CAT 2018 Question Paper with Solution
Slot 1 QA

1. A trader sells 10 litres of a mixture of paints A and B, where the amount of B in the mixture does not exceed that of A. The cost of paint A per litre is Rs. 8 more than that of paint B. If the trader sells the entire mixture for Rs. 264 and makes a profit of 10%, then the highest possible cost of paint B, in Rs. per litre, is

A. 20

B. 16

C. 22

D. 26

Answer: A

Solution:

Let the price of paint B be Rs. b per litre.
So, the price of pain A will be Rs. (b + 8) per litre.
Also, let the amount of A be M litres.
So, that of B will be (10 – M) litres.
According to the question,

$10 - M \leq M$

$10 \leq 2M$

$5 \leq M$

Now, we can form the following table:

Paint	Volume in litres	Cost Per litre	Total
A	M	8 + b	8M + bM
B	10 – M	b	10b – Mb
Total	10	-----	8M + 10b

According to the question, there is 10% profit.
So, (8M + 10b) × 1.1 = 264
8M + 10b = 240
4M + 5b = 120
Here, we need to find the possible value/s of M and b, where M cannot be less than 5.
So, we can get the following table:

M	5	6	7	8	9	10
b	20	19.2	18.4	17.6	16.8	16

Assuming M to be an integer, the maximum value of b occurs when M is 5.
So, the correct answer is 20.
Hence, option (A) is the correct answer.
###TOPIC###Quantitative Aptitude||Arithmetic||Mixtures and Alligations###

2. In a circle with centre O and radius 1 cm, an arc AB makes an angle of 60 degrees at O. Let R be the region bounded by the radii OA, OB, and the arc AB. If C and D are two points on OA and OB, respectively such that OC = OD and the area of triangle OCD is half that of R, then the length of OC, in cm, is

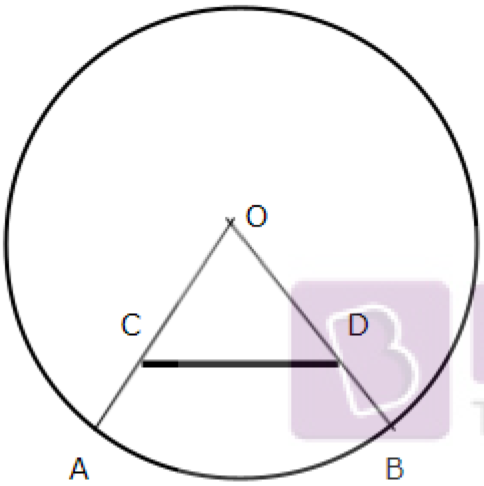
A. $\left(\frac{\pi}{6}\right)^{\frac{1}{2}}$

B. $\left(\frac{\pi}{4}\right)^{\frac{1}{2}}$

C. $\left(\frac{\pi}{3\sqrt{3}}\right)^{\frac{1}{2}}$

D. $\left(\frac{\pi}{4\sqrt{3}}\right)^{\frac{1}{2}}$

Answer: C
Solution:



OA = OB = 1cm = Radius of the circle
The area of the region R, bounded by OA, OB, and arc AB is
$\frac{60}{360} \times \pi \times (1)^2$ sq. cm = $\frac{\pi}{6}$ sq. cm

Area of ΔOCD = Half of the region OAB = $\frac{1}{2} \times \frac{\pi}{6} = \frac{\pi}{12}$ sq. cm
ΔOCD is an equilateral triangle, since ∠COD = 60° and OC = OD
Area of ΔOCD = $\frac{\sqrt{3}}{4} \times (side)^2 = OC^2 \times \frac{\sqrt{3}}{4} = \frac{\pi}{12}$

$OC^2 = \frac{\pi}{3\sqrt{3}}$

$OC = \left(\frac{\pi}{3\sqrt{3}}\right)^{\frac{1}{2}}$

Hence, option (C) is the correct answer.
###TOPIC###Quantitative Aptitude||Geometry||Circle###

3. If $f(x + 2) = f(x) + f(x + 1)$ for all positive integers x, and $f(11) = 91$,

$f(15) = 617$, then $f(10)$ equals.

Answer: 54

Solution:

We get, $f(12) = f(10) + f(11) = f(10) + 91$

Also, $f(13) = f(12) + f(11) = f(10) + 91 + 91 = f(10) + 2 \times 91$

Similarly, $f(14) = f(13) + f(12) = 2f(10) + 3 \times 91$

And $f(15) = f(14) + f(13) = 3 \times f(10) + 5 \times 91$

$617 = 3 \times f(10) + 5 \times 91$

$617 = 3 \times f(10) + 455$
$162 = 3 \times f(10)$
$54 = f(10)$

Hence, 54 is the correct answer.

###TOPIC###Quantitative Aptitude||Functions and Graphs||Functions and Graphs###

4. The distance from A to B is 60 km. Partha and Narayan start from A at the same time and move towards B. Partha takes four hours more than Narayan to reach B. Moreover, Partha reaches the midpoint of A and B two hours before Narayan reaches B. The speed of Partha, in km/h, is ____.

