

APPOLO STUDY CENTRE
GROUP I (A) - FOREST EXAM - (17.12.2017)

1. What is the sum of all 3 digit natural numbers, which are divisible by 8?

- A. 61376 B. 63176 C. 67136 D. 61636

$$104 + 112 + \dots + 992$$

$$a = 104 \quad d = 8 \quad l = 992$$

$$f_n = 104 + (n-1)8 = 992$$

$$n-1 = \frac{888}{8}$$

$$n = 111 + 1 = 112$$

$$S_n = \frac{112}{2} [104 + 992]$$

$$= 56 \times 1096 = 61376$$

2. If a train going at a speed of 150 Kmph takes 18 seconds to cross a signal post. What is the length of the train?

- A. 750 m B. 500 m C. 700 m D. 650 m

$$\text{Train Length} = 150 \times \frac{5}{18} \times 18$$

$$= 750 \text{ m}$$

3. Take any number in your memory. Add 9 with that number and then twice it. Add 3 with the answer and then thrice it. Subtract 3 from the answer and divide it by 6. From the answer subtract the number taken by you initially. Final answer arrived is

- A. 9 B. 20 C. 23 D. 10

Let Number be 1.

$$\frac{3 \left\{ \left[(1+9) \times 2 \right] + 3 \right\} - 3}{6} \Rightarrow 11$$

$$11 - 1 = 10$$

Answer: 10

4. How can we called the following sequence?

1, 1, 2, 3, 5, 8, 13, 21, 34.....

- A. Ficonabi sequence B. Finocabci sequence
 C. Fibonacci sequence D. Finabocci sequence

5. The 17th and 27th term of an arithmetic progression are 100 and 150 respectively. What is its 37th term?

A. 200

B. 50

C. 250

D. 75

$$t_{17} = a + 16d = 100 \quad \text{--- (1)}$$

$$t_{27} = a + 26d = 150 \quad \text{--- (2)}$$

$$\text{(2) - (1)} \rightarrow 10d = 50 \quad \boxed{d = 5}$$

$$\text{(1)} \rightarrow a + 80 = 100 \quad \boxed{a = 20}$$

$$t_{37} = a + 36d \\ = 20 + (36 \times 5) \\ = 200.$$

6. The radii of two right circular cylinders are in the ratio of 3 : 2 and their heights are in the ratio 5 : 3. Find the ratio of their curved surface areas.

A. 5 : 2

B. 2 : 5

C. 3 : 2

D. 5 : 3

$$r_1 : r_2 = 3 : 2 \quad h_1 : h_2 = 5 : 3$$

$$2\pi r_1 h_1 : 2\pi r_2 h_2$$

$$3 \times 5 : 2 \times 3$$

$$\boxed{5 : 2}$$

7. A number consists of two digits whose sum is 9. The number formed by reversing the digits decreases twice the original number by 9. Which is that original number?

A. 63

B. 36

C. 62

D. 26

$$xy \rightarrow 10x + y \quad \boxed{x + y = 9}$$

$$yx \rightarrow 10y + x$$

$$2(10x + y) - (10y + x) = 9$$

$$20x + 2y - 10y - x = 9$$

$$19x - 8y = 9.$$

$$x + y = 9$$

$$8x + 8y = 72$$

$$27x = 81$$

$$\boxed{x = 3}$$

$$\boxed{y = 6}$$

$$\boxed{\text{Ans: } 36}$$

8. A patient in a hospital is given soup daily in a cylindrical bowl of diameter 7 cm. If the bowl is filled with fruit juice to a height of 4 cm, then find the quantity of fruit juice to be prepared daily in the hospital to serve 250 patients.

- A. 37.5 litres **B. 38.5 litres** C. 39.5 litres D. 40.5 litres

$$\pi r^2 h \Rightarrow \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 4 = 154 \text{ cm}^3$$

$$250 \text{ patients} \Rightarrow \frac{154 \times 250}{1000} \text{ ltr} = 38.5 \text{ ltr}$$

Ans: 38.5 ltr.

9. In a compound interest, the sum ₹ 20, 000 will turned the amount ₹26, 620 at 10% rate of interest per annum then the number of years is

- A. 2 years **B. 3 years** C. 4 years D. 5 years

$$20000 \times \left(\frac{110}{100}\right)^N = 26620$$

$$\left(\frac{110}{100}\right)^N = \frac{26620}{20000} = \frac{1331}{10000} = \left(\frac{11}{10}\right)^3$$

$$\therefore N = 3 \text{ years}$$

10. An iron right circular cone of diameter 8 cm and height 12 cm is melted and recast into spherical lead shots each of radius 4 mm. How many lead shots can be made?

