

Speed Maths

Questions:

1	Find the digit sum of the following: a. 42 b. 2468 c. 991 d. 771 e. 837364				
2	Multiplication of numbers which are near the base: a. 88×98 b. 93×96 c. 87×98 d. 79×88 e. 103×104 f. 15111×10003 g. 1222×1003 h. 1051×1007 i. 124×98 j. 94×109 k. 91×103 l. 987×1006				
3	Multiplication of numbers which are near the base: other bases a. 568×998 b. 68778×99997 c. 891×989				
4	Multiplication of numbers which are near the base: proportionality a. 213×203 b. 48×47 c. 88×49 d. 312×307				
5	Multiplication of numbers which are near the base: Numbers near different base a. 9998×94 b. 92×989 c. 1122×104 d. 9996×988				
6	Multiplication of numbers type: [AB x AC , where B+C =10] a. 73×77 b. 84×86 c. 31×39 d. 52×58 e. 75^2 f. 194×196 g. 1001×1009				
7	Multiplication of Miscellaneous type: a. 23×51 b. 53×67 c. 74×43 d. 33×89 e. 21×75 f. 97×45 g. 124×152 h. 137×164				
8	Find the following: i] $42567 \times 52249 = ?$ a. 2224083183 b. 2450158759 c. 6545168683 d. 2224083175 ii] $9654 \times 1354386 = ?$ a. 65313813144 b. 13075242444 c. 843538138131 d. 13075242443				
9	Squaring of a number: 1. $41^2 =$ 2. $52^2 =$ 3. $64^2 =$ 4. $71^2 =$ 5. $33^2 =$ 6. $43^2 =$ 7. $72^2 =$ 8. $75^2 =$ 9. $57^2 =$ 10. $101^2 =$ 11. $106^2 =$ 12. $137^2 =$ 14. $155^2 =$ 15. $9.98^2 =$				

10	Square root of a number (Perfect Square)				
	1. 144	2. 289	3. 676	4. 2304	5. 3249
	6. 4356	7. 6084		8. 24649	9. 29929
					10. 17956
11	Square root of a number (Any number)				
	a. 35.69	b. 198.32	c. 78.41	d. 134.65	
12	Cube root of a number (Perfect Cube)				
	a. 250047	b. 912673	c. 592704	d. 3176523	
13	Cube root of a number (Any number)				
	a. 3942	b. 2192	c. 785	d. 527	

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S2	Divisibility	Aptitude
Divisor	Divisibility condition	Examples
2	The last digit is even (0, 2, 4, 6, or 8).	1,294: 4 is even.
3 or 9	Sum the digits. If the result is divisible by 3, then the original number is divisible by 3.	$405 \rightarrow 4 + 0 + 5 = 9$ and $636 \rightarrow 6 + 3 + 6 = 15$ which both are clearly divisible by 3.
4	Examine the last two digits.	40832: 32 is divisible by 4.
5	The last digit is 0 or 5.	495: the last digit is 5.
6	It is divisible by 2 and by 3.	1,458: $1 + 4 + 5 + 8 = 18$, so it is divisible by 3 and the last digit is even, hence the number is divisible by 6.
8	Examine the last three digits.	34152: Examine divisibility of just 152: 19×8
11	Form the alternating sum of the digits.	918,082: $9 - 1 + 8 - 0 + 8 - 2 = 22$.

Questions:

1. What digits should be put in place of c in $38c$ to make it divisible by
 (a) 2 (b) 3 (c) 4 (d) 5 (e) 6 (f) 9 (g) 10
2. If $5967X13$ is divisible by 3. Find X.
3. If $7X5462$ is divisible by 9. Find X.
4. If $4832X18$ is divisible by 11. Find X.
5. If $87543X$ is divisible by 4. Find X.
6. If $78765X4$ is divisible by 12. Find X.

7. 72 hens cost Rs.96.7..... then what does each hen cost , where two digits in place of “.....”are not visible .

- (a) 5.11 (b) 5.51 (c) 7.20 (d) None of these

Questions For Practice:

Q1. What is the smallest digit that should be replaced by '*' in the number 296^*12 , to make it divisible by 12?

- A. 1 B. 2 C. 3 D. 4 E. None of these

Q2. If the number $54872a63b1$ divisible by 11 and 3 what will be the possible values for 'b' and 'a' respectively?

- A. 1,6 B. 2,8 C. 3,9 D. 2,9 E. 1,7

Q3. If x and y are positive integers such that $(3x + 7y)$ is a multiple of 11, then which of the following will be divisible by 11 ?

- A. $4x + 6y$ B. $x + y + 4$ C. $9x + 4y$ D. $4x - 9y$

Q4. If the number $91876 * 2$ is completely divisible by 8, then the smallest whole number in place of * will be:

- A. 1 B. 2 C. 3 D. 4

Q5. If x and y are the two digits of the number $653xy$ such that this number is divisible by 80, then $x + y = ?$

- A. 2 or 6 B. 4 C. 4 or 8 D. 8

Q6. If the number $653\ xy$ is divisible by 90, then $(x + y) = ?$

- A. 6 B. 2 C. 3 D. 4

Q7. Which digits should come in place of * and \$ if the number $4675*2\$$ is divisible by both 5 & 8?

- A. 4,0 B. 4,5 C. 1,0 D. 8,0

Q8. Which of the following number is not divisible by 4?

- A. 618703572
B. 67920594
C. 62686440
D. 1765216

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S5

Percentage

Aptitude

: Concept Check:

- $p\% \text{ of } q = (p/100) \times q = (pxq)/100$
- p is what % of $q = (px100)/q$
- Percentage change = {change/ (initial value)} $\times 100$
- Percentage point change = Difference of two percentage figures
- If value of an object/number P is successively changed by $x\%$, $y\%$ and then $z\%$, then final value:

$$= P \left(1 \pm \frac{x}{100}\right) \left(1 \pm \frac{y}{100}\right) \left(1 \pm \frac{z}{100}\right)$$
(+ve sign is used for increase, -ve sign for decrease.)
- Conversion of Fraction into percentage

D/N	1	2	3	4	5	6	7	8	9	10
1	100	200	300	400	500	600	700	800	900	1000
2	50	100	150	200	250	300	350	400	450	500
3	33.33	66.66	100							
4	25	50	75	100						
5	20	40	60	80	100					
6	16.66	33.33	50	66.66	83.33	100				
7	14.28	28.56	42.85	57.14	71.42	85.71	100			
8	12.5	25	37.5	50	62.5	75	87.5	100		
9	11.11	22.22	33.33	44.44	55.55	66.66	77.7	88.8	100	
10	10	20	30	40	50	60	70	80	90	100
11	9.09	18.18	27.27	36.36	45.45	54.54	63.6	72.7	81.8	90.9
12	8.33	16.66	25	33.33	41.66	50	58.3	66.6	75	83.3
13	7.69	15.38	23.07	30.76	38.45	46.14	53.83	61.52	69.21	76.9
14	7.14	14.28	21.42	28.57	35.71	42.85	49.98	57.12	64.26	71.4
15	6.66	13.33	20	26.66	33.33	40	46.6	53.3	60	66.6
16	6.25	12.5	18.75	25	31.25	37.5	43.7	50	56.2	62.5

D stands for Denominator

N stands for Numerator

1	8 is 4% of a, and 4 is 8% of b. c equals b/a. What is the value of c?	
2	If 50% of x equals the sum of y and 20, then what is the value of x-2y?	
3	Out of his income Mr Raj spends 20% on house rent and 70% of the rest on household expenditure. If he saves Rs 3600 per month, then his total income per month (in Rs) is	
4	40% of 70 is X% more than 30% of 80. Find X.	
5	If the value of 12.5 % of a certain number is 15. Find the number.	
6	Sahil earns 10 percent more than Satish and Satish earns 20 percent more than Swati. if Swati earns rs 17,500 less than Sahil, what is the earnings of each?	
7	If the value if 14.28 % of certain number is 105. Find the value of 7.14% of that number.	

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8	If Dinesh salary is 20% less than Eshwar's salary, then by what percentage is Eshwar's salary more than Dinesh's salary?	
9	The price of an item goes up by 10 %, by what percent should the new price be reduced to bring it down to the original price?	
10	A number is decreased by 6.25%. By what percent should the new value be increased to result in original value again?	
11	Ram sells his goods 25% cheaper than Shyam and 25 % dearer than Bram. How much percentage is Bram's good cheaper than Shyam's.	
12	The population of a town increased by 12% during 1st year and decreased by 10% during second year. If the present population is 50,400, find the initial population.	
13	During the day, the stock price of a commodity firstly decreases by 11.11 %, then again decreases by 10% and finally increases by 12.5 % and settles down. Find: (i) The ratio of the initial price to the final price. (ii) The net percentage change in the stock price of commodity. (iii) The final price if the initial price was Rs.770 (iv) The initial price if the final price was Rs. 729	
14	The population of a town is increased by 16.66 % in first year, in second year it is decreased by 37.5 % and finally in third year it increased by 57.14 %. The population after 3 years becomes 1,65,000. Find the initial population.	
15	The price of sugar increased by 20%. By what percent a house wife should reduce the consumption of sugar, as her overall expenditure: (i) remains same (ii) Increased by 10% only (iii) Decreased by 10% only	
16	In an election between two candidates, one got 55% of the total valid votes, 20% of the votes were invalid. If the total number of votes was 7500, the number of valid votes that the other candidate got, was:	
17	In an election contested by two parties, Party D secured 12% of the total votes more than Party R. If party R got 132,000 votes, by how many votes did it lose the election?	
18	In an election a candidate who got 56 % of the vote casts, won by 144 votes, find the total number of voters of the voting lists if 80% people cast their vote and there were no invalid votes.	

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S6

Profit and Loss

Aptitude

: Concept Check:

- Cost Price (C.P): The price at which an article is purchased.
- Selling Price (S.P): The price at which an article is sold.
- Gain /Loss: = S.P - C.P
If S.P - C.P is positive then it is called Gain and if S.P - C.P is negative then it is called Loss.
While solving problems, we take |loss|.
- Percentage Gain/Loss = $(\text{Gain/Loss/C.P}) * 100$
- When a person sells two similar items at same price, one at gain x% and other at a loss of x% then, seller incurs loss of $(x/10)^2 = x^2/100$ %.