A. 3
B. 4
C. 6
D. 5

Answer:
Solution:
Let the midpoint be C.
Also, let the speeds of Partha and Narayan be X and Y, respectively.
According to the question, we can write the following:
$\frac{60}{X} = \frac{60}{Y} + 4$....................(1)
$\frac{30}{X} = \frac{60}{Y} - 2$....................(2)
(1) − (2) gives us the following:
$\frac{60}{X} - \frac{30}{X} = 6$

$\frac{30}{X} = 6$

$X = 5$

Hence, option (D) is the correct answer.
So, the correct answer is option D.
###TOPIC###Quantitative Aptitude||Arithmetic||Speed, Time and Distance###

5. A CAT aspirant appears for a certain number of tests. His average score increases by 1 if the first 10 tests are not considered and decreases by 1 if the last 10 tests are not considered. If his average scores for the first 10 and the last 10 tests are 20 and 30, respectively, then the total number of tests taken by him is _____.

Answer: 60
Solution:
From the data given in the question above:

Test category	Number	Average	Total
First 10	10	20	200
Middle	N	B	NB
Last 10	10	30	300
Total	N + 20	A	500 + NB

(N + 20)A = 500 + NB................(1)
If we exclude the first 10 tests, the average will increase to A + 1.
So, in that case, we will get the following equation:
(N + 10)(A + 1) = NB + 300...........(2)
NA + N + 10A + 10 = NB + 300................(3)
Similarly, we will get

$(N + 10)(A - 1) = NB + 200$………(4)
or $NA - N + 10A - 10 = NB + 200$……….(5)
(3) – (5) gives us
$2N + 20 = 100$
$N = 40$ or $N + 20 = 60$
Hence, 60 is the correct answer.
###TOPIC###Quantitative Aptitude||Arithmetic||Averages###

6. Two types of tea, A and B, are mixed and then sold at Rs. 40 per kg. The profit is 10% if A and B are mixed in the ratio 3:2, and 5% if this ratio is 2:3. The cost prices, per kg, of A and B are in the ratio _____.

A. 21:25
B. 19:24
C. 18:25
D. 17:25

Answer: B
Solution:
Let us assume that the cost prices (per kg) of A and B are 100a and 100b, respectively.
In the first case, let us assume that we have taken 3kg of A and 2kg of B.
So, the total cost price = 300a + 200b = 100(3a + 2b) and profit = 10%
Profit = 10% of the cost price = 10% of 100(3a + 2b) = 10(3a + 2b)
So, selling price = cost price + profit = 100(3a + 2b) + 10(3a + 2b)
= 110(3a + 2b)
According to the question,
110(3a + 2b) = 40 – (3 + 2) = 200 or 11(3a + 2b) = 20………………..(1)
Similarly, from the second case, we can get the following:
105(2a + 3b) = 40 × 5 = 200 or 21(2a + 3b) = 40………(2)
From (1) and (2), we will get the following:
22(3a + 2b) = 21(2a + 3b)
66a + 44b = 42a + 63b
24a = 19b
a:b = 19:24
100a:100b = 19:24
Hence, option (B) is the correct answer.
###TOPIC###Quantitative Aptitude||Arithmetic||Profit, Loss and Discount###

7. A wholesaler bought walnuts and peanuts, the price of walnut per kg being thrice that of peanut per kg. He then sold 8 kg of peanuts at a profit of 10% and 16 kg of walnuts at a profit of 20% to a shopkeeper. However, the shopkeeper lost 5 kg of walnuts and 3 kg of peanuts in transit. He then mixed the remaining nuts and sold the mixture at Rs. 166 per kg, thus making an overall profit of 25%. At what price, in Rs. per kg, did the wholesaler buy the walnuts?

A. 98
B. 86
C. 84
D. 96

Answer: D

Solution:

Let the cost price of peanuts and walnuts be Rs. x/kg and Rs. 3x/kg respectively.

The selling price of 8kg peanuts and 16kg of walnuts for the wholesaler =

The cost of the same for the shopkeeper = Rs. $8 \times x \times \frac{110}{100} + 16 \times 3x \times \frac{120}{100}$ = Rs. $\frac{332x}{5}$

The shopkeeper lost 5kg of walnuts and 3kg of peanuts.

Hence, the shopkeeper sold the remaining mixture, i.e.,16kg at Rs. 166 per kg.

Hence, the total selling price for the shopkeeper = Rs. 16×166

The shopkeeper's overall profit of 25%, so $\frac{332x}{5} \times \frac{125}{100} = 16{\times}166$ or x = 32

The cost price of walnuts for the wholesaler = Rs. $3{\times}32$ = Rs. 96

Hence, option (D) is the correct answer.
###TOPIC###Quantitative Aptitude||Arithmetic||Profit, Loss and Discount###

8. When they work alone, B needs 25% more time to finish a job than A does. They two finish the job in 13 days in the following manner: A works alone till half the job is done, then A and B work together for four days, and finally B works alone to complete the remaining 5% of the job. In how many days can B alone finish the entire job?

