XAT 2014

Quantitative Ability

53. $x, 17, 3x - y^2 - 2$, and $3x + y^2 - 30$, are four consecutive terms of an increasing arithmetic sequence. The sum of the four number is divisible by:

A 2

B 3

C 5

D 7

E 11

54. In quadrilateral PQRS, PQ = 5 units, QR = 17 units, RS = 5 units, and PS = 9 units. The length of the diagonal QS can be:

A > 10 and < 12

B > 12 and < 14

C > 14 and < 16

D > 16 and < 18

E cannot be determined

55. The sum of the possible values of X in the equation |X + 7| + |X - 8| = 16 is:

A 0

B 1

C 2

D 3

E None of the above

56. There are two windows on the wall of a building that need repairs. A ladder 30 m long is placed against a wall such that it just reaches the first window which is 26 m high. The foot of the ladder is at point A. After the first window is fixed, the foot of the ladder is pushed backwards to point B so that the ladder can reach the second window. The angle made by the ladder with the ground is reduced by half, as a result of pushing the ladder. The distance between points A and B is

A < 9 m

B ≥ 9 m and < 9.5 m

C ≥ 9.5 m and < 10 m

D ≥ 10 m and < 10.5 m

E ≥ 10.5 m

57. Amitabh picks a random integer between 1 and 999, doubles it and gives the result to Sashi. Each time Sashi gets a number from Amitabh, he adds 50 to the number, and gives the result back to Amitabh, who doubles the number again. The first person, whose result is more than 1000, loses the game. Let 'x' be the smallest initial number that results in a win for Amitabh. The sum of the digits of 'x' is:

A 3

B 5

C 7

D 9

E None of these

58. Consider four natural numbers: x, y, x + y, and x - y. Two statements are provided below:
I. All four numbers are prime numbers.
II. The arithmetic mean of the numbers is greater than 4.
Which of the following statements would be sufficient to determine the sum of the four numbers?

A Statement I.

B Statement II.

C Statement I and Statement II.

D Neither Statement I nor Statement II.

E Either Statement I or Statement II.

59. Triangle ABC is a right angled triangle. D and E are mid points of AB and BC respectively. Read the following statements.
I. AE = 19
II. CD = 22
III. Angle B is a right angle.
Which of the following statements would be sufficient to determine the length of AC?

A Statement I and Statement II.

B Statement I and Statement III.

C Statement II and III.

D Statement III alone.

E All three statements.

60. There are two circles C_1 and C_2 of radii 3 and 8 units respectively. The common internal tangent, T, touches the circles at points P_1 and P_2 respectively. The line joining the centers of the circles intersects T at X. The distance of X from the center of the smaller circle is 5 units. What is the length of the line segment P_1P_2 ?

A ≤ 13

B > 13 and ≤ 14

C > 14 and ≤ 15

D > 15 and ≤ 16

E > 16

61. Consider the formula, $S = \frac{\alpha \times \omega}{\tau + \rho \times \omega}$ positive integers. If ω is increased and α, τ and ρ are kept constant, then S:

A increases

B decreases

C increases and then decreases

D decreases and then increases

E cannot be determined

62. Prof. Suman takes a number of quizzes for a course. All the quizzes are out of 100. A student can get an A grade in the course if the average of her scores is more than or equal to 90.Grade B is awarded to a student if the average of her scores is between 87 and 89 (both included). If the average is below 87, the student gets a C grade. Ramesh is preparing for the last quiz and he realizes that he will score a minimum of 97 to get an A grade. After the quiz, he realizes that he will score 70, and he will just manage a B. How many quizzes did Prof. Suman take?

A 6

B 7

C 8

D 9

E None of these

63. A polynomial y=$ax^3 + bx^2 + cx + d$ intersects x-axis at 1 and -1, and y-axis at 2. The value of b is:

A - 2

B 0

C 1

D 2

E Cannot be determined

64. The probability that a randomly chosen positive divisor of 10^{29} is an integer multiple of 10^{23} is: a^2/b^2, then 'b - a' would be:

A 8

B 15

C 21

D 23

E 45

65. Circle C_1 has a radius of 3 units. The line segment PQ is the only diameter of the circle which is parallel to the X axis. P and Q are points on curves given by the equations $y = a^x and y = 2a^x$ respectively, where a < 1. The value of a is:

A $\frac{1}{\sqrt[6]{2}}$

B $\frac{1}{\sqrt[6]{3}}$

C $\frac{1}{\sqrt[3]{6}}$

D $\frac{1}{\sqrt{6}}$

E None of the above

66. Consider a rectangle ABCD of area 90 units. The points P and Q trisect AB, and R bisects CD. The diagonal AC intersects the line segments PR and QR at M and N respectively. What is the area of the quadrilateral PQNM?

A > 9.5 and ≤ 10

B > 10 and ≤ 10.5

C > 10.5 and ≤ 11

D > 11 and ≤ 11.5

E > 11.5

67. Two numbers, 297_B and 792_B , belong to base B number system. If the first number is a factor of the second number then the value of B is:

A 11

B 12

C 15

D 17

E 19

68. A teacher noticed a strange distribution of marks in the exam. There were only three distinct scores: 6, 8 and 20. The mode of the distribution was 8. The sum of the scores of all the students was 504. The number of students in the in most populated category was equal to the sum of the number of students with lowest score and twice the number of students with the highest score. The total number of students in the class was:

A 50

B 51

C 53

D 56

E 57

69. Read the following instruction carefully and answer the question that follows:
Expression $\sum_{n=1}^{13} \frac{1}{n}$ can also be written as $\frac{x}{13!}$ What would be the remainder if x is divided by 11?