S. No.	Cost Price	Selling Price	Marked Price	Mark Up%	Discount%	Profit/Loss%
1	Rs 250	Rs 300	Rs 320			
2	Rs 240			12.50%	8.33%	
3		Rs 770		25%	21.42%	
4	Rs 300	Rs 250		10%		

S. No.	Questions	Workspace
Type 1	(i) If I buy @ 3 articles in Rs. 5 and sells @ 5 articles in Rs. 8. Find the profit or loss percentage. (ii) If I buy @ 30 articles per rupee, how many for a rupee should sell to gain 20%? (iii) A man bought oranges at the rate of 8 for Rs 34 and sold them at a rate of 12 for Rs 57. How many oranges should be sold to earn Rs 45 as a profit.	
Type 2	(i) CP of 40 articles is equal to SP of 50 articles. Find the profit or loss percentage. (ii) On buying and selling 30 apples, a merchant made a profit equals to the SP of 6 apples. Find the profit percentage. (iii) Cost price of 12 oranges is equal to selling price of 9 oranges and the discount on 10 oranges is equal to the profit on 5 oranges. What is the percentage difference between the profit percentage and discount percentage?	
Type 3	One article is sold at 12.5% profit and another at 16.66% loss. Find the overall profit or loss percentage. (i) If the CP of both the articles are same. (ii) If the SP of both the articles are same. (iii) If the CP of first article is same as the SP of second article. (iv) If the SP of first article is equal to the CP of second article.	
Type 4	(i) Article sold at a certain price results in 20% profit. If sold at Rs. 300 less, It would have been resulted in 10 % loss. What would be the SP to gain 25%? (ii) An article costing Rs. 250 when sold at a certain price results in a gain of X%. Had the Cost Price been Rs. 50 less and the Selling Price been Rs. 100 more, it should have been resulted in a gain of 2X%. Find X. (iii) Profit earned when a person sells an article at Rs 370 is 20% more than the loss incurred when he sells the	

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	<p>article at Rs. 315. Find the cost price.</p> <p>(iv) A man sells an article at a profit of 20%. If he had bought it at 10% less and sold at Rs. 18 more, he would have been made 40% profit. Find there CP</p>	
Type 5	<p>(i) On allowing a discount of 10% on an article. The shopkeeper gains 20%. If a discount of 20% is allowed on it, what will be the gain percentage?</p> <p>(ii) A shopkeeper earns a profit of 12% on selling a book at 10% discount on the printed price. The ratio of the cost price to the printed price is?</p> <p>(iii) The marked price of an electric rod is Rs. 690. The shopkeeper allows a discount of 9.09% and gains 11.11%. If no discount is allowed his gain percent would be?</p> <p>(iv) A trader lists his articles 6.66% above the cost price and allows a discount of 25% on cash payment. His gain percent is?</p>	
Type 6	<p>(i) A manufacturer sells an article to a dealer at 12.5% profit. The dealer sells the article to a customer at 16.66% profit. If the customer pays Rs. 210 for the article, what did the article cost to the manufacturer?</p> <p>(ii) A shopkeeper allowed two successive discounts of 50% and 60% on an article. Find the net change in the price of the article after discounts.</p>	
Type 7	<p>(i) A trader claims to sell his goods at the same rate as his purchase rate. However his balance reads 1 kg for 900 gms. Find his profit percentage.</p> <p>(ii) A trader sells his goods at 10% mark-up over his purchase price. However he uses a faulty half kg weight that weighs 600 gms. Find his profit percentage.</p> <p>(iii) In summers, a meter scale expands by 10%. What will be the profit percentage of a cloth trader, who sells at a mark up of 20% over his purchase price?</p> <p>(iv) In spite of selling at a mark up of 20% over purchase price, a trader manages a profit of only 10% because of his faulty balance. Answer the following:</p> <p>a] If 1 kg of goods is kept on the balance, what will be the reading?</p> <p>b] If balance reads 1000 gms, what is the correct weight?</p>	

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S7

Blood Relations-1

Aptitude

1. A family has a man, his wife, their four sons and their wives. The family of every son also has 3 sons and one daughter. Find out the total number of male members on the whole family?

- (a) 4 (b) 8 (c) 12 (d) 17

2. A and B are brothers. C and D are sisters. A's son is D's brother. How is B related to C?

- (a) Father (b) brother (c) Grandfather (d) Uncle

3. A is B's sister. C is B's mother. D is C's father; E is D's mother. Then, how is A related to D?

- (a) Grandmother (b) Grandfather (c) Daughter (d) Grand daughter

4. Read the following information carefully and answer the questions given below: There are six children playing football, namely A, B, C, D, E, and F. A and E are brothers. F is the sister of E. C is the only son of A's uncle. B and D are daughter of the brother of C's father.

(i) How is C related to F?

- (a) Cousin (b) brother (c) son (d) Uncle

(ii) How many male players are there?

- (a) One (b) Three (c) Four (d) Five

(iii) How many female players are there?

- (a) One (b) Two (c) Three (d) Four

(iv) How is D related to A?

- (a) Uncle (b) Sister (c) Niece (d) Cousin (e) Can't Say

5. Pointing towards A, B says that "Her mother is the only daughter of my mother". How is B related to A?

- a) Can't Say b) Aunt c) Daughter d) Mother

6. Introducing a boy Mohan says, "The brother of this boy's mother, is the only son of my mother's father." How is the mother of the boy related to Mohan?

- a) Grandmother b) Either Aunt or Mother c) Mother d) Aunt

7. Pointing to a woman in the photograph A said, "She is the daughter of the daughter of the only son of my paternal grandfather." How is the woman related to A?

- a) Siste b) Maternal aunt c) Niece d) Cousin

8. If 'A\\$B' means 'A is the father of B', 'A * B' means 'A is the mother of B' 'A @ B' means 'A is the wife of B', then which of the following means 'M is the grandmother of N'?

- (a) M*T\$N@R (b) M*T\$R@N (c) M*R\$T@N (d) M*R@T@N

9. If 'P+Q' means 'P is the father of Q' 'P×Q' means 'P is the brother of Q'; 'P-Q' means 'P is the mother of Q', then which of the following is definitely true about C-A+B?

- (a) B is the son of A. (b) A is the son of C. (c) B is the father of A. (d) C is the mother of B.

10. P*Q means P is mother of Q

P+Q means P is sister of Q

P/Q means P is father of Q

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P-Q means P is brother of Q, then

Which of the following means M is niece of R?

- a) M-T/L-R b) T/M-K c) R-T/M-K d) R+T/M+K

11. If X is the brother of the son of Y's son, how is X related to Y?

- a) son b) brother c) cousin d) grandson

12-14. A\$B means A is the mother of B

A#B means A is father of B

A@B means A is husband of B

A%B means A is daughter of B

12. P@Q\$M#T indicates what relationship of P with T?

- a) paternal grandmother b) maternal grandmother c) paternal grandfather d) maternal grandfather

13. Which of the expressions indicates R is the sister of H?

- a) H\$D@F#R b) R%D@F\$H c) R\$D@F#H d) H%D@F\$R

14. IF F@D%K#H, then how F is related to H?

- a) brother in law b) sister c) sister in law d) CND

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S8

Blood Relations-II

Aptitude

Q1-3: There are six children playing football namely G,H,I,J,K and L.G and K are brothers. L is the only sister of K.I is the only son of G's uncle. H and J are the daughters of the brother of I's father.

1. How is J related to G?

- a)sister b) niece c) cousin d) uncle

2. How is I related to L?

- a)cousin b)son c)uncle d)brother

3. How many male players are there?

- a)one b)three c)four d)five

Q4-7: In a family there are 10 members. G and N are married couple while K is the husband of X. In this family there are four housewives and four working husbands while other members are non-working. The husband in the last generation is a doctor and the husband of S is a teacher. L is a married woman but her husband is not P.Q and K are associated with a profession of engineer and accountant but k is not an accountant. P is the brother of T and both have a sister C. N is the daughter of L, who is daughter-in-law of S and X is the mother of P.

4. The family consist of how many generations?

- a)6 b)1 c)4 d)2

5. Who is husband of S?

- a)T b)S c)L d)P

6. Who is the housewife in the third generation?

- a)L b)P c)N d)X

7. How is K related to N?

- a)Grandmother b)Father c)uncle d)great grandfather

Q8. Introducing Amrita, Raj said her mother is the only daughter of my mother in law. How is Raj related to Amrita?

- a)husband b)father c)wife d)uncle

Q9-13: There are six children in a family namely A, B, C, D, E and F. A and E are sister. F is the only brother of A. B is the only daughter of A's aunt. C is the son of A's uncle. D is the brother of C.

Q9. How is E related to F?

- A) Sister B) Cousin C) Aunt D) Brother

Q10. How is B related to D?

- A) Cousin B) Brother C) Aunt D) Uncle

Q11. How many female members are there?

- A) 2 B) 4 C) 3 D) 5

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Q12. How are F and C related?

- A) Sister B) Aunt C) Uncle D) Cousin

Q13. Who are the children of A's Uncle?

- A) A, B B) C, D C) D, B D) F, C

Q13-15: Direction for questions: -

A + B means A is daughter of B.

A - B means A is husband of B.

A × B means A is brother of B.

Q13. If $h + i \times j + k \times l + m \times n$ then what is the present generation of h. Assume that the oldest generation in this group is the first generation?

- A) 2nd B) 3rd C) 4th D) None of these

Q14. Which of the following statements does not hold?

- A) $a+b \times c$ B) $a-b \times c$ C) $a+b+c$ D) $a+b-c$

Q15. From the statement $a \times b \times c \times d$ which of the following statement is not necessarily true?

- A) B is the brother of A B) C is the brother of A
C) D is the brother of C D) A, B, C are Male

Q16. M is N's sister. M is P's sister. To find out how is N related to P which of the following is the minimum further necessary information to answer the question?

- I. P's gender II. N's gender
A) Either I or II necessary B) Only II is necessary C) Both I and II are necessary D)
pOnly I is necessary

S3

Clocks

Aptitude

Concepts Check

- Angle traced by hour hand in 1 min = $1/2^\circ$.
- Angle traced by minute hand in 1 min= 6° .
- If a watch or a clock indicates 8.15, when the correct time is 8, it is said to be 15 minutes too fast.
- On the other hand, if it indicates 7.45, when the correct time is 8, it is said to be 15 minutes too slow.

1. What is the angle covered by the minute hand in 22 minutes?

A. 66° B. 110° C. 121° D. 132°

2. By how many degrees does an hour hand move in one quarter of an hour?

A. 5° B. 7.5° C. 10° D. 12.5°

3. By how many degrees will the minute hand move, in the same time, in which the hour hand moves 6° ?

A. 54° B. 84° C. 72° D. 60°

4. What is the angle between the hands of the clock, when it shows 40 minutes past 6?

A. 40° B. 70° C. 80° D. 90°

5. When the clock shows 3 hours 14 minutes, what is the angle between the hands of the clock?

A. 10° B. 12° C. 13° D. 14°

6. What is the angle between the two hands of a clock when the time is 25 minutes past 7 O'clock?

A. $62\frac{1}{2}^\circ$ B. $66\frac{1}{2}^\circ$ C. $72\frac{1}{2}^\circ$ D. $69\frac{1}{2}^\circ$

7. When the clock shows 20 minutes past 11 O'clock, what is the angle between the two hands of the clock?

A. 110° B. 120° C. 130° D. 140°

8. At what time between 9 and 10 O'clock, will both the two hands of the clock coincide?

A. $43\frac{3}{11}$ minutes past 9 O'clock

B. $45\frac{6}{11}$ minutes past 9 O'clock

C. $49\frac{1}{11}$ minutes past 9 O'clock

D. $49\frac{6}{11}$ minutes past 9 O'clock

9. At what time between 4 and 5 O'clock are the hands of a clock in the opposite direction?

A. $52\frac{3}{11}$ minutes past 4 O'clock

B. $54\frac{6}{11}$ minutes past 4 O'clock

C. $51\frac{7}{11}$ minutes past 4 O'clock

D. $53\frac{9}{11}$ minutes past 4 O'clock

10. The angle between the hands of a clock is 20° and the hour hand is in between 2 and 3. What is the time shows by the clock?

