CAT 2017 Question Paper with Solution
Slot 2 QA

1. The numbers 1, 2,...,9 are arranged in a 3 × 3 square grid in such a way that each number occurs once and the entries along each column, each row, and each of the two diagonals add up to the same value. If the top left and the top right entries of the grid are 6 and 2, respectively, then the bottom middle entry is

A) None of the above

B) 1

C) 2

D) 4

Answer: A

Solution:

6	A	2
B	C	D
E	F	G

We get 6 + B + E = 6 + C + G = A + C + F = 2 + D + G = 2 + C + E = B + C + D = E + F + G = 15…. (1)

B + E = C + G = 9………… (2)
D + G = C + E = 13……… (3)
(B, E) = (1, 8) or (8, 1) or (4, 5) or (5, 4)
Similarly, (C, G) = (1, 8) or (8, 1) or (4, 5) or (5, 4)

On the other hand, (D, G) or (C, E) = (4, 9) or (9, 4) or (5, 8) or (8, 5)

C + G = 9 and C + E = 13

Only possible value of C is 5.

So, we will get,

6	A	2
B	5	D
E	F	G

Now, since 6 + A + 2 = 15, we will get A = 7

So, we will get,

6	7	2
B	5	D
E	F	G

So, F will be 3.

6	7	2
1	5	9
8	3	4

Hence, option (A) is the correct answer.

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

2. In a 10 km race, A, B, and C each running at uniform speed, get the gold, silver, and bronze medals, respectively. If A beats B by 1 km and B beats C by 1 km, then by how many metres does A beat C?

Answer: 1900

Solution:

By the time A covers 10 km, B covers 9 km

And by the time B covers 10 km, C covers 9 km

So, A:B:C = 100:90:81=10000:9000:8100

So, A will beat C by 10000 – 8100 = 1900 m

Hence, 1900 is the correct answer.

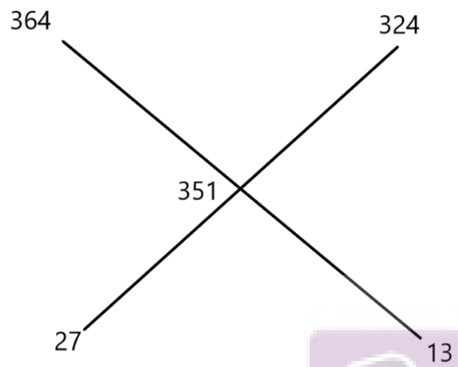
###TOPIC###Quantitative Aptitude||Arithmetic||Speed, Time and Distance###

3. Bottle 1 contains a mixture of milk and water in 7:2 ratio and Bottle 2 contains a mixture of milk and water in 9:4 ratio. In what ratio of volumes should the liquids in Bottle 1 and Bottle 2 be combined to obtain a mixture of milk and water in a 3:1 ratio?

A. 27:14
B. 27:13
C. 27:16
D. 27:18

Answer:

Solution:
Let us consider milk
In the first bottle, proportional part of milk = 7/9
And in the second bottle, proportional part of milk = 9/13
In the mixed case, proportional part of milk = ¾
LCM of the denominators = LCM (9, 13, 4) = 468
So, for the first bottle, we will get $\frac{7}{9}\times 468 = 7\times 52 = 364$
Similarly, for the second bottle, we will get, $\frac{9}{13}\times 468 = 9\times 36 = 324$
And for the mixed final solution, we will get, $\frac{3}{4}\times 468 = 3\times 117 = 351$
Now, using alligation:



So, the required ratio = 27:13
Hence, option (B) is the correct answer.
###TOPIC###Quantitative Aptitude||Arithmetic||Mixtures and Alligations###

4. Arun drove from home to his hostel at 60 miles per hour. While returning home, he drove halfway along the same route at a speed of 25 miles per hour and then took a bypass road which increased his driving distance by 5 miles, but allowed him to drive at 50 miles per hour along this bypass road. If his return journey took 30 minutes more than his onward journey, then the total distance travelled by him is:

A. 55 miles.
B. 60 miles.
C. 65 miles.
D. 70 miles.

Answer: C

Solution:
As the speeds are 60, 25 and 50, half of the distance is the LCM of 60, 25, 50, that is 300D. So, the full distance is 600D.

