CAPSTONE

Mathematics: Arithmetic

Lecture 09

Overview	Next Lecture
◆ Work	◆ Basic Geometry:
◆ Pipe	1. Angle
◆ Age	2. Triangle
	3. Quadrilateral

Name: Batch:

IBA Regular Batch

Pipe-Cistern

➜ If a pipe can fill a tank in x hours, then:

part filled in 1 hour $= \frac{1}{x}$

➜ If a pipe can empty a tank in y hours, then:

part emptied in 1 hour $= \frac{1}{y}$

➜ If a pipe can fill a tank in x hour and another pipe can empty the full tank in y hours, then on opening both the pipes,

the net part filled in 1 hour $= \left(\frac{1}{x} - \frac{1}{y}\right)$ [where y > x]

the net part emptied in 1 hour $= \left(\frac{1}{y} - \frac{1}{x}\right)$ [where x > y]

Time & Work

➜ If A can do a piece work in n days, then A's 1 day's work $= \frac{1}{n}$

➜ If A's 1 day's work $= \frac{1}{n}$, then A can finish the work in n days.

➜ If A complete a piece of work in 'x' days and B complete the same work in 'y' days, then time taken to complete the work by A and B both $= \frac{xy}{x+y}$

➜ If A alone can do a certain work in 'x' days and A and B together can do the same work in 'y' days, then B alone can do the same work in $= \left(\frac{xy}{x-y}\right)$ days

Age

➜ If the current age is x, then n times the age is nx.

➜ If the current age is x, then age n years later/ hence = x + n.

➜ If the current age is x, then age n years ago = x − n.

Practice Test

1. A short distance athlete has been 60 seconds to cover 100 meters. If he makes 30 steps in 9 seconds how many steps has he taken in that time?

   A. 130   B. 170   C. 173   D. 188   E. None of these

2. A man's regular pay is taka 30 per hour up to 40 hours. Overtime is twice the payment for regular time. If he was paid tk. 1680, how many hours overtime did he work?

   A. 8   B. 16   C. 6   D. 20   E. 28

3. Courier charges for packages to a certain destination are tk. 65 for the first 250 grams and tk. 10 for each additional 100 grams or part there. What could be the weight in grams of a package for which the charge is tk. 155?

   A. 1155   B. 1145   C. 1040   D. 1050   E. None of these

4. A contractor employed 30 men to do a piece of work in 38 days. After 25 days, he employed 5 men more and the work as finished one day earlier. How many days he would have been behind, if he had not employed additional men?

   A. 1   B. $1\frac{1}{2}$ C. $1\frac{3}{4}$ D. $2\frac{1}{2}$ E. None of these

5. A group of workers promise to complete a piece of work in 10 days, but five of them do not report for work. If it took the remaining workers 12 days to complete the work, then the number of workers originally hired was -

   A. 15   B. 20   C. 25   D. 30   E. 35

6. Working 11 hours/ day, 24 men and 33 women can complete the construction of a road in 78 days. The working capacity of 3 women equals to that of 1 man. Now, the authority decides that the road is to be constructed in 55 days by working 13 hours/day. If there are only 27 women present how many men will be needed?   [June 2018]

   A. 33   B. 45   C. 87   D. 99   E. None of these

7. A teacher has 3 hours to grade all the papers submitted by the 35 students in her class. She gets through the first 5 papers in 30 minutes. How much faster does she have to work to grade the remaining papers in the allotted time?   [BBA 15-16]

   A. 10%   B. 15%   C. 20%   D. 25%   E. None of these

8. A man can do a piece of work in 5 days, but with the help of his son, he can do it in 3 days. In what time can the son do it alone?