- A. 75 **B. 750** C. 7500 D. 480

Vol. of cone

Vol. of sphere

$$\Rightarrow \frac{\frac{1}{3} \pi \times 4 \times 4 \times 12}{\frac{4}{3} \pi \times \frac{4}{10} \times \frac{4}{10} \times \frac{4}{10}} = 750$$

11. MILK is coded as NKPS then POT is coded as

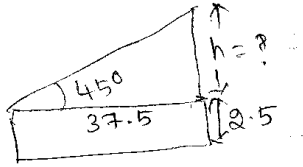
- A. QNS **B. QQX** C. RQU D. RSV

$$M + 1 = N \quad I + 2 = K \quad L + 4 = P \quad K + 8 = S$$

Ans: QQX

12. A girl is 37.5 m away from a tower. Her eye level above the ground is 2.5 m. The angle of elevation of the tower from her eyes is 45° . What is the height of the tower?

- A. 35 m B. 37.5 m C. 40 m D. 42.5 m



$$\tan \theta = \frac{\text{OPP}}{\text{Adj}}$$

$$\tan 45^\circ = \frac{h}{37.5}$$

$$h = 37.5$$

$$\text{Total height of tower} = 37.5 + 2.5 = 40 \text{ m.}$$

13. Simplify $\frac{(1728)^{\frac{1}{3}} + (343)^{\frac{1}{3}}}{(625)^{\frac{1}{2}} - (36)^{\frac{1}{2}}}$.

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

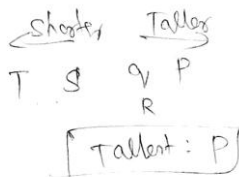
$$\frac{\sqrt[3]{1728} + \sqrt[3]{343}}{\sqrt{625} - \sqrt{36}}$$

$$\frac{12 + 7}{25 - 6} = \frac{19}{19} = 1$$

14. If

- P is taller than Q
- R is shorter than P
- S is taller than T but shorter than Q then who among them is the tallest

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



15. What is the sum of the first 60 terms of the series $1^2 - 2^2 + 3^2 - 4^2 + \dots$

- A. -1830 B. 1830 C. 7260 D. -7260

$$1^2 - 2^2 + 3^2 - 4^2 + \dots + 59^2 - 60^2 = ?$$

$$= \frac{-n(n+1)}{2} = \frac{-60 \times 61}{2} = -30 \times 61$$

Ans: -1830

16. A gardener plans to construct a trapezoidal shaped structure in his garden. The longer side of side of trapezoid needs to start with a row of 100 bricks. Each row must be decreased by 1 bricks on each end and the construction should stop at 25th row. How many bricks does he need to buy?

- A. 1500 B. 1700 C. 1900 D. 2000

$$t_n = a + (n-1)d = l$$

$$100 + (24)(-2)$$

$$100 - 48 = 52$$

$$S_n = \frac{25}{2} [100 + 52]$$

$$= \frac{25}{2} [152] = 25 \times 76 = 1900$$

17. Varun moved a distance of 90 meters towards the north. He then turned to the left and walking for about 25 metres, turned left again and walked 100 meters. Finally he turned to the right at an angle of 45° . In which direction was the finally moving?

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

A A B C C / B B C A A / C C A B B / A A B C C

22. Read the following mathematical truths and statements given below:

- All Natural numbers are integers
- Some integers are not Natural numbers
- All integers are rational numbers
- Some rational numbers are not integers

Statements:

1. Some natural numbers are not rational numbers
2. All natural numbers are rational numbers
3. All integers are natural numbers
4. All rational numbers are integers

Among above four statements which is/are true statement (s)

- A. 1 only B. 1, 2 **C. 2 only** D. 2, 3

All Natural numbers are integers.

All integers are rational numbers

Conclusion: All natural numbers are rational numbers.

23. A water pipe can fill an empty tank in 50 minutes while another pipe can empty the filled tank in $1\frac{1}{4}$ hours. How long minimum time will it take to fill the emptied tank when both pipes are opened simultaneously?