A. 16
B. 18
C. 20
D. 22

Answer: C
Solution:
Let A can finish the work in 4d days and B can finish the work in 5d days (as B takes 25% more days) LCM of 4d and 5d is 20d.
Let the total work be 20dw.
So, in 1 day, work done by A is 5w and B is 4w, half the work = 10dw
A alone finished the work n $\frac{10dw}{5w} = 2d$ days
A and B together can do (4w+5w) = 9w work in 1 day
So, in 4 days, they will do 36w work.
Remaining work = 5% of total = 5% of 20dw=dw
This work is done by B in $\frac{dw}{4w} = \frac{d}{4}$ days and $2d + 4 + \frac{d}{4} = 13$
Solving, we get, $d = 4$
So, B can finish the job in 5d = 20 days
Hence, option (C) is the correct answer.
###TOPIC###Quantitative Aptitude||Arithmetic||Time and Work###

9. Given an equilateral triangle T1 with side 24 cm, a second triangle T2 is formed by joining the midpoints of the sides of T1. Then a third triangle T3 is formed by joining the midpoints of the sides of T2. If this process of forming triangles is continued the sum of the areas, in sq. cm, of infinitely many such triangles T1, T2, T3,... will be

A. $248\sqrt{3}$
B. $192\sqrt{3}$
C. $188\sqrt{3}$
D. $164\sqrt{3}$

Answer: B
Solution:
In any triangle, the triangle obtained by joining the mid points of the sides will have an area which is one-fourth of the original triangle.

Now, area of the equilateral triangle $T_1 = 24^2 \times \frac{\sqrt{3}}{4} = 144\sqrt{3}$ cm²

So, the area of the equilateral triangle $T_2 = \frac{1}{4} \times 144\sqrt{3} = 36\sqrt{3}$ cm² and so on

So, the required sum will be $144\sqrt{3} + 36\sqrt{3} + 9\sqrt{3} + \ldots$

This is a GP with first term = $144\sqrt{3}$ and the common ratio = ¼

So, the sum of the infinite GP = $\frac{144\sqrt{3}}{1-\frac{1}{4}} = \frac{144\sqrt{3}}{\frac{3}{4}} = 192\sqrt{3}$

Hence, option (B) is the correct answer.
###TOPIC###Quantitative Aptitude||Geometry||Lines, Angles, Triangles###

10. While multiplying three real numbers, Ashok took one of the numbers as 73 instead of 37. As a result, the product went up by 720. The minimum possible value of the sum of squares of the other two numbers is

Answer: 40

Solution:

Let the other two numbers be a and b.

So, actual product = 37ab and wrong product = 73ab

Increase = 73ab – 37 ab = (73 -37) ab = 36ab =720 and ab=20

We need to find the minimum value of $a^2 + b^2$ = P(let)

The minimum value of P will correspond to equal values of a and b.

So, a = b $=\sqrt{20}$ and P $=\left(\sqrt{20}\right)^2 + \left(\sqrt{20}\right)^2$ = 20 + 20 = 40

Hence, 40 is the correct answer.

###TOPIC###Quantitative Aptitude||Number System||Properties of Numbers###

11. If x is a positive quantity such that $2^x = 3^{log_5 2}$, then x is equal to

A. $log_5 9$

B. $1 + log_5\left(\frac{3}{5}\right)$

C. $1 + log_3\left(\frac{5}{3}\right)$

D. $log_5 8$

Answer: B

Solution:

$2^x = 3^{log_5 2}$

$x\, log_2 2 = log_5 2 \times log_2 3$

$x = log_5 3 = log_5\left(\frac{3}{5}\times 5\right) = log_5\left(\frac{3}{5}\right) + log_5 5 = log_5\left(\frac{3}{5}\right) + 1.$

Hence, option (B) is the correct answer.
###TOPIC###Quantitative Aptitude||Algebra||Logarithm###

12. If $\log_{12}81 = p$, then $3\left\{\frac{4-p}{4+p}\right\}$ is equal to:

A. $\log_2 8$

B. $\log_6 8$

C. $\log_4 16$

D. $\log_6 16$

Answer: B

Solution:

Since, $p = log_{12} 81 = log_{12} 3^4 = (4\, log_3 3)/(log_3 3 + log_3 2^3)$ or $p = \frac{4}{1+2\, log_3 2}$

$4 - p = 4 - \frac{4}{1+2log_3 2} = \frac{4+8log_3 2-4}{1+2\, l0g_3 2}$, Let $a = log_3 2$

Similarly, $4 + p = \frac{8(1+a)}{1+2a}$

So, $\frac{3(4-p)}{4+p} = \frac{3a}{1+a} = \frac{3\, log_3 2}{1+ log_3 2} = \frac{3\, log_3 2}{log_3 3+ log_3 2} = log_6 8$

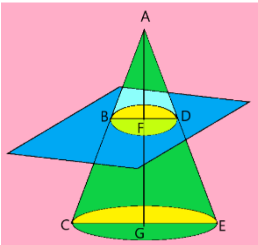
Hence, option (B) is the correct answer.

###TOPIC###Quantitative Aptitude||Algebra||Logarithm###

13. A right circular cone, of height 12 ft, stands on its base which has a diameter of 8 ft. The tip of the cone is cut off with a plane which is parallel to the base and 9 ft from the base. With π = 22/7, the volume, in cubic ft, of the remaining part of the cone is:

Answer: 198

Solution:



AG=12, CE=8, FG=9   AF=AG – FG =12 – 9 = 3
Base diameter = CE = 8
So, base radius = CG=GE = ½ x 8 = 4
Let, the upper radius be r = BF=FD
In triangles AFD and triangle AGE, angle AFD = angle AGE = 90 degrees
Angle FAD and angle GAE are the same angle.
So, triangles DAF and triangle EAG are similar.
So, their corresponding sides will be proportional.

