5. Index Numbers

Exercise 5.1

Find the price index number using simple aggregate Method in each of the following examples:

1. Use 1995 as base year in the following problem:

Commodity	P	Q	R	S	T
Price (in ₹) in 1995	15	20	24	22	28
Price (in ₹) in 2000	27	38	32	40	45

Solution:
Here, Base year = 1995
∴ Po = Price in the year 1995 and
P1 = Price in the year 2000.

Commodity	Price (in ₹)	
	p_0	p_1
P	15	27
Q	20	38
R	24	32
S	22	40
T	28	45
TOTAL	$\sum p_0 = 109$	$\sum p_1 = 182$

Price index number by simple aggression method.

$$Po1 = \frac{\sum p1}{\sum po} \times 100$$

$$= \frac{182}{109} \times 100$$

$$= 1.6697 \times 100$$

$$= 166.97$$

Hence, price index number is 166.97.

2. Use 1995 as base year in the following problem:

Commodity	A	B	C	D	E
Price (in ₹) in 1995	42	30	54	70	120
Price (in ₹) in 2000	60	55	74	110	140

Solution:
Here, Base year = 1995
∴ Po = Price in the year 1995 and
P1 = Price in the year 2000.

Commodity	Price (in ₹)	
	p_0	p_1
A	42	60
B	30	55
C	54	74
D	70	110
E	120	140
TOTAL	$\sum p_0 = 316$	$\sum p_1 = 439$

Price index number by simple aggression method.

$$Po1 = \frac{\sum p1}{\sum po} \times 100$$

$$= \frac{439}{316} \times 100$$

$$= 1.3892 \times 100$$

$$= 138.92$$

Hence, price index number is 138.92.

3.

Commodity	Units	Base year Price (in ₹)	Current year price (in ₹)
Wheat	Kg	28	36
Rice	Kg	40	56
Milk	Liter	35	45
Clothing	meter	82	104
Fuel	liter	58	72

Solution:
Here, po = price in base year
P1 = Price in current years.

Commodity	Unit	Price (in ₹)	
		p_0	p_1
Wheat	kg	28	36
Rice	kg	40	56
Milk	liter	35	45
Clothing	meter	82	104
Fuel	liter	58	72
TOTAL		$\sum p_0 = 243$	$\sum p_1 = 313$

Price index number by simple aggression method.

$$P_{01} = \frac{\sum p_1}{\sum p_o} \times 100$$

$$= \frac{313}{243} \times 100$$

$= 1.2881 \times 100$
$= 128.81$
Hence, price index number is 128.81.

4. Use 2000 as base year in the following problem:

Commodity	Price (in ₹) For year 2000	Price (in ₹) For year 2006
Watch	900	1475
Shoes	1760	2300
Sunglasses	600	1040
Mobiles	4500	8500

Solution:
Here, Base year = 1995
∴ Po = Price in the year 2000 and
P1 = Price in the year 2006.

Commodity	Price (in ₹)	
	p_0	p_1
watch	900	1475
Shoes	1760	2300
Sunglasses	600	1040
Mobiles	4500	8500
Total	$\sum p_0 = 7760$	$\sum p_1 = 13315$

Price index number by simple aggression method.

$$Po1 = \frac{\sum p1}{\sum po} \times 100$$

$$= \frac{13315}{7760} \times 100$$

$$= 1.7159 \times 100$$

$$= 171.59$$

Hence, price index number is 171.59.

5. Use 1990 as base year in the following problem:

Commodity	Unit	Price in 1990 (in ₹)	Price in 1997 (in ₹)
Butter	Kg	27	33
Cheese	Kg	30	36
Milk	Liter	25	29
Bread	Loaf	10	14
Eggs	doze	24	36
Ghee	tin	250	320

Solution:

Here, base year = 1990

∴ Po = Price in the year 1990 and

P1 = price in the year 1997.