A 2

B 4

C 7

D 9

E None of the above

70. A rectangular swimming pool is 48 m long and 20 m wide. The shallow edge of the pool is 1 m deep. For every 2.6 m that one walks up the inclined base of the swimming pool, one gains an elevation of 1 m. What is the volume of water (in cubic meters), in the swimming pool? Assume that the pool is filled up to the brim.v

A 528

B 960

C 6790

D 10560

E 12960

71. The value of the expression: $\sum_{i=2}^{100} \frac{1}{log_i 100!}$ is:

A 0.01

B 0.1

C 1

D 10

E 100

72. There are two squares S 1 and S 2 with areas 8 and 9 units, respectively. S 1 is inscribed within S 2 , with one corner of S 1 on each side of S 2 . The corners of the smaller square divides the sides of the bigger square into two segments, one of length ‘a’ and the other of length ‘b’, where, b > a. A possible value of ‘b/a’, is:

A ≥ 5 and < 8

B ≥ 8 and < 11

C ≥ 11 and < 14

D ≥ 14 and < 17

E > 17

73. Diameter of the base of a water - filled inverted right circular cone is 26 cm. A cylindrical pipe, 5 mm in radius, is attached to the surface of the cone at a point. The perpendicular distance between the point and the base (the top) is 15 cm. The distance from the edge of the base to the point is 17 cm, along the surface. If water flows at the rate of 10 meters per minute through the pipe, how much time would elapse before water stops coming out of the pipe?

A < 4.5 minutes

B ≥ 4.5 minutes but < 4.8 minutes

C ≥ 4.8 minutes but < 5 minutes

D ≥ 5 minutes but < 5.2 minutes

E ≥ 5.2 minutes

74. Aditya has a total of 18 red and blue marbles in two bags (each bag has marbles of both colors). A marble is randomly drawn from the first bag followed by another randomly drawn from the second bag, the probability of both being red is 5/16. What is the probability of both marbles being blue?

A 1/16

B 2/16

C 3/16

D 4/16

E 5/16

Instructions [75 - 77]

Answer the questions based on the given data on the tourism sector in India.

Years	Foreign Tourist Arrivals in India (in million)	Foreign Exchange Earnings from Tourism in India (in US $ million)	Foreign Exchange Earnings from Tourism in India (in Rs. Crore)	Number of Indian Nationals Departures from India (in million)	Number of Domestic Tourist Visits to all States/ Uts (in millions)
1997	2.37	2889	10511	3.73	159.88
1998	2.36	2948	12150	3.81	168.2
1999	2.48	3009	12951	4.11	190.67
2000	2.65	3460	15626	4.42	220.11
2001	2.54	3198	15083	4.56	236.47
2002	2.38	3103	15064	4.94	269.6
2003	2.73	4463	20729	5.35	309.04
2004	3.46	6170	27944	6.21	366.27
2005	3.92	7493	33123	7.18	392.01
2006	4.45	8634	39025	8.34	462.32
2007	5.08	10729	44360	9.78	526.56
2008	5.28	11832	51294	10.87	563.03
2009	5.17	11136	53700	11.07	668.8
2010	5.78	14193	64889	12.99	747.7
2011	6.29	16564	77591	14.21	850.86

75. In which of the following years the percentage increase in the number of Indians going abroad was greater than the percentage increase in the number of domestic tourists?

A 2004 and 2005

B 2005 and 2006

C 2005 and 2007

D 2006 and 2008

E 2004, 2005 and 2006

76. In which of the following years was the rupee cheapest with respect to the dollar?

A 2001

B 2002

C 2007

D 2010

E 2011

77. Let 'R' be the ratio of Foreign Exchange Earnings from Tourism in India (in US $ million) to Foreign Tourist Arrivals in India (in million). Assume that R increases linearly over the years. If we draw a pie chart of R for all the years, the angle subtended by the biggest sector in the pie chart would be approximately:

A 24

B 30

C 36

D 42

E 48

Instructions [78 - 80]

Answer the questions based on the following information given below.
The exhibit given below compares the countries (first column) on different economic indicators (first row), from 2000-2010. A bar represents data for one year and a missing bar indicates missing data. Within an indicator, all countries have same scale.