A. 2 hours $7\frac{3}{11}$ minutes

B. 2 hours $14\frac{6}{11}$ minutes

C. 2 hours $15\frac{5}{11}$ minutes

D. Both A and B

11. Which of the following can be the time shown by the clock, when the hour hand is in between 4 and 5 and the angle between the two hands of the clock is 60° ?

A. $716\frac{6}{11}$ min past 4

B. $18\frac{9}{11}$ min past 4

C. $32\frac{8}{11}$ min past 4

D. $36\frac{5}{11}$ min past 4

12. How many times, the hands of a clock will be at 30° with each other in a day?

A. 36 B. 40 C. 44 D. 48

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13. How many times, the minute hand of a clock overlaps with the hour hand from 9:00 a.m. to 4:00 p.m. in a day?

- A. 5 B. 6 C. 7 D. 8

14. A watch, which gains uniformly was observed to be 1 minute slow at 8:00 a.m. on a day. At 6:00 p.m. on the same day it was 1 minute fast. At what time did the watch show the correct time?

- A. 12:00 noon B. 1:00 p.m. C. 2:00 p.m.
D. 3:00 p.m.

15. A watch, which gains uniformly was observed to be 6 minute slow at 9:00 a.m. on a Tuesday and 3 minutes fast at 12:00 noon on the subsequent Wednesday . When did the watch show the correct time?

- A. 9:00 p.m. on Tuesday
B. 12:00 a.m. on Wednesday
C. 3:00 a.m. on Wednesday
D. 6:00 a.m. on Wednesday

16. A watch showed 10 minutes past 6 O'clock on Thursday morning when the correct time was 6'Oclock. It loses uniformly and was observed to be 15 minutes slow at 8 O'clock on Saturday morning. When did the watch show the correct time?

- A. 1 O'clock on Friday after noon
B. 12 O'clock noon on Friday
C. 4 O'clock on Friday after noon
D. 2 O'clock on Friday morning

17. The minute hand of a clock overtakes the hour hand at intervals of 60 minutes of correct time. How much time does the clock gain or lose in one hour of correct time?

- A. Gains $\frac{5}{11}$ minutes
B. Loses $\frac{5}{11}$ minutes
C. Gains $\frac{5}{11}$ minutes
D. Loses $\frac{5}{11}$ minutes

18. The minute hand of a clock overtakes the hour hand after every 70 minutes of correct time. How much time does the clock lose or gain in a day of normal time?

- A. $93\frac{39}{77}$ minutes

B. $91\frac{31}{77}$ minutes

C. $92\frac{24}{77}$ minutes

D. $94\frac{56}{77}$ minutes

19. Two clocks are showing correct time at 4:00 p.m. One clock loses 3.5 minutes in an hours, while the other gains 2.5 minutes in one hour. At 10:00 p.m. on the same day, by how much time will the two clocks differ?

- A. 12 minutes B. 36 minutes
C. 24 minutes D. 30 minutes

20. There are two clocks on a wall, both set to show the correct time 5:00 p.m. The clocks lose 2 minutes and 3 minutes respectively in an hour. If the clock which loses 2 minutes in one hour shows the time as 9:50 p.m. on the same day, then what time does the other clock show (approx.)?

- A. 9:30 p.m. B. 9:40 p.m.
C. 9:45 p.m. D. 10:15 p.m.

21. If the time in a clock is 10 hours 40 minutes, then what time does its mirror image show?

- A. 1 hour 25 minutes B. 1 hour 15 minutes
C. 1 hour 10 minutes D. 1 hour 20 minutes

22. The reflection of a wall clock in a mirror shows the time as 3 hours 40 minutes. What is the actual time?

- A. 8 hours 20 minutes B. 8 hours 15 minutes
C. 8 hours 45 minutes D. 8 hours 35 minutes

23. If the second hand moves by 240° , then by how many degrees does the minute hand move in the same time?

- A. 1° B. 2° C. 3° D. 4°

24. When the time is 10:30, if the minute hand points towards south, the hour hand point towards

- A. North-East B. North-West
C. South-East D. South-West

25. A clock strikes once at 1 O'clock, twice at 2 O'clock, three times at 3 O'clock and so on. If it takes 10 seconds to strike at 6 O'clock, find the time taken by it to strike at 12O'clock.

- A. 18 seconds B. 22 seconds
C. 24 seconds D. 26 seconds

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S4

Calendars

Aptitude

Concepts Check

- Odd days : The number of days more than the complete number of weeks in a given period is number of odd days during the period.
For example, a period of 10 days contains 3 odd days, 11 days contains 4 odd days, 12 days contains 5 odd days. But period of 14 days contains Zero odd days.
- ODD DAYS in
100 years - 5 200 years – 3 300 years – 1 400 years - 0
- Leap Year: Every year which is divisible by 4 is called a leap year. But every century which is divisible by 4 is not a leap year. Every fourth century is a leap year
- An ordinary year has 365 days i.e. (52 weeks +1day). An ordinary year has 366 days, divided by 7, we get remainder 1, it means that it has 1 odd day. Likewise 366 days (leap year) has 2 odd days.

- If 8th February 1995 was a Wednesday, 8th February 1994 was on which day?
A. Wednesday B. Thursday
C. Tuesday D. Monday
- If 17th September 1993 was a Friday, then which day of the week was 30th June 1989?
A. Wednesday B. Thursday
C. Friday D. Saturday
- If 11th August 1985 was Sunday, that which day of week was 13th August 1986?
A. Tuesday B. Monday
C. Thursday D. Wednesday
- How many odd days are there in 352 days?
A. 1 B. 2 C. 3 D. 0
- Which among the following years is a leap year?
A. 3000 B. 3100 C. 3200 D. 3300
- If 1st January 2012 is a Sunday, then which day of the week will the new year be celebrated in 2016?
A. Friday B. Sunday
C. Wednesday D. Saturday
- If 1st April 1963 was a Monday, then which day of the week will 1st August 1959 be?
A. Saturday B. Monday
C. Tuesday D. Thursday
- On which dates of October, 1994 did Monday fall?
A. 4, 11, 18, 25 B. 2, 9, 16, 23
C. 1, 8, 15, 22 D. 3, 10, 17, 24, 31
- Which year will have same calendar as 2002?
A. 2008 B. 2011 C. 2009 D. 2013
- Which year will have same calendar as 1984?
A. 2020 B. 2008 C. 2012 D. 2004
- What will be next leap year after 2096?
A. 2100 B. 2101 C. 2104 D. 2108
- If in a calendar year, there are 541 days and 10 days a week, then how many odd days will be there in that year?
A. 1 B. 2 C. 3 D. 4
- The last day of the century cannot be
A. Friday B. Wednesday
C. Monday D. Tuesday
- Which day of the week was 25th December, 1995?
A. Sunday B. Monday
C. Tuesday D. Wednesday
- Which day of the week was 23rd July 1776?
A. Sunday B. Wednesday
C. Thursday D. Tuesday
- If holidays are declared only on Sundays and in a particular year 12th March is a Sunday, is 23rd September in that year a holiday?
A. Yes B. No
C. Yes, if it is a leap year D. No, if it is a leap year
- Which day of the week was 1601, Jan 15?
A. Monday B. Tuesday
C. Wednesday D. Thursday
- The first Republic day was celebrated on 26th Jan 1950. It was a
A. Thursday B. Friday
C. Monday D. Tuesday

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19. If 23rd April 2006 is a Sunday, then 23rd April 2106 will be a
A. Wednesday B. Thursday
C. Friday D. Saturday
20. If the first day of the years 2012 and 2023 are Mondays, which day of the week will the last days of years be respectively?
A. Tuesday, Tuesday B. Tuesday, Monday
C. Monday, Tuesday D. Sunday, Monday
21. If 14th November 2006 is a Sunday, then 14th November 2706 is a
A. Sunday B. Friday
C. Tuesday D. Monday
22. In a year, If 23rd November is a Friday then 14th March in that year is on which day of the week?
A. Monday B. Wednesday
C. Sunday D. Tuesday
23. In a leap year, which month will have the same calendar as that of January in that year?
A. April B. July
C. October D. March
24. What is the next leap year after 2396?
A. 2398 B. 2408
C. 2404 D. 2400
25. Which day of the week is 21st April 2006?
A. Tuesday B. Wednesday
C. Thursday D. Friday
5. If 6th March, 2005 is Monday, what was the day of the week on 6th March, 2004?
A. Sunday B. Saturday
C. Tuesday D. Wednesday
6. On what dates of April, 2001 did Wednesday fall?
A. 1st, 8th, 15th, 22nd, 29th
B. 2nd, 9th, 16th, 23rd, 30th
C. 3rd, 10th, 17th, 24th
D. 4th, 11th, 18th, 25th
7. The last day of a century cannot be
A. Monday B. Wednesday
C. Tuesday D. Friday
8. On 8th Feb, 2005 it was Tuesday. What was the day of the week on 8th Feb, 2004?
A. Tuesday B. Monday
C. Sunday D. Wednesday
9. The calendar for the year 2007 will be the same for the year:
A. 2014 B. 2016
C. 2017 D. 2018
10. Which of the following is not a leap year?
A. 700 B. 800
C. 1200 D. 2000
11. January 1, 2008 is Tuesday. What day of the week lies on Jan 1, 2009?
A. Monday B. Wednesday C. Thursday
D. Sunday
12. January 1, 2007 was Monday. What day of the week lies on Jan. 1, 2008?
A. Monday B. Tuesday
C. Wednesday D. Sunday

Questions For Practice

1. It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?
A. Sunday B. Saturday
C. Friday D. Wednesday
2. What was the day of the week on 28th May, 2006?
A. Thursday B. Friday
C. Saturday D. Sunday
3. What was the day of the week on 17th June, 1998?
A. Monday B. Tuesday
C. Wednesday D. Thursday
4. Today is Monday. After 61 days, it will be:
A. Wednesday B. Saturday
C. Tuesday D. Thursday

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S9

Interest

Aptitude

: Concept Check:

- Simple Interest (SI) = $(P \times R \times T)/100$
- If a sum of money becomes x times in n years at simple rate of interest, then the rate is calculated as

$$R = \frac{(x - 1) * 100}{n}$$

$$A = P(1 + \frac{r}{100})^t$$

- Amount Due at the end of the time period is given by $A = P(1 + \frac{r}{100})^t$ where, P: Principal (original amount), R: Rate of Interest (in %), T: Time period (yearly, half-yearly etc.)
- $CI = A - P$
- Difference between CI and SI when time given is 2 years = $P(R/100)^2$
- Difference between CI and SI when time given is 3 years = $P(R/100)^2(3+R/100)$
- *If interest is not compounded yearly, then*

$$A = P(1 + \frac{r}{100 \times n})^{tn}$$

Compound Interest = A - P

Where, n= number of times compounding is done. For example if interest is compounded half yearly then n =2.