Commodity	Unit	Price (in ₹)	
		p_0	p_1
Butter	kg	27	33
Cheese	kg	30	36
Milk	liter	25	29
Bread	loaf	10	14
Eggs	doz	24	36
Ghee	tin	250	320
Total		$\sum p_0 = 366$	$\sum p_1 = 468$

Price index number:

$$Po1 = \frac{\sum p1}{\sum po} \times 100$$

$$= \frac{468}{366} \times 100$$

$$= 1.2787 \times 100$$

$$= 127.87$$

Hence, price index number is 127.87.

6. Assume 2000 to be base year in the following Problem:

Fruits	Units	Price in 2000 (in ₹)	Price in 2007 (in ₹)
Mango	Doze	250	300
Banana	Doze	12	24
Apple	Kg	80	110
Peach	Kg	75	90
Orange	Doze	36	65
Sweet line	doze	30	45

Solution:

Here, base year = 1990

∴ Po = Price in the year 2000 and

P1 = price in the year 2007.

Commodity	Unit	Price (in ₹)	
		p_0	p_1
Mango	doz	250	300
Banana	doz	12	24
Apple	kg	80	110
Peach	kg	75	90
Orange	doz	36	65
Sweet Lime	doz	30	45
Total		$\sum p_0 = 483$	$\sum p_1 = 634$

Price index number:

$$Po1 = \frac{\sum p1}{\sum po} \times 100$$

$$= \frac{634}{483} \times 100$$

$$= 1.3126 \times 100$$

$$= 131.26$$

Hence, price index number is 131.26

7. Use 2005 as base year in the following

Vegetable	Units	Price in 2005 (in ₹)	Price in 2012 (in ₹)
Ladyfinger	Kg	32	38
Capsicum	Kg	30	36
Urinal	Kg	40	60
Tomato	Kg	40	62
Potato	kg	16	28

Solution:

Here, base year = 1990

∴ Po = Price in the year 2005 and

P1 = price in the year 2012.

Commodity	Unit	Price (in ₹)	
		p_0	p_1
Ladyfinger	kg	32	38
Capsicum	kg	30	36
Brinjal	kg	40	60
Tomato	kg	40	62
Potato	kg	16	28
Total		$\sum p_0 = 158$	$\sum p_1 = 224$

Price index number:

$$Po1 = \frac{\sum p1}{\sum po} \times 100$$

$$= \frac{224}{158} \times 100$$

$$= 1.4177 \times 100$$

$$= 141.77$$

Hence, price index number is 141.77.

8. Find the quantity index number using simple Aggression method in each of the following example:

Commodity	I	II	III	IV	V
Base year quantities	140	120	100	200	225
Current year quantities	100	80	70	150	185

Solution:

Let, qi = Quantity of base year and

q1 = Quantity of current year.

Commodity	Quantity	
	q_0	q_1
I	140	100
II	120	80
III	100	70
IV	200	150
V	225	185
Total	$\sum p_0 = 785$	$\sum p_1 = 585$

Quantity index number by simple aggression method:

$$Q01 = \frac{\sum q1}{\sum qo} \times 100$$

$$= \frac{585}{785} \times 100$$

$$= 0.7452 \times 100$$

$$= 74.52$$

Hence, Quantity index number 74.52.

9.

Commodity	A	B	C	D	E
Base year quantities	360	280	340	160	260
Current year Quantities	440	320	470	210	300

Solution:

Let, qi = Quantity of base year and

q1 = Quantity of current year.

Commodity	Quantity	
	q_0	q_1
Ladyfinger	360	440
Capsicum	280	320
Brinjal	340	470
Tomato	160	210
Potato	260	300
Total	$\sum q_0 = 1400$	$\sum q_1 = 1740$

Quantity index number by simple aggression method.

$$Q01 = \frac{\sum q1}{\sum qo} \times 100$$

$$= \frac{1740}{1400} \times 100$$

$$= 1.2429 \times 100$$

$$= 124.29$$

Hence, Quantity index number 124.29.

10. Find the value index number using simple aggression method
In each of the following examples:

Commodity	Base Year		Current Year	
	Price (in ₹)	Quantity	Price (in ₹)	Quantity
A	30	22	40	18
B	40	16	60	12
C	10	38	15	24
D	50	12	60	16
E	20	28	25	36

Solution:

Here, Po = Price in base year, P1 = price in current year.
Qi = Quantity of base year and
q1 = Quantity of current year.