So, $\frac{AD}{AE} = \frac{FD}{GE} = \frac{AF}{AG}$

$\frac{AD}{AE} = \frac{r}{4} = \frac{3}{12} = \frac{1}{4}$

r = 1

So, the volume of the upper cone = $\frac{1}{3}\pi r^2 \times 3 = \pi$

And the volume of the total cone = $\frac{1}{3}\pi \times 4^2 \times 12 = 64\pi =$

So, the volume of the lower part of the cone =
$64\pi - \pi = 63\pi = 63\times\frac{22}{7} = 9\times 22 = 198\, cc$

Hence, 198 is the correct answer.
###TOPIC###Quantitative Aptitude||Mensuration||Pyramid & Cone###

14. How many numbers with two or more digits can be formed with the digits 1, 2, 3, 4, 5, 6, 7, 8, and 9 so that in every such number, each digit is used at most once and the digits appear in the ascending order?

Answer: 502

Solution:

We can form a two digit number satisfying the given condition in ${}^9C_2$=36 ways.
Similarly, we can form a three digit number satisfying the given condition in ${}^9C_3$=84 ways
Similarly going on , we can get the total number of all possible cases as
${}^9C_2+{}^9C_3+{}^9C_4+{}^9C_5+{}^9C_6+{}^9C_7+{}^9C_8+{}^9C_9= {}^9C_0 + {}^9C_1 + {}^9C_2+{}^9C_3+{}^9C_4+ {}^9C_5+{}^9C_6+{}^9C_7+ {}^9C_8+{}^9C_9 - ({}^9C_0 + {}^9C_1)=2^9 - (1+9)=2^9 - 10 = 512 - 10 =502$
Hence, 502 is the correct answer.
###TOPIC###Quantitative Aptitude||Higher Maths||Permutation and Combination###

15. John borrowed Rs. 2,10,000 from a bank at an interest rate of 10% per annum, compounded annually. The loan was repaid in two equal instalments, the first after one year and the second after another year. The first installment was interest of one year plus part of the principal amount, while the second was the rest of the principal amount plus due interest thereon. Then each installment, in Rs., is:

Answer: 121000

Solution:

Let each of the two instalments be Rs. x.

After one year, the amount becomes = Rs. $2,10,000\times\left(1+\frac{10}{100}\right)$

= Rs. $2,10,000\times1.1$= Rs. $2,31,000$

After paying the first instalment, the remaining amount is = Rs. $(2,31,000-x)$

The entire loan was repaid after two years, hence $(231000-x)\left(1+\frac{10}{100}\right)=x$

$(231000-x)1.1=x$

$254100-1.1x=x$

$2.1x=254100$

$x=1,21,000$

Hence, 121000 is the correct answer.

###TOPIC###Quantitative Aptitude||Arithmetic||Interest (Simple and Compound)###

16. If $u^2 + (u-2v-1)^2 = -4v(u + v)$, then what is the value of $u + 3v$?

A. ¼
B. ½
C. 0
D. − ¼

Answer: D

Solution:

$$u^2 + (u - 2v - 1)^2 = \ - 4v(u + v)$$

$$2u^2 + 4v^2 + 1 - 4uv - 2u + 4v = \ - 4uv - 4v^2$$

$$2u^2 + 8v^2 + 1 - 2u + 4v = 0$$

$$2\left(u^2 - u\right) + 8\left(v^2 + \frac{v}{2}\right) + 1 = 0 \ldots\ldots\ldots (1)$$

Now, $u^2 - u = u^2 - 2 (1/2) u + (1/2)^2 - ¼ =(u-1/2)^2 - ¼$

And $v^2 + \frac{v}{2} = v^2 + 2v\left(\frac{1}{4}\right) + \left(\frac{1}{4}\right)^2 - \frac{1}{16} = \left(v + \frac{1}{4}\right)^2 - \frac{1}{16}$

Substituting these values, we will get, (1) or

$$2\left(u - \frac{1}{2}\right)^2 - \frac{1}{2} + 8\left(v + \frac{1}{4}\right)^2 - \frac{1}{2} + 1 = 0$$

$$2\left(u - \frac{1}{2}\right)^2 + 8\left(v + \frac{1}{4}\right)^2 = 0$$

U = ½ and v = -1/4
So, u+3v= ½ -3/4 =-1/4

Hence, option (D) is the correct answer.

###TOPIC###Quantitative Aptitude||Algebra||Quadratic Equations###

17. Point P lies between points A and B such that the length of BP is thrice that of AP. Car 1 starts from A and moves towards B. Simultaneously, car 2 starts from B and moves towards A. Car 2 reaches P one hour after car 1 reaches P. If the speed of car 2 is half that of car 1, then the time, in minutes, taken by car 1 in reaching P from A is:

Answer: 12
Solution:
A P B

AP = D (let)
So, BP = 3D
Let the speed of the second car be S.
So, the speed of the first car = 2S

We need to find the time taken by the first car to reach P from A, that is, to cover the distance D. Let the time be T.
So, we can form the following table:

Name	Time	Speed	Distance
A	T	2S	2ST
B	T + 1	S	S(T + 1)

So, S(T + 1) = 3 × 2ST
ST + S = 6ST
S = 5ST
T = $\frac{1}{5}$= 12 minutes
Hence, 12 is the correct answer.

