

Global Education of Science

Sub	ject	: Quantitative					Paper Set : 1		
.		Aptitude	MCQ and S	Sub	ojective	Date	: 31-07-2024		
Star	ndard	: 13				Time	: 0H:20M		
1016	ai <i>i</i> viark	: 100							
[Quant	titative Aptitud	e - Section A (MCQ)		respectively. A and B ar taps are opened simulta is the capacity of the tar	re inlets and neously, tan nk ?	C is outlet. If all the k is filled in $16 h$. What		
(1)	1 If $\sin \theta$	$=\frac{9}{5}$, then the value of	$\frac{\tan\theta + \cos\theta}{\cot\theta + \csc\theta}$ is equal to		(A) 2346 L	(B) 16	00 L		
	(A) $\frac{23}{60}$		(B) $\frac{51}{60}$		(C) 800 L	(D) 96	0 L		
(2)	(C) $\frac{34}{60}$ The sin in five compc	nple interest accrued or years at the rate of 4 pe ound interest (In ₹) accru	(D) $\frac{37}{60}$ n a certain principal is ₹ 2,000 ercent <i>p.a.</i> What would be the ued on the same principal at	(11)	The ratio of three number , then what is the sum o (A) 96	ers is 3 : 6 : 8 f the three n (B) 72	3. If their product is 9216 umbers?		
	the sar (Λ) 710	me rate in two years?	(D) 794	(12)	(C) 144 The least value to be div	00 (U) 100 * so th	bat the number $5 * 3/157$		
	(A) /10	4	(B) 724	(12)	is divisible by 11 is	50 11			
(2)	(C) 824	1	(D) 816		(A) 2	(B) 3			
(3)	an obs	ervation 48 was wrong	y taken as 23. The corrected		(C) 0	(D) 4			
	new m (A) 35.	iean is 2	(B) 36.1	(13)	Find the greatest number divisible by 24, 28, 30 an	er of four dig d 35	its which is exactly		
	(C) 36.	5	(D) 39.1		(A) 9225	(B) 924	40		
(4)	The pre	esent worth of a bill of a	Rs.1764 due for $2years$ at $5%$		(C) 9250	(D) 920	60		
	compo	bund interest is (in Rs .)	(D) 1700	(14)	A field is in the form of a	a rectangle o	f length $18 m$ and width		
	(A) 168	50	(B) 1700		25 m. A pit, 7.5 m long, t corner of the field and t	he earth take	d 0.8 <i>m</i> deep, is dug in a en out is evenly spread		
(5)	(C) 160)() 	(D) 1714		over the remaining area	of the field.	The level of the field		
(5)	three c	one of the following is diaits?	the largest prime number of		raised is <i>cm</i>	(D) 1.4			
	(A) 997	7	(B) 999		(A) 12	(B) 14			
	(C) 991	1	(D) 993	()	(C) 16	(D) 18			
(6)	When For ho	Ram sold his book for <i>R</i> w much he should have	<i>ls.</i> 255 he made a loss of 15%. sold it if he wanted to make a	(15)	(A) $\sin^2\beta + 4 \cos(\alpha + \beta)$ (A) $\sin 2\alpha$	$\sin \alpha \sin \beta$ (B) cos	+ cos $2(\alpha + \beta) =$ s 2β		
	profit (of 5%?			(C) $\cos 2\alpha$	(D) sin	2β		
	(A) 275	-	(B) 315	(16)) A $3.3m$ high room is hal volume is $123rac{3}{2}m^3$. Find	f as long aga out its lengi	in as it is wide and its th and breadth.		
(7)	(C) 298	$1 + 2n \beta = 1 + 2n \beta = 1$	(D) 335		(A) $7.5 m, 6 m^4$	(B) 8 n	n, 5 m		
(/)		$\alpha = \frac{1}{7}, \ \tan \beta = \frac{1}{3}, \ \tan \theta$	$(\mathbf{P}) \sin 4\beta$		(C) $7.5 m. 5 m$	(D) 8.5	m, 5m		
	(A) 511	20	(D) Name of these	(17)	A takes three times as lo	ong as B and	<i>C</i> together to do a		
(8)	(C) sin What s to ₹ 65 the sec	3p sum of money (In ₹) at c 50 at the end of the first cond year?	ompound interest will amount year and ₹ 676 at the end of		job. <i>B</i> takes four times as work. If all the three, wo in $24 days$, then the num finish the job	s long as A a orking togeth of days,	nd C together to do the her can complete the job A alone will take to		
	(A) 825	õ	(B) 925		(A) 100	(B) 96			
	(C) 625	5	(D) None of these		(C) 95	(D) 90			
(9)	Two tr time fr each o 3 hour	ains, Kanpur Mail and D om stations Kanpur and ther. After passing each s to reach Delhi and Kar	elhi Mail, start at the same I Delhi respectively towards o other, they take 12 hours and opur respectively. If the	(18)	$37\frac{1}{2}$ % of the candidates the boys and $62\frac{1}{2}$ % of the The number of boys faile	in an examir ne girls passe ed was	nation were sirls, 75% of ed and 342 girls failed.		
	Kanpu of the	r wall is moving at the s Delhi Mail is (in km/hr)	speed of $48 \ km/hr$, the speed		(A) 350	(B) 36	0		
	(A) 90		(B) 96		(C) 370	(D) 380	0		
	(C) 86		(D) 84	(19)) If $y = \frac{1}{a^{1 - \log_a x}}, z = \frac{1}{a^{1 - \log_a x}}$	\overline{x}_{a} and $x = 0$	a^k , then $k =$		
(10)	Taps A	I, B and C attached wit	h a tank and velocity of water		(A) $\frac{1}{a^{1-\log_a z}}$	(B) ₁₋	$\frac{1}{\log_a z}$		