   A. 4 days   B. 6 days   C. 7 days   D. 8 days   E. None of these

9. A takes twice as much time as B or thrice as much time as C to finish a piece of work. Working together they can finish the work in 2 days. B can do the work alone in:

   A. 6 days   B. 4 days   C. 8 days   D. 12 days   E. None of these

10. A can complete a project in 20 days and B can complete the same project in 30 days. A & B start working on the project together and A quits 10 days before the project is expected to be completed. How many days in total will the project take to complete?

   A. 16   B. 18   C. 23   D. 27   E. 24

11. A can do a job in 24 day, B in 9 days and C in 12 days. B and C together start the work but leave after 3 days. How much time was taken by A to complete the remaining work?

   A. 7 days   B. 9 days   C. 10 days   D. 12 days   E. 6 days

12. If Arif works alone he will take 20 more hours to complete a task than if he works with Babu to complete the task. If Babu work alone, he will take 5 more hours to complete the task than if he works with Arif to complete the task. What is the ratio of the time taken by Arif to time taken by Babu if each of them works alone to complete the task?

   A. 1:2   B. 2:1   C. 5:3   D. 3:5   E. 7:5

13. A man can build a hut in 9 days; a woman can build the same hut in 12 days and a boy can build that hut in 18 days. After working together for 2 days the man left and the woman and the boy continued the work for 2 days. After that the woman left too and the boy finished the rest of the work. If the total wage for this work is BDT 7910, how much the boy should receive based on the number of days worked?   [June 2018]

   A. BDT 2260   B. BDT 3390   C. BDT 4520   D. BDT 5085   E. None of these

14. A is twice as good a work man as B and is therefore able to finish a job in 18s days less than B. In how many days they can finish the job working together? [December 2017]
    A. 8   B. 12   C. 15   D. 18   E. None of these

15. A and B working together can finish a job in x days. If A works alone and completes the job, he will take x + 4 days. If B woks alone and completes the same job, he will take x + 16 days. What is x?   [June 2016]
    A. 4   B. 6   C. 8   D. 10   E. None of these

16. A female worker can do a job in 12 hours and a male worker can do the same job in 6 hours. If equal numbers of male and female members were deployed to do that job and the team completed the job in 2 hour, how many male worker were employed?   [December 2015]
    A. 1   B. 2   C. 3   D. 4   E. None of these

17. A tank is filled in 5 hours by three pipes A, B and C. The pipe C is twice as fast as B and B is twice as fast as A. How much time will pipe A alone take to fill tank?
    A. 20   B. 25   C. 30   D. 35   E. None of these

18. Pump can fill a tank with water in 2 hours. Because of a leak, it took $2\frac{1}{3}$ hours to fill the tank. The leak can drain all the water of the tank in:
    A. 14 hrs   B. 4 hrs   C. 7 hrs   D. 8 hrs   E. None of these

19. Three pipes A, B and C can fill a tank from empty to full in 30 minutes, 20 minutes and 10 minutes respectively. When the tank is empty, all the three pipes are opened. A, B and C discharge chemical solutions P, Q and R respectively. What is the proportion of the solution R in the liquid in the tank after 3 minutes?   [BBA 13-14]
    A. $\frac{5}{11}$ B. $\frac{6}{11}$ C. $\frac{7}{11}$ D. $\frac{8}{11}$ E. $\frac{9}{11}$

20. A water tank has two taps (tap - 1 and tap 2). Tap - 1 can fill a tank in 8 hrs and tap - 2 can empty the tank in 16 hrs. How long will they take to fill the tank if both taps are opened simultaneously but tap - 2 is closed after 8 hrs?
    A. 10   B. 12   C. 14   D. 16   E. 20

21. One years ago, Pinky was four times as old as her daughter, Soma. Six years hence, Pinky's age will exceed her daughter's age by 9 years. The ratio of the present age of Pinky and her daughter is:
    A. 9:2   B. 11:3   C. 13:4   D. 12:5   E. None of these

22. The age of the father of two children is twice that of the elder one added to four times that of the youngest one. If the arithmetic mean and product of the ages of the two children is 8 years and 48 years respectively, then what is the age of the father?   [BBA 10-11]
    A. 48 years   B. 32 years   C. 40 years   D. 42 years   E. None of these