Commodity	Base Year		Current Year		p_0q_0	p_1q_1
	p_0	q_0	p_1	q_1		
A	30	22	40	18	660	720
B	40	16	60	12	640	720
C	10	38	15	24	380	360
D	50	12	60	16	600	960
E	20	28	25	36	560	900
Total					$\sum p_0q_0 = 2840$	$\sum p_1q_1 = 3660$

Value Index number by simple Aggression method:

$$Vo1 = \frac{\sum p1q1}{\sum poqo} \times 100$$

$$= \frac{3660}{2840} \times 100$$

$$= 1.2887 \times 100$$

$$= 128.87$$

Hence, Value index number is 128.87.

11.

Commodity	Base Year		Current Year	
	Price (in ₹)	Quantity	Price (in ₹)	Quantity
A	50	22	70	14
B	70	16	90	22
C	60	18	105	14
D	120	12	140	15
E	100	22	155	28

Solution:

Po = price in base year

P1 = price in current year

Qi = quantity of base year

q1 = Quantity of current year

Commodity	Base Year		Current Year		p_0q_0	p_1q_1
	p_0	q_0	p_1	q_1		
A	50	22	70	14	1100	980
B	70	16	90	22	1120	1980
C	60	18	105	14	1080	1470
D	120	12	140	15	1440	2100
E	100	22	155	28	2200	4340
Total					$\sum p_0q_0 = 6940$	$\sum p_1q_1 = 10870$

Value index number by simple aggression method:

$$Vo1 = \frac{\sum p1q1}{\sum poqo} \times 100$$

$$= \frac{10870}{6940} \times 100$$

$$= 1.5663 \times 100$$

$$= 156.63$$

Hence, Value index number is 156.63.

12. Find x, if price index number by simple aggression Method is 125:

Commodity	P	Q	R	S	T
Base year price in (in ₹)	8	12	16	22	18
Current year price (in ₹)	12	18	x	28	22

Solution:

Given: Po1 = 125, x =?

Commodity	Price (in ₹)	
	Base Year p_0	Current Year p_1
p	8	12
Q	12	18
R	16	x
S	22	28
T	18	22
Total	$\sum p_0 = 76$	$\sum p_1 = 80 + x$

Now, price index number

$$Po1 = \frac{\sum p1}{\sum po} \times 100$$

$$125 = \frac{80 + x}{76} \times 100$$

$$\frac{125 \times 76}{100} = 80 + x$$

$\therefore 95 = 80 + x$

$\therefore 95 - 80 = x$

$\therefore x = 15$

Hence, the value of x is ₹ 15.

13. Find y, if the price index number by simple Aggression method is 120, takin 1995 as base year.

Commodity	A	B	C	D
price in (in ₹) in 1995	95	Y	80	35
price (in ₹)in 2003	116	74	92	42

Solution:

Here, Base year = 1995

$\therefore$ Po = price in 1995 and

P1 = price in 2003.

Given: Po = 120, y =?

Commodity	Price (in ₹)	
	Base Year p_0	Current Year p_1
A	95	116
B	y	74
C	80	92
D	35	42
Total	$\sum p_0 = 210 + y$	$\sum p_1 = 324$

Now, price index number

$$Po1 = \frac{\sum p1}{\sum po} \times 100$$

$$120 = \frac{324}{210 + y} \times 100$$

$\therefore 120(120+ y) = 32400$

$\therefore\ 210 + y = \frac{23400}{120}$

$\therefore 210 + y = 270$

$\therefore y = 270 - 210$

$\therefore y = 60$

Hence, the value of y is ₹ 60.