(C) $\frac{1}{1+\log_z a}$

(D) $\frac{1}{1 - \log_z a}$

coming through them are 42L/h, 56L/h and 48L/h,

(20)	If $3 + \log_5 x = 2 \log_{25} y$, then	x =	(33)	If the sum of n terms of an A	. <i>P</i> . is $2n^2 + 5n$, then the n^{th}
	(A) $\frac{y}{125}$	(B) $\frac{y}{25}$		term will be (A) $4n+3$	(B) $4n + 5$
	(C) $\frac{y^2}{625}$	(D) $3 - \frac{y^2}{25}$		(c) $4n + 6$	(D) $4n + 7$
(21)	The radius and height of right $5:12$. If its volume is $314\frac{3}{7}m$ cone. (in m)	t circular cone are in the ratio ³ . Find out the radius of the	(34)	The radius of base of solid co 21 cm. It cut into 3 parts by to base. The cuts are at height c	ne is 9 cm. and its height is wo cuts which are parallel to its of 7 cm. and 14 cm. from the
	(A) 5	(B) 8		base respectively. What is the	e ratio of curved surface area of
	(C) 12	(D) 6		top, middle and bottom parts	s respectively?
(22)	A trader marks his goods 40% allows a discount of 25% . The	6 above the cost price and e profit he makes, is in %		(A) 1:4:8 (C) 1:3:9	(B) 1 : 3 : 5 (D) 1 : 6 : 12
	(A) 15	(B) 10	(35)	13, 35, 57, 79, 911, ?	
	(C) 5	(D) 2		(A) 1110	(B) 1112
(23)	If the compound interest on a years at 5 % p.a. is $Rs.504.40$ interest. (In $Rs.$)	a certain sum of money for 3 , find the corresponding simple	(36)	 (C) 1113 16, 22, 40, 78, 144, ? (A) 244 	(D) 1315(B) 241
	(A) 329.24	(B) 384.78		(C) 254	(D) 246
	(C) 435.45	(D) 480.00	(37)	(C) 204 A bag contains 6 red 4 white	(D) 240
(24)	Two numbers are respectivel number. What is the second	y 20% and 30% less than third number as a percentage of the	(37)	are drawn at random, then th and 1 is red, is	he probability that 2 are white
	(A) 87.5	(B) 88		(A) $\frac{5}{204}$	(B) $\frac{7}{102}$
	(C) 77.5	(D) 87		(C) $\frac{3}{68}$	(D) $\frac{1}{13}$
(25)	What is the average of first 7	multiples of 7 ?	(38)	The average age of 30 wome	n decreases by $3 months$ if a
. ,	(A) 7	(B) 14		woman. Calculate the age of	Neha in <i>year</i> ?
	(C) 21	(D) 28		(A) 17.5	(B) 20
(26)	$\frac{5}{6} \div \frac{6}{7} \times ? - \frac{8}{9} \div 1\frac{3}{5} + \frac{3}{4} \times 3\frac{1}{3}$	$=2\frac{7}{9}$		(C) 30	(D) 22
	(A) $\frac{7}{6}$	(B) $\frac{6}{7}$	(39)	In how many different ways o	can the letters of the word
	(C) 1	(D) None of these		'ALLAHABAD' be permute	ed?
(27)	From a pack of 52 cards, 4 ca	rds are drawn. What is the		(A) 7560	(B) 7840
	probability that it has two dig	git—cards and one honours card		(C) 7460	(D) 7650
	(A) $\frac{1125}{77797}$	(B) $\frac{1512}{7725}$	(40)	If ${}^{2n}C_2:{}^{n}C_2 = 9:2$ and ${}^{n}C_r =$	= 10, then $r =$
	(C) $\frac{1152}{1152}$	(D) $\frac{2511}{2512}$		(A) 1	(B) Z
(28)	Working 7 hours daily 24 me in 27 days. In how many days	n can complete a piece of work s would 14 men complete the	(41)	(C) 4 The true discount on a bill of discount is (in P_{0})	Rs. 720 is $Rs. 80$. The banker's
	same piece of work working	9 hours daily ?		(A) 80	(B) 90
	(A) 36	(B) 30		(C) 100	(D) 120
	(C) 32	(D) None of these	(42)	The ratio of the present ages	of two brothers is 1 : 2 and
(29)	If $\sqrt{\frac{x}{169}} = \frac{54}{39}$, then x is equal (A) 108	to (B) 324	()	5 y ears back, the ratio was 1 their ages after $5 y ears$?	: 3. What will be the ratio of
	(C) 2916	(D) 4800		(A) 1:4	(B) 2 : 3
(30)	A person can row with the st	ream at $8km/h$ and against the		(C) 3:5	(D) 5:6
()	stream at $4 \ km/h$. The speed (A) 1	of the current is (In km/hr) (B) 2	(43)	x varies inversely as square of The value of x for $y=6$ will ${\bf k}$	f y. Given that $y = 2$ for $x = 1$. be equal to
	(C) 1.5	(D) 4		(A) 3	(B) 9
(31)	There is a number consisting	of two digits, the digit in the		(C) $\frac{1}{3}$	(D) $\frac{1}{9}$
	units place is twice that in th subtracted from the sum of t	e tens place and if 2 be he digits, the difference is r. The number is	(44)	A train is travelling at a rate of seconds, it will take to cover	of $45 \ km/hr$. How many a distance of $\frac{4}{5} \ km$? (in <i>second</i>)
	equal to $1/0$ of the number (A) 23	(B) 24		(A) 36	(B) 64
	(C) 25	(D) 26	(`	(C) 90	(D) 120
(32)	If the cube root of 79507 is 43 $\sqrt[3]{79.507} + \sqrt[3]{0.079507} + \sqrt[3]{0}$	3, then the value of 000079507 is	(45)	A lady gives a dinner party for ways in which they may be se if two of the friends will not a	r six guests. The number of elected from among ten friends, attend the party together is
	(A) 47.73	(B) 0.4773		(A) 112	(B) 140
	(C) 477.3	(D) 4.773		(C) 164	(D) None of these

(D) 120 r six guests. The number of elected from among ten friends, attend the party together is **(B)** 140 (D) None of these

(46)	If $a^x = b^y = c^z =$	$= d^w$, then $\log_a(bcd) =$	wo
	(A) $\frac{1}{x}\left(\frac{1}{y} + \frac{1}{z} + \frac{1}{z}\right)$	$\left(\frac{1}{w}\right)$ (B) $x\left(\frac{1}{y}+\frac{1}{z}+\frac{1}{w}\right)$	em ma
	(C) $\frac{y+z+w}{x}$	(D) None of these	(10) Six
(47)	A big tanker can min respectively tanker if tan B is	be filled by two pipes A and B in 60 and 40 y. Then what time it will take to fill an empty s used half of time in (in <i>minute</i>) and tap A	tha diff
	and B together	are used rest half of time?	_
	(A) 24	(B) 30	
	(C) 18	(D) 32	
48)	If $x: y = 5: 2, t$	hen $(8x + 9y) : (8x + 2y)$ is	(11) 0 1:
	(A) 22:29	(B) 26 : 61	wit
	(C) 29:22	(D) 61 : 26	The
49)	If a, b, c are in H $\left(\frac{1}{b} + \frac{1}{c} - \frac{1}{a}\right) \left(\frac{1}{c}\right)$. <i>P</i> . , then the value of $+\frac{1}{a}-\frac{1}{b}$ is	the ori <u>c</u>
	(A) $\frac{2}{bc} - \frac{1}{b^2}$	(B) $\frac{1}{5} \left(\frac{3}{c^2} + \frac{2}{ca} - \frac{1}{a^2} \right)$	(12) If U
	(C) $\frac{6}{b^2} - \frac{1}{ab}$	(D) none of these	(13) If a
50)	Length of a rectarectangle is 18 n	angle is twice of its breadth. Area of the n^2 . What would be its perimeter? (in m)	the
	(A) 16	(B) 8	Ouant
	(C) 12	(D) 31	Quality
)u	antitative A	Aptitude - Section B (SUBJECTIVE)	3 marks
50	[1 Mark]		(14) The
<u> </u>			SA lett
(1)	Prabhat took a c	certain amount as a loan from bank at the	(15) X.
	amount to Ashis	sh as a loan at the rate of $12\% p.a.$ on $S.I.$ If	res
	at the end of 12 What was the or	yrs, he made a profit of $Rs.320$ in the deal, riginal amount (In $Rs.$)?	(16) The
(2)	A certain numbe	er of two digits is three times the sum of its	1!+ is e
.,	digits, and if 45 l Then the number	be added to it, the digit will be reversed. er is	15 C
(3)	In an Entrance E scored 92% mar marks of the exa marks scored by	xamination Ritu scored 56% marks, Smita ks and Rina scored 634 marks. The maximum amination are 875. What are the average vall the three girls together ?	
(4)	The number of v of the word AR places is	words that can be formed out of the letters $TICLE$ so that the vowels occupy even	
(5)	In a river, the rat boat in still wate and speed of an of the speeds of water?	tio of the speed of stream and speed of a er is 2 : 5. Again, ratio of the speed of stream boat in still water is 3 : 4. What is the ratio f the first boat to the second boat in still	
Q u	antitative A	Aptitude - Section B (SUBJECTIVE)	
.A [2	2 Marks])		
(6)	5, 54, 90, 115, 13	1,140,?	
(7)	If p, q, r are in 2 quadratic equat	A.P. and are positive, the roots of the ion $px^2 + qx + r = 0$ are all real for	
(0)	Current first to	rms in the following series	

 $\cot^{-1}3 + \cot^{-1}7 + \cot^{-1}13 + \cot^{-1}21 + \dots$ is given by (9) A contract is to be completed in $92 \, days$ and $234 \, men$ were set to work, each working 16h a day. After 66 days, $\frac{4}{7}$ of the

rk is completed. How many additional men may be ployed, s 🛛 that the work may be completed in time, each n now working 18 h a day ?