Principal: Rs. 1000		Rate: 10% per annum			Total
	1 st year	2 nd year	3 rd year		
SI					
CI					

S. No.	Principal	Rate (per annum)	Time	Compound Interest	Amount
1	8000 Rs.	20% compounded Annually	3 Years		
2	640 Rs.	25% compounded Annually	2.5 Years		
3	2160 Rs.	16.67% compounded Half yearly	1 Years		
4	2401 Rs.	57.12% compounded Quarterly	1 Years		
5	8000 Rs.	20% Compounded Quarterly	0.75 Years		
6	6300 Rs.	For 1 st year – 14.28% For 2 nd year – 11.11 %	2 Years		
7	1000 Rs.	For 1 st year – 9 % For 2 nd year – 12 %	2 Years		
8	9600 Rs.	For 1 st year – 8.33 % For 2 nd year – 10 % For 3 rd year - 12.5 %	3 Years		

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S.No.	Questions	Worksheet
1	(i) What is the SI on Rs. 7500/- at the rate of 12% per annum for 8 years? (ii) A man borrowed Rs 15000/- at the rate of 24% SI and to clear the debt after 6years, how much he has to return (iii) A man has to pay Rs 1500 as interest after 3 years at the rate of 10%. What amount he has taken?	
2	A sum of money at simple interest amounts to Rs. 875 in 3.5 years and to Rs. 900 in 4years. The sum is	
3	Raju invested into two different schemes, P and Q at simple interest rate,an amount of Rs. 27,000. Rate of interest for scheme P & Q were 5 % p.a. and 15% p.a. respectively. If the total amount of simple interest earned in 4 years be Rs. 12600, what was the amount invested in Scheme P?	
4	A money-lender claims he lends money at simple rate of interest of 10% per annum. But he cleverly tricks the farmers by including the interest amount in the principal when he calculates it every six months. The effective annual rate of interest he is charging is:	
5	The sum of interest on a sum of money is 1/4 of the principal, and the number of years is equal to the rate of interest. What will be the rate percent?	
6	The rate of interest for 2 years is 3%, 4 years is 6%,and for another 4 years is 4%.If a man gets interest of Rs. 3800 for 8 years, Calculate the principal amount.	
7	A sum of money becomes 5 times in 30 years. Find the rate of interest ?	
8	A sum was put at SI at a certain rate for 4 years. If the sum would have put at a 4% higher rate, it could yield Rs 800 more. What will be the principal?	
9	(i) An amount of Rs 1000 equates to Rs 1728 in 3 years when interest is compounded annually. What will be the rate per annum? (iii) An amount of Rs 1000 amounts to Rs 2197at the rate of 30% when interest is compounded annually. What will be the no of years?	
10	Find difference between CI and SI on Rs. 600 for one year at 10% per annum if CI is considered half yearly.	
11	Difference between CI and SI = Rs. 20 Rate = 4% p.a.c.a. Time = 2 Years Principal = ?	
12	Difference between CI and SI = 4300 Rs. Rate = 7.14% p.a.c.a. Time = 3 Years Principal = ?	
13	Compound interest for 3rd year = 2000Rs. Rate = 11.11% p.a.c.a. Time = 3 Years Principal = ?	

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14	A certain sum of money under compound interest becomes 7 times of itself in 6 years. Find (I) Rate of Interest (II) In what time it will be 343 times of itself ?	
15	Equal sums of money are deposited in two different banks by M/s Enterprises, one at compound interest (compounded annually) and the other at simple interest, both at 5% per annum. If after two years, the difference in the amounts comes to Rs. 200, what are the amounts deposited with each bank?	
16	A sum of money invested at CI amounts to Rs. 1800 in 4 years and 1900 in 5 years. Find the rate of interest per annum?	
17	Radheshyam takes money from the ICICI at lower rate of interest and saves in a scheme, which gives him a compound interest of 20%, compounded annually. Find the least number of complete years after which his sum will be more than double.	
18	An amount of 10500 is invested in a compound interest scheme for 4 years. The rate of interest is 5% for the first year, 7.14 % for next 2 years, and for the last year, it is 4%. The final amount is:	
19	The simple interest accrued on an amount of Rs.27, 500 at the end of three years is Rs.10, 230. What would be the approximate compound interest accrued on the same amount at the same rate in the same period?	
20	A sum of money is accumulating at compound interest at a certain rate of interest. If simple interest instead of compound were reckoned, the interest for first two years would be diminished by Rs 20 and that for the first three years by 61. Find the sum.	

Loans and Instalments in SI & CI

1	Samsung mobile phone is available for Rs.2500 cash or Rs.520 cash down payments followed by 4 equal instalments. If the rate of interest charged is 25% per annum Simple interest, calculate the monthly instalment	
2	How much a person should pay per year to payment the debt of Rs 4180 due in 4 years at the rate of 3% per annum?	
3	A cell phone is available for Rs. 600 or for Rs.300 cash down payment together with Rs.360 to be paid after two months. Find the rate of interest charged under this scheme.	
4	A watch is sold for Rs.440 cash or for Rs.200 cash down payment together with Rs.244 to be paid after one month. Find the rate of interest charged in the instalment scheme.	
5	Kishore purchases a track suit for Rs.2400 cash or for Rs.1000 cash down payments and two monthly instalments of Rs.800 each. Find the rate of interest.	
6	A man borrows Rs 2100 and under takes to pay back with CI @ 10% p.a. in 2 equal yearly instalments at the end of first and second year. What is the amount of each instalment?	

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7	A man borrows Rs 820 and under takes to pay back with CI @ 5% p.a. in 2 equal yearly instalments at the end of first and second year. What is the amount of each instalment?	
8	A man purchases a motorcycle and promises to pay it back in 3 equal annual installments of Rs. 20,480 @ 14.28% p.a.c.a. Find the price of that motorcycle?	
9	A man purchases a motorcycle for Rs. 50,000 and he pays Rs. 6330 as cash down payment and remaining in 3 annual equal installments. Find the each installment, if the rate is 9.09% p.a.c.a.	
10	A loan of Rs 2550 is to be paid back in 2 equal half yearly instalments. How much is the each instalment if the interest is compounded half-yearly at 8% p.a.?	

Brain Exercise:

- 1.** A man invested two equal sums of money in two banks at simple interest, one offering annual rate of interest of 10% and the other, at a rate of 20%. If the difference between the interests earned after two years is between \$120 and \$140, exclusive, which of the following could be the difference between the amounts earned for the same amounts of money, invested at the same rates of interest as above, but at compound interest?
- (A) \$130 (B) \$135 (C) \$137 (D) \$154 (E) \$162
- 2.** At the end of each year, the value of a certain antique watch is c percent greater than its value one year earlier, where c has the same value each year. If the value of the watch was k dollars on January 1, 1992, and m dollars on January 1, 1994, then in terms of m and k , what was the value of the watch, in dollars, on January 1, 1995?
- (A) $m + 1/2(m-k)$ (B) $m + 1/2((m-k)/k)m$ (C) $m\sqrt{m}/\sqrt{k}$ (D) $m^2/2k$ (E) km^2
- 3.** Alex deposited x dollars into a new account that earned 8 percent annual interest compounded annually. One year later Alex deposited additional x dollars in the account. If there were no other transactions and if the account contained w dollars at the end of the two years, which of the following expresses x in terms of w ?
- (A) $w/(1+1.08)$ (B) $w/(1.08+1.16)$ (C) $w/(1.16+1.24)$ (D) $w/(1.08+1.082)$
 (E) $w/(1.082+1.083)$

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S12	Ranking	Aptitude
Q1. How many 3's are there in the following sequence which are neither preceded by 6 nor immediately followed by 9?		
9 3 6 6 3 9 5 9 3 7 8 9 1 6 3 9 6 3 9	A. One B. Two C. Three D. Four	
Q2. Count each 7 which is not immediately preceded by 5 but is immediately followed by either 2 or 3. How many such 7's are there?		
5 7 2 6 5 7 3 8 3 7 3 2 5 7 2 7 3 4 8 2 6 7 8	A. 2 B. 3 C. 4 D. 5	
Q3. In a row of trees, one tree is fifth from either end of the row. How many trees are there in the row?		
A. 8 B. 9 C. 10 D. 11		
Q4. Raman ranks sixteenth from the top and forty ninth from the bottom in a class. How many students are there in the class?		
A. 64 B. 65 C. 66 D. Cannot be determined		
Q5. Sanjeev ranks seventh from the top and twenty-eight from the bottom in a class. How many students are there in the class?		
A. 37 B. 36 C. 35 D. 34		
Q6. Manoj and Sachin are ranked seventh and eleventh respectively from the top in a class of 31 students. What will be their respective ranks from the bottom in the class?		
A. 20th and 24th B. 24th and 20th C. 25th and 21st D. 26th and 22nd		
Q7. Malik is fourteenth from the right end in a row of 40 boys. What is his position from the left end?		
A. 21th B. 24th C. 25th D. 27th		
Q8. In a group of 40 boys, Raju is 12th from the left end and Raghu is 17th from the right end. If Dilip is placed exactly between them what is his right hand rank?		
A. 22 B. 23 C. 24 D. 25		
Q9. In a queue, Amrita is 10th from the front while Mukul is 25th from behind and Mamta is just in the middle of the two. If there be 50 persons in the queue. What position does Mamta occupy from the front?		
A. 20th B. 19th C. 18th D. 17th		
Q10. Thirty-six vehicles are parked in a parking lot in a single row. After the first car, there is one scooter. After the second car, there are two scooters. After the third car, there are three scooters and so on. Work out the number of scooters in the second half of the row.		
A. 10 B. 12 C. 15 D. 17		
Q11. If the numbers from 1 to 45 which are exactly divisible by 3 are arranged in ascending order, minimum number being on the top, which would come at the ninth place from the top?		
A. 1 B. 21 C. 24 D. 27		
Q12. Vimal is 7 ranks ahead of Sathish in a class of 39. If Sathish's rank is seventeenth from the last, what is Vimal's rank from the start?		
A. 11th B. 13th C. 16th D. 18th		
Q13. In a class of 35 students, Kamal is placed seventh from the bottom whereas Sunil is placed ninth from the top. Manoj is placed exactly in between the two. What is Kamal's position from Manoj?		
A. 7 B. 9 C. 10 D. 12		

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Q14. In a queue, Vijay is fourteenth from the front and Jack is seventeenth from the end, while Mary is in between Vijay and Jack. If Vijay be ahead of Jack and there be 48 persons in the queue, how many persons are there between Vijay and Marry?

- A. 8 B. 7 C. 6 D. 5

Q15. In a row of girls, Rita and Monika occupy the ninth places from the right end and tenth place from the left end, respectively. If they interchange their places, Rita and Monika occupy seventeenth places from the right and eighteenth place from the left, respectively. How many girls are there in the row?

- A. 25 B. 26 C. 27 D. Data inadequate

Q16. Students line up in a queue in which Ashok stands fifteenth from the left and Sakthi is seventh from the right. If they interchange their places, Sakthi would be fifteenth from the right. How many students are there in the queue?

- A. 21 B. 22 C. 28 D. 29

Q17. In a row of boys, if A who is tenth from the left and B who is ninth from the right interchange their positions. A becomes fifteenth from the left. How many boys are there in the row?

- A. 21 B. 23 C. 27 D. 28

Q18. In a class of 90, where girls are twice that of boys, Shridar ranked fourteenth from the top, if there are 10 girls ahead of Shridar, how many boys are after him in rank?

- A. 23 B. 26 C. 25 D. 22

Q19. There are five books of different thickness. A is thicker than C and B is thicker than D. E is not as thick as B, but is thicker than C. D is not as thick as C. Which is the thinnest book?