Exercise 5.2

1. Calculate lapser's apaches, Dobrich – bowlers And marshal – edge worth price index numbers in

Problem 1 and 2:

Commodity	Base year		Current Year	
	Price	Quantity	Price	Quantity
A	8	20	11	15
B	7	10	12	10
C	3	30	5	25
D	2	50	4	35

Solution:

Commodity	Price (in ₹)				p_1q_0	p_0q_0	p_1q_1	p_0q_1
	Base Year		Current Year					
	p_0	q_0	p_1	q_1				
A	8	20	11	15	220	160	165	120
B	7	10	12	10	120	70	120	70
C	3	30	5	25	150	90	125	75
D	2	50	4	35	200	100	140	70
Total					$\sum p_1q_0 = 690$	$\sum p_0q_0 = 420$	$\sum p_1q_1 = 550$	$\sum p_0q_1 = 335$

Laspeyre's price index number:

$Po1(L) = \frac{\sum p1qo}{\sum poqo} \times 100$

$= \frac{690}{420} \times 100$

$= 1.6429 \times 100$

$= 164.29$

Paasche's price index number:

$$Po1(P) = \frac{\sum p1qo}{\sum poqo} \times 100$$

$$= \frac{550}{335} \times 100$$

$$= 1.6418 \times 100 = 164.18$$

Dorbish- Bowley's price index number:

Pol (D - B)

$$\rightarrow = \frac{\frac{\sum p1qo}{\sum poqo} + \frac{\sum p1q1}{\sum poq1}}{2} \times 100$$

$$= \frac{1.6429 + 1.6418}{2} \times 100$$

$$= \frac{3.2847}{2} \times 7$$

$$= 1.6424 \times 100$$

$$= 164.24$$

2.

Community	Base Year		Current Year	
	Price	Quantity	Price	Quantity
I	10	9	20	8
II	20	5	30	4
III	30	7	50	5
IV	40	8	60	6

Solution:

Community	Base Year		Current Year					
	p_0	q_0	p_1	q_1	p_1q_0	p_0q_0	p_1q_1	p_0q_1
I	10	9	20	8	180	90	160	80
II	20	5	30	4	150	100	120	80
III	30	7	50	5	350	210	250	150
IV	40	8	60	6	480	320	360	240
					$\sum p_1q_0 = 1160$	$\sum p_0q_0 = 720$	$\sum p_1q_1 = 890$	$\sum p_0q_1 = 550$

Laspeyre's price index number:

$$Po1(L) = \frac{\sum p1qo}{\sum poqo} \times 100$$

$$= \frac{1160}{720} \times 100$$

$$= 1.6111 \times 100$$

$$= 161.11$$

Paasche's price index number:

$$Po1(P) = \frac{\sum p1qo}{\sum poq1} \times 100$$

$$= \frac{890}{550} \times 100$$

$$= 1.6152 \times 100 = 161.82$$

Dorbish- Bowley's price index number:

Pol (D - B)

$$\rightarrow = \frac{P01(L) + PO1(P)}{2}$$

$$= \frac{161.11 + 161.82}{2}$$

$$= \frac{322.93}{2}$$

$$= 161.46$$

Marshall – Edgeworth's price index number:

Pol (M - E)

$$\rightarrow = \frac{\sum p1qo + \sum p1q1}{\sum poqo + \sum poq1} \times 100$$

$$= \frac{1160 + 890}{720 + 550} \times 100$$

$$= \frac{2050}{1270} \times 100$$

$$= 1.6142 \times 100$$

$$= 161.42$$

3. Calculate walsch's price index number in problem 3 and 4.

Community	Base Year		Current Year	
	Price	Quantity	Price	Quantity
L	4	16	3	19
M	6	16	8	14
N	8	28	7	32

Solution:

Community	Base Year		Current Year		p_0q_1	$\sqrt{q_0q_1}$	$P_1\sqrt{q_0q_1}$	$P_0\sqrt{q_0q_1}$
	p_0	q_0	p_1	q_1				
L	4	16	3	19	304	17.44	52.32	69.76
M	6	16	8	14	224	14.97	119.76	89.82
N	8	28	7	32	896	29.93	209.51	239.44
Total							$\sum p_1\sqrt{q_0q_1}$ = 381.59	$\sum p_0\sqrt{q_0q_1}$ = 381.59

Walsh's price index number:

$$Po1\,(W) = \frac{\sum p1\sqrt{qoq1}}{\sum po\sqrt{qoq1}} \times 100$$

$$= \frac{381.59}{399.02} \times 100$$

$$= 0.9563 \times 100 = 95.36$$

4.