'X' s have to be placed in the square of the figure such t each row contains at least one X. In how many erent ways can this be done



- tres are drawn from a cask full of wine and is then filled h water. This operation is performed three more times. ratio of the quantity of wine now left in cask to that of water is 16:65. How much wine did the cask hold ginally? (in *litres*)
- $V_n=rac{1}{n}-rac{1}{n+1},$ then the value of $U_1+U_2+U_3+U_4+U_5$ is
- a_1, a_2, a_3, \dots are in A.P. such that $a_1 + a_7 + a_{16} = 40$, In the sum of the first 15 terms of this A.P. is

titative Aptitude - Section B (SUBJECTIVE)

- number of arrangements of the letters of the word TAYPAUL such that no two A are together and middle er is consonant, is
- Y, \overline{Z} are sets of all positive divisors of $10^{60}, 20^{50}$ and 30^{40} pectively $n(X \cup Y \cup Z)$ is -
- sum of the series

 $\frac{3}{2!+3!} + \frac{4}{2!+3!+4!} + \frac{5}{3!+4!+5!} + \dots + \frac{2008}{(2006)!+(2007)!+(2008)!}$ qual to



Global Education of Science

: Quantitative Subject

Aptitude

: 13

Total Mark : 100

Standard

MCQ and Subjective

Paper Set : 1 : 31-07-2024 Date Time : 0H:20M

(Answer Key)

Quantitative Aptitude - Section A (MCQ)

1 - B	2 - D	3 - C	4 - C	5 - A	6 - B	7 - B	8 - C	9 - B	10 - C
11 - D	12 - A	13 - B	14 - C	15 - C	16 - C	17 - B	18 - D	19 - B	20 - A
21 - A	22 - C	23 - D	24 - A	25 - D	26 - B	27 - C	28 - A	29 - B	30 - B
31 - B	32 - D	33 - A	34 - B	35 - C	36 - D	37 - C	38 - A	39 - A	40 - B
41 - B	42 - C	43 - D	44 - B	45 - B	46 - B	47 - B	48 - C	49 - A	50 - A

		Global Educatio	n of Science		
Subject	: Quantitative Aptitude	MCQ and Su	bjective	Paper So Date	et:1 :31-07-2024
Standard	: 13	(Solution	ıs)	Time	: 0H:20M
Total Mark	: 100		7		
Quan	titative Aptitude - S	Section A (MCQ)	5) Which one of the follow three digits?	ring is the lar	gest prime number of
(1) If $\sin \theta$	$-\frac{3}{2}$ then the value of $-\frac{\tan\theta}{2}$	$+\cos\theta$ is equal to	(A) 997	(B) 999	9
$(1) 11 31110$ $(\Delta) \frac{29}{29}$	$=$ 5, then the value of $\cot \theta$ +	$cosec \theta$ is equal to $\frac{1}{2}$	(C) 991	(D) 993	3
$(-) _{60}$		0 7	Solution:(Correct Answ	/er:A)	
$(C) = \frac{1}{60}$	(D) $\frac{1}{6}$	0	·		
Soluti sin θ = W.K.T.	on:(Correct Answer:B) = $3/5$. $\cos \theta = \sqrt{1 - \sin^2 \theta}$	(6) When Ram sold his bool For how much he should profit of 5%?	\prec for $Rs.255$ d have sold it	he made a loss of 15%. t if he wanted to make a
$\cos \theta =$	$=\sqrt{1-9/25}=\sqrt{16/25}$		(A) 275	(B) 31	5
$\cos \theta =$	=4/5		(C) 295	(D) 33	5
$\cos\theta$	4/3 = 4/3		Solution:(Correct Answ	/er:B)	
cosec	$\theta = 5/3$		$S.P. = \left(\frac{255}{85} \times 100\right) \times \frac{10}{10}$	$\frac{05}{00} = \frac{255}{85} \times 1$	05 = Rs.315
To find	d, $\frac{\tan\theta + \cos\theta}{\cot\theta + \csc\theta} = \frac{\frac{3}{4} + \frac{5}{5}}{\frac{4}{3} + \frac{5}{3}} = \frac{31/20}{9/3}$	= 31/60	(7) If $t = p \rho = 1$	then cos lo	
(2) The state		stein mineirelie 7.0 ,000	(7) If $tan \alpha = \frac{1}{7}$, $tan \beta = \frac{1}{3}$, (A) $sin 2\beta$	(R) sin	=
(2) The sir	vears at the rate of 4 percen	t $p.a$. What would be the	(A) $\sin 2\theta$	(D) No	4p
compo	ound interest (In ₹) accrued c	on the same principal at	(C) $\sin 5\beta$		ine of these
the sa	me rate in two years?	04	Solution:(Correct Answ	/er:B)	
(A) /1	ы (В) /	24	(b) $\cos 2\alpha = \frac{1-t}{1+t^2} = \frac{24}{25}$	Here $t = tan$	α
(C) 82	4 (D) 8	16	$\sin 2\beta = \frac{21}{1+T^2} = \frac{3}{5} \Rightarrow C$	$\cos 2\beta = \frac{4}{5} T$	$=$ tan β
Soluti	on:(Correct Answer:D)		$\therefore \sin 4p = 2 \sin 2p \cos 2\alpha$ $= 2 \frac{3}{2} \frac{4}{2} = \frac{24}{2} = \cos 2\alpha$	2ρ	
(d) Pri	$ncipal = \frac{Simple Interest \times 100}{Time \times Rate}$		-5.5 25		
$=\frac{2000}{5}$	$\frac{7\times100}{\times4} = ₹10,000$	((8) What sum of money (In	₹) at compo	und interest will amount
= Prin	cipal $\left[\left(1 + \frac{Rate}{100} \right)^{Time} - 1 \right]$		the second year?	le filst year a	ind 8 070 at the end of
- 100	$0\left[(1+\frac{4}{2})^2-1\right]$		(A) 825	(B) 92	5
= 100	$ \begin{bmatrix} 1 & 1 \\ 100 \end{bmatrix} $		(C) 625	(D) No	ne of these
= 100	$0 \left[\left(\frac{25}{25} \right)^2 - 1 \right]$		Solution:(Correct Answ	ver:C)	
$=\frac{1}{6}$	$\frac{1}{225} = 310$		(c) Here, $x = 650, y = 6^{\circ}$	76. A = 1 an	d $B=2$
(3) The m	ean of 50 observations was 3	6. It was found later that	\therefore Rate of interest $(R) =$	$=\left[\left(\frac{y}{x}\right)^{1/B-A}\right]$	$-1 \times 100\%$
an obs	servation 48 was wrongly tak	en as 23. The corrected	$= \left[\frac{676}{650} - 1\right] \times 100\%$		J
(A) 35	.2 (B) 3	6.1	$=\frac{26}{650} \times 100\% = 4\%$. D 650×	25 3 605
(C) 36	5 (D) 3	9.1	$\therefore 650 = P\left(1 + \frac{1}{100}\right)$	$\Rightarrow P = \frac{3333}{26}$	$\overline{} = \overline{} 625$
(0) 50	.0 (D) 0	((9) Two trains, Kanpur Mail	and Delhi M	ail, start at the same
Soluti	on:(Correct Answer:C)	18 26 25 26 5	time from stations Kanp	ur and Delhi g oach othor	respectively towards
Correc	Lieu new mean = $\frac{50\times30^{-20+4}}{50}$	$-=30+\frac{-1}{50}=30.5$	3 hours to reach Delhi a	nd Kanpur re	espectively. If the
(4) The pr	esent worth of a bill of $Rs.1$	764 due for $2years$ at $5%$	Kanpur Mail is moving a	t the speed o	of $48 \ km/hr$, the speed
compo	bund interest is (in Rs .)		of the Delhi Mail is (in kn	m/hr)	
(A) 16	50 (B) 1	700	(A) 90	(R) 96	
(C) 16	00 (D) 1	714	(C) 86	(D) 84	
Soluti	on:(Correct Answer:C)		Solution:(Correct Answ	/er:B)	
<i>P.W.</i> :	$= Rs. 1764 \div \left(1 + \frac{5}{100}\right)^2$		Speed of Kanpur mail $\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{\sqrt{2}}$	$\frac{3}{12}$	
= Rs.	$1764 \times \frac{400}{441} = Rs.1600$		Speed of Delhi mail $=$ $\frac{v}{2}$	$\frac{\sqrt{12\times48}}{\sqrt{3}} = 2 \times$	48 = 96km/h

