

module module

TEACHING & LEARNING

ADDITIONAL MATHEMATICS FORM 4

INDEX NUMBER

CHAPTER 11

NAME:.....

FORM :.....

Date received :

Date completed

Marks of the Topical Test :

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For Internal Circulations Only

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

b) $\bar{I} = \frac{\sum w_1 I_1}{\sum w_1}$

Students will be able to:

Understand and use the concept of index number to solve problems.

- 1.1 Calculate index number.
- 1.2 Calculate price index.
- 1.3 Find Q_0 or Q_1 given relevant information.

1.1 Calculating index number.

Index number is a measure used to show the change of a certain quantity for a stated period of time by choosing a specific time as the base year. In general an **index number** is the comparison of a quantity at two different times and is expressed as a percentage.

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

I = index number

Q_1 = quantity at specific time

Q_0 = quantity at base time

Example 1

a) The number of visitors of national museum in the year 2000 is 1.4 million compared to 1.7 million in the year 2003. The index number that shows the difference in the number of visitors in the year 2003 based on the year 2000 is [Answer 121.43]

b) The number of cars sold by a company in the year 2000 and 2002 was 6000 unit and 8400 unit respectively. Calculate the index number of the cars sold in the year 2002 based on the year 2000 [Answer 140]

Exercise 1

a) The number of cars sold by a company in the year 2000 and 2004 was 5000 unit and 8500 unit respectively. Calculate the index number of the cars sold in the year 2004 based on the year 2000. [Answer 170.00]

b) . The table below shows the number of computers sold by a company Z for year 2002 and 2004.

Year	2002	2004
Number of computers	800	1 000

Calculate the index of the computers sold in year 2004 using 2002 as a base year [Answer 125]

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1.2 Calculating price index

Example 2 [answer 125]

a) The price of a particular goods was RM16.00 and RM20.00 in year 1998 and 2002 respectively. Calculate the price index for this goods, taking 1998 as base year

Exercise 2 [answer 300]

a) The price of a particular goods in year 1997 is RM15. Its price in the year 2005 is 3 times its price in year 1997. Calculate price index of this good for year 2005 based on year 1997.

b) The table below shows the prices of an item from 2000 to 2004.

Year	2000	2001	2002	2003	2004
Price (RM)	72	88	100	108	126

Calculate the price index for each year of the given item, using a. 2000 as a base year b. 2002 as a base year.
 Ans a). 122.2, 138.9, 150, 175 b). 113.6, 122.7, 143.2

b) The following table shows the prices of 3 types of fruits for year 2001 and 2003.

Type of food	Price /kilogram	
	2000 = 100	2003
Papaya	RM 1.00	RM 1.00
Durian	RM 2.00	RM 2.40
Banana	RM 1.50	RM 1.60

Calculate price index for each fruit above
 [Answer 100, 120, 106.7]

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1.3 Finding Q_0 or Q_1 given relevant information

Example 3

a) The shoe price in year 2000 was RM 50.00 and price index in year 2004 was 126 with year 2000 as a base year. Find the price in year 2004. [Answer : **RM96.60**]

b) Price for one tine of biscuit in year 1999 is RM12.00. Price Index on year 2000, where 1999 as a base year is 105. Find the price for one tine of biscuit in year 2000. [Answer RM12.60]

Exercise 3

a) Price index for one bottle of syrup in year 2000 is 130. Take year 1998 as the base year, find the price for one bottle of syrup in year 2000, if the price in year 1998 is RM5.00 [Answer RM6.50]

b) Index price for one piece of 'roti canai' at year 2005 was equal to 150, using year 1995 as the base year. If the price for one piece of 'roti canai' was RM0.60 at year 2005, calculate its price at year 1995.

Example 4

a) The table below shows the items price and index number

Items	Price in 1990	Price in 1995	Price Index in 1995 based on year 1990
P	x	RM 0.70	175
Q	RM 2.00	RM 2.50	125
R	RM 2.50	y	120

Find the value of :
 (a) x [answer 4] (b) y [answer 3]

b) Tables below shows price index for petrol, gasoline and gas. Find the value of x, y and z.