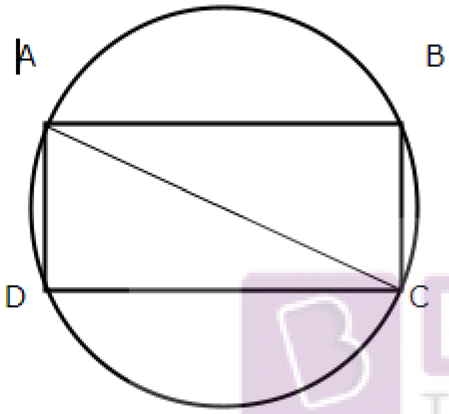
###TOPIC###Quantitative Aptitude||Arithmetic||Speed, Time and Distance###

18. Let ABCD be a rectangle inscribed in a circle of radius 13 cm. Which one of the following pairs can represent, in cm, the possible length and breadth of ABCD?

A. 25,10
B. 24,12
C. 25,9
D. 24,10

Answer: D

Solution:



Since the rectangle is inscribed in the circle, hence the diagonal AC and BD become the diameter of the circle.

Let the length and breadth be L and B units respectively.

Hence, the diagonal of becomes $\sqrt{L^2 + B^2} = 26$, $L^2 + B^2 = 26^2$ or $L^2 + B^2 = 676$

And out of the given options, only option B, i.e., 24 and 10 satisfies the above equation, i.e., $24^2 + 10^2 = 576 + 100 = 676$

Hence, option (D) is the correct answer.
###TOPIC###Quantitative Aptitude||Geometry||Quadrilateral & Polygons###

19. In an examination, the maximum possible score is N while the pass mark is 45% of N. A candidate obtains 36 marks but falls short of the pass mark by 68%. Which one of the following is correct?

A. N ≤ 200
B. 243 ≤ N ≤ 252

C. $N \geq 253$

D. $201 \leq N \leq 242$

Answer: D
Solution:
Pass mark = 0.45N
So, obtained marks + 68% of pass marks = pass marks
So, 36 + 68% of 0.45N = 0.45N
36 = 32% of 0.45N
$36 = 0.32 \times 0.45N$
N = 250
Hence, option (D) is the correct answer.
###TOPIC###Quantitative Aptitude||Arithmetic||Percentages###

20. Let x, y, z be three positive real numbers in a geometric progression such that $x < y < z$. If 5x, 16y, and 12z are in an arithmetic progression then the common ratio of the geometric progression is

A. 1/6
B. 3/6
C. 3/2
D. 5/2

Answer: D

Solution:

Let, the common ratio be r.

So, $y = xr$ and $z = yr^2$

Since 5x, 16y, and 12z are in AP,

We can write $32y = 5x+12z$

Putting the values of y and z, we will get,

$32 \text{ x } r = 5x + 12xr^2$

$32r = 5 + 12 r^2$

$12r^2 - 32r + 5 = 0$
$12r^2 - 30r - 2r + 5 = 0$
$6r(2r - 5) - (2 r - 5) = 0$
$(2r - 5) (6r - 1) = 0$
r = 5/2 or 1/6
since $x<y<z$, r can not be less than one or r = 5/2

Hence, option (D) is the correct answer.

###TOPIC###Quantitative Aptitude||Progression||Geometric Progression###

21. The number of integers x such that $0.25 < 2^x < 200$, and $2^x + 2$ is perfectly divisible by either 3 or 4, is

Answer: 5

Solution:

Since $0.25 < 2^x < 200$, we can say, $(-4) < x < 8$

Since $2^x + 2$ is perfectly divisible by either 3 or 4, $2^x + 2$ must be a natural number.

So, x can be 0, 1, …7 only.

We can draw the chart as given below:

x	2^x	2^x+2	divisible by		ACCEPTABLE?
			3	4	
0	1	3	YES	NO	YES
1	2	4	NO	YES	YES
2	4	6	YES	NO	YES
3	8	10	NO	NO	NO
4	16	18	YES	NO	YES
5	32	34	NO	NO	NO
6	64	66	YES	NO	YES
7	128	130	NO	NO	NO

So, we can see that there are 5 acceptable values of x.

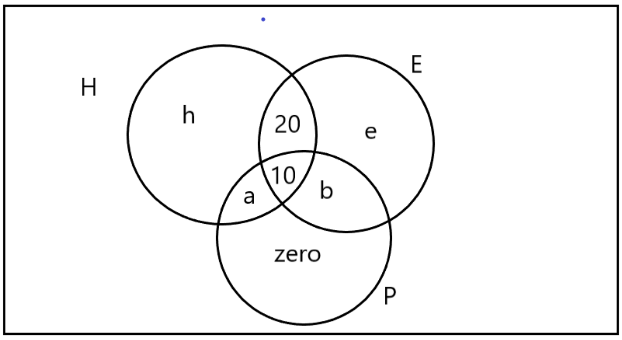
Hence, 5 is the correct answer.

###TOPIC###Quantitative Aptitude||Number System||Properties of Numbers###

22. Each of 74 students in a class study at least one of the three subjects H, E and P. Ten students study all three subjects, while twenty study H and E, but not P. Every student who studies P also studies H or E or both. If the number of students studying H equals that studying E, then the number of students studying H is

Answer: 52

Solution:
We can form the following diagram



20+10+a+h=20+10+e+b [since the number of students for H and E are same]
So, a+h=e+b=k (let)
Now, 20+10+h+a+e+b+0=74
30+k+k=74
2k=44
k = 22
so, H has 20+10+h+a=30+k = 30+22=52
Hence, 52 is the correct answer.