Case	Time (H)	Speed (Mile/H)	Distance (miles)
Home to Hostel	10D	60	600D
Returning first half	12D	25	300D
Returning bypass	6D+0.1	50	300D+5

Returning total	18D+0.1		600D+5

So, 18D + 0.1 = 10D + 0.5
8D = 0.4
D = 0.05
600D = 30
Total distance = 600D + 600D + 5 = 30 + 30 + 5 = 65 km
Hence, option (C) is the correct answer.
###TOPIC###Quantitative Aptitude||Arithmetic||Speed, Time and Distance###

5. Out of the shirts produced in a factory, 15% are defective, while 20% of the rest are sold in the domestic market. If the remaining 8840 shirts are left for export, then the number of shirts produced in the factory is

A. 13600
B. 13000
C. 13400
D. 14000

Answer: B

Solution:
Let the total number of shirts produced in the factory be 100S.
So, defective shirts = 15S
Remaining shirts = 85S
Domestic = 20% 0f 85S = 17S
Export = 85S – 17S = 68S = 8840 (given)
S = 8840/68 = 130
100S = 13000
Hence, option (B) is the correct answer.

###TOPIC###Quantitative Aptitude||Arithmetic||Percentages###

6. The average height of 22 toddlers increases by 2 inches when two of them leave this group. If the average height of these two toddlers is one-third the average height of the original 22, then the average height, in inches, of the remaining 20 toddlers is

A. 30
B. 28
C. 32
D. 26

Answer: C

Solution:

Let the average of the two toddlers be A

So, the average of the total number of 22 toddlers will be 3A.

Sum of the heights of the group of remaining 20 toddlers will be 66A – 2A = 64A

But, as the average increases by 2 inches, the average of the 20 remaining toddlers will be (3A + 2).

Group	Number	Average	Total
First	20	3A + 2	64A
Second	2	A	2A
Overall	22	3A	66A

So, 20(3A + 2) = 64A

60A + 40 = 64A

A = 10
3A + 2 = 32
The average height of the remaining 20 toddlers will be 32 inches.
Hence, option (C) is the correct answer.
###TOPIC###Quantitative Aptitude||Arithmetic||Averages###

7. The manufacturer of a table sells it to a wholesale dealer at a profit of 10%. The wholesale dealer sells the table to a retailer at a profit of 30%. Finally, the retailer sells it to a customer at a profit of 50%. If the customer pays Rs 4290 for the table, then its manufacturing cost (in Rs) is

A. 1500
B. 2000
C. 2500
D. 3000

Answer: B

Solution:

Let the manufacturing cost be Rs. 100C.

So, 100C x 1.1 x 1.3 x 1.5 = 4290

C = 20
100C = 2000

Hence, option (B) is the correct answer.

###TOPIC###Quantitative Aptitude||Arithmetic||Profit, Loss and Discount###

8. A tank has an inlet pipe and an outlet pipe. If the outlet pipe is closed, then the inlet pipe fills the empty tank in 8 hours. If the outlet pipe is open, then the inlet pipe fills the empty tank in 10 hours. If only the outlet pipe is open, then in how many hours the full tank becomes half-full?

A. 20
B. 30
C. 40
D. 45

Answer: A
Solution:
Given the inlet pipe can fill the empty tank in 8 hours if that is the only tap working.
Let the outlet pipe can empty the full tank in A hours if that is the only pipe working.
So, they together can fill the tank in $\frac{8A}{8-A}$ hours, which is given to be 10 hours.
So, $\frac{8A}{A-8} = 10$
$8A = 10A - 80$
-2A = -80
A = 40
The outlet pipe can empty the full tank in 40 hours.
The outlet pipe can empty half the tank in 20 hours.
###TOPIC###Quantitative Aptitude||Arithmetic||Time and Work###

9. Mayank buys some candies for Rs.15 a dozen and an equal number of different candies for Rs. 12 a dozen. He sells all for Rs. 16.50 a dozen and makes a profit of Rs 150. How many dozens of candies did he buy altogether?

A. 50
B. 30
C. 25
D. 45

Answer: A

Solution:

Mayank has bought 'n' dozens of candies of each type.

Total cost price of the candies = Rs. (15n + 12n) = Rs. 27n

Total selling price of 2n price = Rs. $16.50 \times 2n$ = Rs. 33n

According to the question,

$33n - 27n = 150$

$6n = 150$
n = 25

Therefore, the total number of dozens of candies bought by Mayank = 2n = 50.

Hence, option (A) is the correct answer.

###TOPIC###Quantitative Aptitude||Arithmetic||Profit, Loss and Discount###

10. In a village, the production of food grains increased by 40% and the per capita production of food grains increased by 27% during a certain period. The percentage by which the population of the village increased during the same period is nearest to

A. 16
B. 13
C. 10
D. 7

Answer: C
Solution:
We get the following table with appropriate assumptions.