Community	Base Year		Current Year	
	Price	Quantity	Price	Quantity
I	10	12	20	9
II	20	4	25	8
III	30	13	40	27
IV	60	29	75	36

Solution:

Community	Base Year		Current Year		p_0q_1	$\sqrt{q_0q_1}$	$P_1\sqrt{q_0q_1}$	$P_0\sqrt{q_0q_1}$
	p_0	q_0	p_1	q_1				
I	10	12	20	9	108	10.39	207.8	103.9
II	20	4	25	8	32	5.66	141.5	113.2
III	30	13	40	27	351	18.73	749.2	561.9
IV	60	29	75	36	32.31	32.31	2423.2	1938.6
Total							$\sum p_1\sqrt{q_0q_1} = 3521.75$	$\sum p_0\sqrt{q_0q_1} = 2717.6$

Walsch's price index number:

$$Po1\,(W) = \frac{\sum p1\sqrt{qoq1}}{\sum po\sqrt{qoq1}} \times 100$$

$$= \frac{3521.75}{2717.6} \times 100$$

$$= 1.2959 \times 100 = 129.59$$

5. If Po1 (L) = 90 and Po1 (P) = 40, Find Po1 (D-B) And Po1(F).

Solution:

If Po1 (L) = 90 and Po1 (P) = 40, Find Po1 (D-B) = ? , Po1(F).

We have, pol (D - B)

$$\rightarrow = \frac{Po1(L) + Po1(P)}{2}$$

$$= \frac{90 + 40}{2} = \frac{130}{2}$$

$= 65$

We known that Po1 (F) is geometric mean of Po1(L) and Po1 (P).

∴ pol (F)

$$\rightarrow \sqrt{Po1(L) \times Po1\,(P)}$$

$$= \sqrt{90 \times 40}$$

$$= \sqrt{3600}$$

$= 60$

6. If ∑Poqo = 140, ∑Poq1 = 200, ∑P1qo = 350 and ∑p1q1 = 460. Find laspeyre's paasche's, Dorbish – bowley's and Marshall – edgeworth's price index number.

Solution:

∑Poqo = 140, ∑Poq1 = 200, ∑P1qo = 350 and ∑p1q1 = 460.

Laspeyre's price index number:

$$Po1\,(L) = \frac{\sum P1qo}{\sum Poqo} \times 100$$

$$= \frac{350}{140} \times 100$$

$= 2.5 \times 100$

$= 250$

Dorbish bowley's price index number.

Pol (D - B)

$$\rightarrow = \frac{\frac{\sum p1qo}{\sum poqo} + \frac{\sum p1q1}{\sum poq1}}{2} \times 100$$

$$= \frac{2.5 + 2.3}{2} \times 100$$

$$= \frac{4.8}{2} \times \ 100$$

$= 2.4 \times 100 = 240$

Marshall – edgeworth's price index number:

Pol (M - E)

$$\rightarrow = \frac{\sum p1qo + \sum p1q1}{\sum poqo + \sum poq1} \times 100$$

$$= \frac{350 + 460}{140 + 200} \times 100$$

$= \frac{810}{340} \times 100$
$= 2.3824 \times 100$
$= 238.24$

7. Give that, the laspeyre's and Dorbish – bowley's Price index number are 160.32 and 164.18 respectively. Find the paache's price index number:

Solution:
Po1(L) = 160.32, Po1(D-B) = 164.18, Po1(P)= ?
We known that,

$$Po1\ (D-B) = \frac{Po1(L) + Po1(P)}{2}$$

$$\therefore 164.18 = \frac{160.32 + Po1(P)}{2}$$

$\therefore 2(164.18) = 160.32 + Po1\ (P)$
$\therefore 328.36 - 160.32 = Po1(P)$
$\therefore 168.04 = Po1(P)$
$\therefore Po1(P) = 168.04$

8. Given that ∑Poqo = 220, ∑Poq1 = 380, ∑P1q1= 350, And marshall-edgeworth's price index number is 150. Find laspeyre's price index number:

Solution:
∑Poqo = 220, ∑Poq1 = 380, ∑P1q1= 350,
Po1 (M-E) = 150, Po1 (L) =?
We have,
Pol (M - E)

$$\rightarrow = \frac{\sum p1qo + \sum p1q1}{\sum poqo + \sum poq1} \times 100$$

$$\therefore 150 = \frac{\sum p1qo + 350}{220 + 380} \times 100$$

$$\therefore 150 = \frac{\sum p1qo + 350}{600} \times 100$$

$\therefore 150 \times 6 = \sum P1q0 + 350$
$\therefore 900 - 350 = \sum P1q0$
$\therefore \sum P1q0 = 550$
Now,

$$Po1(L) = \frac{\sum P1q0}{\sum Poq0} \times 100$$

$$= \frac{550}{220} \times 100$$

$= 2.5 \times 100$
$= 250$

9. Find x in the following table if laspeyre's andPaasche's price index number are equal:

Community	Base Year		Current Year	
	Price	Quantity	Price	Quantity
A	2	10	2	5
B	2	5	x	2

Solution:
Given: Po1 (L) = Po1 (P)

Community	Base Year		Current Year		p_1q_0	p_0q_0	p_1q_1	p_0q_1
	p_0	q_0	p_1	q_1				
A	2	10	2	5	20	20	10	10
B	2	5	x	2	5x	10	2x	4
					$\sum p_1q_0 = 20 + 5x$	$\sum p_0q_0 = 30$	$\sum p_1q_1 = 10 + 2x$	$\sum p_0q_1 = 14$

We have,

$$Po1(L) = \frac{\sum P1q0}{\sum Poq0} \times 100$$

$$= \frac{20 + 5x}{30} \times 100$$

$$Po1(P) = \frac{\sum P1q1}{\sum Poq1} \times 100$$

$$= \frac{10 + 2x}{14} \times 100$$

Given: Po1 (L) = Po1 (P)

$$= \frac{20 + 5x}{30} \times 100$$

$$\rightarrow = \frac{10 + 2x}{14} \times 100$$

$$\therefore \frac{20 + 5x}{30} = \frac{10 + 2x}{14}$$

$\therefore 280x + 70x = 300 + 60x$
$\therefore 70x - 60x = 300 - 280$
$\therefore 10x = 20$
$\therefore x = 2$
Hence, x =2.

10. If laspeyre's price index number is four times Paasche's price index number, then find the
Relation between Dorbish – bowley's and fisher's Price index numbers.

Solution:
Given: Po1 (L) =4Po1 (P)
We have,
Pol (D - B)
$\rightarrow = \frac{po1(L) + Po1(P)}{2}$
$= \frac{4Po1(P) + Po1(P)}{2}$
$= \frac{5P01(P)}{2}$
$= 2.5P\ o1\ (P) \ldots (1)$
Also, we have,
$Po1(F) = \sqrt{Po1(L) \times Po1(P)}$
$= \sqrt{4P01(P) \times Po1(P)}$
$= 2po1(P) \ldots . (2)$
From (1), Pol(P)
$\rightarrow = \frac{Po1\,(D-B)}{2.5} \ldots (3)$

From (2), Pol (P)
$\rightarrow = \frac{Po1(F)}{2} \ldots (4)$
From (3) and (4),
$\frac{Po1\,(D-B)}{2.5} = \frac{Po1(F)}{2}$
∴ Pol (D - B)
$\rightarrow = \frac{2.5Po1(F)}{2}$
$\rightarrow = \frac{5}{4} Po1(F)$
Hence, Pol (D - B)
$\rightarrow = \frac{5}{4} Po1(F)$

11. If Dorbish – Bowley's and Fisher's price index Number are 5 and 4 respectively, then find
Laspeyre's and paasche's price index number:

Solution:
Given: Po1(D-B) = 5 and Po1(F) =4, Po1(L) = ?, Po1(P) ?