- A. E B. D C. B D. C

Q20. Three persons A, B and C are standing in a queue. There are five persons between A and B and eight persons between B and C. If there be three persons ahead of C and 21 persons behind A, what could be the minimum number of persons in the queue?

- A. 41 B. 40 C. 28 D. 27

Q21. In a class of 180, where girls are twice the number of boys, Rupesh [a boy] ranked 34th from the top. If there are 18 girls ahead of Rupesh, how many boys are after him in rank?

- A. 45 B. 44 C. 60 D. Can't be determined

Q (22/25). P, Q, R and S are four men. P is heavier than S, who is less rich and shorter than Q, who is shorter than R but the richest of all. R is heavier than Q but lighter than S and richer than P.

22. Who is the poorest of all?

- A. P B. Q C. R D. CND

23. Who is heaviest of all?

- A. P B. Q C. R D. S

24. Who is definitely heavier than R and Q, but shorter than Q?

- A. P B. Q C. R D. S

25. If P is the third richest, then who is the second richest?

- A. P B. Q C. R D. S

S10

Ratio and Proportion

Aptitude

: Concept Check:

Ratio: A ratio is simply a fraction. The following notations all express the ratio of x to y
 $\Rightarrow x:y$, $x \div y$, or x/y .

In the ratio $x:y$, we call a as the first term or **antecedent** and b, the second term or **consequent**.

Proportion: The equality of two ratios (fractions) is called proportion. If $a:b = c:d$, we write $a:b :: c:d$ and we say that a, b, c, d are in proportion.

Here a and d are called extremes, while b and c are called mean terms.

Compounded Ratio: The compounded ratio of the ratios: (a:b), (c:d), (e:f) is (ace:bdf)

Duplicate Ratios: Duplicate ratio of (a:b) is ($a^2:b^2$)

Sub-duplicate: Sub-duplicate ratio of (a:b) is ($a^{1/2}:b^{1/2}$)

Triplicate Ratio: Triplicate ratio of (a:b) is ($a^3:b^3$)

Sub-triplicate Ratio: Sub-triplicate ratio of (a:b) is ($a^{1/3}:b^{1/3}$)

1	<p>Direction for Question from (I) to (II) –</p> <p>Wheat and rice are mixed in a ratio of 5 to 2.</p> <p>I. How much rice should be used to make the mixture with 75 Kgs of wheats are taken? How much mixture will this make?</p> <p>II. In a mixture of 180 Kg, what will be the quantities of rice and wheat?</p>	
2	<p>Two numbers are in the ratio of 5:4, and their sum is 261 then what will be the smaller number?</p>	
3	<p>(i) Find the mean proportion to 36 and 16. (ii) Find the third proportion of 2 and 8. (iii) Find the fourth proportion of 1, 2 and 4.</p>	
4	<p>If $a:b = 2:3$, $b:c = 4:3$, $c:d = 3:2$, then find $a:b:c:d$?</p>	
5	<p>(i) Find Sub-Duplicate ratio of 16:25 (ii) Find Duplicate ratio of 3:7 (i) Find Sub-Triplicate ratio of 27:64 (ii) Find Triplicate ratio of 3:7</p>	
6	<p>Richa, Meera, Manpreet went to coffee shop and all had a cup of black coffee each, the ratio of the bill shared by them was (Richa : Meera : Manpreet = 3 : 4 : 5). If the bill was of Rs. 348 then find how much money was paid by Richa?</p>	
7	<p>The monthly incomes of A and B are in the ratio 4 : 5, their expenses are in the ratio 5 : 6. If 'A' saves Rs.25 per month and 'B' saves Rs.50 per month, what are their respective incomes?</p>	
8	<p>Rs.432 is divided amongst three workers A, B and C such that 8 times A's share is equal to 12 times B's share which is equal to 6 times C's share. How much did A get?</p>	

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9	A bag contains 50 paisa, 20 paisa and 10 paisa coins in the ratio 5:3:1. If the total amount in the bag is 640 Rs, find the difference in the amounts contributed by 50 paisa and 20 paisa coins	
10	Rs 4830 is divided among Abhishek, Dishant and Prashant such that if Abhishek's share diminishes by Rs 5, Dishant's share diminishes by Rs 10 and Prashant's share diminishes by Rs 15, their shares will be in the ratio 5:4:3. Find the Dishant's original share.	
11	Ratio of speeds of three cars is 2:3:4 then what is the ratio of time taken by them to cover the same distance?	
12	A person distributes his pens among four friends A, B, C and D in the ratio 1/3: 1/4: 1/5: 1/6. What is the minimum number of pens that the person should have?	
13	The ratio of the cost prices of two articles A and B is 4:5. The articles are sold at a profit with their selling prices being in the ratio 5:6. If the profit on article A is half of its cost price, find the ratio of the profits on the articles A and B?	
14	Three brothers A, B and C together purchased a car of worth 2, 40,000 Rs. Mr. A contributed 1/2 of the total amount contributed by the other two brothers. Mr. C contributed 1/3 of the total amount contributed by the other two brothers. Find the contribution made by Mr. B.	
15	An overall profit of 24% is to be obtained from the sale of two articles. One of them was sold at a loss of 11%. At what profit percentage should the second article be sold, given that the cost prices of the first and the second articles are in the ratio 3 : 5 respectively?	
16	The first, second and third class fares between two stations were 10: 8: 3 and the number of first, second and third class passengers between the two stations in a day was 3: 4: 10. The sale of tickets to passengers running between two stations on that day was Rs. 8050. How much was realized by the sale of second class tickets?	
17	By mistake, instead of dividing Rs 117 among three persons P, Q and R in the ratio (1/2, 1/3, 1/4), it was divided in the ratio 2:3:4. Who gains the most and how much?	
18	The ratio of incomes of Pankaj and Gauri is 3:5 and the ratio of their expenditures is 2:3. Who does save more? (You have to assume that no one takes any loan from anywhere) A] Pankaj B] Gauri C] Both save equally D] Cannot be determined	

S11

Variation, Partnership

Aptitude

: Concept Check:

- If on increasing x, y is also increasing then x is directly proportional to y.
- If on increasing x, y is decreasing then x is inversely proportional to y.

S. No.	Questions	Workspace
1	If a quarter kg of potato costs 60 Paise, how many Paise will 200 gm cost?	
2	A wheel that has 6 cogs is meshed with a larger wheel of 14 cogs. When the smaller wheel has made 21 revolutions, Find the number of revolutions made by the larger wheel?	
3	A fort had provision of food for 150 men for 45 days. After 10 days, 25 men left the fort. Find the number of days for which the remaining food will last.	
4	The cost of a precious stone varies as the cube of its weight. A stone broke into three pieces whose weights are in the ratio 1: 2: 3, as a result of which its cost reduces by Rs. 80280. What was the cost of the unbroken stone?	
5	The cost of a precious stone varies directly as the square root of its weight. A stone broke into 3 pieces whose weights are in the ratio 1: 4: 4. As a result, its value went up by Rs. 12000. Find its initial value.	
6	The distance travelled by a freely falling body is directly proportional to the square of the time taken. If a body falls 144 m in 6 seconds, then find the distance that the body fell in the 7 th second.	
7	Intensity of light varies inversely as the square of the distance between the lampshade and the object. What should the distance between the lampshade and the object be such that the intensity becomes one-fourth of the present intensity given that the distance between the lampshade and the object is 125 cm?	
8	60 litres of diesel is required to travel 600 km using a 800 cc engine. If the volume of diesel required to cover a distance varies directly as the capacity of the engine, then how many litres of diesel is required to travel 800 km using 1200 cc engine?	
9	The reduction in speed of an engine is directly proportional to the square of the number of bogies attached. If the speed of the engine is 120 kmph when 14 bogies are attached and 100 kmph when 16 bogies are attached, find the speed of the engine when there are 20 bogies attached.	

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10	A, B and C enter into a partnership by investing Rs.3600, Rs.4400 and Rs.2800. A is a working partner and gets a fourth of the profit for his services and the remaining profit is divided among the three in the rate of their investments. What is the amount of profit that B gets if A gets a total of Rs. 8000?	
11	A, B and C enter into a partnership investing Rs 35000, Rs 45000 and 55000. Find the their respective shares in annual profit of 40,500	
12	Anil, Mukesh and Ritesh started a business each investing Rs. 20,000. After 4 month Anil withdraws Rs.6000, Mukesh withdraws Rs.8000, Ritesh invest Rs.6000 more At the end of the years, a total profit was Rs.65600. Find the share of Ritesh.	
13	Yogesh started a business investing Rs. 45000. After 3 months, Pranab joined him with a capital of Rs. 60000. After another 6 months, Atul joined them with a capital of Rs. 90000. At the end of the year, they made a profit of Rs. 20000. What would be Atuls share in it?	
14	In business, A and C invested amounts in the ratio 2:1, whereas the ratio between amounts invested by A and B was 3:2, If Rs 157300 was their profit, how much amount did B receive?	
15	Income of two companies A and B are in the ratio of 5: 8. Had the income of company 'A' been more by Rs.25 lakhs, the ratio of their incomes would have been 5: 4 respectively. What is the income of company 'B'?	
16	A, B and C started a business with investment in the ratio 5: 6: 8 respectively. After one-year C withdrew 50% of his capital and A increased his capital by 60% of his investment. After two years in what ratio should the earned profit be distributed among A, B and C respectively?	

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S18

Direction Sense

Aptitude

Q1. After going 60m towards North, Tom takes a right turn and goes for another 16m.he then takes a right turn and goes 48m.How far is he from starting point?

- a)20m b)12m c)16m d)24m

Q2. Y is in the East of X which is in the North of Z. If P is in the South of Z, then in which direction of Y, is P?

- a) North b) South c) South-East d) None of these

Q3. Beena starts at point T, walks straight to point U which is 4 m away. She turns left at 90° & walks to W which is 4m away. Turns 90° right & goes 3m to P, turns 90° right & walks 1m to Q turns left at 90° & goes to V which is 1m away & once again turns 90° right & goes to R 3m away. What is distance between T & R?

- a) 4m b) 5m c) 7m d) 8m e) Cannot be determined

Q4. A watch is so placed that at 4 pm the minute hand points towards north-west.in which direction does the hour hand points at 7 pm?

- a) north-east b) south-east c) north-west d) south-west

Q5. One morning after sunrise, Sita and Geeta were standing at gandhimarg road in Mumbai with their back towards each other. Sita's shadow fell exactly right hand side. Which direction was Geeta facing?

- a) east b) west c) north d) south

Q6. Rashmi started from her house and walked 20m towards east, where her brother Naitik joined her. Both of them turned left and walked 20m. There was a quarrel between the two and got separated. Rashmi turned right and her brother turned left. Rashmi walked 20m and turned left. Naitik walked 30m and then turned left. Rashmi walked 10m to the left. Finally, she turned left again, walked 6m and reached her friend's house.Naitik who turned left walked 10m and finally he turned left, walked 4m and reached his friend's house. Which direction is Naitik facing now?

- a) west b) east c) north d) south

Q7. City M is situated east of city N. City O is situated south of city N. City P is situated north of city O.in which direction city N is situated with respect to city P?

- a) north b) south c) east d) CND

Q8. A, B, C, D, E, F, G, H & I are 9 houses. C is 2km east of B. A is 1km North of B & H is 2km South of A. G is 1km West of H while D is 3km East of G & F is 2km North of G. I is situated just in middle of B & C while E is just in middle of H & D. So distance between A & F is?