Case	Food	Population	Food/popu
Initial	100F	100P	100R
Final	140F	$(100 + x)P$	127R

So, we can write, $\frac{100F}{100P} = 100R$............ (1)

$\frac{140F}{(100+x)P} = 127R$............ (2)

Dividing (1) by (2), we get,

$$\frac{\frac{100F}{100P}}{\frac{140F}{(100+x)P}} = \frac{127R}{100R}$$

$$\frac{1}{\frac{140}{(100+x)}} = \frac{127}{100}$$

$$\frac{127}{100} = \frac{140}{100+x}$$

12700 + 127x = 14000
127x = 1300
X = 10.23
X = 10 (approx.)
Hence, option (C) is the correct answer.
###TOPIC###Quantitative Aptitude||Arithmetic||Percentages###

11. If a, b, c are three positive integers such that a and b are in the ratio 3:4 while b and c are in the ratio 2:1, then which one of the following is a possible value of (a + b + c)?

A. 201
B. 205
C. 207
D. 210

Answer: C

Solution:

Given, $a:b = 3:4$ and $b:c = 2:1$

On combining the ratios we get, $a:b:c = 3:4:2$.

Now, $a + b + c = 3 + 4 + 2 = 9$

Since all these are positive integers, the value of a + b + c will be a multiple of 9.

Among the options, only C is a multiple of 9.

Hence, option (C) is the correct answer.

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

12. A motorbike leaves point A at 1 pm and moves towards point B at a uniform speed. A car leaves point B at 2 pm and moves towards point A at a uniform speed which is double that of the motorbike. They meet at 3:40 pm at a point which is 168 km away from A. What is the distance, in km, between A and B?

A. 364
B. 378
C. 380
D. 388

Answer: B
Solution:
Let the meeting point be M.

AM = 168 km
Let AB be D km. So, MB = (D − 168) km
Let the speed of the motorbike be S. So, speed of the car = 2S

Time taken by the motorbike = $\frac{168}{S}$= 2 h 40 min= $\frac{8}{3}h$....(1)
And, time taken by the car = $\frac{D-168}{2S}$= 1 h 40 min = $\frac{5}{3}h$...(2)
From (1), we get $\frac{168}{S} = \frac{8}{3}$, S = 63
Substituting this value of S in (2), we will get the following:
$\frac{D-168}{126} = \frac{5}{3}$

$\frac{D-168}{42} = 5$
$D - 168 = 210$
D = 378
Hence, option (B) is the correct answer.

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

13. Amal can complete a job in 10 days and Bimal can complete it in 8 days. Amal, Bimal, and Kamal together complete the job in 4 days and are paid a total amount of Rs 1000 as remuneration. If this amount is shared by them in proportion to their work, then Kamal's share, in rupees, is

A. 100
B. 200
C. 300
D. 400

Answer: A
Solution:
Let's assume that Kamal can finish the work in K days while working alone.
Amal can complete the job in 10 days.
Bimal can complete it in 8 days.
Amal, Bimal and Kamal can complete in 4 days while working alone.
LCM(10, 8, 4) = 40
So, let the total work be 40w.
So, in 1 day,
Amal can do $\frac{40w}{10} = 4w$
Bimal can do $\frac{40w}{8} = 5w$
All three together can do $\frac{40w}{4} = 10w$
Kamal in 1 day can do 10w – 4w – 5w = w
The ratio of work done by Amal, Bimal and Kamal is 4w:5w:w = 4:5:1
Kamal will have the share $\frac{1}{4+5+1} = \frac{1}{10}$
So, out of Rs. 1000, Kamal will get Rs. 100.
Hence, option (A) is the correct answer.

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

14. Consider three mixtures: the first having water and liquid A in the ratio 1:2, the second having water and liquid B in the ratio 1:3, and the third having water and liquid C in the ratio 1:4. These three mixtures of A, B, and C, respectively, are further mixed in the proportion 4:3:2. Then the resulting mixture has

A. the same amount of water and liquid B.
B. the same amount of liquids B and C.
C. more water than liquid B.
D. more water than liquid A.

Answer: C
Solution:
The volumes taken from the three mixtures as 4k, 3k, and 2k, respectively.