(10)	Taps A, B and C attached w coming through them are 42 respectively. A and B are infi- taps are opened simultaneous is the capacity of the tank?	ith a tank and velocity of water L/h , $56L/h$ and $48L/h$, ets and C is outlet. If all the usly, tank is filled in $16 h$. What	V = 4 =
	(A) $2540 L$	(B) $1000 L$	=
	(C) 800 L	(D) 960 L	
	Solution: (Correct Answer: C In 1 hr the amount of water t = 42 + 56 - 48 = 50L \therefore Capacity of the tank $= 50$) that will be filled in the tank $ imes 16 = 800 L$	(15) 2 (A
(11)	The ratio of three numbers is , then what is the sum of the (A) 96	3 : 6 : 8. If their product is 9216 three numbers? (B) 72	(« S (*
	(C) 144	(D) 68	2
	Solution:(Correct Answer:D (d) Let the 3 No. be $3x, 6x, 8x$ $x^3 = 64$ x = 4) $x \ 144x^3 = 9216$	(16) A
(12)	Three Numbers are 12,24,32 Sum $= 68$ The least value to be given to	o^* so that the number 5^*3457	v (/
(12)	is divisible by 11 is		s
	(A) 2	(B) 3	L
	(C) 0	(D) 4	b
	Solution:(Correct Answer:A Let the least value to be give Then, $x + 4 + 7 = 5 + 3 + 5$ x = 2	.) en to * be x	(17) A
(13)	Find the greatest number of divisible by $24, 28, 30$ and 35	four digits which is exactly	jc w ir
	(A) 9225	(B) 9240(D) 0260	fi (4
	(C) 9250	(D) 9200	((
	Solution: (Correct Answer:B L.C.M. of 24, 28, 30 and 35 2 24, 28, 30, 35 2 12, 14, 15, 35 3 6, 7, 15, 35 5 2, 7, 5, 35 7 2, 7, 1, 7 2 1)	S T T E
	$= 2 \times 2 \times 2 \times 2 \times 3 \times 5 \times 7 = 84$	40	x T
	Greatest number of four digitation Quotient when 9999 is divide 759 \therefore Greatest number of four $-759 = 9240$	its = 9999 ed by 840 is 11 and remainder is r digits in this case = 9999	(18) 3 tl T
(4.4)			(4
(14)	A field is in the form of a rect $15 m$. A pit, $7.5 m \log, 6 m \log$ corner of the field and the ea	tangle of length $18m$ and width broad and $0.8m$ deep, is dug in a arth taken out is evenly spread	((
	over the remaining area of the raised iscm	ne field. The level of the field	S (0) (1)
	(A) 12	(B) 14	3
	(C) 16	(U) 18	i.
	Solution:(Correct Answer:C)	S

Volume of the earth taken out $= (7.5 \times 6 \times 0.8) cm^3$ $= 36 cm^{5}$ Area of the remaining field $= (18 \times 15 - 7.5 \times 6)m^2$ $= (270 - 45)m^2$ $= 225m^2$ \therefore Level of the field raised $=\frac{36}{225}$ metres $=\frac{3600}{225}cm=16cm$ $2\sin^2\beta + 4\cos(\alpha + \beta)\sin\alpha\sin\beta + \cos 2(\alpha + \beta) =$ (A) sin 2α (B) cos 2β (C) $\cos 2\alpha$ (D) sin 2β Solution:(Correct Answer:C) (c) $\cos 2(\alpha + \beta) = 2\cos^2(\alpha + \beta) - 1$, $2\sin^2\beta = 1 - \cos 2\beta$ $L.H.S. = -\cos 2\beta + 2\cos(\alpha + \beta) \left[2\sin\alpha\sin\beta + \cos(\alpha + \beta)\right]$ $= -\cos 2\beta + 2\cos(\alpha + \beta)\cos(\alpha - \beta)$ $= -\cos 2\beta + (\cos 2\alpha + \cos 2\beta) = \cos 2\alpha.$ A 3.3 m high room is half as long again as it is wide and its volume is $123\frac{3}{4}m^3$. Find out its length and breadth. (A) 7.5 m, 6 m(B) 8 m, 5 m (C) 7.5 m, 5 m(D) 8.5 m, 5 m Solution:(Correct Answer:C) Length = $\frac{3}{2} \times$ breadth; height = $3\frac{3}{10}m\frac{3}{2} \times$ breadth × breadth × $\frac{33}{10} = 123\frac{3}{4}m^3$ or, (breadth) ² = $\frac{445}{5} \times \frac{2}{3} \times \frac{10}{33} = 25m^2$ \therefore Breadth = $\sqrt{25} = 5m$ \therefore Length $=\frac{3}{5}\times 5=7.5m$ A takes three times as long as B and C together to do a job.B takes four times as long as A and C together to do the work. If all the three, working together can complete the job in $24 \, days$, then the number of days, A alone will take to finish the job

A) 100	(B) 96
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(C)	95	(D) 5	90
(C))5	(D) 9	90

Solution:(Correct Answer:B)

Time taken by B + C = x days Time taken by A = 3x days \therefore part of work done by A, B, C in 1 day $\frac{1}{x} + \frac{1}{3x} = \frac{4}{3x}$ By question, $\frac{4}{3x} = \frac{1}{24}$ $x = \frac{4 \times 24}{3} = 32$ days Time taken by A alone $= 32 \times 3 = 96$ days

(18) 37¹/₂% of the candidates in an examination were sirls, 75% of the boys and 62¹/₂% of the girls passed and 342 girls failed. The number of boys failed was

(A) 350	((B) 360

(C) 370 (D) 380

Solution:(Correct Answer:D)

Girla = $37\frac{1}{2}$ % of total; Boys = $62\frac{1}{2}$ % of total $62\frac{1}{2}E$ passed 75% passed $37\frac{1}{2}$ % failed 25% failed

i.e. Number of girls failed = $\frac{37\frac{1}{2}}{100} \times \frac{37\frac{1}{2}}{100} \times \text{total} = 342$ Similarly $\frac{25}{100} \times \frac{62\frac{1}{2}}{100} \times \text{total} = \text{Number of boys failed}$

i.e. $\frac{25}{100} \times \frac{62\frac{1}{2}}{100} \times \frac{342 \times 100 \times 100}{37\frac{1}{2} \times 37\frac{1}{2}} =$ number of boys failed i.e. Number of boys failed $= \frac{25 \times 62\frac{1}{2} \times 342}{37\frac{1}{2} \times 37\frac{1}{2}}$ $=\frac{25 \times 125 \times 342}{75 \times 37\frac{1}{2}} = \frac{125 \times 114}{37\frac{1}{2}}$ $=\frac{125 \times 228}{75} = \frac{5 \times 228}{3} = 380$ (19) If $y = \frac{1}{a^{1-\log_a x}}, z = \frac{1}{a^{1-\log_a y}}$ and $x = a^k$, then k =(A) $\frac{1}{a^{1-\log_a z}}$ **(B)** $\frac{1}{1 - \log_a z}$ (C) $\frac{1}{1 + \log_a a}$ (D) $\frac{1}{1-\log a}$ Solution:(Correct Answer:B) $\log_a y = \frac{1}{1 - \log_a x}, \log_a z = \frac{1}{1 - \log_a y}$ $\therefore \log_a z = \frac{1}{1 - \left(\frac{1}{1 - \log_a x}\right)} = \frac{1 - \log_a x}{-\log_a x}$ $\Rightarrow -\log_a z = -1 + \frac{1}{\log_a x}$ $\Rightarrow \quad \frac{1}{\log_a x} = 1 - \log_a z$ $\therefore \quad \log_a x = \frac{1}{1 - \log_a z} \Rightarrow x = \frac{1}{a^{(1 - (\log_a (z)))}} = a^k (\text{ given })$ $\therefore \quad k = \frac{1}{1 - \log_a z}$ (20) If $3 + \log_5 x = 2 \log_{25} y$, then x =(A) $\frac{y}{125}$ (B) $\frac{y}{25}$ (C) $\frac{y^2}{625}$ (D) $3 - \frac{y^2}{25}$ Solution:(Correct Answer:A) $3 + \log_5 x = \log_5 y \Rightarrow \log_5(125x) = \log_5 y \Rightarrow x = \frac{y}{125}$ (21) The radius and height of right circular cone are in the ratio 5:12. If its volume is $314\frac{3}{7}m^3$. Find out the radius of the cone. (in m) **(A)** 5 **(B)** 8 (C) 12 (D) 6 Solution:(Correct Answer:A) $\begin{array}{l} \frac{1}{3}\times\pi\times(5x)^2\times12x=314\frac{3}{7}\\ \Rightarrow \frac{1}{3}\times\frac{22}{7}\times25\times12x^3=\frac{2200}{7}\Rightarrow x^3=1 \end{array}$ i.e., x = 1 \therefore Radius = $5x = 5 \times 1 = 5m$ (22) A trader marks his goods 40% above the cost price and allows a discount of 25%. The profit he makes, is in % (A) 15 (B) 10 **(C)** 5 (D) 2 Solution:(Correct Answer:C) Let CP be Rs. xThen MP (after marking 40% above CP) = Rs.1.4xSP (after discount of 25%) Rs. $[1.4x][1-0.25] \Rightarrow Rs. 1.05x$ % Profit = Rs. $\left[\frac{1.05x-x}{x}\right] \times 100\% = 5\%$

(23) If the compound interest on a certain sum of money for 3 years at 5 % p.a. is Rs.504.40, find the corresponding simple interest. (In Rs.)