- a) 1km b) 1.41km c) 2km d) 3km e) Cannot be determined

Q9. Village Chimur is 20km to the North of Village Rewa.

Village Rahate is 18km to the East of Village Rewa. direction

Village Angne is 12km to the west of Chimur.

If Sanjay starts from Village Rahate and goes to Village Angne in which is he from his starting point?

- a) North b) North- West c) South d) South- East

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Q10. B is to the South-West of A, C is to the East of B and South East of A, D is to the North of C in the line with B and A. D is in which direction, with respect to A?

- a) North b) East c) South- East d) North- East

Q11. A watches Read 4.30. If the minute hand points east. In which direction will the Hour hand point?

- a) South- East b) North East c) North d) North West

Q12. Ms. A goes for her morning walk at 6 'O' clock towards Sun for 2km. Then she turns to her right and walks 3km. She again turns to her left and walks 2km. Finally, she turns to her left to walk another 6km. In which direction is she moving and at what distance from the last turn she is standing?

- a) 6km East b) 9km East c) 6km North d) 9km North

Q13. A Postman was returning to the Post Office which was front of him to the North. When the Post Office was 100m away from him, he turns to the left and moved 50m to deliver the LAST letter at the Shanti Villa. He then moved in the same direction for 40m turned to his right and moved 100m. How many meters was the away from the Post Office?

- a) 0 b) 150 c) 90 d) 100

Q14. Neeraj wants to go to School from his house. First of all, he goes to the crossing from here he turns to the right and reaches the bus stand. Bus stand is opposite to the library. In which direction is School located?

- a) North b) East c) Cannot be determined d) West

Q15. If South- East is called 'East', North- West is called 'West', South West is called 'South' & so on what will North be called?

- a) East b) South c) North East d) North West e) None of these

(Directions 16 – 20): Read the following information and answer the questions given below it:

Some numbers of bikes are parked in a linear row and all of them are facing in South direction.

Only three bikes are parked between M and N. Only two bikes parked between N and O. P is not an immediate neighbour of N. Q is third to the right of M. More than three bikes parked between M and R and R is to the right of M. There is no immediate neighbour of R and N. Less than five bikes parked between S and Q and R is to the left of S. Less than two bikes parked between Q and R. Less than two bikes parked between P and the bike which is parked on left extreme end and no less than 13 bikes parked between S and P. Each bike is moved facing South direction:

S is 4km east of R. Q is 2km north of R. M is 4km south of Q. N is 2km west of M. P is 6m east of N. O is 4km north of N.

Q16. Who among the following parked on extreme right end?

- a) P b) N c) O d) S e) Cannot be determined

Q17. What is the direction of bike P with respect to bike O?

- a) South – West b) South – East c) North – West d) North e) None of these

Q18. How many bikes are parked in the line?

- a) 14 b) 15 c) 16 d) 17 e) 13

Q19. Which of the following bikes are immediate neighbours of each other?

- a) S, O b) M, P c) P, O d) O, M e) None of these

Q20. What is the direction of bike S with respect to bike N?

- a) North – East b) South – West c) North d) South – East e) None of these

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S15

Average

Aptitude

: Concept Check:

- Simple Average (or Mean) is defined as the ratio of sum of the quantities to the number of quantities. By Definition, Average = (Sum of all quantities)/ no. of quantities
- Weighted Mean:

$$\bar{X} = \frac{N_1 X_1 + N_2 X_2 + N_3 X_3 + \dots + N_n X_n}{N_1 + N_2 + N_3 + \dots + N_n}$$

1	<p>Find out the average of following:</p> <p>I. 39, 21, 48, 47 II. 63, 67, 66, 59, 62 III. First eight multiples of 3 IV. First five prime numbers V. First five multiples of 7 VI. First seven squares of natural numbers</p>	
2	If a person with age 45 joins a group of 5 persons with an average age of 39 years. What will be the new average age of the group?	
3	Two students with marks 50 and 54 leave class VIII A and move to class VIII B. As a result, the average marks of the class VIII A fall from 48 to 46. How many students were there initially in the class VIII A?	
4	The average weight of 10 apples is 0.4 kg. If the heaviest and lightest apples are taken out, the average is 0.41 kg. If the lightest apple weights 0.2 kg, what is the weight of heaviest apple?	
5	While finding the average of '9' consecutive numbers starting from X; a student interchanged the digits of second number by mistake and got the average which is 8 more than the actual. What is X?	
6	There are 30 consecutive numbers. What is the difference between the averages of first and last 10 numbers?	
7	There are two classes A and B., each has 20 students. The average weight of class A is 38 and that of class B is 40. X and Y are two students of classes A and B respectively. If they interchange their classes, then the average weight of both the classes will be equal. If weight of X is 30 kg, what is the weight of Y?	
8	The average marks of 30 students in a section of class X are 20 while that of 20 students of second section is 30. Find the average marks for the entire class X?	
9	The bowling average of cricketer was 12.4 runs; he improves his bowling average by 0.2 runs when he takes 5 wickets for 26 runs in his last match. The number of wickets taken by him before the last match was?	
10	The average of runs of a cricket player of 10 innings was 32. How many runs must be made in his next innings so as to increase his average of runs by 4?	

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Questions for Practice

1. The average weight of the students of two classes A and B with 20 and 30 students respectively are 40 kg and 50 kg respectively. Find the average weight of the students in both the classes put together.
(a) 50kg (b) 55kg (c) 35kg (d) 46 kg (e) 48 kg

2. There are 5 consecutive integers in ascending order. The average of the first and twice the last is equal to the average of the other three. Find the first integer.
(a) -5 (b) -4 (c) -3 (d) -2 (e) -6

3. The average weight of a group of boys is 30 kg. After 1 more boy, weighing 62 kg, joins the group, the average weight of the group goes up by 2 kg. Find the original number of boys in the group.
(a) 11 (b) 12 (c) 15 (d) 19 (e) 14

4. Raju went to the market to purchase three pens. The cost of the first pen was more than that of the second by 25%, which was more than that of the third by 20%. If the average cost of the first two pens was Rs.15 more than that of the last two pens, find the cost of the costliest pen.
(a) Rs.60 (b) Rs.45 (c) Rs.50 (d) Rs.90 (e) Rs.75

5. There are 11 numbers written, in increasing order. The average of the first 6 numbers is 40. The average of the last 6 numbers is 50. Find the average of the 11 numbers if the 6th number is 45.
(a) 41 (b) 42 (c) 46 (d) 44 (e) 45

6. The average age of a group of children increases by 1 year if a 9 year old child joins the group. The average age of the group decreases by 2 years, if a 11 year old child leaves the group. Find the number of children in the group.
(a) 8 (b) 6 (c) 5 (d) 7 (e) 4

7. The average age of the 25 students of a class is 20 years. If the teacher's age is also included, the average goes up by 0.5 years. Find the age of the teacher.
(a) 30 years (b) 31 years (c) 33 years (d) 35 years (e) 36 years

8. The average age of a couple when they got married was 30 years. Three years after their marriage, a child was born to them. The present average age of the couple and the child is 34 years. Find the present age of the child.
(a) 16 years (b) 15 years (c) 12 years (d) 10 years (e) 14 years

9. The average marks obtained by 45 students in a class is 80. The difference between the marks of the student who got the highest mark and the student who got the least mark is 99. If both these students are not considered, the average of the class falls by 1 mark. Find the highest mark.
(a) 203 (b) 151 (c) 125 (d) 108 (e) 161

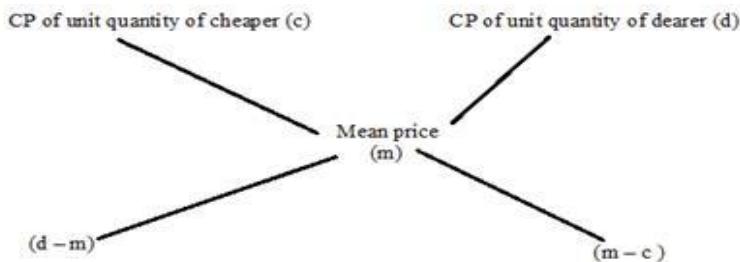
10. The average of n numbers is 41. If two-third of the numbers are increased by 9 and the remaining are decreased by 6, find the new average.
(a) 36 (b) 39 (c) 42 (d) 45 (e) 48

: Concept Check:
Rule of Alligation

If the gradients are mixed in a ratio, then

$$\frac{\text{Quantity of cheaper}}{\text{Quantity of dearer}} = \frac{\text{CP of dearer} - \text{Mean price}}{\text{Mean price} - \text{CP of cheaper}}$$

We represent it as under:



Then, (cheaper quantity): (dearer quantity) = $(d - m)$: $(m - c)$

1	In what ratio must a grocer mix two varieties of pulses costing Rs. 15 and Rs. 20 per kg respectively so as to get a mixture worth Rs. 16.50 kg?	
2	Sterling silver is 92.5% pure silver. How many grams of pure silver and sterling silver respectively must be mixed to obtain 100g of a 94% silver alloy?	
3	A merchant has 1000 kg of sugar, part of which he sells at 8% profit and the rest at 18% profit. He gains 14% on the whole. The quantity sold at 18% profit is?	
4	In what ratio must a grocer mix two varieties of tea worth Rs. 60 a kg and Rs. 65 a kg so that by selling the mixture at Rs. 68.20 a kg he may gain 10%?	
5	How many kgs of Basmati rice costing Rs.42/kg should a shopkeeper mix with 25 kgs of ordinary rice costing Rs.24 per kg so that he makes a profit of 25% on selling the mixture at Rs.40/kg?	
6	The cost of Type 1 rice is Rs. 15 per kg and Type 2 rice is Rs. 20 per kg. If both Type 1 and Type 2 are mixed in the ratio of 2 : 3, then the price per kg of the mixed variety of rice is.	
7	Tea worth Rs. 126 per kg and Rs. 135 per kg are mixed with a third variety in the ratio 1: 1: 2. If the mixture is worth Rs. 153 per kg, the price of the third variety per kg will be?	
8	An alloy contains zinc, copper and tin in the ratio 2:3:1 and another contains copper, tin and lead in the ratio 5:4:3. If equal weights of both alloys are melted together to form a third alloy, then the weight of lead per kg in new alloy will be:	

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9	In two containers A & B, milk & water are in the ratio 5: 3 and 3: 5 respectively. Find the ratio of milk & water when these two mixtures are mixed in equal quantity?	
10	In two containers A & B, milk & water are in the ratio 5 : 3 and 11 : 5. Quantity of both mixtures are mixed in the ratio 1 : 1. Find the ratio of milk & water in the new mixture?	
11	In two containers A & B, milk & water are in the ratio 5 : 3 and 11 : 5. Quantity of both mixtures are mixed in the ratio 2 : 1. Find the ratio of milk & water in the new mixture?	
12	Land & water on earth are in the ratio 1 : 2 and ratio of land & water on northern hemisphere is 2 : 3. Find the ration land and water in southern hemisphere?	
13	The milk and water in two vessels A and B are in the ratio 4:3 and 2:3 respectively. In what ratio the liquids in both the vessels are mixed to get a new mixture in vessel C containing half milk and half water?	
14	Two vessels A and B contain spirit and water mixed in the ratio 5:2 and 7:6 respectively. Find the ratio in which these mixture be mixed to obtain a new mixture in vessel c containing spirit and water in the ratio 8:5?	
15	A milk vendor has 2 cans of mixture of Milk and water. The first contains 25% water and the rest milk. The second contains 50% water. How much mixture should he mix from each of the containers so as to get 12 litres of milk such that the ratio of water to milk is 3 : 5?	

