XAT-2009

Name _____ Test Booklet No.

XAT ID _____ Booklet Series: **A**

INSTRUCTIONS

1. **DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO.**
2. Fill in the information required on the answer sheet. Your test may not be evaluated if the required details are not entered on the answer sheet.
3. **This booklet consists of three sections A, B and C with 35, 38, and 31 questions respectively, i.e. a total of 104 questions.** If there is a problem with your test booklet, immediately inform the invigilator/supervisor. You will be provided with a replacement.
4. Do not seek clarification on any item in the test booklet from the test invigilator or the centre supervisor. Use your best judgement.
5. You are required to answer questions from all three sections and expected to maximize scores in each section.
6. Each question has five alternatives. Answer each question by darkening the appropriate alternative letter against the question number on the answer sheet. For example if your answer to question number 1 is „B , darken fully the circle „B against question 1.
7. All answers are to be marked only on the (OMR) answer sheet. Use the margin in the test booklet for rough work. No other piece of paper is permitted to be used for rough work.
8. Use only HB pencil.
9. **NEGATIVE MARKS (one fourth of a mark) may be deducted for the first six incorrect answers in each section and 0.5 (half a mark) for each incorrect answer thereafter.**
10. Failure to follow instructions and examination norms will lead to disqualification.

To open the test booklet, insert a pencil beneath this page and tear open along the right side of the test booklet as indicated by the arrow at the bottom of the page.

PLEASE WAIT FOR THE SIGNAL TO OPEN THE TEST BOOKLET.

BEST OF LUCK!

Open from this side

SECTION B: DATA INTERPRETATION AND QUANTITATIVE ABILITY

36. In an examination there are 30 questions. 1 mark is given for each correct answer and 0.25 is deducted for every incorrect answer. Ankur attempted all the questions and scored 13.75. How many incorrect answers did he have?

A. 10
B. 11
C. 12
D. 15
E. None of the above

Solution:

Let $x$be the number of questions attempted incorrectly and (30 x) be the number of questions attempted correctly.

(30 x) $x\times 0.25 = 13.75$

Solving this, we get, $x = 13$

Hence, option E.

37. A salesman sells two kinds of trousers: cotton and woollen. A pair of cotton trousers is sold at 30% profit and a pair of woollen trousers is sold at 50% profit. The salesman has calculated that if he sells 100% mor e woollen trousers than cotton trousers, his overall profit will be 45%. However he ends up selling 50% more cotton trousers than woollen trousers. What will be his overall profit?

A. 37.5%
B. 40%
C. 41%
D. 42.33%
E. None of the above

Solution:

Let $x$be the number of Cotton trousers and $y$be the number of Woollen trousers.

Cotton trousers are sold at 30% profit and woollen trousers are sold at 50% profit.

When 100% more woollen trousers are sold than cotton trousers, we have,

$30 \times x + 50 \times y = 45 \times (x + y)$ which gives $y:x = 3:1$

Assume $x = 100$, so $y$will be 300

But $y$is 100% more than the original one.

y= 150 and x= 100

In second case, 50% more cotton trousers are sold than woollen trousers, we have,

$30 \times 150 + 50 \times 150 = k \times (150 + 150)$ which gives k= 40% as overall profit

Hence, option B.

Question Nos. 38-39 are followed by two statements labelled as I and II. You have to decide if these statements are suf ficient to conclusively answer the question. Choose the appropriate answer f rom options given below:

A. If Statement I alone is sufficient to answer the question.
B. If Statement II alone is sufficient to answer the question.
C. If Statement I and Statement II together are sufficient but neither of the two alone is sufficient to answer the question.
D. If either Statement I or Statement II alone is sufficient to answer the question.
E. Both Statement I or Statement II ar e sufficient are insufficient to answer the question.

38. For each rupee in monthly advertising expenditure, KUMAR & Co. experiences a Rs. 6 increase in sales. How much KUMAR & Co. has to spend on advertising to attain Rs. 1000000 in sales revenue for the month?

I. Without advertising KUMAR & Co. earns Rs. 200000 sales revenue per month.
II. When KUMAR & Co. spends Rs. 15000 on advertising, it earns Rs. 290000 as sales revenue.

Solution:

Let basic sales revenue be ,,s_b 'and increase in sales revenue be ,, s_i '.

Total sales revenue = $s_b + s_i$

From Statement I:

$1000000 = 200000 + s_i$

s_i can be calculated easily.

So we can answer using statement I alone.

From Statement II:

$290000 = s_b + 15000 \times 6$

s_b can be calculated easily.

So we can answer using statement II alone.

Hence, option D.

9. Geetanjali Express, which is 250 metre long when moving form Howrah to Tatanagar crosses Subarnarekha bridge in 30 seconds. What is the speed of Geetanjali Express?

I. Bombay Mail, which runs at 60 km/hour crosses the Subarnarekha bridge in 30 seconds.
II. Bombay Mail when running at 90 km/hr crosses a lamp post in 10 seconds.

Solution:

From Statement I:

We cannot find the bridge length as length of the Bombay mail is not known.

So we cannot answer using statement I alone.

From Statement II:

We can find the train length of the Bombay mail as speed 90 km/hr and time of crossing of lamp post 10 seconds is given. However, the length of the bridge cannot be determined.

So we cannot answer using statement II alone.

Combining both the statements I and II:

We can find the bridge length from the speed of Bombay mail i.e. 60 km/hr and time of crossing the bridge i.e. 30 seconds along with the length of the Bombay mail calculated from statement II.

From this we can find the speed of the Geetanjali Express along with the other data provided in the question itself.

So we can answer using both the statements I and II together.

Hence, option D.

40. Rajesh walks to and fro to a shopping mall. He spends 30 minutes shopping. If he walks at speed of 10 km an hour, he returns to home at 19.00 hours. If he walks at 15 km an hour, he returns to home at 18.30 hours. How fast must he walk in order to return home at 18.15 hours?

A. 17 km/hour
B. 17.5 km/hour
C. 18 km/hour
D. 19 km/hour
E. None of the above.

Solution:

We know that Distance = Speed × Time

Speed and Time are inversely related.

If Rajesh walks at 10 km/hr, then he reach home at 19.00 hours and if he walks at 15 km/hr, then he returns home at 18.30 hours.

With this we can say that time required in the first case will be 15 $x$minutes and that in the second case will be 10 x minutes.

15 x 10 x= 30 minutes, x= 6

Total Distance = 10 km/hr × (15 × 6) minutes = 15 km

To reach home at 18.15 hours, he has to walk 15 km in 45 minutes.

Required speed = 15/0.75 = 20 km/hr

Hence, option E.

