



MATHS

BOOKS - S CHAND MATHS (ENGLISH)

INDEX NUMBERS

Example

1. A small industrial concern used three raw materials A, B and C in its manufacturing process, the prices of the materials was as shown below:

<i>Commodity</i>	<i>Price (in ₹) in the year 1995</i>	<i>Price (in ₹) in the year 2005</i>
<i>A</i>	4	5
<i>B</i>	60	57
<i>C</i>	36	42

Using 1995 as the base year, calculate a simple aggregate price index for 2005.



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2. Compute a price index for the following by simple aggregate method:

<i>Commodity</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>
Price in 1986 (₹)	20	30	10	25	40	50
Price in 1991 (₹)	25	30	15	35	45	55



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3. For the data given below, compute the index numbers for various years by taking 1997 as the base year:

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000
Price of a commodity	4	5	6	7	8	10	9	11	12



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4. The index number for the year 2005 taking 2000 as base year for the following data was found to be 125.

Find the missing entries in the data if $\sum p_0 = 360$.

Commodities	A	B	C	D	E	F
Prices in 2000 (in ₹)	40	60	20	50	x	110
Prices in 2005 (in ₹)	55	70	40	y	100	115



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5. For the data given below, compute index numbers for various years by taking 1992 to 1994 as base period.

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000
Price of a commodity	4	5	6	7	8	10	9	11	12



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6. Calculate the price index number by simple average of relative method for the data of Ex. 2.



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7. From the following data, compute price index by using simple average of price relatives:

Commodity and unit	Price in 1989 (in ₹)	Price in 1990 (in ₹)
Butter (kg)	20.00	21.00
Cheese (kg)	15.00	14.00
Milk (lt)	3.00	3.00
Bread (l)	2.80	2.80
Eggs (doz)	6.00	8.00
Ghee (1tin)	250.00	260.00



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8. Using simple average of price relatives method, the price index for 2001, taking 1991 as base year, was found to be 127. If $\sum p_0 = 263$, find x and y from the following data:

Commodities	A	B	C	D	E	F
Prices in 1991 (in ₹)	80	70	50	x	18	25
Prices in 2001 (in ₹)	100	87.50	61	22	y	32.50



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9. Calculate the index number for the year 2005 with 2000 as the base year by weighted aggregate method from the following data:

Commodity	Price in ₹		Weights
	year 2000	year 2005	
<i>A</i>	140	180	10
<i>B</i>	400	550	7
<i>C</i>	100	250	6
<i>D</i>	125	150	8
<i>E</i>	200	300	4



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10. A family buys quantities of rice, wheat, fish, potato and coal whose prices are given below, in the ratio

3 : 1 : 3 : 2 : 2. Find the weighted aggregate price index.

Commodity	Rice	Wheat	Fish	Potato	Coal
Base Price (₹)	30	22	54	20	15
Current Price (₹)	35	25	64	25	18



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11. Construct index number for price for the year 2007 with 2005 as the base year from the following data by taking quantities in the base year as weights:

Commodity	2005		2007	
	Price	Quantity	Price	Quantity
<i>A</i>	2	8	4	6
<i>B</i>	5	10	6	5
<i>C</i>	4	14	5	10
<i>D</i>	2	19	2	3



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12. The quotations for four different commodities for the years 2000 and 2005 are given below. Calculate the index number for 2005, with 2000 as the base year, by using the weighted average of price relatives method.

Commodity	Weight	Price (in ₹) in the Year 2000	Price (in ₹) in the Year 2005
A	5	2.00	4.50
B	7	2.50	3.20
C	6	3.00	4.50
D	2	1.00	1.80



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13. Taking 1975 as the year, with an index number 100, calculate an index number for 1979, based on weighted average of price relatives derived from the table given below:

Commodity	A	B	C	D
Weight	30	15	25	30
Price per unit in 1975	20	10	5	40
Price per unit in 1979	24	20	30	40

The weights are now change if so that the weight for A is 40 and C is 10 and the total weight is 100. If the value of the index no, in 1979 with the changed weight is 182, calculate the weights applied to B and D.

