

RRB NTPC

Previous Years' Arithmetic Questions

Part VI Mixture & Alligations, Prob. on Ages & Remainder Theorem

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1. A shop keeper purchased 15 kg of sugar and 20 kg of wheat of Rs. 50 and Rs. 75 per kg. respectively. On selling then he gained 10% on sugar and 20% on wheat. What was the total sale value? A. Rs. 2,550 B. Rs. 2,625 C. Rs. 1,800 D. Rs. 1,575 Sol. Total sale value

 $= 15 \times 50 \times \frac{110}{100} + 20 \times 75 \times \frac{120}{100}$ = 825 + 1800 = 2625

2. How much quantity of water must be added to 48 ml of alcohol to make a solution that contain 25% alcohol?
A. 48 B. 64
C. 144 D. 192

Sol. Let Total solution be 100% Alcohol = 25%, Water = 75% We have, 48 : x = 25 : 75

$$x = \frac{48 \times 75}{25} = 144$$
 ml

Hence, option C is correct.

3. There is 6% of sugar in a 5 litre mixture of sugar. Out of it 1 litre water vapourises. Find the percentage of sugar in the remaining mixture?

| (A) 5% | (B) 7.5% |
|-----------------|------------------------------|
| (C) 6% | (D) 4% |
| A. (C) | B. (D) |
| C. (B) | D. (A) |
| Sol. Sugar in t | he initial mixture = $6/100$ |
| × 5 = 0.3 | |
| Now since 1 ltr | water vaporises |
| So porcontago | of cupar in final mixtura - |

So percentage of sugar in final mixture = $0.3 / 4 \times 100 = 7.5\%$

4. A vessel contains 240 litres of mixture containing milk and water in the ratio of 5: x, respectively. 48 litres of mixture is taken out from this vessel and put into another vessel P. When 12 litres of water is added in vessel P then ratio of milk to water is found to be 2: 1, respectively. Find the value of x.

| Α. | 1 | B. 5 |
|----|---|------|
| C. | 3 | D. 2 |

Sol. Amount of milk in 48 litres of mixture = $\frac{5}{5+x} \times 48 = \frac{240}{5+x}$ litres



So, amount of water in 48 litres of mixture = $\frac{48x}{5+x}$ litres According to the question, $\frac{240}{5+x} : \left[\left\{ \frac{48x}{5+x} \right\} + 12 \right] = 2:1$ $\frac{240}{5+x} = \left[\left\{ \frac{96x}{5+x} \right\} + 24 \right]$ 240 = 96x + 120 + 24x 120x = 240 - 120 = 120 $x = \frac{120}{120} = 1$

5. Two mixtures of milk and water having 48% and 84% milk concentration are mixed to get a mixture containing 60% milk, and this mixture is poured in a vessel containing 12 litres of water. It is found that concentration of milk after the mixture is poured into the vessel is 50%. Find the amount of 48% milk solution used.

A. 48 litres C. 36 litres Sol.

48%

B. 40 litres D. 54 litres

24% 12% Ratio = 24: 12 = 2: 1 Ratio of 48% solution and 84% solution mixed in 2: 1 Let, amount of milk and water in 60% solution is 3x and 2x (litres) According to the question,

84%

3*x* 50

$$\frac{1}{2x+12} = \frac{1}{50}$$

3x = 2x + 12; x = 12

So, amount of milk in the solution = $3 \times 12 = 36$ litres

And, amount of water in the solution = $2 \times 12 = 24$ litres

So, amount of total mixture = 36 + 24 = 60 litres

Therefore, amount of 48% milk solution used = $\frac{2}{3} \times 6 = 40$ *litres*

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6. Calculate the ratio in which two salt solutions of concentrations 25% and 60% are to be mixed to get a solution of concentration 30%?

A. 6 : 1 B.7:2 C. 5 : 1 D.4:5 Sol. \Rightarrow According to the condition given in the problem,

$$25 \ 60 \ 30 \ 5$$

$$30 \ 5 \ Ratio = 6 :1$$

7. A can contains a mixture of two liquids A and B in the ratio 7 : 5. When 9 L of mixture are drawn off and the can is filled with B, the ratio of A and B becomes 7 : 9 L of liquid contained by the can initially was

| Α. | 10 | B. 20 |
|----|----|-------|
| C. | 21 | D. 25 |

Sol. Let the mixture of two liquid be 7x and 5x.