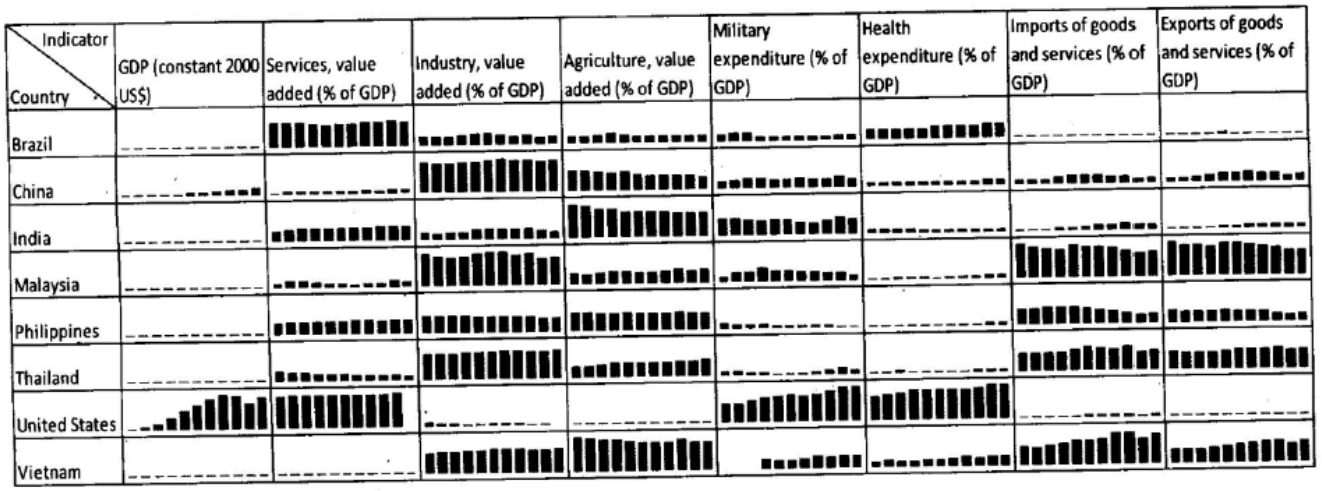


Table given below contains data of GDP in constant 2000 US Dollar (in billions).

Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Brazil	645	653	671	678	717	740	769	816	858	855	919
China	1,198	1,298	1,416	1,558	1,715	1,909	2,151	2,457	2,693	2,940	3,246
India	475	498	518	559	603	659	720	790	821	888	973
Malaysia	94	94	99	105	112	118	125	133	140	137	147
Philippines	81	83	86	91	97	101	107	114	119	120	129
Thailand	123	125	132	141	150	157	165	174	178	174	187
United States	9,899	10,007	10,190	10,450	10,814	11,146	11,443	11,661	11,619	11,209	11,548
Vietnam	31	33	36	38	41	45	48	53	56	59	63

78. Which of the following countries, after United States, has the highest spending on military as % of GDP, in the period 2000-2010?

A Vietnam

B China

C India

D Brazil

E Thailand

79. Which country (and which year) has witnessed maximum year-to-year decline in “industry as percentage of GDP”? Given that the maximum value of industry as percentage of GDP is 49.7% and the minimum value of industry as percentage of GDP is 20.02%, in the chart above.

A United States in 2002-3

B Brazil in 2006-7

C India in 2009-10

D Malaysia in 2008-9

E China in 2008-9

80. Which of the following countries has shown maximum increase in the “services, value added as % of GDP” from year 2000 to year 2010?

A Brazil

B India

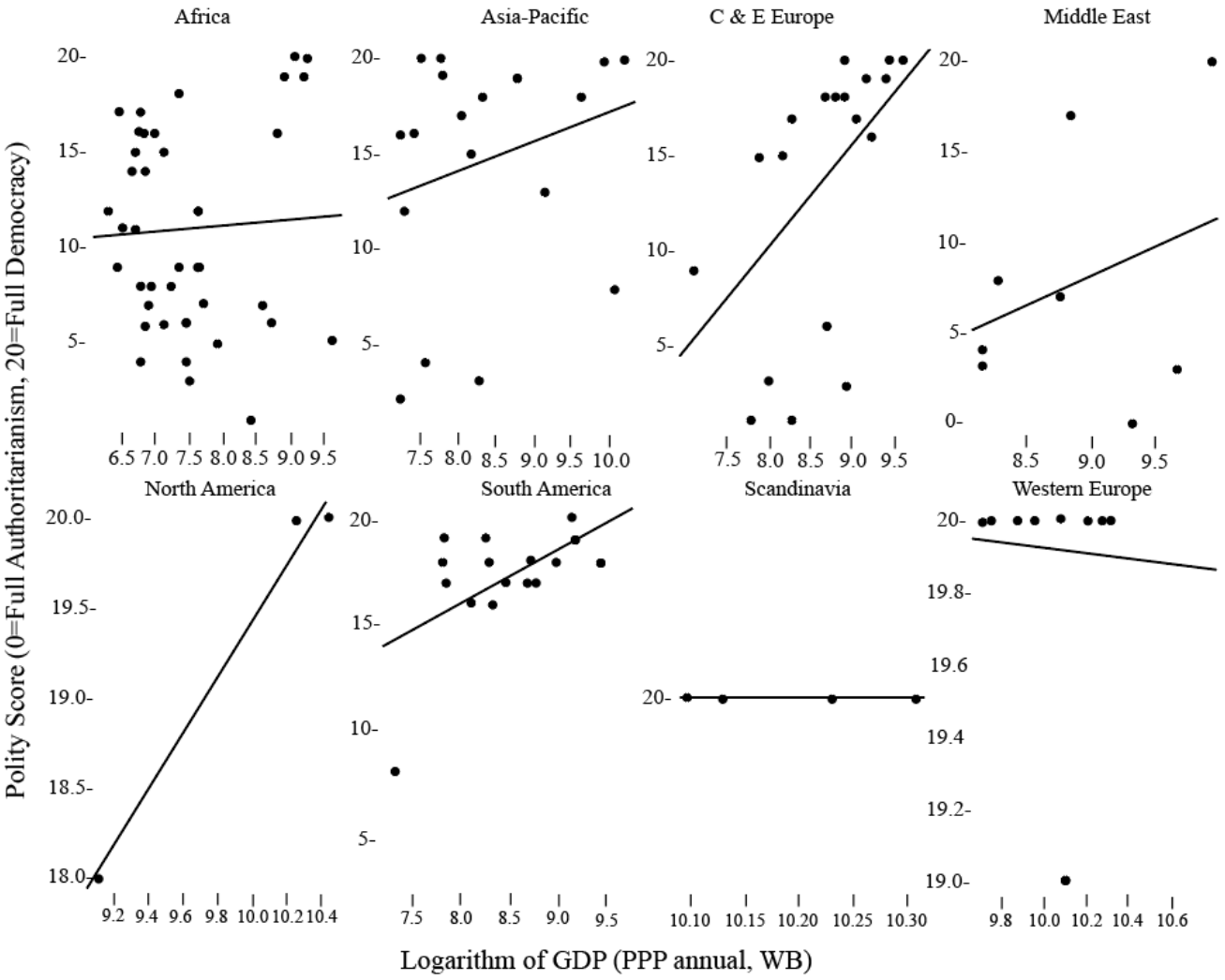
C United States

D Philippines

E None of the above

Instructions [81 - 83]

