithms2. Progressions3. Vector4. Circular Measure5. Solving and Proving Trigonometric Functions6. Linear Programming7. Kinematics	<ol style="list-style-type: none">1. Differentiation2. Integration3. Permutations and Combinations4. Probability Distributions5. KBAT

During exam...



- Follow instructions
- Don't spend too much time on a question
- Choose the correct formula to be used and use it correctly!
- Final answer must be in the simplest form.
- Your answer should be **correct to 4 S.F.(at least!)**
(or follow the instruction given in the question)

Rounding off

- Final answer only should be rounded off to at least 4 significant figures.
- During working steps gives more than 4 s.f.
- Special case (for final answer only):
 - ❑ Angles in degrees → up to 2 decimal places.
 - ❑ Money → up to 2 d.p
 - ❑ Table of values for linear law can be up to 2 decimal places.

Fractions

- Examples of final answer:

➤ $\frac{2}{4}$ is not accepted as final answer. Must write $\frac{1}{2}$ or 0.5.

➤ For fractions like $\frac{1}{3}$, avoid writing it as 0.3333.

➤ $\frac{2}{1}$ is not considered as simplest form.

➤ $\frac{3}{-4}$ is not accepted as simplest form. Must write either $-\frac{3}{4}$ or $\frac{-3}{4}$.

➤ Surds symbol not in denominator → Rationalize

- Show your working steps clearly. BE ORGANIZED.
- Write your ic number and *angka giliran* on your extra answer sheets.

TIME MANAGEMENT

- Use the time given **WISELY**.
- 1 mark = 1.5 minutes
- Meaning,
 - 2 marks questions = 3 minutes
 - 3 marks questions = 4.5 minutes
 - 10 marks questions = 15 minutes
- DO NOT WASTE TIME ON QUESTIONS YOU CANNOT ANSWER, JUST MOVE ON TO THE NEXT QUESTION AND GET BACK TO THAT QUESTION LATER.

Important Keywords

KEYWORD	MEANING
STATE	No need working or it can be computed mentally. Normally only 1 mark.
SOLVE/ FIND THE VALUE(s)/DETERMINE	<ul style="list-style-type: none">•Finding the unknown value•Involve working steps•Do not miss any important steps
HENCE	Normally you have to use the previous answer to answer the next question
SKETCH	No need of graph paper. A rough sketch but should give the correct picture
DRAW/PLOT	<ul style="list-style-type: none">•Use graph paper•Table of values, correct scale, correct plot

KEYWORD	MEANING
EXPRESS	<ul style="list-style-type: none">•Express in terms of another variable
FIND THE RANGE OF VALUES	<ul style="list-style-type: none">•Answer in terms of $<$, $>$, \leq, \geq
SHOW/PROVE	Answer is given and you have to show the steps how to obtain the answer Do not try to cheat!



COMMON MISTAKES

- Do not show proper method
 - * Skip method of solving quadratic equation
 - * Do not write vector law
 - * Tulis apa yg tgh dicari.
- Round off too early (less than 4 sf)





**MASTERING
CONCEPT**



**KBAT/HOTS
NON-ROUTINE
QUESTIONS**

A yellow grid pattern in the bottom right corner, with two stylized pencils (one cyan and one red) resting on it.