- A. $1\frac{1}{4}$ hours B. $2\frac{1}{4}$ hours **C. $2\frac{1}{2}$ hours** D. 3 hours

Fill = 50 min Empty = 75 min

$$\frac{1}{50} - \frac{1}{75} = \frac{1}{\text{Total}}$$

$$\frac{50 \times 75}{75 - 50} = \frac{50 \times 75}{25} = 150 \text{ Min}$$

(i.e.) $2\frac{1}{2}$ hours.

24. Working hours of an office is morning 9:30 to evening 5 : 30. There will be a Lunch break between 12 noon and 1 : 15 p.m. If the office functioning 6 days in a week, what is the total working hours of the office during a week.

- A. 39 hours 10 minutes B. 36 hours
C. 40 hours 30 minutes D. 38 hours

$$\begin{aligned}
 &9:30 \text{ AM to } 5:30 \text{ PM} \rightarrow 8 \text{ hours} \\
 &\text{Working hours} = 8 - 1\frac{1}{4} = 6 \text{ hr } 45 \text{ min.} \\
 &6 \text{ days working Time} = 6\frac{3}{4} \times 6 \\
 &= \frac{27}{4} \times 6 = \frac{81}{2} \\
 &= 40 \text{ hr } 30 \text{ min.}
 \end{aligned}$$

25. The LCM of two numbers is 20 times their HCF. The sum of HCF and LCM is 2520. If one of the number is 480 then the other number is

- A. 400 B. 120 C. 600 D. 240

$$\begin{aligned}
 &\text{LCM} = 20 \times \text{HCF} \\
 &\text{LCM} + \text{HCF} = 2520 \\
 &20\text{HCF} + \text{HCF} \rightarrow 21\text{H} = 2520 \\
 &\quad \quad \quad \boxed{\text{H} = 120} \\
 &\quad \quad \quad \text{L} = 20 \times 120 \\
 &\text{L} \times \text{H} = \text{Prod. of two nos} \\
 &\boxed{20 \times 120} \times 120 = 480 \times x \\
 &\quad \quad \quad \boxed{x = 600}
 \end{aligned}$$

26. What is next come to VIJ?

SCD, TEF, UGH, VIJ

- A. WKL B. CMN C. UJI D. IJT

S C D , T E F , U G H , V I J , W K L

27. A train starts from a place A at 6 a.m and arrives at another place B at 4.30 p.m. on the same day. If the speed of the train is 40 km per hour. Find the distance travelled by the train.

- A. 42 km B. 420 km C. 430 km D. 480 km

$$\begin{aligned}
 D &= S \times T \\
 &= 40 \times 10\frac{1}{2} \\
 &= 40 \times \frac{21}{2} = 420 \text{ km}
 \end{aligned}$$

28. A train takes 18 seconds to pass through a platform 162 m long and 15 seconds to pass through another platform 120 m long then the length of the train in

- A. 90 m B. 100 m C. 110 m D. 120 m

Let, Length of the train be 'x' m.

$$x + 162 \rightarrow 18 \text{ sec.}$$

$$x + 120 \rightarrow 15 \text{ sec.}$$

$$15(x + 162) = 18(x + 120)$$

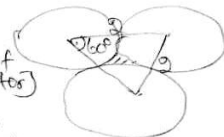
$$5x + 810 = 6x + 720$$

$$\boxed{x = 90 \text{ m}}$$

29. Three coins each 2 cm in diameter are placed touching one another. Find the area enclosed by them ($\pi = 1.732$) (Approximately three decimal places)

- A. 0.161 cm² B. 0.151 cm² C. 0.171 cm² D. 0.181 cm²

Required Area = [Area of Equi Δ] - [Area of 3 × Sector]



$$\begin{aligned}
 &= \frac{\sqrt{3}}{4} (2)^2 - 3 \times \left[\frac{60^\circ}{360^\circ} \times \frac{22}{7} \times 1 \times 1 \right] \\
 &= \sqrt{3} - \frac{11}{7} \\
 &= 1.732 - 1.5 \\
 &= 0.161 \text{ cm}^2
 \end{aligned}$$