Items	1986 (1975 = 100)	1990 (1975 = 100)	1990 (1986 = 100)
Petrol	250	280	z
Gasoline	x	180	120
Gas	175	y	140

[Answer x = 150 y = 80 , z = 112]

Exercise 4

Find the value of x , y and z

Items	Price in 1999	Price in 2000	Price Index (1999=100)
P	RM 2.00	RM 2.50	x
Q	RM 3.00	y	110
R	z	RM 5.00	125

3 Table bellow shows the pries index for flour ,milk and sugar .Find the value of a, b and c

Items	1986 (1975=100)	1990 (1975=100)	1990 (1986=100)
flour	250	280	c
milk	a	180	120
sugar	175	b	140

(Answer : a = 150 , b = 245 , c = 112)

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Students will be able to:

2. Understand and use the concept of composite index to solve problems.
- 2.1 Calculate composite index.
- 2.2 Find index number or weightage given relevant information.
- 2.3 Solve problems involving index number and composite index.

2. Calculating composite index

The composite index is the weighted mean for all the items in a certain situation. If $I_1, I_2, I_3, \dots, I_N$ represent the index numbers for N items respectively weightages $w_1, w_2, w_3, \dots, w_N$ then the composite index is

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

$$= \frac{I_1 w_1 + I_2 w_2 + I_3 w_3 + \dots + I_N w_N}{w_1 + w_2 + w_3 + \dots + w_N}$$

Example 5

a The following table indicates the price index and the weightages for several types of fruits in year 2005 with 2000 as the base year.

Fruit	Index	Weightage
Banana	120	4
Pineapple	132	3
Mango	150	1
Guava	160	3

Calculate the composite index for year 2005 with 2000 as the base year.[Answer 136.91]

Solution

Example 6

b) The following table indicates price index in year 2005 with 2000 as the base year for the material that needed for prawn noodle and the weightages respectively.

Material	Price Index	Weightage
Noodle	113	3
Prawn	104	2
Vegetable	118	4
Gas	102	1

Calculate the composite index for year 2005 with 2000 as the base year. [Answer 112.1]

Solution**Exercise 7**

1. The following table shows several items for Abu's family monthly expenses in year 2005 with the price index and weightages using 2000 as the base year.

Material	Price Index	Weightage
Food	116	9
Rental	110	5
Electric and gas	112	2
Clothes	99	1
Other	115	3

Calculate the composite index for year 2005 with 2000 as the base year. [answer 113.1]

Solution**Exercise 8**

2. The following table indicates the price index and the weightages for several types of foods in year 2005 using 2000 as the base year.

Item	Index	Weight
Rice	120	5
Vegetable	136	3
Meat	125	6
Daily	104	2
Others	115	4

Calculate the composite index for year 2005 with 2000 as the base year [Answer 121.1]

Solution**Homework Text Book Exercise 11.2.1 page 266****2.2 Finding index number or weightage given relevant information****Example 9**

a) The above table shows the change in prices of four models of goods from year 2000 to year 2002 with respective weightages.

Model	Index	Weight
A	110	1
B	100	2
C	98	4
D	p	3

Given that the composite index is 104.7 and year 2000 as base year, find the change in price index of model D. [Answer $p = 115$]

Solution

b) Table below indicates the index numbers for several goods in year 1999 and year 1990 is taken as the base year.

Goods	Index Number	Weight
P	110	k
Q	140	6
R	150	8
S	180	2

Given that the composite index is 142, find the value of k.
[Answer : 4]

Solution

Exercise 9

1. Table above shows index numbers of certain goods in year 2001 where year 2000 as is taken the base year.

Goods	Index Number	Weight
E	130	5
F	150	7
G	m	8
H	120	2

Given that the composite index is 141, find the value of m.
[Answer m = 145.25]

Solution

2. Table 1 shows the price index of several type of cloths which are sold in a shop in year 2001 and year 1995 is taken as the base year.