Answer the questions based on the trends lines from the following graphs.
Note: Left side of X axis represents countries that are “poor” and right side of X axis represents countries that are “rich”, for each region. GDP is based on purchasing power parity (PPP).
These are World Bank (WB) estimates.



81. Which of the following could be the correct ascending order of democratic regions for poor?

A North America, C and E Europe, South America, Middle East, Asia Pacific

B Scandinavia, Western Europe, Africa, Asia Pacific, Middle East

C Scandinavia, Western Europe, North America, C and E Europe, Middle East

D C and E Europe, Africa, South America, Western Europe, Scandinavia

E Africa, South America, Western Europe, North America, Scandinavia

82. Which region has the highest disparity, of democratic participation, between rich and poor?

A North America

B C & E Europe

C Africa

D South America

E Western Europe

83. The maximum GDP of African region is higher than the maximum GDP of South American region by factor of:

A 10

B 100

C 2

D 4

E None of these

Answers

53.**A**	54.**B**	55.**B**	56.**E**	57.**C**	58.**A**	59.**E**	60.**C**
61.**A**	62.**D**	63.**A**	64.**D**	65.**A**	66.**D**	67.**E**	68.**E**
69.**D**	70.**D**	71.**C**	72.**D**	73.**D**	74.**C**	75.**C**	76.**B**
77.**C**	78.**C**	79.**D**	80.**B**	81.**D**	82.**B**	83.**E**	

Explanations

53. **A**

The terms $x, 17, 3x - y^2 - 2$ and $3x + y^2 - 30$ are in A.P.

=> Common difference = $d = 17 - x$ ---------Eqn(I)

$d = 3x - y^2 - 19$ ---------Eqn(II)

$d = 2y^2 - 28$ ---------Eqn(III)

From eqn(I) & (II), => $17 - x = 3x - y^2 - 19$

=> $4x - y^2 = 36$ -------Eqn(IV)

From eqn(II) & (III), => $3x - y^2 - 19 = 2y^2 - 28$

=> $x - y^2 = -3$ --------Eqn(V)

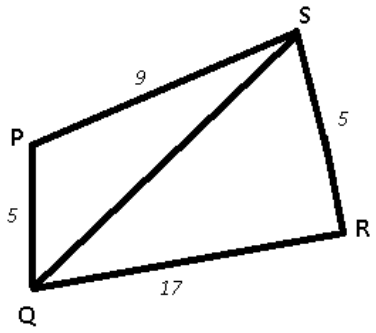
Solving eqn(IV) & (V), we get :

$x = 13, y^2 = 16$

=> Terms are = $13, 17, 21, 25$

$\therefore$ Sum = $13 + 17 + 21 + 25 = 76$, which is divided by 2. (among the given options)

54. **B**



In a triangle , sum of two sides is greater than the third side and difference of two sides is less than third side.

In $\triangle$ PQS

=> $QS < 9 + 5$ => $QS < 14$ ------Eqn(I)

In $\triangle$ QRS

=> $QS > 17 - 5$ => $QS > 12$ ------Eqn(II)

From eqn(I) & (II)

=> $12 < QS < 14$

55. **B**

Expression : $|x+7|+|x-8|=16$

Case 1 : $x<-7$

=> $-(x+7)-(x-8)=16$

=> $-2x+1=16$

=> $x=\frac{-15}{2}=-7.5$

Case 2 : $-7\leq x<8$

=> $(x+7)-(x-8)=16$

=> $15=16$, which is not possible.

Case 3 : $x\geq 8$

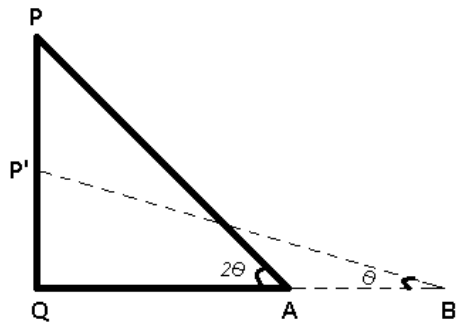
=> $(x+7)+(x-8)=16$

=> $2x-1=16$

=> $x=\frac{17}{2}=8.5$

$\therefore$ Sum of all possible values of $x=8.5-7.5=1$

56. **E**



Given : Length of ladder = PA = P'B = 30 m and PQ = 26 m

$\angle$ PAQ = 2 $\angle$ P'BQ

To find : AB = ?