30. A man is 114 metres behind a boy. The man runs 21 metres in a minute and the boy runs 15 metres in a minute. In what time they will meet
 A. 18 minutes **B. 19 minutes** C. 20 minutes D. 36 minutes

$$\frac{114}{6} = 19 \text{ minutes}$$

31. A sum of money increases 5 times its principal at 8% per annum over a certain year. Find the number of years
 A. 25 **B. 50** C. 75 D. 100

$$N = \frac{(x-1) \times 100}{R}$$

$$= \frac{(5-1) \times 100}{8} = 50\%$$

32. Let $r\%$ be the rate of interest paid and P be the monthly instalment paid for n months then maturity amount is?

A. $PN + \frac{PNr}{100}$ **B. $Pn + \frac{PNr}{100}$** C. $PN + \frac{100}{PNr}$ D. $Pn + \frac{100}{PNR}$

(B) $Pn + \frac{PNr}{100}$

33. The average marks of 50 students is 40. The mark of a student is wrongly taken as 35 instead of 85. Find the correct average of 50 students by taking the correct mark of a student.

A. 38 B. 39 C. 42 **D. 41**

$$85 - 35 = 50$$

$$\text{Increased Average } \uparrow = \frac{50}{50} = 1$$

$$\text{Correct Average} = 40 + 1 = 41$$

34. The radius of solid sphere and solid hemisphere is same. Then the ratio of curved surface area of solid sphere, total surface area of the solid hemisphere and curved surface area of solid hemisphere is

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

$$4\pi r^2 : 3\pi r^2 : 2\pi r^2$$

$$\boxed{4 : 3 : 2}$$

35. Find the number which is 35% less than 260.

A. 170

B. **169**

C. 168

D. 167

$$\text{Required Number} = 260 \times \frac{65}{100}$$

$$= 169.$$

36. Now Sharma age is quarter as old as his father. Six years ago the father's age was seven times as old as Sharma. Find their present ages

A. 8, 32

B. 10, 40

C. **12, 48**

D. 14, 56

S	F	
Now	1×2	4×2 3×2
	↓	↓
6yrs ago	1	7 6
	$\boxed{1 \text{ unit} = 6}$	

$$S = 12 \text{ years}$$

$$F = 48 \text{ years}$$

37. Ratio of ages of Muthu and Karthi at present is 5 : 3. But 6 years ago that ratio is 3 : 1. What is the ratio of their ages after 5 years?

A. 5 : 4

B. **10 : 7**

C. 10 : 8

D. 4 : 3

	M	K	
Now	5	3	②
6yrs ago	3	1	②

$$\boxed{2 \text{ unit} = 6}$$

$$1 \text{ unit} = 3$$

$$M = 15 \text{ years} \quad K = 9 \text{ years}$$

$$\text{After 5 years} \rightarrow 20, 14$$

$$\boxed{10 : 7}$$

38. 5 men and 2 boys working together can do four times as much work as a man and a boy can do. Then ratio of working capacities of a man and a boy are in the ratio

A. 5:2

B. 1:3

C. 2:1

D. 2:5

$$(5M + 2B) = 4(M + B)$$

$$5M + 2B = 4M + 4B$$

$$1M = 2B$$

$$\frac{M}{B} = \frac{2}{1}$$

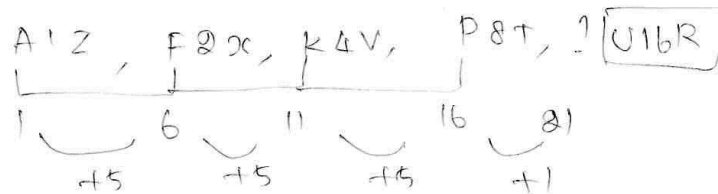
39. What would come as the next element in the alpha numeric series? A1Z, F2X, K4V, P8T?

A. Q10U

B. U16R

C. R16V

D. U10V



40. Find the sum of the series upto infinity $625 + 125 + 25 + 5 + \dots$

A. 500.25

B. 718.25

C. 755.25

D. 781.25

$$625 + 125 + 25 + 5 + \dots \quad r = \frac{1}{5}$$

$$S_{\infty} = \frac{a}{1-r} = \frac{625}{1-\frac{1}{5}} = \frac{625 \times 5}{4} = \frac{3125}{4} = 781.25$$

41. Find the odd man out : 216, 730, 343, 1331

A. 1331

B. 216

C. 730

D. 343

All are cube numbers except 730.

42. A student is ranked 13th from right to him and 8th from left to him then how many students are in total in number

A. 18

B. 19

C. 20

D. 21

$$L + R - 1 = \text{Total}$$

$$8 + 13 - 1 = 20$$

43. In 30 litres mixture of acid the ratio of acid and water is 2 : 3. What amount of water should be added to the mixture so that the ratio of acid and water becomes 2 : 5.