If 9 L of mixture be drawn, Then, liquid

$$A, 7x - 9 \times \frac{7}{7 + 5} = 7x - \frac{63}{12} = 7x - \frac{21}{4}L$$

and liquid

$$B, 5x - 9 \times \frac{5}{7 + 5} = 5x - \frac{45}{12} = 5x - \frac{15}{4}$$

When 9 L mixture is mixed in B, then the quantity of

$$B = \left(5x - \frac{15}{4} + 9\right)L$$

According to the given condition,

$$\frac{\left(7x - \frac{21}{4}\right)}{\left(5x - \frac{15}{4} + 9\right)} = \frac{7}{9}$$

$$\Rightarrow 63x - \frac{189}{4} = 35x - \frac{105}{4} + 63$$

$$\Rightarrow 63x - 35x = \frac{-105}{4} + 63 + \frac{189}{4}$$

$$\Rightarrow 28x = \frac{-105 + 252 + 189}{4}$$

$$\Rightarrow 28x = \frac{336}{4} = 84 \Rightarrow x = \frac{84}{28} = 3$$

$$\therefore$$
 Qunatity of $A = 7x = 7 \times 3 = 21 \text{ L}$



8. In 40 L mixture of milk and water, the ratio of milk to water is 7:1.In order to make the ratio of milk and water 3:1, the quantity of water (in liters) that should be added to the mixture will be?

в. 6<u>1</u>2

D. $6\frac{3}{4}$

Sol. Let the quantity of milk=7x Quantity of water=1x 7x + 1x = 40x=5 Milk=35L and water=5L Let 'a' liter water be mixed in the solution 35/(5+a) = 3/135 = 15 + 3a3a=20

9. The ratio of milk to water in a mixture is 5:1. 5 L of water is added to mixture and ratio becomes 5:2. Find the quantity of milk in the initial mixture.

Sol. Let quantity of milk and water be 5x and x litres.

Then, 5x / (x + 5) = 5/25x + 25

∴ x =5

 \therefore Quantity of milk = 5x = 25 litres

10. Age of Sonam will be half of her father's age after 8 years. 8 years before the ratio of their age was 1:3. Find the present age of Sonam's father.

| (A) 48 | (B) 56 |
|------------------------|--------------|
| (C) 36 | (D) 65 |
| A. A | B. C |
| C. D | D. B |
| Sol. Let the age of S | onam = x |
| Then after 8 years, a | age of Sonam |
| = x + 8 | |
| His father's age after | r 8 years |
| = 2(x+8) | |

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A.T.Q. *x* – 16 + 8 - 1 2x + 16 - 163x - 24 = 2xx = 24Present age of father = 2x + 16 - 8= 2x + 8= 56.11. The sum of the ages of four children born at the intervals of 4 years is 48. Find the age of the youngest child. (A) 4 years (B) 5 years (C) 6 years (D) 7 years A. (A) B. (C) C. (B) D. (D) Sol. Let the age of youngest child is x yr. According to question, x+x+4+x+8+x+12=484x + 24 = 48x=6 So, age of youngest child is 6 yr. 12. The ages of two brothers are in the ratio 5:8 and the difference between their ages is 12, find their ages. (in years) (B) 16, 28 (A) 20, 32 (C) 18, 30 (D) 22, 34 A. (B) B. (D) C. (A) D. (C) Sol. The ages of two brothers are 5x and 8x. Given that , 8x-5x = 3xAnd 3x = 12x = 4So, the age of brothers are 20 year and 32 year. 13. Surya is 25 years older than his son. In 5 years, he will be twice as old as his son. What will be Surya's age after 3 years? (A) 20 (B) 23 (C) 45 (D) 48 A. (B) B. (A) C. (D) D. (C) Sol. Sons age = s Surya's age = xx=25+s Also x+5 = 2(s+5)



last mumber = 360 - (220 + 90) = 50

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17. Ram's son's age is 1/3 of Ram's wife's age. Ram's wife's age is 4/5 of Ram's age and Ram's age is 3/5 of Ram's father's age. Find the age of the son of Ram, if Ram's father is 50 yr old. A. 8 yr B. 10 yr C. 12 yr D. 6 yr Sol. Ram father age is 50 year so Ram's age = 30yrsRam's wife age = $4/5 \times 30 = 24yrs$ Ram son's age = $1/3 \times 24 = 8yrs$

18. A mother after 4 yr will be twice the age of her daughter after 4 years. The sum of their present ages is 46. What is the present age of the daughter? A. 14 yr B. 15 yr C. 16 yr D. None of these Sol. Let present age of daughter be x years, then her mother's age = (46 - x) years After 4 years, Daughter's age = (x + 4) years and Mother's age = (46 - x + 4) years = (50 - x)years According to question

According to question,

 $50 - x = 2 \times (x + 4)$

$$\Rightarrow$$
 50 - X = 2X + 8

$$\Rightarrow$$
 3x = 42

$$\Rightarrow x = \frac{42}{3} = 14$$
 years

Thus, daughter's present age = 14 years Hence, option A is correct.