Mixture	Ratio	Proportional part of		Volume
		Water	Liquid	Taken
First	1:2	$\frac{1}{3}$	$\frac{2}{3}$	4k
Second	1:3	$\frac{1}{4}$	$\frac{3}{4}$	3k
Third	1:4	$\frac{1}{5}$	$\frac{4}{5}$	2k

Now, as the LCM of the denominators is LCM (3, 4, 5) = 60 = k

Mixture	Ratio	Proportional part of		Volume	Volume of	
		Water	Liquid	Taken	Water	Liquid
First	1:2	$\frac{1}{3}$	$\frac{2}{3}$	240	80	160
Second	1:3	$\frac{1}{4}$	$\frac{3}{4}$	180	45	135
Third	1:4	$\frac{1}{5}$	$\frac{4}{5}$	120	24	96
Total	149:391	$\frac{149}{540}$	$\frac{391}{540}$	540	149	

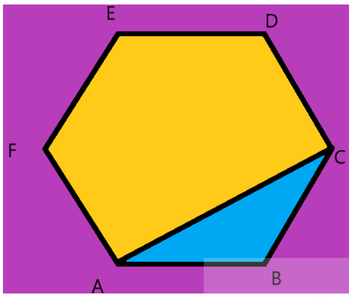
We can see that only option C is correct. That is, there is more water than liquid B (from the second mixture).
Hence, option (C) is the correct answer.

###TOPIC###Quantitative Aptitude||Arithmetic||Mixtures and Alligations###

15. Let ABCDEF be a regular hexagon with each side of length 1 cm. The area (in sq. cm) of a square with AC as one side is

A. $3\sqrt{2}$.
B. 3.
C. 4.
D. $\sqrt{3}$.

Answer: B
Solution:



In the isosceles triangle ABC, AB = AC = 1
Angle ABC = 120 degrees
So, angles BAC and BCA each = 30 degrees
So, AC = BC cos 30 + AB cos 30 = $\sqrt{3}$
So, the area of the square will be 3.
Hence, option (B) is the correct answer.

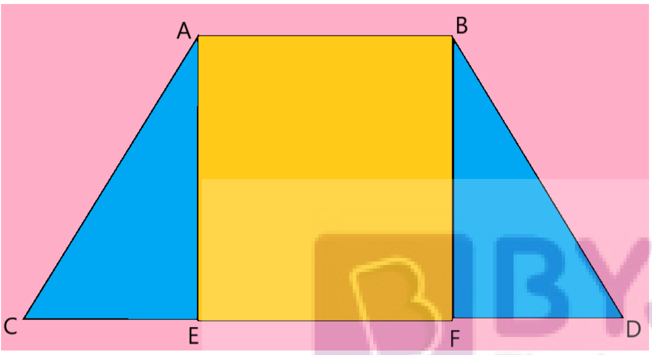
###TOPIC###Quantitative Aptitude||Geometry||Quadrilateral & Polygons###

16. The base of a vertical pillar with uniform cross-section is a trapezium whose parallel sides are of lengths 10 cm and 20 cm while the other two sides are of equal length. The perpendicular distance between the parallel sides of the trapezium is 12 cm. If the height of the pillar is 20 cm, then the total area, in sq. cm, of all six surfaces of the pillar is

A. 1300
B. 1340
C. 1480
D. 1520

Answer: C

Solution:



AB = 10 = EF and CD = 20
AE = BF = 12
Let, AC = BD = x
So, in the right-angled triangle AEC, using Pythagoras Theorem.
$AC^2 = AE^2 + CE^2$
$x^2 = 12^2 + CE^2$
$CE^2 = x^2 - 144$
Similarly, in right-angled triangle BFD, we can write, $FD^2 = x^2 - 144$
So, CE = FD = y (let)
Since CD = 20, we can write, y + 10 + y = 20 or y = 5
So, AC = BD = 13 [using Pythagorean Triplets]
So, the perimeter of the trapezium = 10 + 20 + 13 + 13 = 56
So, the lateral surface area = perimeter of the base x height = 56 x 20 = 1120
Area of the base = area of the roof = area of the trapezium = ½ x (10 + 20) × 12 = 180
So, total surface area = 1120 + 2 × 180 = 1120 + 360 = 1480
Hence, option (B) is the correct answer.
###TOPIC###Quantitative Aptitude||Geometry||Quadrilateral & Polygons###

17. The points (2, 5) and (6, 3) are two end points of a diagonal of a rectangle. If the other diagonal has the equation y = 3x + c, then c is

A. - 5

B. - 6

C. - 7

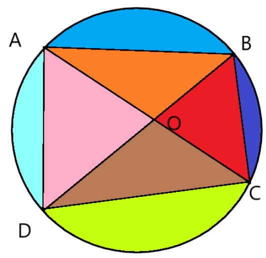
D. – 8

Answer: D
Solution:
For any parallelogram, the diagonals bisect each other.
So, the midpoint of (2, 5) and (6, 3) will also lie on $y = 3x + c$
So, the midpoint of (2, 5) and (6, 3) is (4, 4).
So, putting $x = y = 4$ in $y = 3x + c$, we get, $4 = 12 + c$ or $c = (-8)$
Hence, option (D) is the correct answer.