We have, P0l (D - B)

$\rightarrow = \frac{Po1(L) + Po1(P)}{2}$

$\therefore 5 = \frac{Po1(L) + Po1(P)}{2}$

$\therefore po1(L) + Po1(P) = 10$

$\therefore$ Po1(L) + Po1(P) = 10 ... (1)

Also, Pol (F)

$= \sqrt{Po1(L) \times Po1(P)}$

$\therefore 4 = \sqrt{Po1(L) \times Po1(P)}$

$\therefore P01(L) \times Po1(P) = 16 \quad ...(2)$

Now, we have

$[Po1(L) - Po1(P)]^2$

$= [Po1(L) - Po1(P)]^2$

$\rightarrow -4P01\ (L)\ .Po1(P)$

$= (10)^2 - 4\ (16)$

= 100 – 64

= 36

$\therefore\ Po1(L) - Po1(P) = \pm 6 \quad ....(3)$

Adding equation (1) and (3) we get

2Po1(L) = 16

$\therefore$ Po1(L) = 8

Using this result in (1), we get

Po1(P) = 2

If we take Po1(L) – Po1(P) = - 6 then

Po1(L) = 2 and Po1(P) = 8

Hence, Po1(L) = 8 and Po1(P) = 2

Exercise 5.3

1. Calculate the cost of living index in problem 1 to 3:

Community	Base Year		Current Year
	Price	Quantity	Price
Food	120	15	170
Clothing	150	20	190
Fuel and Lighting	130	30	220
House rent	160	10	180
Miscellaneous	200	12	200

Solution:

Community	Base Year		Current Year	p_1q_0	p_0q_0
	p_0	q_0	p_1		
Food	120	15	170	2250	1800
Clothing	150	20	190	3800	3000
Fuel and Lighting	130	30	220	6600	3900
House rent	160	10	180	1800	1600
Miscellaneous	200	12	200	2400	2400
Total				$\sum p_1q_0 = 17150$	$\sum p_0q_0 = 12700$

By aggression expenditure method,

$$CLI = \frac{\sum P1PO}{\sum POqo} \times 100$$

$$\rightarrow = \frac{17150}{12700} \times 100$$

$$= 1.3504 \times 100$$

$$= 135.04$$

Hence, Cost of living index number is 135.04.

2.

Community	Base Year		Current Year
	Price	Quantity	Price
Food	40	15	45
Clothing	30	10	35
Fuel and Lighting	20	17	25
House rent	60	22	70
Miscellaneous	70	25	80

Solution:

Community	Base Year		Current Year	p_1q_0	p_0q_0
	p_0	q_0	p_1		
Food	40	15	45	675	600
Clothing	30	10	35	350	300
Fuel and Lighting	20	17	25	425	340
House rent	60	22	70	1540	1320
Miscellaneous	70	25	80	2000	1750
Total				$\sum p_1q_0 = 4990$	$\sum p_0q_0 = 4310$

By aggression expenditure method,

$$CLI = \frac{\sum P1PO}{\sum POqo} \times 100$$

$$\rightarrow = \frac{4990}{4310} \times 100$$

$$= 1.1578 \times 100$$

$$= 115.78$$

Hence, Cost of living index number is 115.78.

3.

Community	Base Year		Current Year
	Price	Quantity	Price
Food	132	10	170
Clothing	154	12	160
Fuel and Lighting	164	20	180
House rent	175	18	195
Miscellaneous	128	5	120

Solution:

Community	Base Year		Current Year	p_1q_0	p_0q_0
	p_0	q_0	p_1		
Food	132	10	170	1700	1320
Clothing	154	12	160	1920	1848
Fuel and Lighting	164	20	180	3600	3280
House rent	175	18	195	3510	3150
Miscellaneous	128	5	120	600	640
Total				$\sum p_1q_0 = 11330$	$\sum p_0q_0 = 10238$

By aggression expenditure method,

$$CLI = \frac{\sum P1PO}{\sum POqo} \times 100$$

$$\rightarrow = \frac{11330}{10238} \times 100$$

$$= 1.1067 \times 100$$

$$= 110.67$$

Hence, Cost of living index number is 110.67.

4.