: Concept Check:

Concept of Replacement

The general formula for replacements is as follows:

$$FC = IC \times (1 - x/V)^n$$

Here

FC = Final concentration

IC = Initial concentration

x = replacement quantity

V = Final volume after replacement

n = number of replacements

Note: Always remember FC and IC are the concentrations of the second component in the mixture.

"x" is the concentration of the first component.

1	A mixtures of salt & water contain 15 % salt. 13 litre water evaporated from the mixture therefore the strength of salt becomes 25%. Find the original quantity of mixtures?	
2	A 20 Kg fresh water melon contains 96% water. After 5 days due to evaporation the quantity of water remains 95%. Find the weight of water melon now?	
3	A 300gm mixture of sugar & water contains 60% sugar. What quantity of water should be added in the mixture so that the quantity of sugar becomes 40%?	
4	What quantity of dry fruit can be obtained from 100 Kg fresh fruit, if fresh fruit contains 68 % water and dry fruit contains 20 % water?	
5	A container contains 40 liters of milk. From this container 4 liters of milk was taken out and replaced by water. This process was repeated further two times. How much milk is now contained by the container?	
6	8 liters 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 water is 16 : 65. How much wine did the cask hold originally?	
7	A sample of x liters from a container having a 60 litre mixture of milk and water containing milk and water in the ratio of 2: 3 is replaced with pure milk so that the container will have milk and water in equal proportions. What is the value of x?	
8	A 20-liter mixture of milk and water contains milk and water in the ratio 3: 2. 10 liters of the mixture is removed and replaced with pure milk and the operation is repeated once more. At the end of the two removals and replacement, what is the ratio of milk and water in the resultant mixture?	

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9	A can contains a mixture of two liquids A and B in the ratio 7: 5. When 9 litres of mixture are drawn off and the can is filled with B, the ratio of A and B becomes 7: 9. How many litres of liquid A was contained by the can initially?	
10	A chemist has 10 L of a solution that is 10% nitric acid by volume. He wants to dilute the solution to 4% strength by adding water. How many liters of water must be added?	
11	A dishonest milkman professes to sell his milk at cost price but he mixes it with water and thereby gains 25%. Find the percentage of water in the mixture.	
12	In what proportion must water be mixed with spirit to gain $\frac{50}{3}\%$ by selling it at C.P.?	

S20

HCF and LCM

Aptitude

Concept Check

- $$\text{H.C.F of given fractions} = \frac{\text{H.C.F of numerators}}{\text{L.C.M of denominators}}$$
- $$\text{L.C.M of given fractions} = \frac{\text{L.C.M of numerators}}{\text{H.C.F of denominators}}$$
- Product of two numbers = H.C.F * L.C.M of the two numbers

Complete the following table

N₁	24	27	136	192	
N₂	36	42		144	261
HCF (N₁ and N₂)			8	48	9
LCM (N₁ and N₂)			816		1827

HCF/ GCD

	Questions	Workspace
Type:1	<p>1. Find the Highest Common Factor of:</p> <p>(a) 24, 36, 108 (b) 144, 192, 360 (c) $12a^2b^3c^4$, $20abc^{10}d$, $24a^6b^2c^8$ (d) x^2-5x+6, $x^2-7x+12$ (e) $\frac{9}{10}, \frac{12}{25}, \frac{18}{35}, \frac{21}{40}$</p> <p>2. Find the greatest number that divides 350, 400 and 750, leaves no remainder in each case.</p> <p>3. 48 rose plants, 72 marigold plants and 108 lotus plants have to be planted in rows such that each row have equal number of plants and each row has plants of a particular variety only. What is the least number of rows required?</p> <p>4. A rectangular cloth of (54*90) units is to be cut into equal squares. Find how many minimum no. of square pieces are required such that no cloth is wasted.</p> <p>5. A merchant has three kinds of milk: 435 liters, 493 liters and 551 liters. Find the least number of casks of equal size required to store all the milk without mixing.</p>	
Type:2	<p>1. The product of two numbers is 2028 and their H.C.F. is 13. The number of such pairs is</p> <p>2. The sum of two numbers is 528 and their H.C.F. is 33. The number of pairs of numbers satisfying the above conditions is</p> <p>3. If HCF of two natural number is 10. Sum of these two natural numbers is 90.</p> <p>(a) How many pairs of numbers are possible? (b) What numbers are possible?</p>	
Type:3	<p>1. Find the greatest number that divides 55, 127 and 175, leaves same remainder in each case.</p> <p>2. Find the largest three digit number that on being divided by 6, 10 and 15 leaves a remainder of 5 in each case</p> <p>3. When marbles from a bag were divided into groups of 8 marbles, three marbles were left; when groups of 10 were made, again three marbles were left; and when groups of 12 marbles were made, again three marbles were left out. What is the least number of marbles that the bag contained?</p>	

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Type:4	<p>1. Find the greatest number that divides 150, 194 and 245, leaves remainders of 6, 2 and 5 respectively.</p> <p>2. n on dividing 50, 75 and 125 leaves a remainder of 2, 3 and 5 respectively. What is the largest value that n can take?</p>	
LCM		
Type:1	<p>1. Find the LCM of (a) 13, 23 and 48 (b) 24, 36, 44 and 62 (c) 22, 33, 45, and 72 (d) 13, 17, 21 and 33 (e) $\frac{9}{10}, \frac{12}{25}, \frac{18}{35}, \frac{21}{40}$</p> <p>2. Find the least number which when divided by 45 and 72, gives no remainder.</p> <p>3. The traffic lights at three different road crossings change after every 48 sec, 72 sec. and 108 sec. respectively. If they all change simultaneously at 8 : 20 : 00 hrs; then they will again change simultaneously at?</p> <p>4. Two alarm clocks ring their alarms at regular intervals of 24 seconds and 36 seconds. If they first beep together at 1 pm, at what time will they beep again for the first time?</p> <p>5. Six bells commence tolling together and toll at intervals of 2, 4, 6, 8 10 and 12 seconds respectively. In 30 minutes, how many times do they toll together?</p>	
Type:2	<p>1. What is the least number which when divided by 8, 9, 12 and 15 leaves the same remainder 1 in each case?</p> <p>2. Let the least number of six digits which when divided by 4, 6, 10, 15 leaves in each case same remainder 2 be N. The sum of digits in N is</p> <p>3. A toyshop owner has a number of toys in such a way that when he put 2, 3 or 5 toys in a packet, he is always left with 1 toy. Find the minimum number of toys he can possess.</p> <p>4. The least multiple of 7, which leaves a remainder of 4, when divided by 6, 9, 15 and 18 is?</p> <p>5. A fruit vendor has some mangoes. When he packs mangoes in the packets of 2, 3 or 5 he is always left with 1 mango but when 13 mangoes are packed in a packet nothing is left. Find the minimum number of mangoes the fruit vendor possesses.</p>	
Type:3	<p>1. What is the least number which when divided by 3, 4 and 7 gives remainder of 2, 3 and 6 respectively?</p> <p>2. What is the least multiple of 13, which when divided by 5 and 7 gives remainder of 3 and 5 respectively?</p>	
Type:4	<p>1. What is the least number possible which when divided by 5 and 7 gives remainder of 3 and 2 respectively?</p> <p>2. The least numbers which can be added to and Subtracted to 763 so that it is completely divisible by 57 is?</p>	

Cubes

Q1.A cube of side 4 cm is painted black on all of its surfaces and then divided into various smaller cubes of side 1cm each.The smaller cubes so obtained are separated.

1. How many of smaller cubes have exactly three faces painted?

A.5 B.6 C.7 D.8

2. How many of smaller cubes have exactly two faces painted?

A.24 B.12 C.17 D.16

3.How many of smaller cubes have exactly one faces painted?

A.24 B.12 C.17 D.16

4. How many of smaller cubes having no face painted?

A.24 B.12 C.8 D.16

Q2.A cube of side 4 cm is painted red on the pair of one opposite surfaces,green on the pair of another opposite surfaces and one pair of opposite surfaces is left unpainted.Now the cube is divided into 64 smaller cubes of side 1 cm each.

1. How many of smaller cubes have exactly three faces painted?

A.0 B.6 C.7 D.8

2. How many of smaller cubes have exactly two faces painted?

A.24 B.12 C.17 D.16

3.How many of smaller cubes have exactly one faces painted?

A.24 B.12 C.32 D.16

Q3.A cube of side 4 cm is painted red on the pair of one adjacent surfaces,green on the pair of other adjacent surfaces and two adjacent surfaces are left unpainted. Now the cube is divided into 64 smaller cubes of side 1 cm each.

1. How many of smaller cubes have exactly three faces painted?

A.0 B.2 C.7 D.8

2. How many of smaller cubes have exactly two faces painted?

A.24 B.12 C.14 D.16

3.How many of smaller cubes have exactly one faces painted?

A.24 B.30 C.32 D.16

4. How many of smaller cubes having no face painted?

A.24 B.12 C.18 D.16

Q4. The length of each side of cube is 10cms. The outer border of the width of 1 cm is painted black on each side and the remaining space enclose by this 1cm path is painted Blue. This cube is cut into 1000 smaller cubes of each side 1cm.

1. How many cube have all the faces uncolored?

A.512 B.729 C.329

D.343 E. None of these.

2. How many cubes have three faces coloured black?

A.104 B.96 C.8

D.4 E. None of these.

3. How many cubes have at least two faces coloured black?

A.104 B.96 C.64

D. 32 E. None of these.

4. How many cubes have one face blue and an adjacent face black?

A. Zero B.4 C.8

D.2 E.None of these.

5. How many cubes have at least one faced coloured?

A. 384 B.480 C.488

D.512 E.None of these.

Q5. A cube is painted red on 2 adjacent surfaces & black on the surfaces opposite to red surfaces and green on the remaining surfaces. Now the cube is cut into 64 smaller cubes of equal size.

1. How many smaller cubes have only one surface painted?

A.8 B.16 C.24 D.32

2. How many smaller cubes have no surface painted?

A.0 B.4 C.8 D.16

3. How many smaller cubes have less than three surfaces painted?

A.8 B.24 C.28 D.48

4. How many smaller cubes have only three surface painted?

A.4 B.8 C.16 D.24

5.How many smaller cubes with two surfaces painted have one face green and one of the adjacent faces black or red?

A.8 B.16 C.24 D.28

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6. How many smaller cubes have at least one surface painted with green colour?
A.8 B.24 C.32 D.56

Q6.A cube of 4 cm has been painted on its surfaces in such a way that 2 opposite surfaces have been painted blue & two adjacent surfaces have been painted red. Two remaining surfaces have been left unpainted. Now the cube is cut into smaller cubes of side 1 cm each.