Solution : In $\triangle$ PAQ

=> $(QA)^2=(PA)^2-(PQ)^2$

=> $(QA)^2=30^2-26^2=900-676$

=> $QA=\sqrt{224}\approx 15$

Also, $cos2\theta=\frac{QA}{PA}$

=> $2\theta=cos^{-1}(\frac{15}{30})$

=> $2\theta=60$ => $\theta=\frac{60}{2}=30$

In $\triangle$ P'QB

=> $cos30=\frac{QB}{P'B}$

=> $QB=\frac{\sqrt{3}}{2}\times 30$

=> $QB = 15 \times 1.732 = 25.98$

$\therefore$ AB = QB - QA = 25.98 - 15 = 10.98 m

57. **C**

Let the no. chosen by Amitabh be x

In the first step, the result got by Amitabh is 2x and the result got by Shashi is 2x+50.

In the second step, the result got by Amitabh is 4x+100 and the result got by Shashi is 4x+150.

In the third step, the result got by Amitabh is 8x+300 and the result got by Shashi is 8x+350.

In the fourth step, the result got by Amitabh is 16x+700 and the result got by Shashi is 16x+750.

In the fifth step, the result got by Amitabh is 32x+1500 and the result got by Shashi is 32x+1550.

In step 5, since both of their results are greater than 1000, so step 4 will be the last step.

Since Amitabh wins the game the result of Shashi must be greater than 1000.

Now, $16x + 750 \geq 1000$

or $x \geq 16$

Hence the minimum value of x should be 16 and the its sum of digits is 7.

58. **A**

Natural numbers = $x, y, (x + y), (x - y)$

Statement I : As all the numbers are prime, therefore, either x or y has to be 2 because otherwise (x+y) cannot be prime.

Case 1 : If x = 2, then (x-y) cannot be prime

Case 2 : If y = 2, numbers = $(x - 2), x, (x + 2)$

These numbers are prime, hence all possibility = 3,5,7

$\therefore$ Sum = 2+3+5+7 = 17

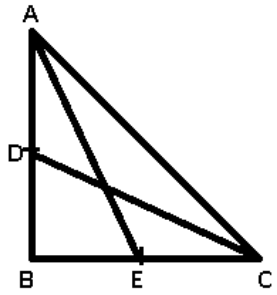
Using statement II, we cannot find the required sum, as no specific value of mean is given.

Thus, statement I alone is sufficient.

59. **E**

ABC is right angled triangle. D and E are mid points of AB and BC respectively.

As it is not given that which angle is 90°. So we need statement (III) to find the value of AC.



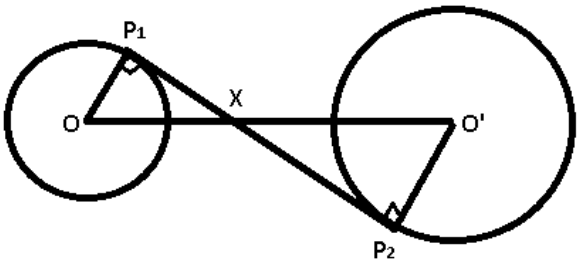
Whereas using statement (I) & (II) alone, we cannot find the value of AC.

But using all the three statements. We can find value of $(AB)^2 + (BC)^2$.

Hence, the value of $AC = \sqrt{(AB)^2 + (BC)^2}$ using Pythagoras Theorem.

=> Ans - (E) : All statements are required.

60. **C**



Given : $OP_1 = 3, O'P_2 = 8, OX = 5$ units

To find : $P_1P_2 = ?$

Solution : In $\triangle OP_1X$

=> $(P_1X)^2 = (OP_1)^2 - (OX)^2$

=> $(P_1X)^2 = 5^2 - 3^2 = 25 - 9$

=> $P_1X = \sqrt{16} = 4$

In $\triangle OP_1X$ and $\triangle O'P_2X$

$\angle OXP_1 = O'XP_2$ (Vertically opposite angles)

$\angle OP_1X = O'P_2X = 90$

=> $\triangle OP_1X \sim \triangle O'P_2X$

=> $\frac{XP_1}{XP_2} = \frac{OP_1}{O'P_2}$

=> $XP_2 = 4 \times \frac{8}{3} = 10.66$

$\therefore P_1P_2 = P_1X + XP_2 = 4 + 10.66 = 14.66$ units

61. **A**

Expression : $S = \frac{\alpha \times \omega}{\tau + \rho \times \omega}$

=> $\frac{1}{S} = \frac{\tau + \rho \times \omega}{\alpha \times \omega}$

=> $\frac{1}{S} = \frac{\tau}{\alpha\omega} + \frac{\rho}{\omega}$

Since, τ, ρ and α are constant,

=> $\frac{1}{S} = \frac{k_1}{\omega} + k_2$

Thus, $S \propto \omega$

$\therefore$ When ω increases, S increases.

62. **D**

Grade A $\geq$ 90 and Grade B = 87 to 89

If Ramesh scores 70 instead of 97, => Change of marks = 97 - 70 = 27

It creates a change from grade A to B, this means an overall change in average by

= Minimum marks for grade A - Minimum marks for Grade B = 90 - 87 = 3

$\therefore$ Number of subjects = $\frac{27}{3} = 9$

63. **A**

Expression : $ax^3 + bx^2 + cx + d$

When it intersects x-axis at x = 1, => Point = (1,0)

=> $a(1)^3 + b(1)^2 + c(1) + d = 0$

=> $a+b+c+d=0$ -------Eqn(I)

Similarly at (-1,0)

=> $a(-1)^3+b(-1)^2+c(-1)+d=0$

=> $-a+b-c+d=0$ => $(a+c)=(b+d)$

Substituting it in eqn(I), we get :

=> $2(b+d)=0$ => $b+d=0$ --------Eqn(II)

When it intersects y-axis at = 2, => Point = (0,2)