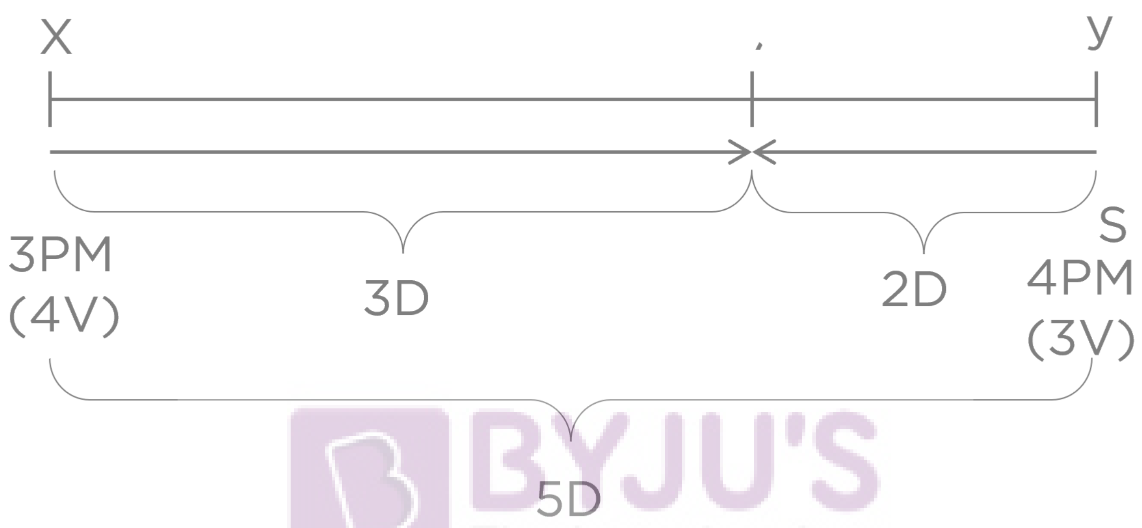
###TOPIC###Quantitative Aptitude||Set Theory||Set Theory###

23. Train T leaves station X for station Y at 3 pm. Train S, traveling at three quarters of the speed of T, leaves Y for X at 4 pm. The two trains pass each other at station Z, where the distance between X and Z is three-fifths of that between X and Y. How many hours does train T take for its journey from X to Y?

Answer: 15

Solution:

We can draw the following diagram:



We have assumed the total distance as 5D and speed of T as 4V to avoid fractions. Now, train T covers 3D distance in t time.

So, $t = \frac{3D}{4V}$...............(1)

Similarly, train S covers 2D distance in (t – 1) time.

So, $t - 1 = \frac{2D}{3V}$....................(2)

Dividing (1) by (2), we will get, $\frac{t}{t-1} = \frac{\left(\frac{3}{4}\right)}{\frac{2}{3}}$

$$\frac{t}{t-1} = \frac{9}{8}$$

8t = 9t – 9
9 = t

Now, train T takes $\frac{5D}{4V}$ time to cover the entire distance.

From (1), we get, $\frac{D}{V} = \frac{4t}{3} = 12$

So, required time = $\frac{5}{4} \times 12 = 15$ hours

Hence, 15 is the correct answer.

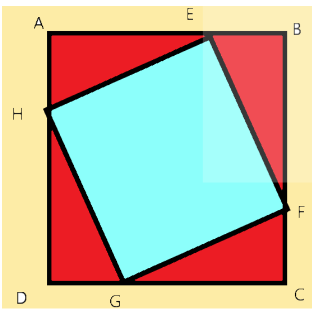
###TOPIC###Quantitative Aptitude||Arithmetic||Speed, Time and Distance###

24. Points E, F, G, H lie on the sides AB, BC, CD, and DA, respectively, of a square ABCD. If EFGH is also a square whose area is 62.5% of that of ABCD and CG is longer than EB, then the ratio of length of EB
to that of CG is

A. 1 : 3
B. 3 : 8
C. 4 : 9
D. 2 : 5

Answer: A

Solution:



LET, EB= x, CG =y, and HE=EF=FG=GH=z
Now, let, angle BEF be θ.
Since, in a square, all angles are right angles, in triangle EBF, angle EBF = 90 degrees
Since sum of all the angles of any triangle is always 180 degrees, we can say, angle BFE = 90 - θ
Since EFGH is a square, angle EFH is a right angle.
Since BFC is a straight line, angle BFC is 180 degrees.
So, angle BFE + angle EFH + angle GFC = 180 degrees
So, $90 - \theta + 90 + GFC = 180$ or GFC= θ
In right angled triangle FCG, angle FGC = $90 - \theta$
So ,between triangles EBF and FCG, EF=FG =z
Angles BEF = angle GFC = θ
And angle BFE = angle FGC =$90 - \theta$
So, using the angle-side-angle formula, the two triangles BEF and CFG are congruent.
So, FC=EB=x and BF=CG=y

Similarly, we can prove that EB=FC=GD=AH=x AND BF=CG=HD=AE=y

So, AB=x+y=BC=CD=DA
Now, area of the square ABCD $=(x+y)^2=x^2+2xy+y^2$
Area of the square EFGH = $z^2=x^2+y^2$ [using Pythagoras' theorem in right angled triangle EBF]
According to the question,
$x^2 + y^2 = 62.5\%\ of\ (x^2 + 2xy + y^2)$
$x^2 + y^2 = \left(\frac{5}{8}\right) \times (x^2 + 2xy + y^2)$

$3x^2 + 3y^2 - 10xy = 0$

$(x - 3y)(3x - y) = 0$
X=3y or x = y/3
It is given that CG>EB, or y>x.
As both x and y are positive numbers, x =3y is not acceptable.
So, x = y/3
Or $\frac{x}{y} = \frac{1}{3}$ or EB : CG = 1:3
###TOPIC###Quantitative Aptitude||Geometry||Lines, Angles, Triangles###

25. Given that x^{2018} y^{2017} = 1/2 and x^{2016} y^{2019} = 8, the value of $x^2 + y^3$ is

A. 37/4
B. 31/4
C. 35/4
D. 33/4

Answer: D

Solution:

Given that x^{2018} y^{2017} = ½……………….(1) and x^{2016} y^{2019} = 8…………………………..(2)

(1)/(2) gives us y = 4x…………………..(3)

Since all values are given positive (1/2 and 4), so, we have ignored the negative values.