(A) 329.24 (E	3) 384.78
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(C) 435.45 (D) 480.00

Solution:(Correct Answer:D)

Here,
$$CI = P\left[\left(1 + \frac{R}{100}\right)^3 - 1\right]$$

 $\Rightarrow 504.40 = P\left[\left(1 + \frac{5}{100}\right)^3 - 1\right]$
 $\Rightarrow 504.40 = P\left[\left(\frac{21}{20}\right)^3 - 1\right] \Rightarrow 504.40 = P\left[\frac{1261}{8000}\right]$
 $\Rightarrow P(\text{Principal}) = Rs.3200$
 $\Rightarrow SI = \frac{P \times R \times T}{100} = \frac{3200 \times 5 \times 3}{100} = Rs.480$

(24) Two numbers are respectively 20% and 30% less than third number. What is the second number as a percentage of the first ?

(A) 87.5	(B) 88
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(C) 77.5 (D) 87

Solution:(Correct Answer:A)

Let the third number be 100 Second number = 70, First number = 80 Required percentage = $\frac{70}{80} \times 100 = 87.5$ %

- (25) What is the average of first 7 multiples of 7?
 - **(B)** 14
 - (C) 21 (D) 28

Solution:(Correct Answer:D)

First Number = 7 Seventh Number = 49 Average = $\frac{49+7}{2} = \frac{56}{2} = 28$

(A) 7

(26)	$\frac{5}{6} \div \frac{6}{7} \times ? - \frac{8}{9} \div 1\frac{3}{5} + \frac{3}{4} \times ?$	$3\frac{1}{3} = 2\frac{7}{9}$
	(A) $\frac{7}{6}$	(B) $\frac{6}{7}$
	(C) 1	(D) None

(D) None of these

Solution:(Correct Answer:B)

Let
$$\frac{5}{6} \div \frac{6}{7} \times x - \frac{8}{9} \div \frac{8}{5} + \frac{3}{4} \times \frac{10}{3} = \frac{25}{9}$$
. Then
 $\frac{5}{6} \times \frac{7}{6} \times x - \frac{8}{9} \times \frac{5}{8} + \frac{3}{4} \times \frac{10}{3} = \frac{25}{9}$
 $\frac{35}{36} x - \frac{5}{9} + \frac{10}{4} = \frac{25}{9}$ or, $\frac{35}{36} x = \frac{25}{9} + \frac{5}{9} - \frac{5}{2}$
 $\frac{36}{36} x = \frac{30}{9} - \frac{5}{2}$ or, $\frac{35}{36} x = \frac{60-45}{18}$
 $x = \frac{15}{18} \times \frac{36}{35}$

(27) From a pack of 52 cards, 4 cards are drawn. What is the probability that it has two digit—cards and one honours card of black and red suit ?
(2) 1125

(A)
$$\frac{1125}{7735}$$
 (B) $\frac{1312}{7735}$

(C)
$$\frac{1152}{7735}$$
 (D) $\frac{2511}{7735}$

Solution:(Correct Answer:C)

$$\begin{split} n(S) &= {}^{52}C_4 = \frac{52 \times 51 \times 50 \times 49}{1 \times 2 \times 3 \times 4} = 13 \times 17 \times 25 \times 49 \\ n(E) &= {}^{36}C_2 \times {}^8C_1 \times {}^8C_1 \\ &= \frac{36 \times 35}{1 \times 2} \times 8 \times 8 = 18 \times 35 \times 8 \times 8 \\ \therefore P(E) &= \frac{18 \times 35 \times 8 \times 8}{13 \times 17 \times 25 \times 49} = \frac{18 \times 8 \times 8}{13 \times 17 \times 35} = \frac{1152}{7735} \end{split}$$

- (28) Working 7 hours daily 24 men can complete a piece of work in 27 days. In how many days would 14 men complete the same piece of work working 9 hours daily ?
 - **(A)** 36 **(B)** 30
 - (C) 32 (D) None of these

Solution:(Correct Answer:A)

We have, $M_1 = 24$, $D_1 = 27$, $W_1 = 1$, $t_1 = 7$ $M_2 = 14$, $D_2 = ?$, $W_2 = 1$, $t_2 = 9$ $\therefore \quad M_1 D_1 t_1 W_2 = M_2 D_2 t_2 W_1$ $\Rightarrow 24 \times 27 \times 7 \times 1 = 14 \times D_2 \times 9 \times 1$ $\Rightarrow D_2 = 36$ days.

(29) If $\sqrt{\frac{x}{169}} = \frac{54}{39}$, then x is equal to (A) 108 (B) 324 (C) 2916 (D) 4800

Solution:(Correct Answer:B)

b) $\sqrt{\frac{x}{169}} = \frac{54}{39} \Rightarrow \frac{x}{169} = \frac{54}{39} \times \frac{54}{39}$ $\therefore \quad x = \frac{54}{39} \times \frac{54}{39} \times 169 = 324$