41. A shop sells two kinds of rolls- egg roll and mutton roll. Onion, tomato, carrot, chilli sauce and tomato sauce are the additional ingredients. You can have any combination of additional ingredients, or have standard rolls without any additional ingredients subject to the following constraints:

(a) You can have tomato sauce if you have an egg, but not if you have a mutton roll.
(b) If you have onion or tomato or both you can have chilli sauce, but not other wise.

How many different rolls can be ordered according to these rules?

A. 21
B. 33
C. 40
D. 42
E. None of the above.

Solution:

For Mutton Roll, we have following combinations.

With „0 additional ingredients, we have 1 combination.

With „1 additional ingredient, we have 3 combinations.

With „2 additional ingredients, we have 5 combinations.

With „3 additional ingredients, we have 4 combinations.

With „4 additional ingredients, we have 1 combination.

Total combinations for Mutton roll = 14

For Egg Roll, we have following combinations.

With „0 additional ingredients, we have 1 combination.

With „1 additional ingredient, we have 4 combinations.

With „2 additional ingredients, we have 8 combinations.

With „3 additional ingredients, we have 9 combinations.

With „4 additional ingredients, we have 5 combinations.

With „5 additional ingredients, we have 1 combination.

Total combinations for Egg roll = 28

Total combinations = 14 + 28 = 42

Hence, option D.

42. Given five points A = (7, 4), B = (- 10, 0), C = (- 10, 3), D = (0, 10) and E = (7, 7). Every second all the points move by halving their abscissas and by doubling their ordinates. This process continues for 500 years. After 500 years, which two points are closest?

A. A and B
B. B and C
C. A and E
D. D and E
E. A and C

Solution:

The points are A(7, 4), B(-10, 0), C(-10, 3), D(0, 10) and E(7, 7).

Every second, these points halve their abscissas and double their ordinates.

After 500 years, abscissas for all these points will be very much close to „0 .

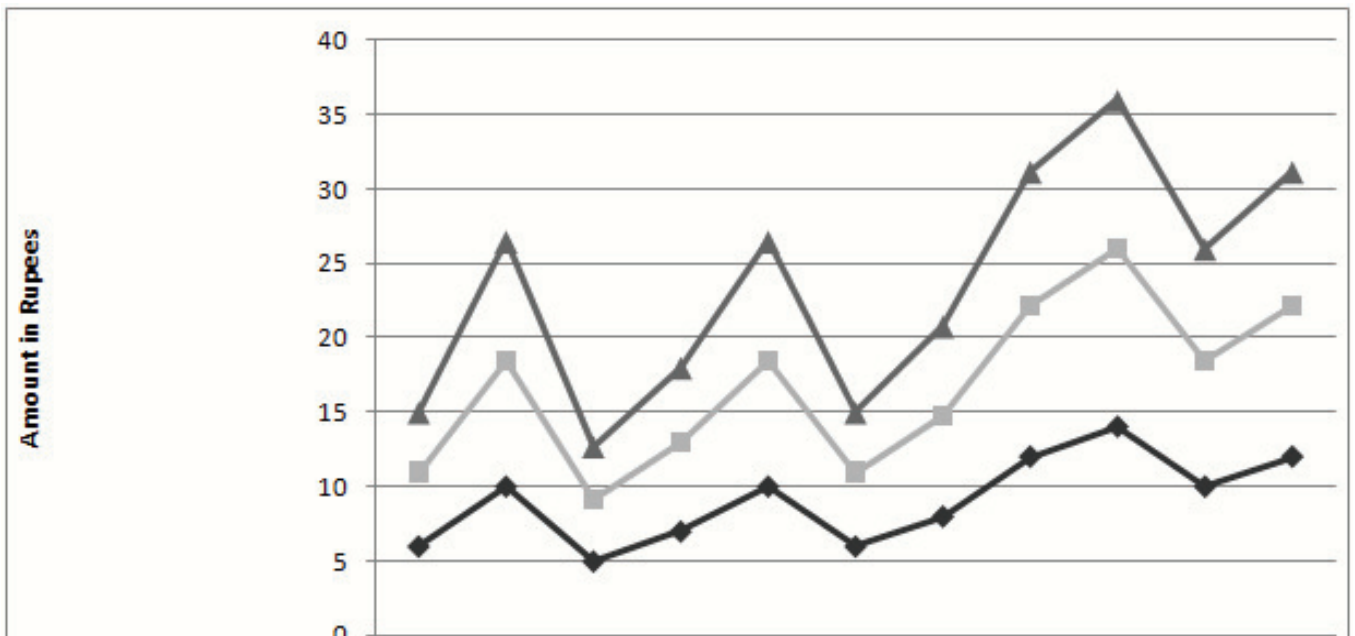
But ordinates for all these points, except B, will move to infinity.

Points will be closest to each other after 500 years which are initially close to each other with respect to ordinates only. Here points A and C are closest to each other by 1 ordinate.

Points A and C will be closest.

Hence, option E.

Instructions: Answer the question no. 43 and 44 on the basis of the data given in the chart



	Panir Kachouri	Fish Kachouri	Mistis ukh	Veg. Pattie	Chicken Pattie	Chicken Titbit	Veg. Pizza	Chicken Pizza	Fish Spring Roll	Cream Roll	Chicken Spring Roll
Prodn. Cost	4	8	3.5	5	8	4	6	9	10	7.5	9
Producer's Selling Price	5	8.5	4.2	6	8.5	5	6.8	10.2	12	8.5	10.2
Retailer Selling Price	6	10	5	7	10	6	8	12	14	10	12

The chart above gives per unit selling prices and costs in rupees of 11 items prepared by a sweetshop. Margins are calculated on percentage basis. Based on the chart above, answer the question that follows:

43. Which of the following conclusions can be made?

A. Producer s margin for panir kachouri is less than retailer s margins.
B. Producer s margin for chicken pizza is more than retailer s margins.
C. Producer s margin for fish spring roll more than retailer s margins.
D. Producers and retailer s margins are highest for panir kachouri alone.
E. Retailer s made losses in a few products.

Solution:

From the Tables, we get that Producer s margin for fish spring roll is more than retailer s margin.

Hence, option C.

44. Which of the following conclusion can be drawn from diagram above?

A. Retailers selling price for mistisukh was more than producer s selling price for chicken titbit.
B. Difference between retailer s selling price and producer s selling price for fish kachour i was more than that of cream roll.

C. These are three types of margins for all items.
D. Of all the margins, both for retailer and producer, producer s margin for chicken pizza was the maximum.
E. The three lines that connect different points, in the diagram above, are superfluous.

Solution:

There are different items for which line graphs are made, which is ambiguous.

Hence, option E.

45. Mungeri Lal has two investment plans- A and B, to choose from. Plan A offers interest of 10% compounded annually while plan B offers simple interest of 12% per annum. Till how many years is plan B a better investment?