Substituting y = 4x in (1), We will get, $x^{4035} = 2^{-4035}$ so x = ½

Substituting this value in (3), we will get, ,y = 2 and $x^2+y^3=33/4$.

Hence, option (D) is the correct answer.

###TOPIC###Quantitative Aptitude||Number System||Indices and Surds###

26. Raju and Lalitha originally had marbles in the ratio 4 : 9. Then Lalitha gave some of her marbles to Raju. As a result, the ratio of the number of marbles with Raju to that with Lalitha became 5 : 6. What fraction of her original number of marbles was given by Lalitha to Raju?

A. 1/4
B. 1/5
C. 6/19
D. 7/33

Answer: D

Solution:

Suppose that Lalitha had 4m marbles and Raju had 9m marbles. Lalitha gave 'x' marbles to Raju. According to the question, we can write the following:

$$\frac{4m+x}{9m-x} = \frac{5}{6}$$

$24m + 6x = 45m - 5x$

$11x = 21m$

$x = \frac{21m}{11}$

The required fraction $= \frac{\frac{21m}{11}}{9m} = \frac{7}{33}$

Hence, option (D) is the correct answer.

###TOPIC###Quantitative Aptitude||Arithmetic||Ratio and Proportion###

27. If $\log_2(5 + \log_3 a) = 3$ and $\log_5(4a + 12 + \log_2 b) = 3$, then a + b is equal to

A. 32
B. 59
C. 67
D. 40

Answer: B

Solution:

Given,

$\log_2(5 + \log_3 a) = 3$……………..(1) and $\log_5(4a + 12 + \log_2 b) = 3$…………………(2)

from (1), we get $5 + \log_3 a = 2^3 = 8$

$\log_3 a = 3$ or $a = 3^3$ or $a = 27$……………(3)

From (2) we get, $4a + 12 + \log_2 b = 5^3 = 125$

$4 \times 27 + 12 + \log_2 b = 125$

$108 + 12 + \log_2 b = 125$
$\log_2 b = 5$
$b = 2^5 = 32$
so, $a + b = 32 + 27 = 59$
Hence, option (B) is the correct answer.

###TOPIC###Quantitative Aptitude||Algebra||Logarithm###

28. Humans and robots can both perform a job but at different efficiencies. Fifteen humans and five robots working together take thirty days to finish the job, whereas five humans and fifteen robots working together take sixty days to finish it. How many days will fifteen humans working together (without any robot) take to finish it?

A. 40
B. 32
C. 36
D. 45

Answer: B

Solution:
Let, in 1 day, while working alone,
1 man can do M units of work and 1 robot can do R units of work.
Let the total work be T units.
According to the first condition,
30(15H+5R)=T and 150(3H+R)=T.................(1)
Also, 60(5H+15R)=T and 300(H+3R)=T.....................(2)
Comparing (1) and (2), we get,
150(3H+R)=300(H+3R)
3H+R=2(H+3R)
3H+R=2H+6R
H = 5R.......................(3)
Substituting this value in (1) we get,
T = 150(15R+R)=150x16R..............(4), 15 humans = 15H = 15x5R............(5)
If D is the number of days taken by 15 humans to finish the total work, then
15x5RD= 150X16R and D=32
Hence, option (B) is the correct answer.
###TOPIC###Quantitative Aptitude||Arithmetic||Time and Work###

29. In a parallelogram ABCD of area 72 sq. cm, the sides CD and AD have lengths 9 cm and 16 cm, respectively. Let P be a point on CD such that AP is perpendicular to CD. Then the area, in sq. cm, of triangle APD is

A. $18\sqrt{3}$
B. $24\sqrt{3}$
C. $32\sqrt{3}$
D. $12\sqrt{3}$

Answer: C

Solution:

Since the area is 72 cm^2, we can write AP x CD = 72

9AP = 72 and AP = 8 cm

In right angled triangle APD, using Pythagoras' Theorem, we get, PD = $8\sqrt{3}$

So, the area of APD =1/2 x PD x AP= $\frac{1}{2}\times 8\sqrt{3}\times 8 = 32\sqrt{3}cm^2$

Hence, option (C) is the correct answer.