###TOPIC###Quantitative Aptitude||Co-ordinate Geometry||Co-ordinate Geometry###

18. ABCD is a quadrilateral inscribed in a circle with centre O. If ∠COD = 120 degrees and ∠BAC = 30 degrees, then the value of ∠BCD (in degrees) is

Answer: 60.
Solution:



In the diagram,
Angle DOC = 120 degrees
In triangle ODC, OD = OC = radius of the circle
So, ODC is an isosceles triangle.
So, angle ODC = angle OCD = x (let)
So, x + x + 120 = 180
x = 30
angle ODC = angle OCD = 30 degrees
It is given that angle BAC = 30 degrees
So, the two angles BAC and ODC must lie on the same segment.
So, DOB must be a straight line. Otherwise, it is not possible to get the angle ODC as 30 degrees.
Since, in any circle, the angle formed on the segment at the opposite arc is half of that formed at the centre, we can say, on segment CD, angle DBC= ½ x central angle COD = ½ x 120= 60
in triangle OBC, OB=OC = radius of the circle
so, angle OCB= angle OBC = 60
Hence, 60 is the correct answer.

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

19. If three sides of a rectangular park have a total length 400 ft, then the area of the park is maximum when the length (in ft.) of its longer side is

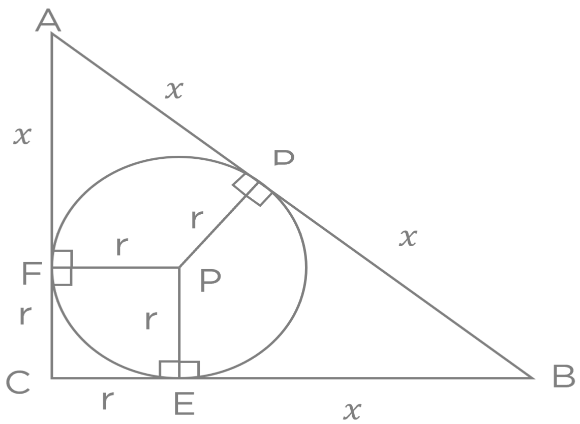
Answer: 200.
Solution:
Let the length of the park be 'L' and the breadth be B, B < L.
So, area = A = LB
So, 400 = 2L + B or 2B + L
So, B = 400 – 2L or 200 – L/2
So, LB = 400L – $2L^2$ or 200L – ½ L^2

Case 1:
A = LB = 400L – $2L^2$ = (-2)(L^2 – 200L) = (-2)(L^2 – 200L +100^2 – 100^2) = (-2)(L – $100)^2$ + $2(100)^2$
=20000 – $2(L – 100)^2$
So, A will be maximum when $2(L – 100)^2$ is minimum.
Since the minimum value of the square of any real quantity is zero and since L is a real number, the minimum value of $2(L – 100)^2$ is zero.
So, L = 100
So, the area will be maximum at L = 100.
Since in this case, 400 = 2L+B, putting L = 100, we will get, B = 200>100=L
Which contradicts our initial assumption that L>B
So, we can NOT accept this case.

Case 2:
A = LB = 200L – ½ L^2
A= $-\frac{1}{2}\times\left(L^2-400L\right)$
A=$-\frac{1}{2}\times\left\{L^2-2.L.200+200^2-200^2\right\}$
$A=-\frac{1}{2}\times\left\{(L-200)^2-40000\right\}$
$A=-\frac{1}{2}(L-200)^2+20000$
$A=20000-\frac{1}{2}(L-200)^2$
A will be maximum when $\frac{1}{2}(L-200)^2$ is minimum.
A will be maximum when L = 200
For L = 200, we get, 400 = 2B + L or B = 100
Here, B < L, so, it can be accepted.

###TOPIC###Quantitative Aptitude||Geometry||Plain Geometry###

20. Let P be an interior point of a right-angled isosceles triangle ABC with hypotenuse AB. If the perpendicular distance of P from each of AB, BC, and CA is 4(√2 - 1) cm, then the area, in sq. cm, of the triangle ABC is
Answer: 16.
Solution:
Let 'r' be the radius, the perpendicular distance is equal to the radius as shown.