A. 3
B. 4
C. 5
D. 6
E. 7

Solution:

Let Mungeri Lal have Rs. 100 to be invested in both the plans.

From plan A, we can calculate total amount along with the compound interest of 10% for every year.

From plan B, we can calculate total amount along with the simple interest of 12% for every year.

From the calculations, we can show that till 4 years, plan B gives more amount than plan A with the same initial investment.

Hence, option B.

46. For all real numbers x, except x = 0 and x = 1, the function F is defined by

A. $(\sin a)^2$
B. $(\cos a)^2$
C. $(\tan a)^2$
D. $(\cot a)^2$
E. $(\sec a)^2$

Solution:

Hence, option B.

47. Two teams *Arrogant* and *Overconfident* are participating in a cricket tournament. The odds that team Arrogant will be champion is 5 to 3, and that Overconfident will be the champion is 1 to 4. What are the odds that either team Arrogant or team Overconfident will become the champion?

A. 3 to 2
B. 5 to 2
C. 6 to 1
D. 7 to 1
E. 9 to 1

Solution:

The correct answer is 7 to 3, which is not mentioned in the given options.

Answer the questions 48 to 50 on the basis of the data given in the table.

A cake chain manufactures two types of products – „cakes/pastries/gateaux and savouries. The chain was concerned about high wastage (in terms of leftover) and wanted to reduce it. Table 1 provides information about sales, costs and wastage for both products.

Table 1: Revenue Statement

	Cakes/ Pastries/ Gateaux			Savouries		
Year	Sales in Rs. lac	Costs in Rs. lac	Leftover as % age of sales	Sales in Rs. lac	Costs in Rs. lac	Leftover as % age of sales
1993	81.47	80.06	1.52	41.79	41.07	9.38
1994	171.42	168.03	1.58	80.69	79.09	10.61
1995	326.95	323.7	1.43	146.88	145.42	10.08
1996	591.77	576.52	1.23	220.96	215.26	10.45
1997	667.1	657.89	2.06	516.23	509.1	8.43
1998	936.52	928.95	1.74	468.39	464.6	11.04
1999	978.69	966.97	1.19	528.31	521.98	6.98
2000	752.09	743.2	1.5	637.63	630.09	5.61
2001	713.46	687.83	1.83	694.42	669.47	5.96
2002	885.29	845.83	1.76	869.15	830.4	5.66
2003	1071.81	1014.87	1.81	913.68	865.14	6.72
2004	1225.00	1163.75	2.78	1075.00	1021.25	6.14

48. Which of the following statement(s) is (are) right?

1. The worth of leftover for cakes/pastries/gateaux increased from 1993 to 2004.
2. The worth of leftover for cakes/pastries/gateaux, kept on fluctuating, many a times, between 1993 and 2004.
3. The worth of leftover for savouries and cakes/pastries/gateaux was highest in 2004.
4. The worth of leftover for savouries kept on fluctuating, many a times, between 1993 and 2004.

Choose the right combination from the following:

A. 1 and 4
B. 3 and 4
C. 1 and 2
D. 3 only
E. 2 and 3

Solution:

Cakes/Pastries/Gateaux

Year	Sales	Cost	Leftover%	LO(Cack)	Decline	Profit
A1993	81.47	80.06	1.52	1.238344		0.171656
A1994	171.42	168.03	1.58	2.708436	-1.47009	0.681564
A1995	326.95	323.7	1.43	4.675385	-1.96695	-1.42539
A1996	591.77	576.52	1.23	7.278771	-2.60339	7.971229
A1997	667.1	657.89	2.06	13.74226	-6.46349	-4.53226
A1998	936.52	928.95	1.74	16.29545	-2.55319	-8.72545
A1999	978.69	966.97	1.19	11.64641	4.649037	0.073589
A2000	752.09	743.2	1.5	11.28135	0.365061	-2.39135
A2001	713.46	687.83	1.83	13.05632	-1.77497	12.57368
A2002	885.29	845.83	1.76	15.5811	-2.52479	23.8789
A2003	1071.81	1014.87	1.81	19.39976	-3.81866	37.54024
A2004	1225	1163.75	2.78	34.055	-14.6552	27.195

Savouries

Year	Sales	Cost	Leftover %	LO(sav)	Profit	Total profit
A1993	41.79	41.07	9.38	3.919902	-3.1999	-3.028246
A1994	80.69	79.09	10.61	8.561209	-6.96121	-6.279645
A1995	146.88	145.42	10.08	14.8055	-13.3455	-14.770889
A1996	220.96	215.26	10.45	23.09032	-17.3903	-9.419091
A1997	516.23	509.1	8.43	43.51819	-36.3882	-40.920449
A1998	468.39	464.6	11.04	51.71026	-47.9203	-56.645704
A1999	528.31	521.98	6.98	36.87604	-30.546	-30.472449
A2000	637.63	630.09	5.61	35.77104	-28.231	-30.622393
A2001	694.42	669.47	5.96	41.38743	-16.4374	-3.86375
A2002	869.15	830.4	5.66	49.19389	-10.4439	13.435006
A2003	913.68	865.14	6.72	61.3993	-12.8593	24.680943
A2004	1075	1021.25	6.14	66.005	-12.255	14.94

From the above table, we get sentences 1 and 3 as right one. But option corresponding to this answer is not provided.

49. Maximum decline in amount of leftover of cakes/pastries/gateaux occurred in the year:

A. From 1997 to 1998
B. From 1995 to 1996
C. From 1998 to 1999
D. There was always an increase in worth of leftover.
E. Cannot be calculated from the data.

Solution:

We can observe that in the year 1998-99 there was a maximum decline.

Hence, option C.

50. If profit = sales – cost – leftover, in which year did the cakes chain was in losses?

1. 1993
2. 1997
3. 1998
4. 2000

Choose the right option:

A. 1, 2, 3, 4
B. 3, 4
C. 2, 3
D. 1, 2, 3
E. It was always in profit.

Solution:

We can see from the last column that there were losses in the years 1993, 1997, 1998 and 2000.

Hence, option A.

51. Let a and b be the roots of the quadratic equation $x^2 + 3x - 1 = 0$. If $P_n = a^n + b^n$ for $n = 0$, then, for $n = 2$, $P_n =$

A. $-3P_{n-1} + P_{n-2}$
B. $3P_{n-1} + P_{n-2}$
C. $-P_{n-1} + 3P_{n-2}$
D. $P_{n-1} + 3P_{n-2}$
E. None of the above

Solution:

We have, $x^2 + 3x - 1 = 0$

Since, $P_n = a^n + b^n$ for $n = 0$, we have

Now, let s look at the options:

Option A: $P_n = -3P_{n-1} + P_{n-2}$ for $n = 2$

For $n = 2$, $P_2 = -3P_1 + P_0 = -3(-3) + 2 = 9 + 2 = 11$

Since, P_2 is 11, this option is valid.