- A. 19 litres B. 15 litres **C. 12 litres** D. 10 litres

$$\begin{array}{l} \text{Acid} \quad \text{water} \\ 2 \quad : \quad 3 \quad \text{30 litres} \\ \\ \frac{18}{18+x} = \frac{2}{5} \\ 30 = 18+x \\ \boxed{x = 12 \text{ lbs}} \text{ added.} \end{array}$$

44. Express $233\frac{1}{3}\%$ as a fraction

- A. $2\frac{1}{3}$ B. $3\frac{1}{2}$ C. $2\frac{1}{2}$ D. $3\frac{2}{3}$

$$233\frac{1}{3}\% \Rightarrow \frac{700}{3} \times \frac{1}{100} = \frac{7}{3} = 2\frac{1}{3}$$

45. The mean mark of 75 students was found to be 35. Later on, it was found that a score of 32 was misread as 23. Find the correct mean corresponding to the correct score.

- A. 35.12 B. 35.21 C. 35.23 D. 35.32

$$32 - 23 = 9$$

$$\text{Average Increased by} = \frac{9}{75} = \frac{3}{25} = 0.12$$

$$\text{correct Average} = 35.12$$

46. Simplify the following $\left(\frac{1}{64}\right)^0 + (64)^{\frac{1}{3}} + (32)^{\frac{1}{5}} - (32)^{\frac{1}{5}}$.

- A. $13\frac{1}{16}$ B. $15\frac{3}{16}$ C. $17\frac{1}{16}$ D. $19\frac{3}{16}$

$$1 + \sqrt{\frac{1}{64}} + 2^{5 \times \frac{4}{5}} - \frac{1}{2^{5 \times \frac{4}{5}}}$$

$$1 + \frac{1}{8} + 16 - \frac{1}{16} \Rightarrow 17 + \frac{1}{16} = 17\frac{1}{16}$$

47. Radius of a cylinder is increased by 10% then percentage increase in its volume is

- A. 20% B. 15% C. 10% D. 21%

Let, $r = 10$ $h = 10$

$$\pi r^2 h \Rightarrow \pi \times 100 \times 10 = 1000\pi \rightarrow 100\%$$

Now $r = 11$, $h = 10$.

$$\Rightarrow \pi \times 121 \times 10 = 1210\pi \rightarrow 121\%$$

Increased \therefore 21%

48. If $P = \frac{x}{x+y}$, $Q = \frac{y}{x+y}$ then what is the value of $\frac{1}{P-Q} - \frac{2Q}{P^2-Q^2}$

- A. $x+y$ B. 1 C. -1 D. $x-y$

Solution

$$P+Q = \frac{x}{x+y} + \frac{y}{x+y} = \frac{x+y}{x+y}$$

$$\frac{1}{P-Q} - \frac{2Q}{P^2-Q^2} = \frac{1}{P-Q} - \frac{2Q}{(P+Q)(P-Q)}$$

$$= \frac{P+Q-2Q}{(P+Q)(P-Q)} = \frac{P-Q}{(P-Q)(P+Q)} = \frac{1}{P+Q} = 1$$

49. Simplify the following $\log_3 \sqrt{5x+1} - \frac{1}{2} = \log_3 \sqrt{x+1}$.

A. 0

B. 1

C. 2

D. 3

$$\log_3 \sqrt{5x+1} - \frac{1}{2} = \log_3 \sqrt{x+1}$$

$$\log_3 \frac{\sqrt{5x+1}}{\sqrt{x+1}} = \frac{1}{2}$$

$$\log_3 \left(\frac{5x+1}{x+1} \right)^{\frac{1}{2}} = \frac{1}{2}$$

$$\frac{1}{2} \log_3 \left(\frac{5x+1}{x+1} \right) = \frac{1}{2}$$

$$\frac{5x+1}{x+1} = 3$$

$$\boxed{x=1}$$

50. A rubber ball is dropped from a height of 25 m, which strikes the ground and rebounds every time to the half of the height from where it falls down. What is the total distance travelled by the ball to come to the rest position?

A. 75 m

B. 175 m

C. 125 m

D. 150 m

Solution:

$$25 + 12.5 + 12.5 + 6.25 + 6.25 + 3.125 + 3.125 + 1.5625 + 1.5625 + \dots + 0 = 75 \text{ m}$$