19. A Man is 26 years older than his son. After 3 years, his age will be 3 times of his son. Find the present age of father. (A) 10 year (B) 36 year

(C) 32 year (D) 40 year A. (C) B. (A) C. (B) D. (D) Sol. Let the age of man and son is x & y respectively x- y = 26(i) and x+3 = 3(y+3)x + 3 = 3y+9x = 3y+6(ii) from equation (i) and (ii) 2y = 20Y = 10 x = 36 years

20. Ram's present age is 4 times his son's present age. 5 years hence Ram will be thrice his son's age at that time. Find their present ages. (in years) (B) 40 and 10 (A) 60 and 15 (C) 20 and 5 (D) 32 and 8 A. (D) B. (B) C. (A) D. (C) Sol. let The present age of Ram's son be =x, The present age of Ram's son be = y Given = 4x = y(i) Again, 3(x+5) = y + 53x + 15 = y + 53x + 15 = 4x + 5(from eq. (i)) x = 10Hence, there Present ages of Ram and This son are 40 years and 10 years respectively. 21. The sum of the present ages of Varun and Kapil is 42 yr. The ratio of their ages after 5 yr will be 15:11. What is the present age of Kapil? A. 17 yr B. 24 yr C. 25 yr D. 22 yr Sol. Let X and Y be the present ages of Varun and Kapil respectively. $X+Y = 42 \dots (1)$ After 5 years (X+5): (Y+5) = 15: 1111(X+5) = 15(Y+5)11X+55 = 15Y+7511X = 15Y + 20 $X = (15Y+20)/11 \dots (2)$ By equation (1) and (2) (15Y+20)/11 + Y = 42 $15Y+20+11Y = 42 \times 11$ 26Y + 20 = 46226Y = 442Y = 442/26 = 17Hence present age of Kapil = 17 Years

22. The present ages of Ram, Shyam and Mohan are in the ratio of 6 : 7 : 9 and ratio of ages of Shyam, Mohan and Sohan is 8 : 5 : 3. If the age of Sohan is 54 years then find the difference between Shyam and Mohan's age.

| A. 33 | B. 22 |
|-------|-------|
| C. 24 | D. 36 |

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D. 30

Sol. let age of son 12 years ago be x and

Age of mother 12 years hence = (x+24)3

Present age of mother = 3x + 72-12 =

25. Ratio of present ages of A and B and

A and C are 5:7 and 1:2 respectively. If at the time of the birth of A the sum of

ages of B and C was 35 years. Then find

B. 35 yr

D. 40 yr

12 years hence age of son = x+24

Present age of father = 4x+12

Age of son = 48 + 12 = 60 years

that of the father be 4x

According to guestion 4x + 12 = 3x + 60

the present age of A.

Sol. Ratio of present ages :

Let the common ration = x

At the time of the birth of A,

Sum of ages of B and C = 2x+5x=7x

So present age of A=5xPresent age of B = 7x

Present age of C = 10 x

Age of B =7x-5x=2x yr

Age of C=10x-5x=5x yr

So ratio of ages of A B and C =

A. 25 yr

C. 50 yr

A:B=5:7

A:C=1:2=5:10

A:B:C=5:7:10

 $\therefore x = 48$ vears



According to question, 7x=35 $\Rightarrow x=5$ So present age of A =5x=5*5=25 years 26. Find the greatest number that will divide 400, 445 and 541 leaving remainder 9, 20 and 14 as remainders. B. 19 A. 18 C. 17 D. 9 Sol. Firstly, we will have to subtract the respective remainders out of the numbers: So, the numbers will be: 400 - 9 = 391445 - 20 = 425541 - 14 = 527Now the required number will be the HCF of these numbers:

what is present age of son? A. 60

father is 9 years more than mother, then

B. 40

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C. 50

= 3x + 72

3x + 60



HCF (391, 425, 527) = 17 11 + x - 7 - 1 = 0So the number is 17 3 + x = 0so, only one value of x that is x=8 will 27.If 10-digit number 67127y76x2 is satisfy the equation. divisible by 88. then the value of (7x - 2y)By putting y=1 and x=8(4x-y) = 31is: A. 10 B. 7 C. 3 D. 5 30. If the number 97215*6 is completely Sol. For divisible by 88, the given number divisible by 11 then the digit representing * is: should be divisible by 11 and 8 both. B. 3 For divisibility by 8 A. 2 6x2 should be divisible by 8 C. 4 D. 5 Sol. The given number is 97215*6 So, x will be 3. For divisibility by 11 difference of sum of By the divisibility rule of 11 we get: odd place digits and sum of even place (6+5+2+9) - (* + 1 + 7) = (14 - x)digits should be zero or divisible by 11. Then 14 – x must be divisible by 11 = (6+1+7+7+x) - (7+2+y+6+2) $\therefore \mathbf{x} = 3$ = (21+x) - (17+y) = 4+x-yBy putting x=3, 4+3-y = 7-y should be 31. The least number, which Is to be added to the greatest number of 4 digits zero or Multiple of 11 so that the sum may be divisible by 345, So, y=7 Is So, 7x-2y= 7 x 3-2 x 7 = 21-14 = 7 A. 50 B. 6 C. 60 D. 51 28. If a 10-digit number 1330x558y2 is Sol. The largest 4-digit number = 9999divisible by 88, then the value of (x + y)345)9999(28 is: A. 6 B. 8 690 C. 9 D. 7 Sol. 1330x558y2 is divisible by 88 so it 3099 must be divisible by 11 and 8 For divisibility by 11 2760 X+y+9-18=0 or multiple of 11 By taking the above expression equal to 339 0 we get .'. Required number = 345 - 339 = 6X+y=932. 2^{16} - 1 is divisible by 29. If a 9-digit number 32x4115y2 is B. 13 A. 11 divisible by 88, then the value of (4x - y)C. 17 D. 19 for the smallest possible value of y, is: Sol. $2^{16} - 1 = (2^8)2 - 1$ A. 31 B. 20 $= (2^8 + 1) (2^8 - 1)$ C. -1 D. 11 = (256 + 1) 1256 - 1)Sol. For divisibility by 88, number should = 257 x 255 which is exactly di-visible by be divisible by 11 and 8 both. 17. For divisible by 8 last 3 digit of the number (5y2) must be divisible by 8. 33. Find the remainder when 7^{65} is So, the value of y can be 1,5 and 9. divided by 16808. For divisibility by 11, difference of sum of A. 16807 B. 6 digits at odd place and sum of digits at C. 7¹³ D. None of these even place must be zero or divisible by Sol. 11. So, (11+x) - (7+y) = 0 or multiple For the smallest value of y, y=116808 16808

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| _ | $(16807)^{13}$ | (16808 - 1) ¹³ | $-(-1)^{13}1$ |
|---|----------------|---------------------------|---------------|
| _ | 16808 | 16808 | -(1) - 1 |

Hence, the remainder when 7^{65} is divided by 16808 is equal to -1 or 16808 - 1 =16807.

34.If 738A6A is divisible by 11, then the value of A is

| Α. | 6 | В. | 3 |
|----|---|----|---|
| С. | 9 | D. | 1 |

Sol. As 738A6 A is divisible by 11. We have, if a number is divisible by 11, then the difference of the sum of digits at odd places and the sum of its digits at even places, is either 0 or will divisible by 11. Therefore,

A + A + 3 = 6 + 8 + 7 2A = 21 - 3 2A = 18 $A = \frac{18}{2} = 9$

35.1008 divided by which single digit number gives a perfect square? A. 9 B. 4 C. 9 D. 7

C. 8 D. 7 Sol. Take option (4), 1008 divide by 7 = 1008/7 = 144144 is a square of 12 Now, take option (3) 1008 divide by 8 = 1008/8 = 126126 is not a square of any number. Take option (1) 1008 divide by 9 = 1008/9 = 112112 is not a square of any number. Take option (2), 1008 divide by 4 = 1008/4 = 252252 is not a square of any number. Hence, the answer is 7