Option B: $P_n = 3P_{n-1} - P_{n-2}$ for $n = 2$

For $n = 2$, $P_2 = 3P_1 - P_0 = 3(-3) - 2 = -9 - 2 = -11$

Since, P_2 is 11, this option is cannot be correct.

Option C: $P_n = -P_{n-1} + 3P_{n-2}$ for $n = 2$

For $n = 2$, $P_2 = -P_1 + 3P_0 = -(-3) + 3(2) = 9$

Since, P_2 is 11, this option is cannot be correct.

Option D: $P_n = P_{n-1} + 3P_{n-2}$ for $n = 2$

For $n = 2$, $P_2 = P_1 + 3P_0 = (-3) + 3(2) = 3$

Since, P_2 is 11, this option is cannot be correct.

Hence, option A.

52. A rural child specialist has to determine the weight of five children of different ages. He knows from his past experience that each of the children would weigh less than 30 Kg and each of them would have different weights. Unfortunately, the scale available in the village can measure weight only over 30 Kg. The doctor decides to weigh the children in pairs. However his new assistant weighed the children without noting down the names. The weights were: 35, 36, 37, 39, 40, 41, 42, 45, 46 and 47 Kg. The weight of the lightest child is:

A. 15 Kg.
B. 16 Kg.
C. 17 Kg.
D. 18 Kg.
E. 20 Kg.

Solution:

Let a, b, c, $d$and $e$be the weight of five children such that $a < b < c < d < e$.

Adding all the weights, we get, $4 \times (a + b + c + d + e) = 408$

$(a + b + c + d + e) = 102$

But $a + b = 35$(Lowest) and $d + e = 47$(Highest)

$a + b + d + e = 82$ gives $c = 20$

Also, $a + c = 36$ (Second lowest) which gives $a = 16$ kg

Hence, option B.

53. Sangeeta and Swati bought two wristwatches from Jamshedpur Electronics at 11.40 A.M. IST. After purchasing they found that when 60 minutes elapses on a correct clock (IST), Sangeeta s wristwatch registers 62 minutes whereas Swati s wristwatch registers 56 minutes. Later in the day Sangeets s wristwatch reads 10 P.M., then the time on Swati s wristwatch is:

A. 8:40 PM
B. 9:00 PM
C. 9:20 PM

D. 9:40 PM
E. Cannot be calculated.

Solution:

It was 11.40 AM when Sangeeta and Swati bought the watches. According to Sangeeta s watch, it was now 10 PM; that is, her watch has shown time elapsing by 10 hours and 20 minutes (= 620 minutes).

It is given that when the actual time elapses by 60 minutes, her watch shows time elapsing by 62 minutes. Hence,

Actual time Time on Sangeeta s watch

60 minutes 62 minutes

? 620 minutes

Hence, the actual time elapsed by (620 × 60)/62 = 600 minutes

It is given that when the actual time elapses by 60 minutes, Swati s watch shows time elapsing by 56 minutes. Hence,

Actual time Time on Swati s watch

60 minutes 56 minutes

600 minutes ?

Hence, the time on Swati s watch elapsed by (600 56)/60 = 560 minutes

Hence, the time on her watch is 11.40 AM + (9 hours, 20 minutes) = 9.00 PM

Hence, option B.

54. F(x) is a fourth order polynomial with integer coefficients and no common factor. The roots of F(x) are - 2, - 1, 1, 2. If p is a prime number than 97, then the largest integer that divides F(p) for all values of p is:

A. 72
B. 120
C. 240
D. 360
E. None of the above

Solution:

Roots of F(x) are 2, 1, 1, 2, we have,

So we have, F(x) = (x+ 2)(x+ 1)(x1)(x2)

F(p) = (p+ 2)(p + 1)(p 1)(p2) where „ $p$is the prime number > 97

Let „$k$be the largest integer which can divide F(p).

In (p+ 2), (p + 1), (p 1) and (p2), there will two even numbers and two odd numbers as „ p itself is an odd number.

Now, out of these two even numbers, one surely will be divisible by 4 and other by 2. So these two numbers are collectively divisible by 8.

Now, (p+ 2), (p + 1), p, (p 1) and (p2) are five consecutive integers. So either (p + 1) and (p 2) or (p + 2) and (p 1), each will be divisible by 3. So either of these two pairs are divisible by 9.

Also, being 5 consecutive numbers, it must contain one number which is multiple by 5. So this number will be divisible by 5.

So collectively F(p) will be divisible by 8 × 9 × 5 = 360

Hence, option D.

Instructions: Consider the information given below for question 55 and 56.

In the diagram below, the seven letters correspond to seven unique digits chosen from 0 to 9. The relation among the digits is such that:

P.Q.R = X.Y.Z = Q.A.Y

P		X
Q	A	Y
R		Z

55. The value of A is:

A. 0
B. 2
C. 3
D. 6
E. None of the above

Solution:

P X
Q A Y
R Z

6 8
4 2 9
3 1

After trial and error, we get, $8 \times 9 \times 1 = 4 \times 2 \times 9 = 6 \times 4 \times 3 = 72$

From this above table, we get that, A is equal to 2.

Hence, option B.

56. The sum of the digits which are not used is:

A. 8
B. 10
C. 14
D. 15
E. None of the above

Solution:

Digits which are not used are 0, 5, 7

Sum of these digits = 5 + 7 + 0 = 12

Hence, option E.

57. Steel Express stops at six stations between Howrah and Jamshedpur. Five passengers board at Howrah. Each passenger can get down at any station till Jamshedpur. The probability that at five persons will get down at differ ent station is:

E. None of the above.

Solution:

The total number of ways in which the 5 passengers can descend at 7 different stations (6 intermediate stations + Jamshedpur Station) is given by 7^5.