Let 'x' be the length of BE.
Since, B is an exterior point of the circle with centre P, the two tangents drawn from B on that circle must be equal.
So, BD is also x.
Since AC = BC
So, AC = x + r, AF = x and AD = x.
Using Pythagoras' Theorem, we will get, $2(x + r)^2 = (2x)^2$
$(x + r)^2 = 2x^2$

Taking square root of both sides,
$x + r = x\sqrt{2}$
$x\left(\sqrt{2} - 1\right) = r$
$x\left(\sqrt{2} - 1\right) = 4\left(\sqrt{2} - 1\right)$
So, x = 4
So, each equal side of the triangle = r + x = $4\sqrt{2}$
So, the area of the triangle = $\frac{1}{2}\times 4\sqrt{2}\times 4\sqrt{2} = 16$
Hence, 16 is the correct answer.

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

21. If the product of three consecutive positive integers is 15600, then the sum of the squares of these integers is

A. 1777
B. 1785
C. 1875
D. 1877

Answer: D

Solution:

Let, the numbers be (N - 1), N and (N + 1)

So, (N + 1)(N)(N - 1) = 15600 =12 x 13 x 100 =2 x 2 x 3 x 13 x 2 x 2 x 5 x 5

(N + 1)(N)(N - 1) = (2 x 2 x 2 x 3) × (5 x 5) x (13 x 2) = 24 x 25 x 26

So, the number s are 24, 25, 26

So, sum of the squares = $24^2 + 25^2 + 26^2$ = 576 + 625 + 676 = 1877

Hence, option (D) is the correct answer.

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

22. If x is a real number such that $\log_3 5 = \log_5(2 + x)$, then which of the following is true?

A. $0 < x < 3$
B. $23 < x < 30$
C. $x > 30$
D. $3 < x < 23$

Answer: D

Solution:

$log_3 3 < log_3 5 < log_3 9 = 1 < log_3 5 < 2$

So, $1 < (x + 2) < 2$

$5^1 < x + 2 < 5^2$

$3 < x < 23$

Hence, option (D) is the correct answer.

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

23. Let $f(x) = x^2$ and $g(x) = 2^x$, for all real x. Then the value of $f(f(g(x)) + g(f(x)))$ at $x = 1$ is

A. 16
B. 18
C. 36
D. 40

Answer: C

Solution:

Given, $f(x) = x^2$ and $g(x) = 2^x$,

Substituting $x = 1$, $f(1) = 1$, $g(1) = 2$

$f(f(g(x)) + g(f(x))) = f(f(g(1))+g(f(1))) = f(f(2)+g(1))$

$= f(4+2) = f(6) = 6^2 = 36.$

Hence, option (C) is the correct answer.

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

24. The minimum possible value of the sum of the squares of the roots of the equation $x^2 + (a + 3)x - (a + 5) = 0$ is

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

Answer: C

Solution:

From the given equation, if the roots are m and n, we can write,

$m + n = (-(a + 3))$ and $mn = -(a + 5)$

So, $m^2 + n^2 = (m + n)^2 - 2mn = (a + 3)^2 + 2(a + 5) = a^2 + 8a + 19 = (a + 4)^2 + 3$

Since any square of real number can not be negative,

so, the minimum value of a + 4 is zero, where a is (-4)

So, the required minimum value will be 3.

Hence, option (C) is the correct answer.

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

25. If $9^{x - (1/2)} - 2^{2x - 2} = 4^x - 3^{2x - 3}$, then x is

A. 3/2
B. 2/5
C. ¾
D. 4/9

Answer: A

Solution:

$9^{x - (1/2)} - 2^{2x - 2} = 4^x - 3^{2x - 3}$

$\frac{9^x}{3} - \frac{4^x}{4} = 4^x - \frac{9^x}{27}$

$\frac{9^x}{3} + \frac{9^x}{27} = 4^x + \frac{4^x}{4}$

$\frac{10\times9^x}{27} = \frac{5\times4^x}{4}$

$(\frac{3}{2})^{2x} = \frac{27}{8}$

$x = \frac{3}{2}$

Hence, option (A) is the correct answer.