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14. Compute price index for the following data by applying weighted average of price relative method.

Item	Price in 1991 (₹)	Price in 1992 (₹)	Quantity in 1991
Wheat	2.00	2.50	40 kg
Sugar	3.00	3.25	20 kg
Milk	1.50	1.75	10 litre

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15. Calculate weighted index number for 2001 from the following data:

Item	A	B	C
Quantity (units)	20	15	10
Price in 2000 (in ₹)	200	100	20
Price in 2001 (in ₹)	320	120	28



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16. The price relatives and weights of a set of commodities are given below:

Commodity	A	B	C	D
Price relative	125	120	127	119
Weight	x	$2x$	y	$y+3$

If the sum of weights is 40 and the index for the set is 122, find the numerical values of x and y .



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17. An Index of retail prices is the mean of the five other price index numbers which are weighted as follows:

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
Food 348	Rent 88	Household goods 106	Fuel and lights 65	Miscellaneous 393

The original index of retail prices are established at 100. If the following percentage increases in the various indices have occurred since that time, find the index of retail prices now.

$$A = 55\%, B = 180\%, C = 60\%, D = 45\%, E = 90\%$$

.



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1. Using the simple aggregate method, calculate the price index number from the following data:

<i>Commodities</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
1993 prices (in ₹)	50	40	10	5	2
1995 prices (in ₹)	80	60	20	10	6

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2. Using the simple aggregate method, calculate the price index number from the following data:

<i>Commodities</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	<i>F</i>
1990 prices (in ₹)	40	60	20	50	80	100
1998 prices (in ₹)	50	60	30	70	90	110

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3. Using the simple aggregate method, calculate the price index number from the following data:

<i>Commodities</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
Price in 1997	90	40	90	30
Price in 1998	95	60	110	35

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4. Using 2005 as base year, the index numbers for the price of a commodity in 2006 and 2007 are 118 and 125. Calculate the index numbers for 2005 and 2007 if 2006 is taken as the base year.

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5. Compute a price index for the following by using price relative method.

<i>Commodities</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
Price in 1991 (in ₹)	20	40	60	80	100
Price in 1992 (in ₹)	70	45	70	90	105



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6. Compute a price index for the following by using price relative method.

<i>Material</i>	<i>Cement</i>	<i>Timber</i>	<i>Steel</i>	<i>Bricks</i>
Price in 1969 (in ₹)	5	9.5	35	12
Price in 1970 (in ₹)	8	14.3	42	24



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7. The index number for the following data for the year 2008, taking 2004 as base year was found to be 116. The simple aggregate method was used for calculation. Find the numerical value of x and y if the sum of the prices in the year 2008 is Rs. 203.

<i>Commodity</i>	<i>Price (in ₹) in the year 2004</i>	<i>Price (in ₹) in the year 2008</i>
<i>A</i>	20	25
<i>B</i>	10	30
<i>C</i>	30	15
<i>D</i>	25	45
<i>E</i>	x	35
<i>F</i>	50	y



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8. Construct index numbers by the simple average of relative method for 1990 and 1991 with 1989 as the base

year.

<i>Commodity</i> <i>Price (in ₹) per unit</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
1989	100	40	30	10	20
1990	120	45	35	12	22
1991	150	60	45	15	23



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9. Construct the index number for 1991 taking 1990 as the base year from the following data by simple average of price relative method.

<i>Commodity</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
Price in 1990 (₹)	100	80	160	220	40
Price in 1991 (₹)	140	120	180	240	40



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10. Construct index number from the following data for 1991 and 1992 taking 1990 as base by using the method of simple average of price relatives:

<i>Group</i>	Price in 1990 (in ₹)	Price in 1991 (in ₹)	Price in 1992 (in ₹)
<i>A</i>	20.00	24.00	22.00
<i>B</i>	1.25	1.50	1.00
<i>C</i>	5.00	8.00	8.00
<i>D</i>	2.00	2.25	2.12



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11. The following data relate to the price of rice in different years.