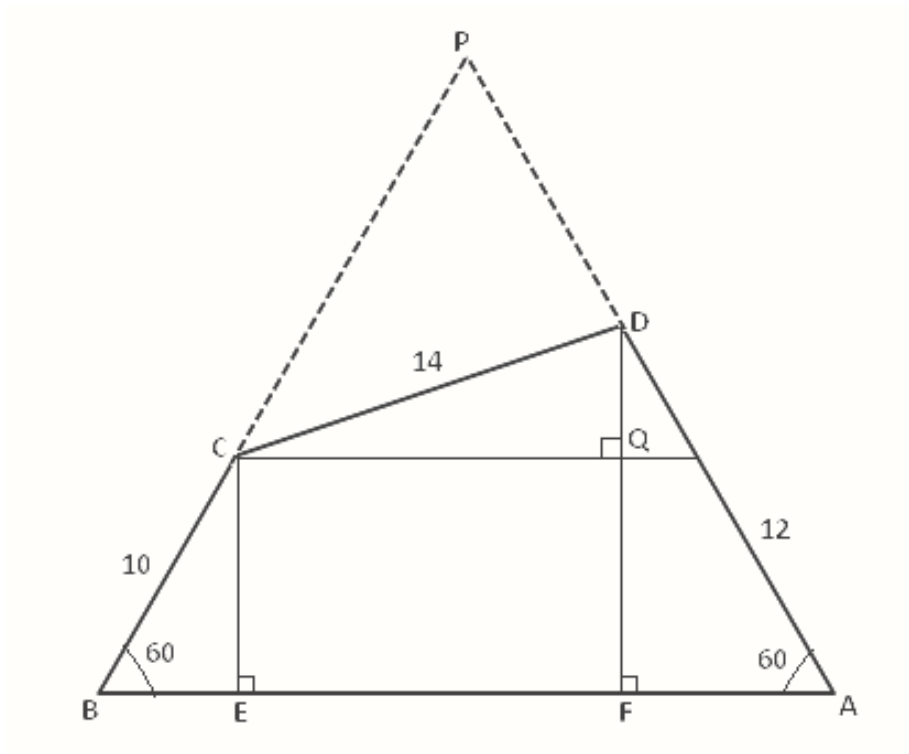
The number of ways in which the 5 passengers descend at the 7 stations, such that each of the passengers gets down at a different station is given by ${}^{7}P_{5}$.

Hence, option C.

58. In a quadrilateral ABCD, BC = 10, CD = 14, AD = 12 and CBA = BAD = 60°. If

A. 193
B. 201
C. 204
D. 207
E. None of the above.

Solution:



AB = AF + FE + BE

= 12 × (cos 60°) + CQ + (10 × cos 60°)

$a+ b= 204$

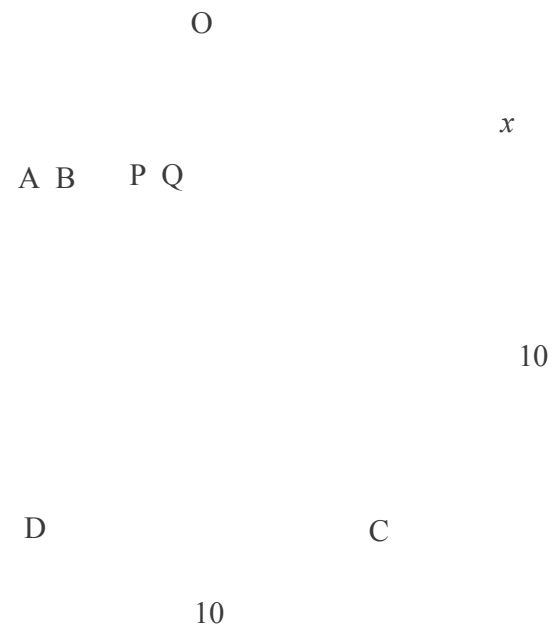
Hence, option C.

59. ABCD is a square with sides of length 10 units. OCD is an isosceles triangle with base CD. OC cuts AB at point Q and OD cuts AB at point P. The area of trapezoid PQCD is 80 square units. The altitude from O of the triangle OPQ is:

A. 12
B. 13
C. 14
D. 15
E. None of the above.

Solution:

The given information can be illustrated as follows:



Area of the trapezoid PQCD = 80 units

PQ = 6 units

Now, OPQ and ODC are similar triangles. Let M be the point of contact of the altitude of OCD and side AB. Then, let length of OM = $x$units.

$10\,x = 6\,x + 60$

$x = 60/4 = 15$ units

Hence, option D.

60. How many differently shaped triangles exist in which no two sides are of the same length, each side is of integral unit length and the perimeter of the triangle is less than 14 units?

A. 3
B. 4
C. 5
D. 6
E. None of the above.

Solution:

Now, let there be a triangle with sides a, b, c, wher e c is the largest side.

Also, it is given that the perimeter must be less than 14.

$a + b + c < 14$ … (ii)

Since, $c < a + b$

$c + c < a + b + c < 14$

$2\,c < 14$

$c < 7$

Hence, we try out for values of $c$from 1 to 6, and check if we can find two numbers $a$and $b$that satisfy equations (i) and (ii). These values are tabulated below:

c	***a, b***
4	3, 2
5	2, 4
5	3, 4
6	2, 5
6	3, 4

Thus, there are 5 such triangles.

Hence, option C.

61. Company BELIANCE hosted a party for 8 members of Company AXIAL. In the party no member of AXIAL had interacted with more than three members of BELIANCE. Out of all the members of BELIANCE, three members – each interacted with four members of AXIAL and the remaining members – each interacted with two members of AXIAL. The greatest possible number of company BELIANCE in the party is

A. 9
B. 10
C. 11
D. 12
E. None of the above.

Solution:

There are 8 members in AXIAL, and each of them interacts with a maximum of 3 members from BELIANCE.

A maximum of $8 \times 3 = 24$ interactions are possible

Now, assume that there are X members in BELIANCE. Since 3 members of BELIANCE each interact with 4 members of AXIAL

12 interactions occur in this process.

$24 - 12 = 12$ interactions remain; that is, 12 is the maximum number of interactions that could occur among the remaining members.

The remaining members in BELIANCE is $(X - 3)$ and each of them interact with 2 members of AXIAL, therefore interactions will be maximum when $(X - 3) \times 2 = 12$, that is when $X = 9$

Hence, option A.

Answer the questions 62 to 64 on the basis of the following information.

KK, an aspiring entrepreneur wanted to set up a pen drive manufacturing unit. Since technology was changing very fast, he wanted to carefully gauge the demand and the likely profits before investing. Market survey indicated that he would be able to sell 1 lac units before customers shifted to different gadgets. KK realized that he had to incur two kinds of costs – fixed costs (the costs which do not change, irr espective of numbers of units of pen drives produced) and variable costs (= variable cost per unit multiplied by number of units). KK expected fixed cost to be Rs. 40 lac and variable cost to be Rs. 100 per unit. He expected each pen drive to be sold at Rs. 200.

62. What would be the break-even point (defined as no profit, no loss situation) for KK s factory, in term of sales?

A. Rs. 80 lac
B. Rs. 100 lac

C. Rs. 120 lac
D. Rs. 140 lac
E. Cannot be found with the given data.

Solution:

Now, the expected variable cost for each pen drive is Rs. 100, while the expected selling price per unit is Rs. 200. Hence, the expected profit margin is Rs. 100 per unit.