=> $a(0)^3+b(0)^2+c(0)+d=2$

=> $d=2$

Substituting it in Eqn(II), => $b=-2$

64. **D**

Number of factors of $10^{29}=2^{29}\times 5^{29}$

= $30\times 30=900$

Factors of 10^{29} which are multiple of 10^{23}

= $10^6=2^6\times 5^6$

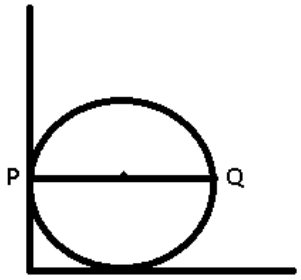
= $7\times 7=49$

=> Required probability = $\frac{49}{900}=\frac{a^2}{b^2}$

=> $\frac{a}{b}=\frac{7}{30}$

$\therefore b-a=30-7=23$

65. **A**



Radius = 3 units, => Diameter = PQ = 6 units

y-coordinates of P and Q are same as PQ is parallel to x-axis

x-coordinates of P and Q will have a difference of 6 units.

Equating y-coordinate of P and Q

=> $a^x=2a^{x+6}$

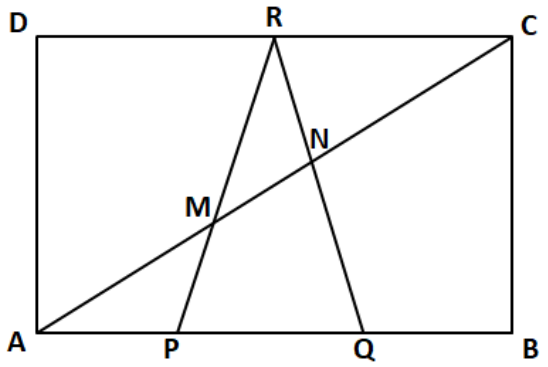
=> $\frac{1}{2}=\frac{a^{x+6}}{a^x}$

=> $a^{x+6-x}=\frac{1}{2}$

=> $a=\frac{1}{\sqrt[6]{2}}$

66. **D**

Let us draw the figure according to the available information,



In $\triangle$ AMP and $\triangle$ CMR

$\angle$ MAP = $\angle$ MCR

$\angle$ AMP = $\angle$ CMR

Therefore, we can say that $\triangle$ AMP $\sim$ $\triangle$ CMR

Hence, we can say that $\frac{AP}{CR} = \frac{MP}{MR}$

$\Rightarrow \frac{AB/3}{AB/2} = \frac{MP}{MR}$

$\Rightarrow MR = \frac{3}{2} * MP$

Therefore, we can say that $\Rightarrow MR = \frac{3}{5} * RP$ ... (1)

Similarly, in $\triangle$ ANQ and $\triangle$ CNR

$\angle$ NAQ = $\angle$ NCR

$\angle$ ANQ = $\angle$ CNR

Therefore, we can say that $\triangle$ ANQ $\sim$ $\triangle$ CNR

Hence, we can say that $\frac{AQ}{CR} = \frac{NQ}{NR}$

$\Rightarrow \frac{2AB/3}{AB/2} = \frac{NQ}{NR}$

$\Rightarrow NR = \frac{3}{4} * NQ$

Therefore, we can say that $\Rightarrow NR = \frac{3}{7} * RQ$ ... (2)

In $\triangle$ RMN and $\triangle$ RPQ

$\frac{\text{Area of triangle RMN}}{\text{Area of triangle RPQ}} = \frac{0.5 * RM * RN * sinMRN}{0.5 * RP * RQ * sinPRQ}$

$\text{Area of triangle RMN} = \frac{3}{5} * \frac{3}{7} * \text{Area of triangle RPQ}$

We know that, Area of triangle RPQ = 1/6*Area of rectangle ABCD = 1/6*90 = 15 sq. units

$\Rightarrow \text{Area of triangle RMN} = \frac{3}{5} * \frac{3}{7} * 15$ = $\frac{27}{7}$ sq. units

Hence, the area of the quadrilateral PQNM = 15 - $\frac{27}{7}$ = $\frac{78}{7} = 11\frac{1}{7}$ sq. units. Therefore, option D is the correct answer.

67. **E**

In Base B, $297_B = 2B^2 + 9B + 7$

and $792_B = 7B^2 + 9B + 2$

It is given that 297_B is a factor of 792_B

=> $\frac{7B^2+9B+2}{2B^2+9B+7}$ must be an integer

=> $\frac{(2B^2+9B+7)+(5B^2-5)}{2B^2+9B+7}$

=> $\frac{5B^2-5}{2B^2+9B+7} + 1 = k$

=> $5B^2 - 5 = (2B^2 + 9B + 7)k$ (where k is factor)

Put $k = 1$

=> $5B^2 - 5 = 2B^2 + 9B + 7$

=> $B^2 - 3B - 4 = 0$

=> $(B - 4)(B + 1) = 0$

=> $B = 4, -1$

Since, B is a base,so B must be greater than 9. Hence, it is not possible

Put $k = 2$

=> $5B^2 - 5 = 4B^2 + 18B + 14$

=> $B^2 - 18B - 19 = 0$

=> $(B - 19)(B + 1) = 0$

=> $B = 19, -1$

$\therefore B = 19$

68. **E**

Let x, y, z be the number of students getting 6, 8 and 20 marks respectively.