	(30) A person can row wi	th the stream at $8 km/h$ and against the	e (35)	13, 35, 57, 79, 911, ?		
	stream at $4 km/h$. If	ie speed of the current is $(\ln km/hr)$		(A) 1110	(B) 1112	
	(A) 1	(B) 2		(C) 1113	(D) 1315	
	(C) 1.5	(D) 4		Solution:(Correct Ans	wer:C)	
	Solution:(Correct A	nswer:B)		Tens and units digits fo	orm two differnet series of	
	Let the speed of boa	$\operatorname{at} = x$		consecutive odd numb	iers.	
	Speed of stream = i $x \pm y = 8km/h \Rightarrow i$	l = a = Akm		13, 35, 57, 79, 911 So, next term = 1113.		
	$2x = 12 \Rightarrow x = 6 \Rightarrow$	y = 2km/h	(2.2)			
			(36)	16, 22, 40, 78, 144, ?	(D) 0.41	
	(31) There is a number co	insisting of two digits, the digit in the		(A) 244	(B) 241	
	subtracted from the	sum of the digits, the difference is		(C) 254	(D) 246	
	equal to $1/6^{th}$ of the	e number. The number is		Solution:(Correct Ans	wer:D)	
	(A) 23	(B) 24		$16 \xrightarrow{+6}{22} 22 \xrightarrow{+18}{40} 40 \xrightarrow{+38}{+28}$	$\rightarrow 78 \xrightarrow{+66}{+36} 144 \xrightarrow{+102} 246$	
	(C) 25	(D) 26		$6 \longrightarrow 18 \longrightarrow 38 \longrightarrow$ So the next term is 24	$ ightarrow 66 \xrightarrow{\longrightarrow} 102$	
	Solution:(Correct Answer:B)					
	Let the 2 digit numb	Let the 2 digit number by $10x + y$.		A pag contains b red, 4 White and 8 blue balls. If three balls are drawn at random, then the probability that 2 are white		
	Given $y = 2x$	(10		and 1 is red, is	hen the probability that 2 are write	
	Given $x + y - 2 = \frac{1}{6}$ 6x + 6y - 12 - 10x	$\frac{1}{2}(10x+y)$		(A) $\frac{5}{204}$	(B) $\frac{7}{102}$	
	6x + 0y - 12 = 10x $6x + 12x - 12 = 10x$	x + 2x		(C) $\frac{3}{68}$	(D) $\frac{1}{13}$	
	6x = 12			Solution:(Correct Ans	wer:C)	
	$x = 2$ $\therefore y = 4$. In	e number is 24		(c) Required probability	$\mathbf{y} = \frac{{}^{4}C_{2} \times {}^{6}C_{1}}{{}^{18}C_{1}} = \frac{3}{68}.$	
	(32) If the cube root of 7	$\frac{9507}{2507}$ is $\frac{43}{43}$, then the value of	(20)	The average age of 20	we may decrease by $2 = a + b + b + b$	
	$\sqrt[3]{79.507} + \sqrt[3]{0.0795}$	$07 + \sqrt[3]{0.000079507}$ is	(30)	new person Neha is inc	cluded in place of a $25 year$ old	
	(A) 47.73	(B) 0.4773		woman. Calculate the a	age of Neha in $year$?	
	(C) 477.3	(D) 4.773	N	(A) 17.5	(B) 20	
	Solution:(Correct A	nswer:D)	\bigcirc	(C) 30	(D) 22	
	$\sqrt[3]{79.507} + \sqrt[3]{0.0795} - 4.3 + 43 + 0.043$	$07 + \sqrt[3]{0.000079507}$		Solution:(Correct Ans	wer:A)	
	= 4.773	10		Average decreases by 3 months or $\frac{3}{12}$ years Sum of the age decreased $-30 \times \frac{3}{2} - \frac{15}{15} - 75$ years		
(33) If the sum of n terms of an A.P. is $2n^2 +$		s of an $A B$ is $2m^2 + 5m$ then the m^{th}		Age of Neha = $25 - 7$.	5 = 17.5	
	term will be	So an $1.1 \cdot 152h + 5h$, then the h	(20)	In how many different	ways can the latters of the word	
	(A) $4n + 3$	(B) $4n + 5$	(39)	<i>ALLAHABAD</i> be pe	ermuted?	
	(C) $4n + 6$	(D) $4n + 7$		(A) 7560	(B) 7840	
	Solution:(Correct A	nswer:A)		(C) 7460	(D) 7650	
	(a) Given that $S_n=$	$2n^2 + 5n$		Solution:(Correct Ans	wer:A)	
	Putting $n = 1, 2, 3, \dots, S_1 = 2 \times 1 + 5 \times 1 = 7$,			(a) The word ALLAHABAD has 9 letters in all. The letter A^{\prime}		
	$S_2 = 2 \times 4 + 10 = 8$	$S + 10 = 18, S_3 = 18 + 15 = 33.$		occurs 4 times, the lett	:er L' occurs 2 times and the	
	$50, T_1 = S_1 = a = 7$ $T_2 = S_2 - S_2 = 33 = 3$	$, I_2 = S_2 - S_1 = I_0 - I = I_1,$ - 18 = 15		\therefore The require number	of permutations	
	Therefore series is 7.	, 11, 15,		$=\frac{9!}{4!2!1!1!}=\frac{9\times8\times7\times6\times5}{4!\times2}$	<u>1×4!</u>	
	Now, n^{th} term $=a$ -	(n-1)d = 7 + (n-1)4 = 4n + 3.		$= 9 \times 8 \times 7 \times 3 \times 5 =$	7560	
	Aliter : As we know	$T_n = S_n - S_{n-1}$	(40)	If ${}^{2n}C_2$: ${}^nC_2 = 9:2$ and	I $^{n}C_{r}=10$, then $r=$	
	$= (2n^2 + 5n) - \Big\{2(n^2 + 5n) - \Big\}$	$(n-1)^2 + 5(n-1)$		(A) 1	(B) 2	
	$= 2n^2 + 5n - 2n^2 + $	4n - 2 - 5n + 5 = 4n + 3.		(C) 4	(D) 5	
	(34) The radius of base of	1) The radius of base of solid cone is 9 cm. and its height is 21 cm. It cut into 3 parts by two cuts which are parallel to its		Solution:(Correct Answer:B)		
	21cm. It cut into 3 p			(b) $\left(\frac{(2n)!}{2!(2n-2)!}\right) 2 = \left(\frac{(2n)!}{2!(2n-2)!}\right)$	$\left(\frac{n!}{2!(n-2)!}\right)$ 9	
	base. The cuts are at	height of $7 cm$. and $14 cm$. from the		$\Rightarrow (2n)(2n-1)2 = 9n$	$(n-1) \Rightarrow n = 5$	
	top, middle and bot	top, middle and bottom parts respectively?		Now ${}^5C_r = 10 \Rightarrow r = 10$	2.	
	(A) 1:4:8	(B) 1:3:5	(41)	The true discount on a	bill of Rs. 720 is Rs. 80. The banker's	
	(C) 1:3:9	(D) 1:6:12		discount is (in $Rs.$)		
	Solution (Correct A	nswer:B)		(A) 80	(B) 90	
	Solution.(Correct A			(C) 100	(D) 120	

Solution:(Correct Answer:B)

P.W. = Rs. (720 - 80) = Rs. 640S.I. on Rs. 640 = Rs. 80S.I. on $Rs.720 = \left(\frac{80}{640} \times 720\right) = Rs.90$ B.D. = Rs.90

- (42) The ratio of the present ages of two brothers is 1 : 2 and 5 years back, the ratio was 1:3. What will be the ratio of their ages after 5 years? (A) 1:4 (B) 2:3
 - **(C)** 3 : 5 (D) 5:6

Solution:(Correct Answer:C)

Let the present ages of brothers be x and y respectively $\therefore x: y = 1:2$ 5 years ago, (x-5):(y-5)=1:3Then,(x+5): (y+5) = ? $\tfrac{x}{y} = \tfrac{1}{2} \dots (1)$ $\frac{x-5}{y-5} = \frac{1}{3}$...(2) From (2), $3(x-5) = y - 5 \dots (B)$ Subtracting (B) from (A) 2x - 3(x - 5) = y - (y - 5)or 2x - 3x + 15 = y - y + 5-x + 15 = 5x = 15 - 5 = 10 years From (A), y = 2x = 20 years $\frac{(x+5)}{(y+5)} = \frac{10+5}{20+5} = \frac{15}{25} = \frac{3}{5}$

(43) x varies inversely as square of y. Given that y = 2 for x = 1. The value of x for y = 6 will be equal to (A) 3 (B) 9 (D) $\frac{1}{0}$

(C) $\frac{1}{3}$

Solution:(Correct Answer:D)

Given $x \propto \frac{1}{y^2}$ or $x = k \times \frac{1}{y^2}$ Given, y = 2 for x = 1, for y = 6, x = ?From (1), $1 = k \times \frac{1}{2^2}$ or $k=1\times 2^2=4$ $\therefore x = 4 \times \frac{1}{6^2} = \frac{1}{9}$

(44) A train is travelling at a rate of $45 \, km/hr$. How many seconds, it will take to cover a distance of $\frac{4}{5}$ km? (in second)

(C) 90 (D) 120

Solution:(Correct Answer:B)

Time $=\frac{4}{5} \times \frac{1}{45}$ hrs $=\frac{4}{5} \times \frac{1}{45} \times 60 \times 60sec = 64$ seconds

- (45) A lady gives a dinner party for six guests. The number of ways in which they may be selected from among ten friends, if two of the friends will not attend the party together is
 - (A) 112 **(B)** 140
 - (C) 164 (D) None of these

Solution:(Correct Answer:B)

(b) Either 6 selected out of 8 or one from 2 and 5 from 8 $= {}^{8}C_{6} + {}^{2}C_{1} + {}^{8}C_{5} = 140.$

(46) If $a^x = b^y = c^z = d^w$, then $\log_a(bcd) =$ (A) $\frac{1}{x} \left(\frac{1}{y} + \frac{1}{z} + \frac{1}{w} \right)$ (B) $x \left(\frac{1}{y} + \frac{1}{z} + \frac{1}{w} \right)$ (C) $\frac{y+z+w}{z}$ (D) None of these

Solution:(Correct Answer:B)

 $b^y = a^x \Rightarrow b = a^{\frac{x}{y}}, c = a^{\frac{x}{z}}, d = a^{\frac{x}{w}}$ $\log_a(bcd) = \log_a\left(a^{\frac{x}{y}} \cdot a^{\frac{x}{z}} \cdot a^{\frac{x}{w}}\right) = \frac{x}{y} + \frac{x}{z} + \frac{x}{w} =$ $x\left(\frac{1}{y}+\frac{1}{z}+\frac{1}{w}\right)$