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

26. If log($2^a \times 3^b \times 5^c$) is the arithmetic mean of log($2^2 \times 3^3 \times 5$), log($2^6 \times 3 \times 5^7$), and log($2 \times 3^2 \times 5^4$), then a equals

Answer: 3

Solution:

$log\left(2^a \times 3^b \times 5^c\right) = \frac{1}{3}[log\left(2^2 \times 3^3 \times 5\right) + log\left(2^6 \times 3 \times 5^7\right) + log(2 \times 3^2 \times 5^4)]$

or, $log\left(2^a \times 3^b \times 5^c\right) = \frac{1}{3}[log(2^9 \times 3^6 \times 5^{12})]$

or, $log\left(2^a \times 3^b \times 5^c\right) = log(2^3 \times 3^2 \times 5^4)$

On comparing both the sides, a=3.

Hence, 3 is the correct answer.

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

27. Let a_1, a_2, a_3, a_4, a_5 be a sequence of five consecutive odd numbers. Consider a new sequence of five consecutive even numbers ending with $2a_3$. If the sum of the numbers in the new sequence is 450, then a_5 is

Answer: 51

Solution:

In the new sequence of 5 consecutive even numbers, the sum is 450.

So, the middle number is 450/5=90

So, the max number will be 90 + 2 + 2 = 94 = $2a_3$ (given)

We get a_3 = 47 and a_5 = 47 + 2 + 2 = 51

Hence, 51 is the correct answer.

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

28. How many different pairs (a, b) of positive integers are there such that a ≤ b and 1/a + 1/b = 1/9 ?

Answer: 3

Solution:

From the given equation, we can get, $a = \frac{9b}{b-9} = \frac{9(b-9)}{b-9} + \frac{81}{b-9} = 9 + \frac{81}{b-9}$ ...(1)

As a and b are different positive integers

From (1), (b-9) must divide 81 completely.

So, (b – 9) must be a divisor of 81.

81 has these divisors = 1, 3, 9, 27 and 81

So, b – 9 can be 1, 3, 9, 27 and 81

b can be 10, 12, 18, 36 or 90 and a can be 90, 36, 18. 12 or 10

But only the last three are acceptable as a≤ b.

Hence, 3 is the correct answer.

###TOPIC###Quantitative Aptitude||Number System||Factors and their properties###

29. In how many ways, can 8 identical pens be distributed among Amal, Bimal, and Kamal so that Amal gets at least 1 pen, Bimal gets at least 2 pens, and Kamal gets at least 3 pens?

Answer: 6
Solution:
After giving Amal 1 pen, Bimal 2 pens and Kamal 3 pens, only 2 pens are left.
As we are distributing the 2 pens among three persons, there are two partitions.
So, the number of ways in which we can distribute the remaining 2 identical pens among the three persons in $^4C_2$ = 6 ways.
Hence, 6 is the correct answer.

###TOPIC###Quantitative Aptitude||Higher Maths||Permutation and Combination###

30. How many four digit numbers, which are divisible by 6, can be formed using the digits 0, 2, 3, 4, 6, such that no digit is used more than once and 0 does not occur in the left-most position?

Answer: 50
Solution:
If a number is divisible by 2 and 3, it must be divisible by 6.
For a number to be divisible by 2, the rightmost digit or the unit's place must be an even number. Four possibilities are possible 0, 2, 4 or 6.
If a number is divisible by 3, the sum of the digits must be divisible by 3.
That is, the sum of the digits must be 3 or 6 or 9 or 12 and so on.
Case 1:
Now, if the last digit is zero, then the sum of the other three digits can be 3 or 6 or 9 or 12 only [as the maximum sum can be 6 + 4 + 3 = 13].
We can see that 3 or 6 are not possible and 9 or 12 are only two possibilities.
So, the other two digits can be (2, 3, 4) or (2, 4, 6).
In both of these two cases, we can arrange those three digits in 3! = 6 ways.
So, the total number of ways = 6 x2 = 12

Case 2:
If the unit's place digit is 2, then the sum of the other three digits can be 7 or 10 or 13.
Now, we can get 7 by using (0, 3, 4).
To get 10, we can use 0, 4, 6 only.
Here, we can fill in the leftmost place using 4 and 6 only, that is, in two ways.
Now, the other two places can be filled in 2!= 2 ways.
So, the total number of ways = 2 x 2 = 4
Now, we can get 7 by using (0, 3, 4) and we can arrange them in 4 ways as described above.
Also, we can get 13 by using (3, 4, 6) and we can arrange them in 3!= 6 ways
So, the total number of ways = 4 + 4 + 6 = 14

Case 3: The unit's place digit is 4, then the sum of the other three digits can be 2 or 5 or 8 or 11.
Now, we can not get 2.
But, we can get 5 using (0, 2, 3)⇒ we can arrange them in 4 ways as explained above under "case two".
We can get 8 using (0, 2, 6) ⇒ we can arrange them in 4 ways as explained above under "case two".
We can get 11 using (2, 3, 6)⇒ we can arrange them in 3!=6 ways.
So, the total number of cases = 4 + 4 + 6 = 14
Case 4: The unit's place digit is 6, then the sum of the other three digits can be 0 or 3d or 6 or 9 or 12.
We can not get 0 or 3.
But, we can get 6 by using (0, 2, 4) ⇒ we can arrange them in 4 ways as explained above under "case two".