23. The sum of the ages of the father and son is 50 years. When the ages of the son will be equal to the present age of the father, the sum of the ages will be 102 years. Find the age of father?
    A. 30   B. 36   C. 42   D. 38   E. 48

24. Eight years ago, Zahed was twice as old as Zubair. At present Zahed is 1.5 times as old as Zubair. Sixteen years from now, what will be the ratio of Zubair age to Zahed's age?   [June 2018]
    A. 5:4   B. 6:5   C. 5:6   D. 4:5   E. None of these

25. A is three years older than B who is twice as old as C. If the total of the ages of A, B and C is 38, how old is B?   [December 2017]
    A. 10   B. 12   C. 14   D. 15   E. None of these

Home Task

1. The rent of a guest house was tk. 50 per day for first three days, tk. 100 per day for next 5 days and tk. 300 per day for other days. The registration fee in the beginning is tk. 50. If one has to pay tk. 1300, for how many days he availed of this facility?

    A. 8   B. 10   C. 12   D. 15   E. 18

2. A company employs 15 persons working 44 hours a week. If 4 persons are ill, how many hours a week would the rest have to work to make up the work force lost?

    A. 40   B. 50   C. 55   D. 60   E. 65

3. 3 pumps working 8 hour a day can empty a tank in 2 days. How many hours a day must 4 pumps work to empty the same tank in 1 day?

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

4. A garrison of 500 men had provisions for 27 days. After 3 days, a reinforcement of 300 men arrived. For how many more days will the remaining food last now?

    A. 16   B. 15   C. 17   D. 18   E. None of these

5. If 3 men or 6 boys can do a piece of work in 10 days, working 7 hours a day; how many day will it take to complete a piece of work twice as large with 6 men and 2 boys working together for 8 hours a day?

    A. 6   B. 6.5   C. 7   D. 7.5   E. None of these

6. 4 men and 6 women can complete a work in 8 days, while 3 men and 7 women can complete it in 10 days. In how many days will 10 women complete it?

    A. 40 days   B. 36 days   C. 32 days   D. 34 days   E. None of these

7. A contract to be completed in 46 days and 117 men were set to work, each working 8 hours a day. After 33 days, $\frac{4}{7}$ of the work is completed. How many additional men may be employed so that the work may be completed in time, each man now working 9 hours a day?

    A. 80   B. 71   C. 61   D. 81   E. None of these

8. If 30 men renovate $\frac{1}{2}$ of room space in 120 days, how many days would 80 men require to renovate $\frac{1}{3}$ of the remaining room space. Assuming each person works at the same rate?   [June 2018]

    A. 15   B. 30   C. 60   D. 120   E. None of these

9. Rakib can complete a task in 30 minutes and together with his brother Momin, he can complete the task in 20 minutes. How long would it take for Momin working alone to complete the task?

    A. 30 minutes   B. 40 minutes   C. 50 minutes   D. 60 minutes   E. None of these

10. Rashid can do a piece of work in 8 days, which Tapu can finish in 12 days. If they work at it on alternate days with Rashid beginning, in how many days, the work will be finished?

   A. $\frac{28}{3}$　　　B. $\frac{19}{2}$　　　C. $\frac{217}{24}$　　　D. $\frac{31}{3}$　　　E. $\frac{25}{3}$

11. Babu can paint a house three times faster than Ali can paint. If working together, it takes Ali and Babu 24 hours to paint the house, then how many hours will it take Babu to paint the house alone?

   A. 24　　　B. 38　　　C. 30　　　D. 32　　　E. None of these

12.　Siam needs m minutes to do a task. After he works for k minutes, what part of the task remain incomplete?

   A. $\frac{k}{m}$　　　B. $\frac{m}{k}$　　　C. $\frac{m-k}{m}$　　　D. $\frac{m}{m-k}$　　　E. None of these

13. A container full of water weighs 20 kg. If one-fourth of the container is full of water, it weighs 8 kg. What is the weight of the empty container?