- (47) A big tanker can be filled by two pipes A and B in 60 and 40 min respectively. Then what time it will take to fill an empty tanker if tap B is used half of time in (in *minute*) and tap Aand B together are used rest half of time?
 - (A) 24 **(B)** 30
 - (C) 18 (D) 32

Solution:(Correct Answer:B)

Let the required time = x Part of the tank will be filled by tap (A and B) $=\frac{1}{60} + \frac{1}{40} = \frac{5}{120} = \frac{1}{24}$ Then according to question $\frac{x}{2\times 40}+\frac{x}{2\times (24)}=1\Rightarrow \frac{x}{80}+\frac{x}{48}=1\Rightarrow x=30$ Required time =30min(48) If x : y = 5 : 2, then (8x + 9y) : (8x + 2y) is (A) 22:29 (B) 26:61 **(C)** 29 : 22 (D) 61 : 26 Solution:(Correct Answer:C) $\begin{array}{l} \text{Given } x:y=5:2\Rightarrow x=5k \text{ and } y=2k\\ \therefore \quad \frac{8x+9y}{8x+2y}=\frac{8\times5k+9\times2k}{8\times5k+2\times2k}=\frac{58k}{44k}=\frac{29}{22} \end{array}$ (49) If a, b, c are in H.P., then the value of $\left(\frac{1}{b} + \frac{1}{c} - \frac{1}{a}\right) \left(\frac{1}{c} + \frac{1}{a} - \frac{1}{b}\right)$ is (A) $\frac{2}{bc} - \frac{1}{b^2}$ (B) $\frac{1}{5}\left(\frac{3}{c^2}+\frac{2}{ca}-\frac{1}{a^2}\right)$

(C) $\frac{6}{h^2} - \frac{1}{ah}$ (D) none of these

Solution:(Correct Answer:A)

As
$$a, b, c$$
 are in $H.P. 1/a, 1/b, 1/c$ are in $A.P.$

$$\Rightarrow \quad \frac{1}{b} - \frac{1}{a} = \frac{1}{c} - \frac{1}{b} \text{ or } \frac{2}{b} = \frac{1}{a} + \frac{1}{c} \dots (1)$$
Therefore,
 $\left(\frac{1}{b} + \frac{1}{c} - \frac{1}{a}\right) \left(\frac{1}{c} + \frac{1}{a} - \frac{1}{b}\right)$
 $= \left(\frac{1}{b} + \frac{1}{c} + \frac{1}{c} - \frac{2}{b}\right) \left(\frac{1}{c} + \frac{1}{b} - \frac{1}{c}\right) [\text{using}(1)]$
 $= \left(\frac{2}{c} - \frac{1}{b}\right) \left(\frac{1}{b}\right) = \frac{2}{bc} - \frac{1}{b^2}.$

- (50) Length of a rectangle is twice of its breadth. Area of the rectangle is $18 m^2$. What would be its perimeter? (in m)
 - **(A)** 16 **(B)** 8
 - (C) 12 (D) 31

Solution:(Correct Answer:A)

Area of the floor $=\frac{256}{2}m^2=128m^2$ Let the breadth of the rectangle = b length = 2bAccording to the question $\therefore 2b^2 = 128 \Rightarrow b^2 = 64 \Rightarrow b = 8m$ length = 2b = 16m

Quantitative Aptitude - Section B (SUBJECTIVE)

VSQ [1 Mark]

(1) Prabhat took a certain amount as a loan from bank at the rate of 8% Simple interest per annum and gave the same amount to Ashish as a loan at the rate of 12% p.a. on S.I. If at the end of 12 yrs, he made a profit of Rs.320 in the deal, What was the original amount (In Rs.)?

Solution:

Let the original amount be Rs. P. $T = 12, R_1 = 8\%, R_2 = 12\%$, Profit = 320 $\frac{P \times T \times R_2}{100} - \frac{P \times T \times R_1}{100} = 320$ $\frac{P \times 12 \times 12}{100} - \frac{P \times 8 \times 12}{100} = 320$ $P = \frac{2000}{3}$ P = Rs.666.67

(2) A certain number of two digits is three times the sum of its digits, and if 45 be added to it, the digit will be reversed. Then the number is

Solution:

Let the number be 10x + yNow, 10x + y = 3(x + y) $\Rightarrow 7x = 2y$ $\therefore \frac{x}{y} = \frac{2}{7}$ \therefore Required number = 27

(3) In an Entrance Examination Ritu scored 56% marks, Smita scored 92% marks and Rina scored 634 marks. The maximum marks of the examination are 875. What are the average marks scored by all the three girls together ?

Solution:

Maximum marks in examination = 875 \therefore Ritu's marks = $875 \times \frac{56}{100} = 490$ and Smita's marks = $875 \times \frac{92}{100} = 805$ and Rina's marks = 634Hence, required average marks = $\frac{490+805+634}{3} = \frac{1929}{3} = 643$

(4) The number of words that can be formed out of the letters of the word *ARTICLE* so that the vowels occupy even places is

Solution:

(c) Out of 7 places, 4 places are odd and 3 even. Therefore 3 vowels can be arranged in 3 even places in ${}^{3}P_{3}$ ways and remaining 4 consonants can be arranged in 4 odd places in ${}^{4}P_{4}$ ways.

Hence required no. of ways = ${}^{3}P_{3} \times {}^{4}P_{4} = 144$.

(5) In a river, the ratio of the speed of stream and speed of a boat in still water is 2 : 5. Again, ratio of the speed of stream and speed of an boat in still water is 3 : 4. What is the ratio of the speeds of the first boat to the second boat in still water?

Solution:

Let speed of first boat = 5a, stream = 2aSpeed of stream = 3b, boat = 4bStream should be same $\Rightarrow 2a = 3b \Rightarrow a = \frac{3}{2}b$ Required Ratio = $\frac{5a}{4b} = \frac{5\times3}{2\times4} = \frac{15}{8}$

Quantitative Aptitude - Section B (SUBJECTIVE)

S.A [2 Marks]

(6) 5, 54, 90, 115, 131, 140, ?

Solution:

 $5 \xrightarrow{(+49)=(7)^2} 54 \xrightarrow{(+36)=(6)^2} 90 \xrightarrow{(+25)=(5)^2} 115 \xrightarrow{(+16)=(4)^2} 131 \xrightarrow{(+9)=(3)^2} 140 \xrightarrow{(+4)=(2)^2} 144$

(7) If p, q, r are in A.P. and are positive, the roots of the quadratic equation $px^2 + qx + r = 0$ are all real for

Solution:

(a)
$$p, q, r$$
 are positive and are in $A.P.$
 $\therefore q = \frac{p+r}{2}$ (i)
The roots of $px^2 + qx + r = 0$ are real
 $\Rightarrow q^2 \ge 4pr$
 $\Rightarrow \left[\frac{p+r}{2}\right]^2 \ge 4pr$ [using (i)]
 $\Rightarrow p^2 + r^2 - 14pr \ge 0$
 $\Rightarrow \left(\frac{r}{p}\right)^2 - 14\left(\frac{r}{p}\right) + 1 \ge 0$
 $(\because p > 0 \text{ and } p \ne 0)$
 $\Rightarrow \left(\frac{r}{p} - 7\right)^2 - 48 \ge 0$
 $\Rightarrow \left(\frac{r}{p} - 7\right)^2 - (4\sqrt{3})^2 \ge 0$
 $\Rightarrow \left|\frac{r}{p} - 7\right| \ge 4\sqrt{3}.$

(8) Sum of first n terms in the following series $\cot^{-1}3 + \cot^{-1}7 + \cot^{-1}13 + \cot^{-1}21 + \dots$ is given by

Solution:

(d) Let
$$S = 3 + 7 + 13 + 21 + \dots + T_n$$

 $\Rightarrow T_n = n^2 + n + 1.$
Let $T_r = \cot^{-1}(r^2 + r + 1) = \tan^{-1}(r + 1) - \tan^{-1}r.$
Put $r = 1, 2, \dots, n$ and add, we get the required sum $\tan^{-1}(n+1) - \tan^{-1}1 = \tan^{-1}\left(\frac{n}{n+2}\right) = \cot^{-1}\left(\frac{n+2}{n}\right).$

(9) A contract is to be completed in $92 \, days$ and $234 \, men$ were set to work, each working 16h a day. After $66 \, days$, $\frac{4}{7}$ of the work is completed. How many additional men may be employed, s \Box that the work may be completed in time, each man now working 18 h a day?