Cloths	Price Index, I	Weight, w
Dress	130	5
Trouser	120	x
Jacket	110	4
Gown	150	3

TABLE 1

Given that the composite index is 125 at year 2001 where year 1995 is taken as the base year, find the value of x.
[Answer x = 8]

Solution

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2.3 Solving problems involving index number and composite index

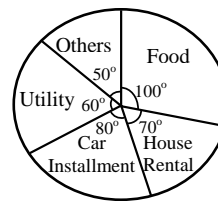
1. Table 3 shows the price index for the monthly expenses in the year 2005 based on the year 200 [Ans. a) RM550 b) RM 109.17 c) RM1832

Monthly Expenses (RM)	Price Index
Food	110
House Rental	105
Car Instalment	100
Utility	120
Others	115

TABLE 3

(a) Given that the monthly expenses on food in the year 2000 was RM500. Calculate the monthly expenses on food in the year 2005.

DIAGRAM 1



(b) Based on the information in Table 3 and Diagram 1, calculate the composite index for the monthly expenses in the year 2005 based on the year 2000.
(c) Given that the monthly expenses for the year 2005 is RM2000. Calculate the monthly expenses for the year 2000

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SPM QUESTIONS

1. Diagram 2 is a bar chart indicating the weekly cost of the items *P*, *Q*, *R*, *S* and *T* for the year 1990. Table 3 shows the price and the price indices for the items.

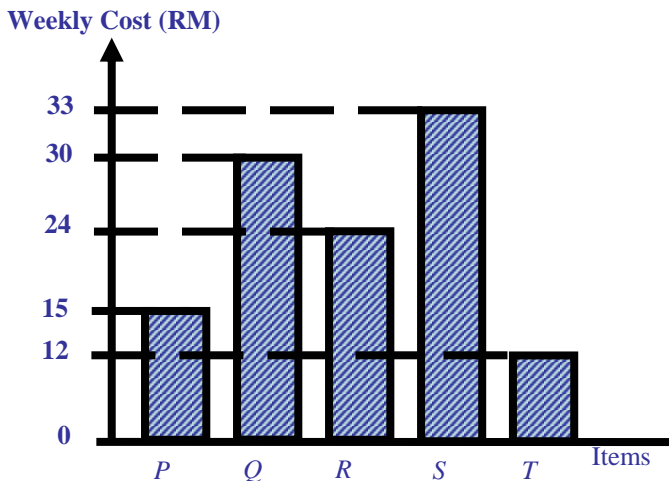


DIAGRAM 2

Items	Price in 1990	Price in 1995	Price Index in 1995 based on 1990
<i>P</i>	x	RM0.70	175
<i>Q</i>	RM2.00	RM2.50	125
<i>R</i>	RM4.00	RM5.50	y
<i>S</i>	RM6.00	RM9.00	150
<i>T</i>	RM2.50	Z	120

TABLE 3

- (a) Find the value of
 (i) x ,
 (ii) y ,
 (iii) z .

Answer	
a i) $x = \text{RM}0.40$	ii) $y = 137.5$
iii) $z = \text{RM}3.00$	b) 140.9
c) 642.50	d) 169.1

- (b) Calculate the composite index for the items in the year 1995 based on the year 1990.
- (c) The total monthly cost of the items in the year 1990 is RM456. Calculate the corresponding total monthly cost for the year 1995.
- (d) The cost of the items increase by 20% from the year 1995 to the year 2000. Find the composite index for the year 2000 based on the year 1990.

(SPM 2003, Paper 2, Question 13)

2. Table 4 shows the price indices and percentage of usage of four items, *P*, *Q*, *R* and *S*, which are the main ingredients in the production of a type of biscuit.

Items	Price index for the year 1995 base on the year 1993	Percentage of usage (%)
<i>P</i>	135	40
<i>Q</i>	x	30
<i>R</i>	105	10
<i>S</i>	130	20

TABLE 4

- (a) Calculate
- (i) the price of *S* in the year 1993 if its price in the year 1995 is RM37.70
- (ii) the price index of *P* in the year 1995 based on the year 1991 if its price index in the year 1993 based on the year 1991 is 120.
- (b) The composite index number of the cost of biscuit production for the year 1995 based on the year 1993 is 128.
- (i) the value of x ,
- (ii) the price of a box of biscuit in the year 1993 if the corresponding price in the year 1995 is RM32.

(SPM 2004, Paper 2, Question 12)
 Answer a) i) RM29.00 ii) 162
 b) i) 125 ii) RM25.00