<i>Year</i>	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Price (in ₹)	6	7	7	8	10	14	12	13	14	15

Find out price relatives

(i) taking 1988 as base,



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12. The following data relate to the price of rice in different years.

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Price (in ₹)	6	7	7	8	10	14	12	13	14	15

Find out price relatives

(ii) 1992 as base,



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13. The following data relate to the price of rice in different years.

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Price (in ₹)	6	7	7	8	10	14	12	13	14	15

Find out price relatives

(ii) 1992 as base,



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14. Compute a price index for the following by (i) simple aggregate and (ii) average of price relative method.

Commodity	A	B	C	D	E	F
Price in 1994 (₹)	20	30	10	25	40	50
Price in 1999 (₹)	25	30	15	35	45	55



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15. Construct an index for 1998 taking 1997 as base by Average of Relatives.

<i>Commodity</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
Price in 1997	5	4	8	11	2
Price in 1998	7	6	9	12	2

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16. Construct the consumer price index number for 1990 taking 1989 as the base year and using simple average of price relative method for the following data:

<i>Commodities</i>	<i>Price in 1989</i>	<i>Price in 1990</i>
Butter	20	21
Cheese	16	12
Milk	3	3
Eggs	2.80	2.80

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Exercise 30 B

1. Explain briefly, what is meant by a "weighted average".

Calculate a cost of living index from the following table of prices and weights.

	<i>Weight</i>	<i>Price index</i>
Food	35	108.5
Rent	9	102.6
Clothes	10	97.0
Fuel	7	100.9
Miscellaneous	39	103.7



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2. Taking 1975 as the base year with an index number 100, calculate an index number for 1985 based on weighted

average of price relatives derived from the table given

below:

<i>Commodity</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
Weight	20	30	10	40
Price per unit in 1975	10	20	5	40
Price per unit in 1985	30	35	10	80



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3. Calculate the index number for the year 1979 with 1970 as base from the following data using weighted average of price relatives.

<i>Commodity</i>	<i>Weights</i>	<i>Price in ₹</i>	
		<i>1970</i>	<i>1979</i>
<i>A</i>	22	2.50	6.20
<i>B</i>	48	3.30	4.40
<i>C</i>	17	6.25	12.75
<i>D</i>	13	0.65	0.90



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4. Construct a composite index number, as a weighted mean from the following data:

<i>Index number</i>	122	145	101	98	137	116
<i>Weight</i>	7	2	4	1	6	5

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5. Construct a composite index number from the following index numbers and weights:

<i>Index numbers</i>	127	142	186	172	115
<i>Weight</i>	5	4	3	6	8

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6. A small industrial concern used three raw materials A, B and C in its manufacturing process.

The price, in £ per kg, of these materials are shown below:

	<i>1957</i>	<i>1967</i>
<i>A</i>	4	5
<i>B</i>	60	57
<i>C</i>	36	42

Using 1957 as the base year, calculate for 1967.

(i) a simple aggregate price index.



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7. A small industrial concern used three raw materials A, B and C in its manufacturing process.

The price, in £ per kg, of these materials are shown below:

	<i>1957</i>	<i>1967</i>
<i>A</i>	4	5
<i>B</i>	60	57
<i>C</i>	36	42

Using 1957 as the base year, calculate for 1967.

(i) a simple aggregate price index.



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8. A manufacturer uses 4 raw materials A, B, C, D in the production of a certain commodity. Masses of raw materials used in manufacturing are in the ratio 2 : 3 : 4 : 1. The prices, in Rs, of the materials per kilogram

in the years 1978, 1980 are given in the following table:

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
1978	8	12	6	18
1980	9.50	13	7.50	20

Calculate the index number for the total cost of the raw materials used for the manufacture of the commodity in, 1980, using 1978 as the base year.