   A. 2　　　B. 3　　　C. 4　　　D. 8　　　E. None of these

14. Asif can do a job in 15 hours, and Rassel can do the same job in 9 hours. If they start doing the job together at 6 am and Rassel stops working at 9 am, at what time will Asif finish the job?

   A. 2 pm　　　B. 4 pm　　　C. 5 pm　　　D. 6 pm　　　E. None of these

15. Mukit can do a work in 8 days while his collegues Asad takes 12 days and Mithun takes 16 days to complete the same. Mukit and Asad started the work and after few days Asad left the work keeping it incomplete. Rest of the work was completed by Mukit and Mithun in 2 days. How long it took to complete the whole work?

   A. 4 days　　　B. 5 days　　　C. 6 days　　　D. 8 days　　　E. 5.5 days

16. Arif and Babu worked together to paint a house. Arif worked for 1 hour 45 minutes and Babu worked for 45 minues. Babu's hourly rate is double the rate of Asif's. If they together earned tk. 71.50, what is hourly rate of Arif in taka?

   A. 20　　　B. 22　　　C. 22.50　　　D. 21.50　　　E. None of these

17. A and B can do a work in 12 days. B and C can do it in 15 days and, A and C can do it in 20 days. If all of them work together, in how many days they can finish the work?

   A. 25　　　B. 9　　　C. 12　　　D. 22　　　E. 10

18. Working independently, x takes 12 hours to finish a certain work. He finishes $\frac{2}{3}$ of the work. The rest is finished by y whose rate is $\frac{1}{10}$th of x. In how many hours does y finish the work?　　　[Dec'2015]

   A. 40　　　B. 50　　　C. 60　　　D. 70　　　E. None of these

19. Three workers A, B, C working individually can completed a task in 30 days, 15 days and 10 days respectively. If A starts the task alone and B and C help A in every 2nd and 3rd day respectively, on which day will the task be completed?   [June 2018]

    A. 10   B. 12   C. 14   D. 15   E. None of these

20. There pipes can individually fill a water tank in 10, 12 and 15 hours. How many hours will it take for all three pipes opened together to fill half of the tank?

    A. 6 hr   B. 5 hr   C. 4 hr   D. 2 hr   E. None of these

21. A water tank with 84 gallons capacity is filled by pipe A and emptied by pipe B. If the rate of water flow through pipe A is 2 gallons per hour, how many gallons per hour should flow through pipe B so that when both pipes are open, the initially empty tank should be full in capacity in 96 hours?

    A. $\frac{3}{8}$ B. $\frac{4}{3}$ C. $\frac{9}{8}$ D. $\frac{8}{9}$ E. $\frac{2}{3}$

22. Two pipes A and B can fill a cistern in $37\frac{1}{2}$ minutes and 45 minutes respectively. Both pipes are opened. In what time the cistern will be filled in just after half an hour, if the B is turned off after?

    A. 5 mins   B. 9 mins   C. 10 mins   D. 15 mins   E. None of these

23. A is 3 years older than B and 3 years younger than C. B and D are twins. So how older is C than D?

    A. 2 years   B. 3 years   C. 5 years   D. 6 years   E. 12 years

24. A father is 32 years older than the son. In 7 years the fathers age will be 5 years more than twice that of the son. The age of the father, 3 years from now, will be -

    A. 45   B. 55   C. 65   D. 75   E. None of these

25. Six years ago, Rahim was p time as old as Kalam was. If Rahim is now 17 years old, how old is Kalam now in terms of P?

    A. $\frac{11}{P} + 6$ B. $\frac{P}{11} + 6$ C. $\frac{P}{17} + 6$ D. $\frac{17}{P}$ E. None of these