Break-even point in terms of sales (in Rupees) = 0.4 lac × 200 = Rs. 80 lac

Hence, option A.

63. KK was sceptical that per unit variable might increase by 10% though the demand might remain same. What will be the expected changes in profit in such a case?

A. Profit would decrease by 10.33%
B. Profit will increase will by 15.75%
C. Profit would decrease by 15.75%
D. Profit will decrease by 16.67%
E. Profit will increase by 16.67%

Solution:

Originally, Variable Cost = Rs. 100 per unit and Sales Price = Rs. 200 per unit. Also, the demand (in number of units sold) was 1 lac units and the Fixed Costs was Rs. 40 lac.

Original Profit = Total Sales – Total Costs

= (200 × 1 lac) – (40 lacs + 100 × 1 lac)

= 200 lac – 140 lac = 60 lac

Now, per unit variable cost has increased by 10%.

New Variable Cost = 1.1 × 100 = Rs. 110 per unit. The sales price, demand and fixed costs remain the same.

New Profit = (200 × 1 lac) – (40 lac + 110 × 1 lac)

= 200 lac – 150 lac = 50 lac

Hence, option D.

64. He discussed his business with a chartered accountant. KK informed that he was contemplating a loan of Rs. 20 lac at simple interest of 10% per annum for starting the business. The chartered accountant informed him that in such a case KK has to pay interest, followed by 30% tax.

    By how much does KK s earnings change with 20% growth in sales vis -à-vis the original sales volume, in both cases considering tax and interest on loan?

A. 20%
B. 16.7%
C. 25.6%
D. 33.3%
E. 34.5%

Solution:

Originally, KK s profit = 200 lac – 140 lac = Rs. 60 lac

He has taken a loan for Rs. 20 lac at a simple interest of 10%, hence he has to pay an interest of 10% × 20 lac = Rs. 2 lac.

From the remaining 58 lac, KK has to pay 30% tax.

KK s total earnings = 58 lac 0.7 = 40.6 lac

Now, there is a 20% growth in sales; that is, he will now be able to sell 1.2 lac units (as opposed to 1 lac units earlier)

Profit = Total Sales – Total Costs

= (200 × 1.2 lac) – (40 lac + 100 × 1.2 lac)

= 240 lac – 160 lac = 80 lac

KK s Profit after paying interest on his Rs. 20 lac loan = 80 lac – 2 lac = 78 lac

KK s total earnings after tax deduction = 78 lac 0.7 = 54.6 lac

Hence, option E.

65. Let X be a four digit number with exactly three consecutive digits being same and is a multiple of 9. How many such X s are possible?

A. 12
B. 16

C. 19
D. 21
E. None of the above.

Solution:

X is a four-digit number that is divisible by 9. This means that the sum of its digits should add up to a multiple of 9.

It is also given that exactly 3 consecutive digits are the same. Hence, two possible patterns of the number arise: XXXY and YXXX

Case 1: The first three digits are the same, and the fourth one is different; i.e. XXXY

Here, we will substitute X by values from 1 to 9 (not 0, since X is the first digit), and see how many values Y can take such that XXXY will be a multiple of 9.

For example, when X is 1, then the first three digits add upto 3. Since (X + X + X + Y) must be some multiple of 9, hence Y can only be 6 (i.e. the number will be 1116). Similarly, when X is 3, then the first three digits add up to 9. Hence, the fourth digit could be either 0 or 9 (i.e. the numbers formed will be 3330 and 3339 – both multiples of 9).

X	Y
1	6
2	3
3	0, 9
4	6
5	3
6	0, 9
7	6
8	3
9	0*

* When X is 9, then the first three digits add up to 27. Hence, the fourth digit could be either 0 or 9. However, if the fourth digit was 9, then the number formed would be 9999, which doesn t satisfy the criteria that exactly THREE consecutive digits should be the same.

This case leads to 1 + 1 + 2 + 1 + 1 + 2 + 1 + 1 + 1 = 11 possibilities

Case 2: The last three digits are the same, and the first one is different; i.e. YXXX

Again, we substitute X by values from 0 to 9 (this time Y is the first digit, so X can be 0), and see how many values of Y can satisfy the criteria that YXXX is a multiple of 9.

For example, when X is 1, the last three digits add up to 3. Hence, Y can take the value 6. When X is 3, the sum of the last three digits is 9; so Y will be 9 (Y, being the first digit, cannot be 0).

X	Y
0	9
1	6
2	3
3	9
4	6
5	3
6	9
7	6
8	3
9	-

This case leads to 1 × 9 = 9 possibilities

total of 11 + 9 = 20 four-digit numbers are possible that is a multiple of 9, with exactly 3 consecutive digits being same

Hence, option E.

Questions 66-67

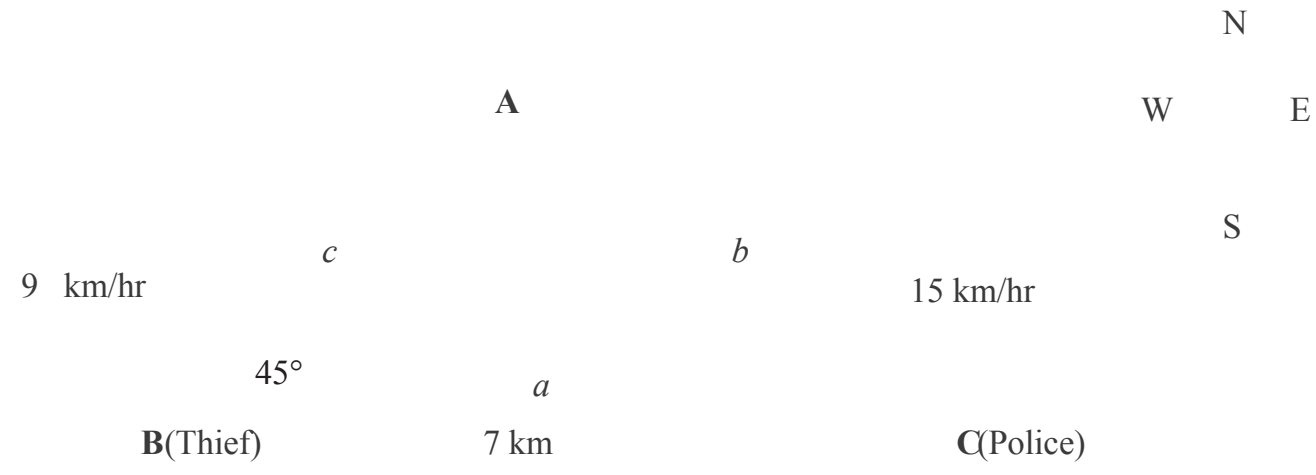
A police inspector spots a thief standing 7 km away from him on a straight road aligned in East-West direction. The inspector is standing on the eastern side while the thief is on the western side of the road. On spotting the inspector the thief takes his bicycle and tries to cut across the adjoining field by riding away with a uniform speed of 9v2 km/hour in a direction making an angle of 45° with the road towards North-East. The inspector starts with his scooter at the same instance to move with a uniform velocity15 km/hour and catches the thief.