Solution:

Remaining work = $(1 - \frac{4}{7}) = \frac{3}{7}$ Remaining period = (92 - 66) = 26 days Let the number of additional men = x $M_1 = 234, D_1 = 66, H_1 = 16$ $W_1 = \frac{4}{7}, M_2 = (234 + x), D_2 = 26, H_2 = 18, W_2 = \frac{3}{7}$ According to the question, $M_1W_2H_1D_1 = M_2W_1H_2D_2$ $234 \times \frac{3}{7} \times 16 \times 66 = (234 + x) \times \frac{4}{7} \times 18 \times 26$ $\Rightarrow 234 + x = \frac{3 \times 66 \times 16 \times 234}{4 \times 26 \times 18}$ $234 + x = 36 \times 11 = 396 \Rightarrow x = 396 - 234 = 162$ Additional men to be employed = 162

(10) Six 'X' s have to be placed in the square of the figure such that each row contains at least one X. In how many different ways can this be done



Solution:

(c) In all, we have 8 squares in which 6 X's have to be placed and it can be done in ${}^{8}C_{6} = 28$ ways. But this includes the possibility that either the top horizontal row does not have any X or the bottom horizontal has no X.

Since we want each row must have at least one X, these two possibilities are to be excluded.

Hence required number of ways are 28 - 2 = 26.

(11) 8 litres are drawn from a cask full of wine and is then filled with water. This operation is performed three more times. The ratio of the quantity of wine now left in cask to that of the water is 16 : 65. How much wine did the cask hold originally? (in *litres*)

Solution:

Let the quantity of wine originally in the cask was \boldsymbol{x} litres Quantity of wine left in the cask after 4 operations

 $= x \left(1 - \frac{8}{x}\right)^{4} \text{ litres}$ $\therefore \frac{x \left(1 - \frac{8}{x}\right)^{4}}{x} = \frac{16}{81}$ $\text{ or } \left(1 - \frac{8}{x}\right)^{4} = \frac{16}{81} = \left(\frac{2}{3}\right)^{4}$ $\therefore 1 - \frac{8}{x} = \frac{2}{3}$ $\text{ or } \frac{8}{x} = 1 - \frac{2}{3} = \frac{1}{3}$ $\therefore x = 8 \times 3$ = 24 litres

(12) If $U_n = \frac{1}{n} - \frac{1}{n+1}$, then the value of $U_1 + U_2 + U_3 + U_4 + U_5$ is

Solution:

 $U_n = \frac{1}{n} - \frac{1}{n+1}$ $U_1 = \frac{1}{1} - \frac{1}{2} = +\frac{1}{2}$ $U_2 = \frac{1}{2} - \frac{1}{3} = \frac{1}{6}$ $U_3 = \frac{1}{3} - \frac{1}{4} = \frac{1}{12}$ $U_4 = \frac{1}{4} - \frac{1}{5} = \frac{1}{20}$ $U_5 = \frac{1}{5} - \frac{1}{6} = \frac{1}{30}$ $U_1 + U_2 + U_3 + U_4 = \frac{1}{2} + \frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \frac{1}{30}$ $= \frac{30 + 10 + 5 + 3 + 2}{60}$ $= \frac{50}{60} = \frac{5}{6}$

(13) If a_1, a_2, a_3, \dots are in A.P. such that $a_1 + a_7 + a_{16} = 40$, then the sum of the first 15 terms of this A.P. is

Solution:

 $\begin{array}{l} a_1, a_2, \dots a_n \text{ are in A.P.} \\ a_1 + a_7 + a_{16} = 40 \\ \Rightarrow a + a + 6d + a + 15d = 40 \\ \Rightarrow 3a + 21d = 40 \\ \Rightarrow a + 7d = \frac{40}{3} \\ 515 = \frac{15}{2} \left[2a + 14d \right] \\ = 15 \left[a + 7d \right] \\ = 15 \times \frac{40}{3} \\ = 200 \end{array}$

Quantitative Aptitude - Section B (SUBJECTIVE)

3 marks

(14) The number of arrangements of the letters of the word SATAYPAUL such that no two A are together and middle letter is consonant, is



(15) X,Y,Z are sets of all positive divisors of $10^{60},20^{50}$ and 30^{40} respectively $n(X\cup Y\cup Z)$ is -

Solution:

$$\begin{split} x &= 2 \times 5^{60} \\ n(x) &= 6! \times 5! \\ n(y) &= 10! \times 5!, \text{ where } y - 2^{100} \times 5^{50} \\ z &= 2^{40} \times 3^{40} \times 5^{40} \\ n(z) &= 41^3 \\ n(x \cap y) &= 6! \times 5! \\ n(y \cap z) &= 41^2 = n(z \cap x) \\ n(x \cap y \cap z) &= 41^2 \\ n(x \cup y \cup z) &= n(x) + n(y) + n(z) \\ &= n(x \cap y) - (y \cap z) - n(z \cap x) + n(x \cap y \cap z) \\ &= 61^2 + 101 \times 51 + (41)^3 - 61 \times 51 - 41^2 - 41^2 \\ &= 61(61 - 51) + 41^2(41 - 1) + 101 \times 51 = 73001 \end{split}$$

(16) The sum of the series

 $\frac{3}{1!+2!+3!}+\frac{4}{2!+3!+4!}+\frac{5}{3!+4!+5!}+\ldots\ldots+\frac{2008}{(2006)!+(2007)!+(2008)!}$ is equal to

Solution:

$$\begin{split} & \mathsf{T}_{\mathsf{n}} = \frac{\mathsf{n}}{(\mathsf{n}-2)! + (\mathsf{n}-1)! + \mathsf{n}!} \\ & = \frac{n}{(\mathsf{n}-2)! \cdot [1+\mathsf{n}-1+\mathsf{n}(\mathsf{n}-1)]} = \frac{n}{(\mathsf{n}-2)! \cdot n^2} \\ & = \frac{1}{(\mathsf{n}-2)! \cdot \mathsf{n}} \\ & = \frac{\mathsf{n}-1}{(\mathsf{n}-1)! \cdot \mathsf{n}} = \frac{1}{(\mathsf{n}-1)!} \left[1 - \frac{1}{\mathsf{n}} \right] = \frac{1}{(\mathsf{n}-1)!} - \frac{1}{\mathsf{n}!} \\ & \mathsf{hence} \quad \mathsf{sum} = \sum_{n=3}^{2008} \left(\frac{1}{(\mathsf{n}-1)!} - \frac{1}{\mathsf{n}!} \right) \\ & \mathsf{sum} = \frac{1}{2!} - \frac{1}{3!} + \frac{1}{3!} - \frac{1}{4!} + \frac{1}{4!} - \frac{1}{5!} \dots + \frac{1}{(2007)!} - \frac{1}{(2008)!} \\ & = \frac{1}{2!} - \frac{1}{(2008)!} = \frac{(2008)! \cdot 2}{2 \cdot (2008)!} \\ & \mathsf{Alternatively:} \\ & \mathsf{T}_{\mathsf{n}} = \frac{\mathsf{n}+2}{\mathsf{n}!(\mathsf{n}+2)!} = \frac{\mathsf{n}!(\mathsf{n}+2)}{\mathsf{n}![\mathsf{1}+\mathsf{n}+\mathsf{1}+(\mathsf{n}+2)(\mathsf{n}+1)]} \\ & = \frac{n+2}{n!(\mathsf{n}+2)^2} = \frac{1}{n!(\mathsf{n}+2)} \\ & = \frac{\mathsf{n}+2-1}{(\mathsf{n}+1)(\mathsf{n}+2)} = \frac{1}{(\mathsf{n}+1)!} - \frac{1}{(\mathsf{n}+2)!} \\ & [\mathsf{where}\, n = 1, 2, 3, \dots . 2006] \end{split}$$