Group	Food	Clothing	Fuel and Lighting	House rent	Miscellaneous
I	70	90	100	60	80
W	5	3	2	4	6

Solution:

Community	I	W	IW
Food	132	10	170
Clothing	154	12	160
Fuel and Lighting	164	20	180
House rent	175	18	195
Miscellaneous	128	5	120
Total		∑W=20	∑IW=1540

By family budget method:

$$CLI = \frac{\sum IW}{\sum W} = \frac{1540}{20} = 77$$

Hence, cost of living index number is 77.

5.

Group	Food	Clothing	Fuel and Lighting	House rent	Miscellaneous
I	400	300	150	120	100
W	3	3	4	5	2

Solution:

Community	I	W	IW
Food	400	3	1200
Clothing	300	3	900
Fuel and Lighting	150	4	600
House rent	120	5	600
Miscellaneous	100	2	200
Total		∑W=17	∑IW=3500

By family budget method,

$$CLI = \frac{\sum IW}{\sum W}$$

$$\rightarrow = \frac{3500}{17} = 205.88$$

Hence, cost of living index number is 205.88.

6.

Group	Food	Clothing	Fuel and Lighting	House rent	Miscellaneous
I	200	150	150	120	160
W	30	20	10	40	50

Solution:

Community	I	W	IW
Food	400	3	1200
Clothing	300	3	900
Fuel and Lighting	150	4	600
House rent	120	5	600
Miscellaneous	100	2	200
Total		∑W=17	∑IW=3500

By family budget method,

$$CLI = \frac{\sum IW}{\sum W}$$

$$\rightarrow = \frac{25400}{150} = 169.33$$

Hence, cost of living index number is 169.33.

7. Find x, if the cost of living index is 150.

Group	Food	Clothing	Fuel and Lighting	House rent	Miscellaneous
I	180	120	300	100	160
W	4	5	6	x	3

Solution:

Community	I	W	IW
Food	180	4	720
Clothing	120	5	600
Fuel and Lighting	300	6	1800
House rent	100	x	100x
Miscellaneous	160	3	480
Total		∑W=18+x	∑IW=3600+100x

By family budget method,

$CLI = \frac{\sum IW}{\sum W}$

Given: CLI = 150

$\therefore\ 150 = \frac{3600 + 150x}{18 + x}$

$\therefore 150(18+x) = 3600 + 100x$

$\therefore 2700 + 150x = 3600 + 100x$

$\therefore 150x - 100x = 3600 - 2700$

$\therefore 50x = 900$

$\therefore x = 18$

Hence, x is 18.

8. Find y, if the cost of living index is 200.

Group	Food	Clothing	Fuel and Lighting	House rent	Miscellaneous
I	180	120	160	300	200
W	4	5	3	y	2

Solution:

Community	I	W	IW
Food	180	4	720
Clothing	120	5	600
Fuel and Lighting	160	3	480
House rent	300	y	300y
Miscellaneous	200	2	400
Total		∑W=14+y	∑IW=2200+300y

By family budget method.

$$CLI = \frac{\sum IW}{\sum W}$$

Given: CLI = 200

$$\therefore\ 200 = \frac{2200 + 300y}{14 + y}$$

$\therefore$ 200(14+y) = 2200 + 300y

$\therefore$ 2800+ 200y = 2200 + 300y

$\therefore$ 2800 – 2200 = 300y – 200y

$\therefore$ 600 = 100y

$\therefore$ y = 6

Hence, y is 6.

9. The cost of living index number for the years 1995 And 1999 are 140 and 200 respectively. A person earns 11200 per month in the year 1995. What should be his Monthly earning in the year 1999 in order to maintain His Standard of living as in the year 1995?

Solution:

Here, Given that,

CLI for 1995 = 140

CLI for 1999 = 200

Earning of a person in the year 1995 = 11200 p.m

Earning for the year 1999 = ?

Earning of a person in the year 1999

$$= \frac{His\ eraning\ in\ 1995 \times CLI\ for\ 1995}{CLI\ for\ 1995}$$

$$= \frac{11200 \times 200}{140}$$

= 16000

Hence, the earning p.m, of a person in the year 1999 Should be 16000 to maintain his former standard of Living.