And 9 by using (2, 3, 4) ⇒ we can arrange them in $3! = 6$ ways.

So, the total number of cases or ways = 4 + 6 = 10
###TOPIC###Quantitative Aptitude||Higher Maths||Permutation and Combination###

31. If $f(ab) = f(a)f(b)$ for all positive integers a and b, then the largest possible value of $f(1)$ is

Answer: 1

Solution:

Let, a = 1, $f(1 \times b) = f(a)\, f(b)$

$f(b) = f(a) \times f(b)$

$f(a) = 1$ for all values of b

SO, $f(a) = 1$ is the only value.

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

32. Let $f(x) = 2x - 5$ and $g(x) = 7 - 2x$. Then $|f(x) + g(x)| = |f(x)| + |g(x)|$ if and only if

A. $5/2 < x < 7/2$
B. $x \le 5/2$ or $x \ge 7/2$
C. $x < 5/2$ or $x \ge 7/2$
D. $5/2 \le x \le 7/2$

Answer: D

Solution:

$|a|+|b| = |a+b|$ is possible if and only if both a and b are of the same sign or both are zero.

So, here, $f(x) \times g(x)$ must be positive

That is, $(2x-5)(7-2x) > 0$

So, x must lie between 5/2 and 7/2.

Let $f(x) \times g(x) = 0$, then the values 5/2 and 7/2 must be included.

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

33. An infinite geometric progression a_1, a_2, a_3,... has the property that $a_n = 3(a_{n+1} + a_{n+2} +....)$ for every $n \geq 1$. If the sum $a_1 + a_2 + a_3 +...... = 32$, then a_5 is

A. 1/32
B. 2/32
C. 3/32
D. 4/32

Answer: C

Solution:

Let, for the GP, common ratio = r

So, $a_n = 3(a_{n+1} + a_{n+2} +....)$

So, $a_n = \frac{3a_{n+1}}{1-r}$............(1) or $a_1 = \frac{3a_2}{1-r}$ and $\frac{3a_1}{1-r} = 32$............ (2)

Since $a_1 + a_2 + a_3 +...... = 32$

We get, $\frac{3a_2}{1-r} + \frac{a_2}{1-r} = 32$

$\frac{4a_2}{1-r} = 4\times8$

$\frac{a_2}{1-r} = 8$....................(3)

$\frac{3a_2}{1-r} = 24$

$a_1 = 24$

$a_2 = 24r$

Form (3), $\frac{24r}{1-r} = 8$

3r= 1- r

4r = 1

r = ¼

$a_5 = a_1 \times r^4 = 24\times\left(\frac{1}{4}\right)^4 = \frac{3}{32}$

Hence, option (C) is the correct answer.

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

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34. If $a_1 = 1/(2 \times 5)$, $a_2 = 1/(5 \times 8)$, $a_3 = 1/(8 \times 11)$,...., then $a_1 + a_2 + a_3 + \ldots\ldots + a_{100}$ is

A. 25/151
B. 1/2
C. ¼
D. 111/55

Answer: A

Solution:

$$\frac{1}{2\times5}+\frac{1}{5\times8}+\frac{1}{8\times11}+\ldots+\frac{1}{(3n-1)\times(3n+2)}$$

$$=\frac{1}{3}\left(\frac{1}{2}-\frac{1}{5}+\frac{1}{5}-\frac{1}{8}+\frac{1}{8}-\frac{1}{11}+\ldots+\frac{1}{3n-1}-\frac{1}{3n+2}\right)$$

$$=\frac{1}{3}\left(\frac{1}{2}-\frac{1}{3n+2}\right)=\frac{1}{3}\left(\frac{3n}{2(3n+2)}\right)=\frac{n}{2(3n+2)}$$

Substituting n = 100, the answer is $\frac{50}{302}=\frac{25}{151}$

Hence, option (A) is the correct answer.
###TOPIC###Quantitative Aptitude||Progression||Sequence & Series###