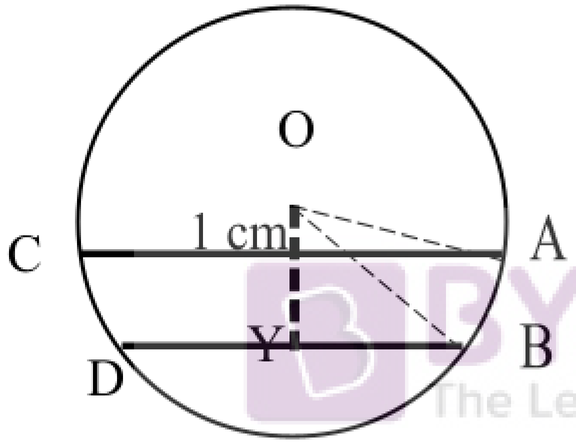
###TOPIC###Quantitative Aptitude||Geometry||Quadrilateral & Polygons###

31. In a circle, two parallel chords on the same side of a diameter have lengths 4 cm and 6 cm. If the distance between these chords is 1 cm, then the radius of the circle, in cm, is

A. $\sqrt{13}$
B. $\sqrt{14}$
C. $\sqrt{11}$
D. $\sqrt{12}$

Answer: A

Solution:



The lengths of the chords CA and DB are 6cm and 4cm respectively and the distance between these two are 1 cm.

OA = OB are the two radii of the circle. letOA = OB = R units

The perpendicular drop from the centre O bisects the chords. Hence, ΔOXA and ΔOYB are two right-angled triangles in which XA = 3cm and YB = 2cm and also OX + 1 = OY

Let OX = x cm, hence OY = x + 1 cm

$OX^2 + XA^2 = OY^2 + YB^2 = OA^2 = OB^2 = R^2$

$x^2 + 9 = (x + 1)^2 + 4$

$x^2 + 9 = x^2 + 2x + 1 + 4$

$2x = 4$

$x = 2$

Hence the radius = $\sqrt{2^2 + 3^2}$ cm = $\sqrt{13}$ cm

Hence, option (A) is the correct answer.

###TOPIC###Quantitative Aptitude||Geometry||Circle###

31. A tank is fitted with pipes, some filling it and the rest draining it. All filling pipes fill at the same rate, and all draining pipes drain at the same rate. The empty tank gets completely filled in 6 hours when 6 filling and 5 draining pipes are on, but this time becomes 60 hours when 5 filling and 6 draining pipes are on. In how many hours will the empty tank get completely filled when one draining and two filling pipes are on?

Answer: 10
Solution:
Let, in 1 hour, each filling pipe can fill F units and each draining pipe can drain D units.
So, the capacity of the tank = 6(6F – 5D) = 60(5F – 6D)………………..(1)
6F – 5D = 10(5F – 6D)
6F – 5D = 50F – 60 D
55D = 44F
5D = 4F = 20 K (let) [where K is a non-zero constant]
D=4K, F = 5K
So, if we assume that when one draining and two filling pipes are on, they will take H hours to completely fill the tank, then,
H(2F – D) = total capacity of the tank………………..(2)
From (1) and (2), we will get, H(2F – D)= 60(5F – 6D)………………(3)
Putting the values of F and D into this equation, we will get,
H(10K – 4K)= 60(25K – 24K)
H(6K)=60k
H = 10
Hence, 10 is the correct answer.

###TOPIC###Quantitative Aptitude||Arithmetic||Time and Work###

32. If among 200 students, 105 like pizza and 134 like burger, then the number of students who like only burger can possibly be

A. 26
B. 23
C. 96
D. 93

Answer: D
Solution:
Let, B students like both pizza and burger and N students like none of pizza and burger.
So, those who like only burger = 134 – B
And those who like only pizza = 105 – B
So, 134 – B + 105 = 200 – N, where both B and N are whole numbers
B = 39 + N
So , B can be 39 or more.
So, 134 can be 95 or less.
But, on the other hand, even if all pizza eaters also eat burgers, then also at least 29 people must be there who only like burgers.
So, the required value should be in the interval [29,95]
Hence, option (D) is the correct answer.
###TOPIC###Quantitative Aptitude||Set Theory||Set Theory###

33. Let $f(x) = \min\{2x^2, 52 - 5x\}$, where x is any positive real number. Then the maximum possible value of f(x) is

Answer: 32

Solution:

If $2x^2 < 52 - 5x$ then $2x^2 + 5x - 52 < 0$ so, $(-6.5)<x<4$
so, $x = -6, -5, -4, -3, -2, -1, 0, 1, 2, 3$
but, since $x>0$, we will get, $x = 1$ or 2 or 3 only
so, $f(x)$ can be at max $2(3)^2 = 18$
and if $2x^2 > 52 - 5x$ then $2x^2 + 5x - 52 > 0$ so, $x< (-6.5)$ and $4< x$
So, the max value of $f(x)$ can be $52 - 5(4) = 32$
Hence, 32 is the correct answer.
###TOPIC###Quantitative Aptitude||Algebra||Inequalities###

34. In an apartment complex, the number of people aged 51 years and above is 30 and there are at most 39 people whose ages are below 51 years. The average age of all the people in the apartment complex is 38 years. What is the largest possible average age, in years, of the people whose ages are below 51 years?

A. 25

B. 26

C. 27

D. 28

Answer: D

Solution:

From the given data, we can form the following table:

Case	Number	Average	Total
Higher	30	51 and above	1530 and above
Lower	39 or less	Below 51	Below 1949
Overall	69 or less	38	2622 or less

For the "lower" case, if we need the largest possible average, we need the lowest possible average in the "higher" case.

For the "higher" case, the lowest possible average = 51

So, for the "higher" case, the lowest possible sum = 1530

So, for the "lower" case, the sum will be 2622 – 1530 = 1092

So, average =1092/39=28

Hence, option (D) is the correct answer.

###TOPIC###Quantitative Aptitude||Arithmetic||Averages###