If the commodity is sold for Rs. 5.75 in 1978, calculate the selling price in 1980, on the assumption that selling prices are directly proportional to the cost of raw material.



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9. The table shows the averages prices of coffee, sugar and milk in 1979 and 1980, and the weights used to calculate the cost of making a cup of coffee,

	<i>Cost in 1979</i> <i>(per kg)</i> ₹ (p_0)	<i>Cost in 1980</i> <i>(per kg)</i> ₹ (p_1)	<i>Weights</i> <i>(w)</i>
Sugar	3	7	3
Milk	3	3.50	4
Coffee	90	120	2

Calculate, correct to one decimal place, the index number for the cost of a cup of coffee in 1980 using.

(i) weighted price relatives, (ii) weighted aggregates

taking the index number for 1979 as 100 in each case.



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10. An enquiry into the budget of the middle class families in a city in England gave the following information:

What is the cost of living index of 2004 as compared with that of 1995 are seen?

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11. Calculate the cost of living index number from the following group data:

<i>Group</i>	<i>Weights</i>	<i>Group Index No.</i>
Food.	47	247
Fuel and Lighting	7	293
Clothing	8	289
House rent	13	100
Miscellaneous	14	236

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12. The following commodities have the given price indices relative to a base of 100. The weights are also given.

	<i>Relative index</i>	<i>Weight</i>
Butter	181	4
Bread	116	12
Tea	110	3
Bacon	152	7

Calculate the new index for this set of commodities.

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13. Calculate an index number for the second year, taking the first year as base, taking into account the prices of the four commodities (in Rs. per kg) and the weights

given here under.

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>
I year	30	28	36	28
II year	42	35	45	42
Weight	24	14	6	25



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14. Construct the consumer price index number for 1988 on basis of 1998 from the following data:

<i>Commodity</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
Weights	40	25	5	20	10
Price (₹ per unit) 1988	16.00	40.00	0.50	5.12	2.00
Price (₹ per unit) 1998	20.00	60.00	0.50	6.25	1.50



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15. Calculate the index number for the year 2006 with 1996 as the base year by the weighted average of price

relatives method from the following data.

<i>Commodity</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
Weight	40	25	5	20	10
Price (₹ per unit) year 1996	32.00	80.00	1.00	10.24	4.00
Price (₹ per unit) year 2006	40.00	120.00	1.00	15.36	3.00



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16. Calculate the cost of living index for the following data:

<i>Commodity</i>	<i>Weight</i>	$x = \frac{P_1 \times 100}{P_0}$
<i>A</i>	22	248
<i>B</i>	48	133.30
<i>C</i>	17	204
<i>D</i>	13	138.50



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17. Find the consumer price index number for 1991 on the base of 1990 from the following data, using the method of weighted relatives.

Item	Quantity	Price in 1990 (₹)	Price in 1991 (₹)
A	20 units	200	320
B	14 units	400	420
C	15 units	100	120
D	18 units	40	60
E	10 units	20	28



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18. From the following data compose price index by applying weighted average of price relatives method using arithmetic means:

Commodity	P_0 (₹)	q_0	P_1 (₹)
Sugar	9.00	20 kg	15.00
Flour	5.00	40 kg	10.00
Milk	6.00	10 lit.	15.00

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19. The following table shows the prices per unit in 1980 and 1984 with weights of the commodities A, B, C, D,

<i>Commodity</i>	<i>Weights</i>	<i>Price in units in 1980</i>	<i>Price in unit in 1984</i>
<i>A</i>	20	25	30
<i>B</i>	25	20	30
<i>C</i>	15	50	70
<i>D</i>	40	5	10

Taking 1980 as base year with an index number 100, calculate the index number of 1984 based on weighted average of price relatives.

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20. The price quotations of four different commodities for 2001 and 2009 are as given below, Calculate the index

number for 2009 with 2001 as the base year by using weighted average of price relative method.