1. How many cubes will have no side painted?
A.18 B.16 C.22 D.8
2. How many cubes will have at least red colour on its surface?
A.20 B.22 C.28 D.32
3. How many cubes will have at least blue colour on its surfaces?
A.20 B.8 C.24 D.32
4. How many cubes will have only two surfaces painted with red & blue, respectively?
A.8 B.12 C.24 D.30
5. How many cubes will have three surfaces painted?
A.3 B.4 C.2 D.16

Q7. A cube of side 10 cm is coloured red with a 2cm wide green strip along all the sides on all the faces. The cube is cut into 1000 smaller cubes of equal size. Now answer the following question based on the above information.

1. How many cubes have three green faces?
A.0 B.4 C.6
D.8 E. None of these.
2. How many cubes have one face red and adjacent face green?

- A.0 B.4 C.6
D.8 E. None of these.
3. How many cubes have at least one face coloured?
A.425 B.450 C.488
D.180 E. None of these.
4. How many cubes are without any colour?
A.512 B.518 C.582
D.527 E. None of these.
5. How many cubes have at least two green faces each?
A. 108 B.104 C.163
D.171 E. None of these.

Q8. A cuboid shaped wooden block has 6 cm length, 4 cm breadth and 1 cm height. Two faces measuring 4 cm x 1 cm are coloured in black. Two faces measuring 6 cm x 1 cm are coloured in red). Two faces measuring 6 cm x 4 cm are coloured in green. The block is divided into 6 equal cubes of side 1 cm (from 6 cm side), 4 equal cubes of side 1 cm (from 4 cm side)

1. How many cubes having red, green and black colours on at least one side of the cube will be formed ?
A. 16 B. 12 C. 10 D. 4
2. How many small cubes will be formed ?
A. 6 B. 12 C. 16 D. 24
3. How many cubes will have 4 coloured sides and two non-coloured sides ?
A. 8 B. 4 C. 16 D. 10
4. How many cubes will have green colour on two sides and rest of the four sides having no colour ?
A. 12 B. 10 C. 8 D. 4
5. How many cubes will remain if the cubes having black coloured are removed ?
A. 4 B. 8 C. 12 D. 16

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S19

Linear Equations

Aptitude

1	A boy is 10 years older than his brother. In 4 years he will be twice as old as his brother. Find the present age of each.	
2	Sally is 3 times as old as John. 8 years from now, Sally will be twice as old as John. How old is John?	
3	Becca is twice as old as Susan and Greg is 9 years older than Susan. 3 years ago, Becca was 9 less than 3 times Susan's age. How old is Greg now?	
4	Lauren is 3 less than twice Andrew's age. 4 years from now, Sam will be 2 more than twice Andrew's age. 5 years ago, Sam was three times Andrew's age. How old was Lauren 5 years ago?	
5	Gabby is 1 year more than twice Larry's age. 3 years from now, Megan will be 27 less than twice Gabby's age. 4 years ago, Megan was 1 year less than 3 times Larry's age. How old will Megan be 3 years from now?	
6	Mr. and Mrs. Gupta have three children - Pratik, Hritik and Kajol, all of whom were born in different cities. Pratik is 2 years elder to Hritik. Mr. Gupta was 30 years of age when Kajol was born in Hyderabad, while Mrs. Gupta was 28 years of age when Hritik was born in Bangalore. If Kajol was 5 years of age when Pratik was born in Mumbai, then what were the ages of Mr. and Mrs. Gupta respectively at the time of Pratik's birth? A] 35 years, 26 years B] 30 years, 21 years C] 37 years, 28 years D] None of the above	
7	In a zoo, there are some lions and pigeons. If their heads are counted these are 100 and if their legs are counted these are 320. How many pigeons are there? A] 40 B] 20 C] 35 D] 15	
8	Abu company provides taxi for call center employees. The company has 7 Taversas, 5 Qualis, 6 Innovas and few small cars. If Tavera makes one fourth of the total fleet, how many small cars are there in the company? A] 12 B] 7 C] 6 D] 10	
9	Recycling 900 kg of paper saves 17 trees. How many trees are saved when 1200 kg of paper are recycled? A] 19 B] 25 C] 20 D] 22	
10	Out of every 100 people in police department 10 are women. Out of every 100 people in military forces, 3 are women. In batch of 180 police personnel and 200 army personnel, how many of them would be women? A] 24 B] 30 C] 18 D] 6	
11	I purchased a certain number of pens of Rs. 2800. Had I purchased 60 pens more, the cost of each pen would be Rs. 6 less. How many pens did I purchase? A] 200 Pens B] 140 Pens C] 120 Pens D] None of these	

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12	<p>Sumitra put 5 grams of seeds in her bird feeder on Sunday. On Wednesday, half of the seeds were eaten, so she put 3 grams more. On Friday, she found half were eaten. How many grams were eaten in that week?</p> <p>A] 3 g B] 2.5 g C] 2.75 g D] 5.25 g</p>	
13	<p>There are ten children standing in a line, not all of whom have the same number of chocolates with them. If the first child distributes his chocolates to the remaining nine children such that he doubles their respective number of chocolates then he will be left with one chocolate. If the tenth child takes away one chocolate from each of the remaining nine then he will be having four chocolates less than the number of chocolates that the first child initially had. What is the total number of chocolates that are there with the second child to the ninth child?</p> <p>A. 13 B. 10 C. 12 D. None of these</p>	
14	<p>The post office stamps of Rs. 1, Rs. 3 and Rs. 7. Which of the following totals can't be achieved by buying exactly 100 stamps?</p> <p>A. Rs. 298 B. Rs. 473 C. Rs. 600 D. Rs. 440</p>	
15	<p>A number is interesting if on adding the sum of the digits of the number and the product of the digits of the number, the result is equal to the number. What fraction of numbers between 10 and 100 (both 10 and 100 included) is interesting?</p> <p>A. 0.1 B. 0.11 C. 0.16 D. 0.22 E. None of these</p>	

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6	Simplify: $\log_2 96 - \log_2 3$	
7	Simplify: $\frac{\log_5 27}{\log_5 64}$ A] $\log_4 3$ B] $\log_3 4$ C] $\log_{64} 27$ D] $\log_{27} 64$	
8	If $\log_{36} 49 = \frac{\log_{36} 7}{\log_x 6}$, then find x .	
9	If $5^{\log_5 7^2} = k$, find k .	
10	Simplify: $\log \frac{15}{8} + 2 \log \frac{8}{5} - 3 \log \frac{2}{3} - \log 2.7$ A] $\log 2 + \log 3$ B] $1 - \log 2$ C] $1 + \log 3$ D] $1 + \log 2$	
11	Simplify: $\log_2 \log_2 \log_2 \log_{\sqrt{3}} 6561$.	
12	Simplify: $\log_{b^2} a \times \log_{c^2} b \times \log_{d^2} c \times \log_{e^2} d \times \log_{a^2} e$.	
13	If $\log_2 \log_3 \log_2 \log_x 2^{1024} = 1$, find x .	
14	<p>Directions for following Questions: if $\log 2 = 0.3030$ and $\log 3 = 0.4771$, find the number of digits in the following.</p> <p>i. 60^{12} (A) 25 (B) 22 (C) 23 (D) 24</p> <p>ii. 72^9 (A) 17 (B) 20 (C) 18 (D) 25</p> <p>iii. 27^{25} (A) 38 (B) 37 (C) 36 (D) 35</p>	

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QUANTITATIVE APTITUDE

Lecture No. [XIII]

Topic: Surds and Indices

Sub topic: Surds and Indices

Lecture Outcome:

After the session, student would be able to:

- (i) understand the basic concept of Surds and Indices, including differentiation between the two.
- (ii) Applications of Surds and Indices.

<p>1. $\frac{81^{1/2} \div 9^{2/4}}{3^{-6}} = ?$</p> <p>2. $\left(\left(2^3\right)^2\right)^2 = ?$</p> <p>3. $3^{2/3} = ?$</p> <p>4. $3.375^{1/3} = ?$</p> <p>5. If $2^x \times 8^{1/5} = 2^{1/5}$, then $x = ?$</p> <p>6. By solving the expressions $\left(\frac{-1}{216}\right)^{-2/3}$, we get</p> <p>7. The square root of $1\frac{25}{144}$ is equal to a. $1\frac{5}{12}$ b. $1\frac{1}{12}$ c. $\frac{5}{12}$ d. $\frac{12}{13}$</p> <p>8. If $10^{2y} = 25$ then the value of 10^y should be a. $1/5$ b. $-5/5$ c. $1/25$ d. 5</p> <p>9. $\left(\sqrt{7} + \frac{1}{\sqrt{7}}\right)^2$ is equal to</p> <p>10. $5\sqrt{5}x^{3/2} \div 5^{-2} = 5^{a+2}$, then the value of a is</p> <p>11. $\frac{2^{n+4} - 2(2^n)}{2(2^{n+3})} + 2^{-3}$ is equal to a. 2^{n+1} b. $-2^{n+1} + \frac{1}{8}$ c. $\frac{9}{8} - 2^n$ d. 1</p> <p>12. $[100 \div .01 \times 100]^{1/6} = ?$</p> <p>13. If $8^x 2^y = 512$ and $3^{3x+2y} = (3^2)^{3x+2}$, (a) [1, 3] (b) [2, 3] (c) [2, 4] (d) [1, 4]</p> <p>14. If $2^{2x-1} + 4^x = 3^{x-1/2} + 3^{x+1/2}$, then x equals</p>	<p>15. If $\left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3}$, then x is equal to:</p> <p>16. The value of x for which $2^{x+4} - 2^{x+2} = 3$, is:</p> <p>17. If $9^x - 10 \cdot 3^x + 9 = 0$, then x is equal to:</p> <p>18. If $\frac{9^n \times 3^5 \times (27)^3}{3 \times (81)^4} = 27$, then the n equals:</p> <p>19. If $a^{x-3} \cdot a^{y+2} = a^2 \cdot a^x$ and $a^x \cdot a^y = a^4$, then: (a) $x = y = 0$ (b) $x = y = 1$ (c) $x > y$ (d) $x < y$</p> <p>20. If $a^{x-2}(a^{2x+2} + a^{1-x}) = a^{-3}(a^9 + a^2)$, then the value of x (a) 0 (b) a fraction (c) a positive integer (d) a negative integer</p> <p>21. If $a^x = b^y = c^z$ and $b^2 = ac$, then y equals: (a) $\frac{xz}{x+z}$ (b) $\frac{xz}{2(x-z)}$ (c) $\frac{xz}{2(x+z)}$ (d) $\frac{2xz}{(x+z)}$</p> <p>22. If $2^x = 4^y = 8^z$ and $\frac{1}{2x} + \frac{1}{4y} + \frac{1}{4z} = 4$, then the value of X is? (a) $\frac{7}{16}$ (b) $\frac{7}{32}$ (c) $\frac{7}{48}$ (d) none</p> <p>23. If $16 \times 8^{n+2} = 2^m$, then m is equal to: (a) $n + 8$ (b) $2n + 10$ (c) $3n + 2$ (d) $3n + 10$</p> <p>24. Find the positive square root of: (i) $3 + 2\sqrt{2}$ (ii) $5 + \sqrt{24}$ (iii) $7 - \sqrt{48}$</p> <p>25. Compare: (i) 2^{30} and 3^{20} (ii) $(1/4)^{50}$ and $(1/5)^{40}$ (iii) $(2/3)^{3/2}$ and $(3/2)^{2/3}$</p>
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