=> $6x + 8y + 20z = 504$ ----------Eqn(I)

Since, the mode is 8, => Most populated category = y

=> $y = x + 2z$

=> $x = y - 2z$ ----------Eqn(II)

Substituting it in eqn(I), we get :

=> $(6y - 12z) + 8y + 20z = 504$

=> $14y + 8z = 504$

By hit and trial, since x, y, z are integers, we get : $y = 32$ and $z = 7$

Putting it in Eqn(II), => $x = 32 - 2 \times 7 = 18$

$\therefore$ Total students = $x + y + z = 18 + 32 + 7 = 57$

69. **D**

Expression : $\sum_{n=1}^{13} \frac{1}{n} = \frac{x}{13!}$

=> $\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + ... + \frac{1}{13} = \frac{x}{13!}$

=> $x = \frac{13!}{1} + \frac{13!}{2} + \frac{13!}{3} + ... + \frac{13!}{13}$

Now, if x is divided by 11

=> $\frac{13!+\frac{13!}{2}+\frac{13!}{3}+.....+\frac{13!}{13}}{11}$

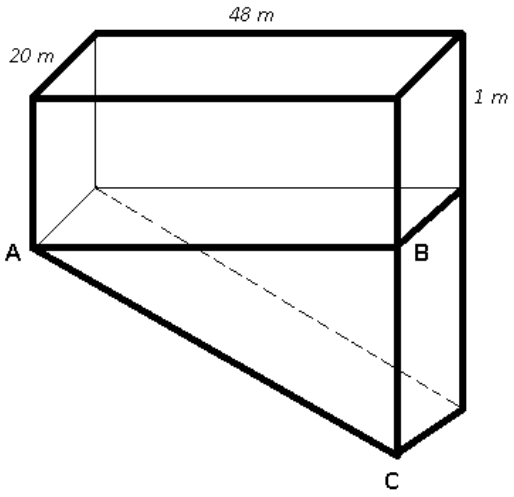
All terms are divisible by 11 except $\frac{13!}{11}$

∴ Remainder if x is divided by 11 = Remainder of $\frac{13!}{11\times11}$

= $(10! \times 12 \times 13)\%11$

= $(10 \times 1 \times 2)\%11 = 20\%11 = 9$

70. **D**



For every 2.6 m that one walks along the slanting part of the pool, there is a height of 1 m that is gained.

=> $\frac{AC}{BC} = \frac{2.6}{1}$

=> $AC = 2.6 \times BC$

Also, dimensions of cuboidal part = $48 \times 20 \times 1$

In $\triangle$ ABC

=> $(AC)^2 = (AB)^2 + (BC)^2$

=> $(2.6 \times BC)^2 = (48)^2 + (BC)^2$

=> $6.76(BC)^2 - (BC)^2 = 2304$

=> $(BC)^2 = \frac{2304}{5.76} = 400$

=> $BC = \sqrt{400} = 20$ m

∴ Volume of water in the pool = Volume of cuboid + Volume of triangle

= $(l \times b \times h) + (\frac{1}{2} \times AB \times BC) \times height$

= $(48 \times 20 \times 1) + (\frac{1}{2} \times 48 \times 20 \times 20)$

= $960 + 9600 = 10560m^3$

71. **C**

Expression : $\sum_{i=2}^{100} \frac{1}{log_i 100!}$

= $\frac{1}{log_2 100!} + \frac{1}{log_3 100!} + \frac{1}{log_4 100!} + ... + \frac{1}{log_{100} 100!}$

We know that $\frac{1}{log_b a} = log_a b$

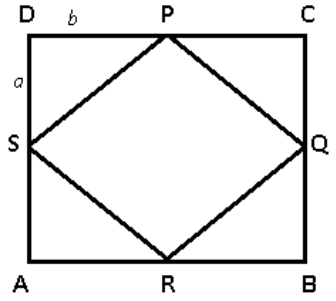
= $log_{100!} 2 + log_{100!} 3 + log_{100!} 4 + ... + log_{100!} 100$

Also, $log_a b + log_a c = log_a (b \times c)$

= $log_{100!}(2 \times 3 \times 4 \times 5 \times ..... \times 100)$

= $log_{100!}100! = 1$

72. **D**



Area of $S_1 = 8$ sq. units

=> Side of $S_1 = PS = \sqrt{8} = 2\sqrt{2}$ units

Similarly, Side of $S_2 = CD = \sqrt{9} = 3$ units

=> $a + b = 3$

In $\triangle$ PDS

=> $b^2 + a^2 = 8$

=> $b^2 + (3 - b)^2 = 8$

=> $b^2 + 9 + b^2 - 6b = 8$

=> $2b^2 - 6b + 1 = 0$

=> $b = \frac{6 \pm \sqrt{36-8}}{4} = \frac{6 \pm \sqrt{28}}{4}$

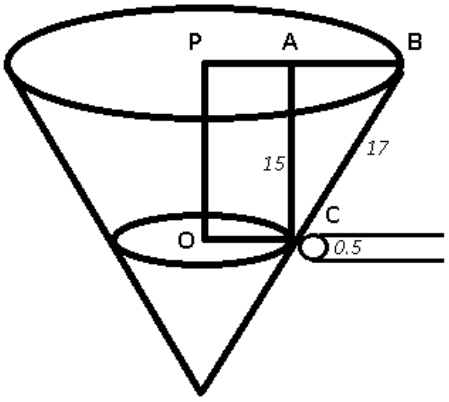
=> $b = \frac{3+\sqrt{7}}{2} \quad (\because b > a)$