Commodity	Weight	Price (in ₹)	
		2009	2001
A	10	9.00	4.00
B	49	4.40	5.00
C	36	9.00	6.00
D	4	3.60	2.00



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Chapter Test

1. Construct the consumer price index number for 1990, taking 1989 as the base year and using simple average of

price relative method for the following data:

<i>Commodities</i>	<i>Price in 1989</i>	<i>Price in 1990</i>
Butter	20	21
Cheese	16	12
Milk	3	3
Egg	2.80	2.80



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2. A small industrial concern used three raw materials A, B and C in its manufacturing process, the prices of the materials was as shown below:

<i>Commodity</i>	<i>Price (in ₹) in the year 1995</i>	<i>Price (in ₹) in the year 2005</i>
A	4	5
B	60	57
C	36	42

Using 1995 as the base year, calculate a simple aggregate price index for 2005.

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3. Find the consumer price index number for the year 2010 as the base year 2000 by using method of weighted aggregates.

Commodity	A	B	C	D	E
year 2000 price (in ₹) per unit	16	40	0.50	5.12	2.00
Year 2010 price (in ₹) per unit	20	60	0.50	6.25	1.50
Weights	40	25	5.00	20.00	10.00

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4. The price of six different commodities for years 2009 and year 2011 are as follows:

Commodities	A	B	C	D	E	F
Price in 2009 (₹)	35	80	25	30	80	x
Price in 2011 (₹)	50	y	45	70	120	105

The index number for the year 2011 taking 2009 as the base year for the above data was calculated to be 125. Find the values of x and y if the total price in 2009 is Rs. 360.



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Multiple Choice Questions

1. If the price index of a commodity is 140, then the percentage increase in the price of the commodity in current year as compared to base year is

A. 0.04

B. 0.4

C. 0.2

D. 0.1

Answer: B



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2. If a machine costs ₹ 12000 in the year 2015 and ₹ 18000 in the year 2019, then the price relative is

A. 180

B. 120

C. 150

D. 125

Answer: C



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3. If the price index of a commodity in the year 2016 taking 2014 as the base year is 125, then the index number for the year 2014 taking 2016 as the base year is

- A. 80
- B. 75
- C. 60
- D. 120

Answer: A





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4. In Delhi if 2.5 lac cars were registered in 2010 and 10 lac cars were registered in 2015, then the quantity index is

A. 250

B. 500

C. 400

D. 800

Answer: C



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5. The price relative of wheat is 125 in 2015 compared to 2012. If the wheat costs ₹ 16 per kg in 2012, then its cost (per kg) in 2015 is

A. ₹ 18

B. ₹ 20

C. ₹ 24

D. ₹ 25

Answer: B



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6. The price relative of TV set is 80 in 2016 compared to 2014. If a TV set costs ₹ 15000 in 2014, then its cost in 2016 is

A. ₹ 12000

B. ₹ 18750

C. ₹ 12500

D. none of these

Answer: A



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7. The price relative of sugar is 110 in 2012 as compared to 2011. If the sugar costs ₹ 33 per kg in 2012, then its cost (per kg) in 2011 was

A. ₹ 36.30

B. ₹ 29.70

C. ₹ 30

D. ₹ 27

Answer: C



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8. The price relative of coal is 80 in 2015 compared to 2012. If coal costs ₹ 6 per kg in 2015, then its cost (per kg) in 2012 was

A. ₹ 4.80

B. ₹ 7.50

C. ₹ 9

D. ₹ 12

Answer: B



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9. The monthly salary of an employee was ₹ 6000 in 2005 and ₹ 9000 in 2010. The salary of the employee is linked to consumer price index. If the consumer price index in 2005 was 150, then the consumer price index in 2010 was

A. 225

B. 180

C. 100

D. none of these

Answer: A



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10. Using 2016 as base year, the index numbers for the prices of a commodity in 2017 and 2018 are 125 and 150 respectively. The index number or the price of the commodity in 2018 taking as 2017 base year is

- A. 125
- B. 150
- C. 120
- D. 137.5

Answer: C



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