66. Time taken by the inspector to catch the thief is:

A. 12 minutes
B. 15 minutes
C. 18 minutes
D. 20 minutes
E. 30 minutes

Solution:

The information given in the common data can be represented as follows:



Both the thief and the police man start running simultaneously and stop when they meet; that is, they run for the same amount of time. Let this time be t hours. The speeds of the thief and the police man are 9 km/hr and 15 km/hr respectively.

Using the time-speed-distance formula, we have,

Distance AC = $b = 15\ t$ km

Also, in ABC, we have,

$63\ t^2 + 126\ t - 49 = 0$

$9\ t^2 + 18\ t - 7 = 0$

$(3\ t + 7)(3\ t - 1) = 0$

$t = -7/3$ or $t = 1/3$

Time cannot be negative, hence $t = 1/3$ hours or 20 minutes

Hence, option D.

67. The distance the inspector has to travel is:

A. 3 km
B. 3.75 km
C. 5 km
D. 6 km
E. 7.5 km

Solution:

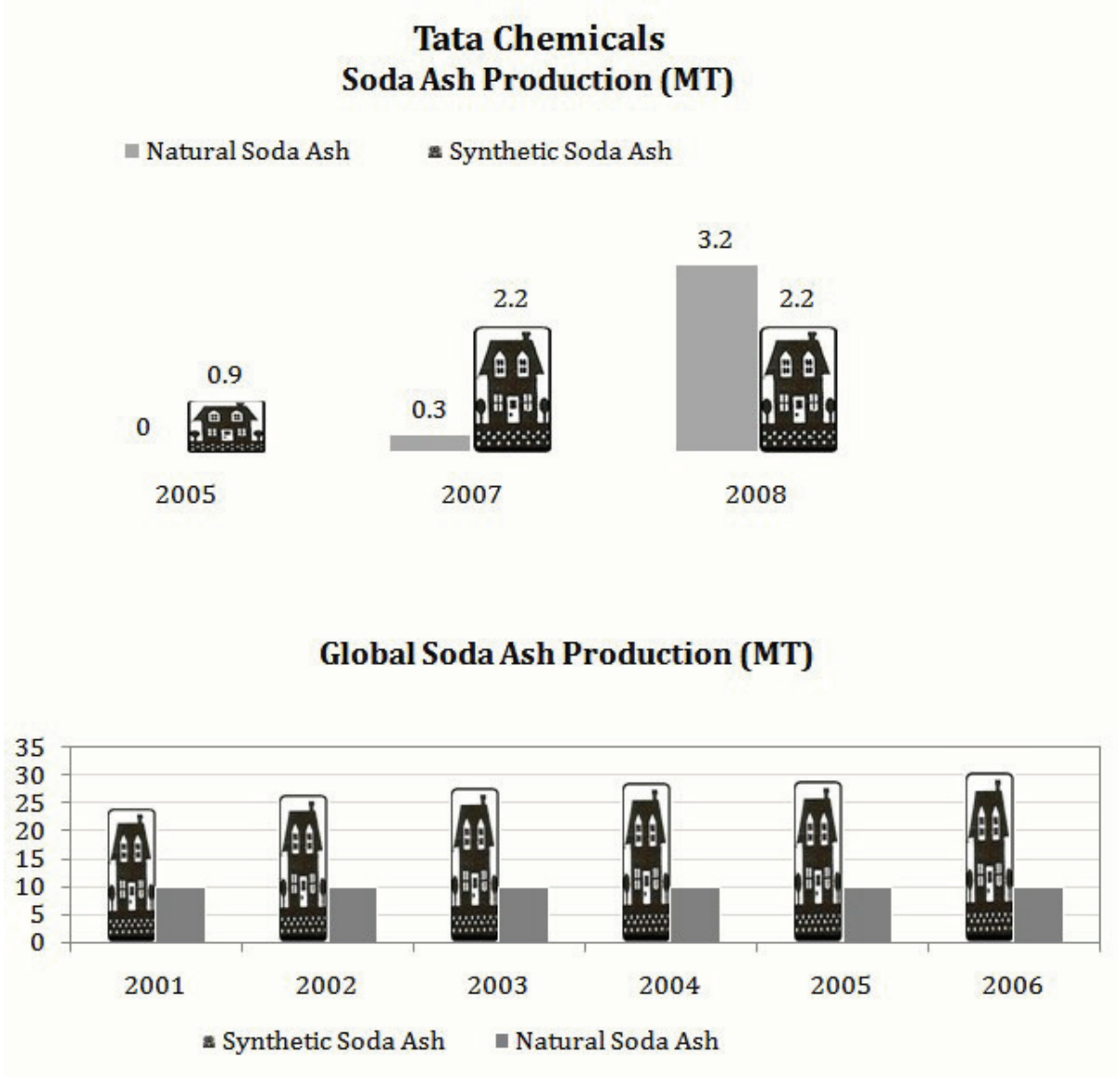
From the solution of the previous question, it is clear that the distance travelled by the policeman

$= 15t = 15 \times 1/3 = 5$ kilometres

Hence, option C.

Instructions: Answer the questions 68 to 70 on the basis of the data given in two charts.

Sodium carbonate, also called as soda ash is an important ingredient for glass, soaps and detergents, and many other products. There were two ways of producing soda ash. The first is producing soda ash from *trona* obtained naturally. The second method was producing soda ash from common salt through Solvay process. Soda ash produced thus was called synthetic soda ash. Tata Chemicals was one of largest producers of soda ash. Given below are two charts- first chart shows production of two varieties of soda ash in the world.



68. It was expected that global soda ash production would be same for 2006, 2007 and 2008 (only for this question). What could be a possible reason for different patterns of production in Tata Chemicals and the words?

A. Tata Chemicals build new plants of 2.2 MT natural soda ash capacity in 2007.
B. Tata Chemicals build 3.2 MT of natural soda ash capacity from 2005 to 2008.
C. Tata Chemicals produced 2.7% of total soda ash in the world.
D. Tata Chemicals might have acquired 0.3 MT of natural soda ash facility in 2007.
E. None of above conclusions could possibly be drawn

Solution:

Comparing the graphs given for Tata Chemicals and for the Global production of soda ash, we see that between the years 2005 to 2007, the production of natural soda ash in Tata Chemicals have increased from 0 MT to 0.3 MT. So, the global production also ought to have increased. However, from the graph (also, it is given in the question that the soda ash production remains the same for 2006, 2007 and 2008) we see that the global production remains unchanged during this period. The only reason, among the given options, that justifies this is that Tata Chemicals, rather than producing more quantities of natural soda ash on its own, acquired another company s production. This will explain why the global production did not increase.