36.A number when divided by 280 leaves 115 as remainder. When the same number is divided by 35, the remainder is A. 15 B. 10 C. 20 D. 17 Sol. Here, 280 is a multiple of 35. \therefore Required remainder = Remainder obtained on dividing 115 by 35 = 10 37. What number, from the following, should be deducted from 1184 to make it exactly divisible by 21? A. 15 B. 12 C. 8 D. 7 Sol. 1176 is exactly divisible by 21 so (1184-1176) = 8 should be deducted from 1184. 38. You have 20 big and 16 small diaries and you want to make present with both type of diaries. How many maximum present can be made without leaving any diary? (A) 5 (B) 4 (C) 3 (D) 2 A. (C) B. (B) C. (A) D. (D) Sol. maximum present = HCF of (16,20)= 4 39.What number should be deducted from 1265 to make it exactly divisible by 29? (A) 15 (B) 16 (C) 18 (D) 17 B. (B) A. (C) C. (D) D. (A) Sol. We can write $1265 = 43 \times 29 + 18$ So make the number divisible by 29 we have to subtract 18 40. Find the smallest number which is divided by 16, 24, 36 and 54 leaves, remainder 12, 20, 32 and 50 respectively. (A) 432 (B) 444 (C) 428 (D) 452 A. (B) B. (A) C. (D) D. (C) Sol. Since the difference is constant (16-12),(24-20),(36-32),(54-50) = 4

 $\begin{array}{l} 12,(24-20),(36-32),(54-50) = 4\\ \text{Required number} = \text{LCM}(16,24,36,54) - \\ 4 = 432 - 4 = 428 \end{array}$

41.Which is the least number which when doubled will be exactly divisible by 12, 18, 21 and 30 ? A. 2520 B. 1260 C. 630 D. 196 Sol. Let 2X be the number exactly divisible by 12, 18, 21 and 30. $12 = 2 \times 2 \times 3$ $18 = 2 \times 3 \times 3$ $21 = 3 \times 7$

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 $30 = 2 \times 3 \times 5$ L.C.M. of 12, 18, 21 and $30 = 2 \times 2 \times 3 \times 3 \times 5 \times 7 = 1260$ Hence 2X = 1260=> X = 630

42.Find the least number to be added to 1739 so that it is exactly divisible by 11-(A) 11 (B) 2 (C) 1 (D) 10 A. (C) B. (A) C. (B) D. (D) Sol. Divide the given number by 11

1739/11 gives 1 as remainder , so to make the number divisible by 11 we need to add 10 to it.

43. In a number system, on dividing 11509 with a number Mukesh gets 71 as dividend and 7 as remainder. What will be the divisor?

| (A) 132 (B) 172 | |
|-----------------|--------|
| (C) 182 (D) 162 | |
| A. (D) | B. (A) |
| C. (B) | D. (C) |
| Sol. | () |

44. The greatest number which when divided by 989 and 1327 leaves remainder 5 and 7 respectively, is A. 8 B. 16 C. 24 D. 32 Sol. Let X be the number s. t. 989 = $aX+5 \rightarrow aX = 989 - 5 = 984$ 1327 = $bX+7 \rightarrow bX = 1327 - 7 = 1320$ 984 = $2 \times 2 \times 2 \times 2 \times 3 \times 41$ 1320 = $2 \times 2 \times 2 \times 3 \times 5 \times 11$ HCF of 984 and 1320 = $2 \times 2 \times 2 \times 3 = 24$ Therefore X = 24 The greatest number which when divided by 989 and 1327 leaves remainder 5 and 7 respectively is 24.

45. The number nearest to 10000 which is exactly divisible by each of 3, 4, 5, 6, 7 and 8 is A. 9240 B. 10080 C. 9996 D. 10000 Sol. First take the LCM of 3,4,5,6,7,8=840 Dividing 10000 840 by we get remainder=760 Number nearest to 10000 will be 10000-760=9240 And 10000+(840-760)=10000+80 = 10080 Thus there are two numbers 46. A prime number is the number which is divisible A. 1 B. 2 C. itself D. 1 and itself only Sol. A prime number is a positive integer that has exactly two distinct whole number factors (or divisors), namely 1 and the number itself. 47. Find the least number to be added to 1739 so that it is exactly divisible by 11. A. 11 B. 2 C. 1 D. 10 Sol. On dividing 1739 by eleven, we get the remainder = 1so on adding 10 we get the number exactly divisible by 11 i.e. 1749 Alternate Method: For exactly divisible by 11 = (1+3)-(7+9)should be equal to 0 or divisible by 11. By going through the options, if we add 10 to 1739 = 1739 + 10 = 1749







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