=> $a = 3 - \frac{3+\sqrt{7}}{2} = \frac{3-\sqrt{7}}{2}$

$\therefore \frac{b}{a} = \frac{\frac{3+\sqrt{7}}{2}}{\frac{3-\sqrt{7}}{2}}$

= $\frac{3+\sqrt{7}}{3-\sqrt{7}} \approx 15.9$

73. **D**



Radius of cone = $BP = 13$ cm

In $\triangle$ ABC

=> $(AB)^2 = (BC)^2 - (AC)^2$

=> $(AB)^2 = 17^2 - 15^2 = 289 - 225$

=> $AB = \sqrt{64} = 8$ cm

=> AP = OC = $BP - AB = 13 - 8 = 5$ cm

Let time elapsed before water stops coming out of the pipe = T min

Volume of frustum = Volume discharged

=> $\frac{1}{3}\pi h(R^2 + r^2 + Rr) = \pi\ (0.5)^2 \times f \times\ T$ (where f is the flowrate given by 10m/s = 1000cm/s)

(Total volume = Cross sectional area of pipe $\times$ flowrate $\times$ Total time)

=> $\frac{1}{3} \times 15 \times (13^2 + 5^2 + 13 * 5) = 0.25 \times 1000 \times T$

=> $5 \times 259 = 250 \times T$

=> $T = \frac{259}{50} = 5.18$ mi

74. **C**

Probability of both marbles being red = Probability of red from 1st * probability of red from 2nd

= $\frac{5}{16}$

$\because$ Each bag has marbles of both colors and probability cannot be greater than 1

=> $\frac{5}{16} = \frac{5}{8} \times \frac{1}{2}$

where, probability of red marbles from 1st bag = $\frac{5}{8}$

=> Probability of blue marbles from 1st bag = $1 - \frac{5}{8} = \frac{3}{8}$

Similarly, Probability of red marbles from 1st bag = $\frac{1}{2}$

=> Probability of blue marbles from 2nd bag = $1 - \frac{1}{2} = \frac{1}{2}$

$\therefore$ Probability of both blue marbles = $\frac{3}{8} \times \frac{1}{2}$

= $\frac{3}{16}$

75. **C**

Year	Indians going abroad	%Increase wrt previous	Number of domestic	% increase
2003	5.35	8.2	309.04	14.6
2004	6.21	16	366.27	18.5
2005	7.18	15.6	392.01	7
2006	8.34	16.1	462.32	17.9
2007	9.78	17.3	526.56	13.9
2008	10.87	11.1	563.03	6.9

From the above table, it is clear that the percentage increase in the number of Indians going abroad was greater than the percentage increase in the number of domestic tourists

for the years 2005 and 2007

C is the correct answer.

76. **B**

Year	Exchange in dollars	Exchange in rupees	Dollar/Rupee
2001	3198	15083	0.212026785
2002	3103	15064	0.205987785
2007	10729	44360	0.241862038
2010	14193	64889	0.218727365
2011	16564	77591	0.213478367

from the above table, it is clear that the value of rupee wrt to the dollar is cheapest in the year 2002

Hence B is the correct answer.

77. **C**

Year	Earnings	Tourist arrivals	Ratio
1997	2889	2.37	1218.99
1998	2948	2.36	1249.15
1999	3009	2.48	1213.31
2000	3460	2.65	1305.66
2001	3198	2.54	1259.06
2002	3103	2.38	1303.78
2003	4463	2.73	1634.80
2004	6170	3.46	1783.24
2005	7493	3.92	1911.48
2006	8634	4.45	1940.22
2007	10729	5.08	2112.01
2008	11832	5.28	2240.91
2009	11136	5.17	2153.97
2010	14193	5.78	2455.54
2011	16564	6.29	2633.39
		Total	26415.49

If we try to plot a pie chart using the values of R for all the years, 2011 will subtend maximum value since its R value is maximum among all the years.

Angle = $\frac{2633.39}{26415.49} \times 360^0$

=35.88 = 36^0 approximately.

C is the correct answer.

78. **C**

After the USA, we have to find a country with the highest spending on the Military as a % of GDP.

From the chart for Military Expenditure, it can be easily seen that the bar graph for India is higher than any other country except the USA.

Hence, option C is the answer.

79. **D**

This change can be observed by viewing the chart.

Where all other countries saw a gradual drop in their “industry as a % of GDP”, for Malaysia in 2008-09, the fall was sudden and had the maximum value among the options.

Hence, option D is the answer.

80. **B**

From the chart for “services, value-added as a % of GDP” we can see that every other country, except India, has a constant value or decrease from 2000-10, whereas India shows a slow but gradual increase.

Hence, option B is the answer.

81. **D**

We have to mark the option which displays an ascending order of democratic regions for the poor.

From the charts, we can see that the lowest value is displayed by C & E Europe (<5).

Option D has C & E Europe as the first name, so it could be the answer. Checking the remaining regions in option D, we get Africa (approx. 10), South America (14), Western Europe (19.99) and Scandinavia (20).

Thus, the order should be C&E Europe, Africa, South America, Western Europe and Scandinavia.

Hence, option D is the answer.

82. **B**

We have to find the region with the highest disparity in democratic participation between rich and poor. We can check this by calculating the difference between the highest and lowest values from the chart.

North America = 20 - 18 = 2

C&E Europe = 20 - 5 = 15

Africa = 11 - 10 = 1

South America = 20 - 14 = 6

Western Europe = 19.95 - 19.85 = 0.1

Thus, C&E Europe has the highest disparity between the rich and the poor.

Hence, option B is the answer.

83. **E**

From the graph, we can say that the maximum GDP of African and South American region has the same value. i.e 20

So E is the correct answer.