Hence, option D.

69. Suppose the total global production increased (year on year) from 2005 to 2008 by the amount Tata Chemicals synthetic production (year on year) increased in the same period. By what percentage did the total global production increase from 2007 to 2008?

A. Cannot be calculated at all from the tables above.
B. Increased by 10.16%.
C. Increased by 9.48%.
D. Did not increase at all.
E. Increased by 8.64%

Solution:

From the first graph, Tata Chemical s synthetic production did not increase at all from 2007 to 2008 (it remained 2.2 MT in both years).

The question states that the total global production increased by the same amount, hence the total global production increase from 2007 to 2008 was 0.

Hence, option D.

70. Which of the following statements are true?

1. Proportion of natural soda ash to synthetic soda has decreased from 2001 to 2006 globally.
2. Proportion of natural soda ash to synthetic soda ash has increased from 2001 to 2006 globally.
3. Proportion of synthetic soda ash to total soda ash has decreased for Tata chemicals from 2005 to 2007.
4. Proportion of synthetic soda ash to total ash has increased for Tata chemicals.

A. 1 and 3
B. 1 and 4
C. 2 and 4
D. 2 and 3
E. 1, 2 and 3 only

Solution:

According to the first statement, the ratio of Natural soda ash to synthetic soda ash decreased from 2001 to 2006 globally. This is true since the global production of natur al soda ash remained constant while that of synthetic soda ash kept increasing.

The second statement is a direct contradiction of the first, and is therefore obviously false.

According to the third statement, the ratio of synthetic soda ash to the total soda ash decreased from 2005 to 2007 for Tata Chemicals. From the graph, we see that this ratio is 1 (0.9/0.9) in 2005, and is less than 1 (2.2/2.5) in 2007. So, this statement is definitely true.

The fourth statement does not specify any years, and there are years during which the specified ratio decreases (like the one given in the third statement). This statement is false.

Hence, option A.

71. What is Tata Chemicals share of global production in 2008?

A. 12.86%
B. 17.42%
C. 59.34%
D. Incomplete data.
E. None of the above.

Solution:

In order to find Tata Chemicals share of the global production in 2008, we need to know the global production in 2008. However, this data is not given to us.

Hence, option D.

72. Suppose total global production of soda ash in 2008 was 40 MT and Tata Chemicals was second highest producer of soda ash globally after another company called Solvay. FMC Wyoming was the third highest producer. Two Indian giants, Tata Chemicals and Nirma have a combined production capacity of 8.8 MT. Which of the following statements are right?

1. Solvay s marked share was more than 20.66%
2. Solvay s marked share was more than 13.5%
3. FMC s share was less than 10.33%
4. FMC share was less than 13.5%
5. Nirma, which was sixth largest producer, had a share of less than 8.5%

Choose the right option.

A. 1 and 3
B. 1 and 5
C. 2 and 4
D. 1, 3 and 5
E. 2, 4 and 5

Solution:

It is given that the total global production of soda ash in 2008 was 40 MT. Solvay was the highest producer, Tata Chemicals was the second highest producer, and FMC was the third highest.

Now, from the first graph, we see that the total soda ash production of Tata Chemicals in 2008 was 3.2 + 2.2 = 5.4 MT. Since the combined production of Tata Chemicals and Nirma was 8.8 MT, thus Nirma s production was 8.8 – 5.4 = 3.4 MT

Now let s go through the five statements:

Statement 1: Solvay s market share > 20.66% 40 = 8.264 MT: We have no way knowing whether or not this is true.

Statement 2: Solvay s market share > 13.5% 40 = 5.4 MT: Since, Tata Chemicals production is 5.4 MT, and Solvay is the highest producer; hence Solvay s production is definitely > 5.4 MT. This statement is definitely true.

Statement 3: FMC s share < 10.33% × 40 = 4.132 MT: We have no way knowing whether or not this is true.

Statement 4: FMC s share < 13.5% 40 = 5.4 MT: Since, Tata Chemicals production is 5.4 MT, and FMS ranked below Tata; hence FMC s production is definitely < 5.4 MT. This statement is definitely true.

Statement 5: Nirma s share < 8.5% 40 = 3.4 MT (and Nirma was the sixth largest producer): We have already seen that Nirma s production was 3.4 MT; so, this statement is definitely false.

Hence, option C.

73. Raj Travels has the following revenue model for a group package. Owner charges Rs. 20,000 per person till group size of 200. For every additional traveller beyond 200, he starts offering discount of 50 rupees to all members of the group. The maximum possible income for Raj Travels from the package is:

A. Rs. 4000000
B. Rs. 4200000
C. Rs. 4500000
D. Rs. 5000000
E. Rs. 5500000

Solution:

If there are 200 or less than 200 people in a group, then charges per person = Rs. 20,000.

For every extra person beyond the 200 mark, the owner gives a discount of Rs. 50 to all the people in the group. That is, if there ar e (200 + 3) = 203 people in the group, then the owner will allow all the 203 people to pay just (20,000 – 50 × 3) = Rs. 19850 each.

Thus, if there are (200 + n) people in the group, then each of the (200 + n) people will pay Rs. (20,000 – 50n).

Total revenue for the owner = (200 + n)(20,000 – 50n)

$= 40,00,000 – 10,000\ n + 20,000\ n – 50\ n^2$

$= 40,00,000 + 10,00\ 0n – 5\ 0n^2$

$= –50(\ n^2 – 200n – 80,000)$

Substituting each of the options, we have

Option E: $-50(n^2 - 200n - 80{,}000) = 55{,}00{,}000$

$n^2 - 200n - 80{,}000 = -1{,}10{,}000$

$n^2 - 200n + 30{,}000 = 0$

Here, discriminant $= (-200)^2 - 4 \times 30{,}000 = 40{,}000 - 120{,}000 = -80{,}000$

The discriminant is negative, this option is not valid.

Option D: Here we get $n^2 - 200n + 20{,}000 = 0$

Here, discriminant $= (-200)^2 - 4 \times 20{,}000 = 40{,}000 - 80{,}000 = -40{,}000$

The discriminant is negative, this option is also not valid.

Option C: Here we get $n^2 - 200n + 10{,}000 = 0$

Here, discriminant $= (-200)^2 - 4 \times 10{,}000 = 40{,}000 - 40{,}000 = 0$

This option is valid and is the maximum among the given options.

Hence, option C.