

CAT 2018 Question Paper with Solution

Slot 2 QA

1. Points A, P, Q and B lie on the same line such that P, Q and B are respectively, 100 km, 200 km and 300 km away from A. Cars 1 and 2 leave A at the same time and move towards B. Simultaneously, car 3 leaves B and moves towards A. Car 3 meets Car 1 at Q, and Car 2 at P. If each car is moving in uniform speed then the ratio of the speed of Car 2 to that of Car 1 is
- A. 1 : 4
 - B. 2 : 9
 - C. 1 : 2
 - D. 2 : 7

Answer: A

Solution:

As the cars 1 and 3 meet at Q, we can say that by the time car 1 covers 200 km, car 3 covers 100 km.

So, the speed of car 1 is double of that of car 3.....(1)

Similarly, as cars 2 and 3 meet at P, we can say that by the time car 2 covers 100 km, car 3 covers 200 km.

So, here, speed of car 3 is double that of car 1.....(2)

So, combining (1) and (2), we can get,

The speed of car 1 is 4 times that of car 2.

So, the required ratio is 1:4.

Hence, option (A) is the correct answer.

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

2. Let $a_1, a_2, \dots, a_{52}$ be positive integers such that $a_1 < a_2 < \dots < a_{52}$. Suppose their arithmetic mean is one less than the arithmetic mean of $a_2, a_3, \dots, a_{52}$. If $a_{52} = 100$, then the largest possible value of a_1 is

- A. 48
- B. 20
- C. 45
- D. 24

Answer: D

Solution:

Arithmetic mean of the entire set of numbers = A (let)

So, arithmetic mean of $a_2, a_3, \dots, a_{52} = A+1$

So, $52A = a_1 + a_2 + \dots + a_{52} = a_1 + a_2 + \dots + a_{51} + 100 \dots (1)$

On the other hand, $51(A+1) = a_2 + \dots + a_{52} = a_2 + \dots + a_{51} + 100 \dots (2)$

Substituting this value in (1), we will get, $52A = a_1 + 51(A+1)$

$A = a_1 + 51 \dots (3)$

Now, A will be maximum if the values $a_1, a_2, \dots$ are consecutive integers.

So, the average will be the average of the first and the last term, that is, 50 and 100 respectively.

So, the maximum value of A will be 75.

So, maximum value of $a_1 = 75 - 51 = 24$

Hence, option (D) is the correct answer.

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

3. There are two drums, each containing a mixture of paints A and B. In drum 1, A and B are in the ratio 18 : 7. The mixtures from drums 1 and 2 are mixed in the ratio 3 : 4 and in this final mixture, A and B are in the ratio 13 : 7. In drum 2, then A and B were in the ratio

- A. 251 : 163
- B. 239 : 161
- C. 220 : 149
- D. 229 : 141

Answer: B

Solution:

Let the amount of A and B in drum 2 are in the ratio $a:b$,

The amount of A and B from drum 1 is $\frac{18}{25}$ and $\frac{7}{25}$.

Also, the amount of mixtures from drum 1 and 2 are taken in the ratio of 3:4

So, we have $\frac{\frac{18}{25} \times \frac{3}{7} + \frac{a}{a+b} \times \frac{4}{7}}{\frac{7}{25} \times \frac{3}{7} + \frac{b}{a+b} \times \frac{4}{7}} = \frac{13}{7}$

$$\Rightarrow \frac{54(a+b) + 4a(25)}{21(a+b) + 4b(25)} = \frac{13}{7}$$

$$\Rightarrow 7(154a + 54b) = 13(21a + 121b)$$

$$\Rightarrow 1078a + 378b = 273a + 1573b$$

$$\Rightarrow 805a = 1195b \Rightarrow a:b = 239:161$$

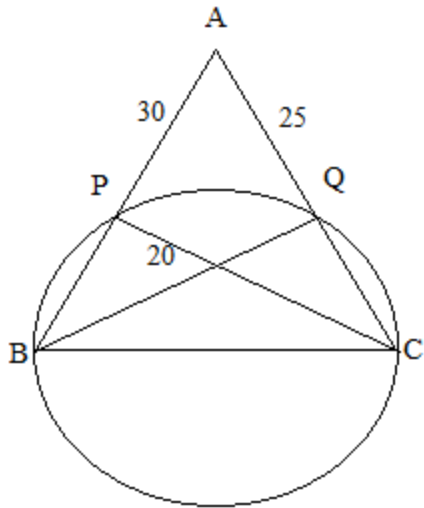
Hence, option (B) is the correct answer.

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

4. On a triangle ABC, a circle with diameter BC is drawn, intersecting AB and AC at points P and Q, respectively. If the lengths of AB, AC, and CP are 30 cm, 25 cm, and 20 cm respectively, then the length of BQ, in cm, is

Answer: 24

Solution:



Since BC is the diameter of the circle, $\angle BPC$ and $\angle BQC$ are semi-circular angles and equal to 90° .

In the $\triangle ABC$, the area = $\frac{1}{2} \times \text{Base} \times \text{Height}$

Since AB and AC are both bases and PC and BQ are both heights of the same triangle.

$$\frac{1}{2} \times AB \times PC = \frac{1}{2} \times AC \times BQ$$

$$\frac{1}{2} \times 30 \times 20 = \frac{1}{2} \times 25 \times BQ$$

$$BQ = (30 \times 20) / 25$$

$$BQ = 24$$

Hence the length of BQ is 24cm.

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

5. Let $t_1, t_2, \dots$ be real numbers such that $t_1 + t_2 + \dots + t_n = 2n^2 + 9n + 13$, for every positive integer $n \geq 2$. If $t_k = 103$, then k equals

Answer: 24

Solution:

$$\text{Given, } t_1 + t_2 + \dots + t_n = 2n^2 + 9n + 13 \dots \dots \dots (1)$$

$$\text{Let } n = k, \text{ then } t_1 + t_2 + \dots + t_k = 2k^2 + 9k + 13 \dots \dots \dots (2)$$

Similarly, substituting $n = (k-1)$,

$$\text{we get, } t_1 + t_2 + \dots + t_{(k-1)} = 2(k-1)^2 + 9(k-1) + 13 \dots \dots (3)$$

$$(2) - (3) \text{ will give us } t_k = 2(k^2 - (k-1)^2) + 9 = 2(2k-1) + 9 = 4k + 7 = 103 \text{ (given)}$$

$$\text{So, } k = 24$$

Hence, 24 is the correct answer.

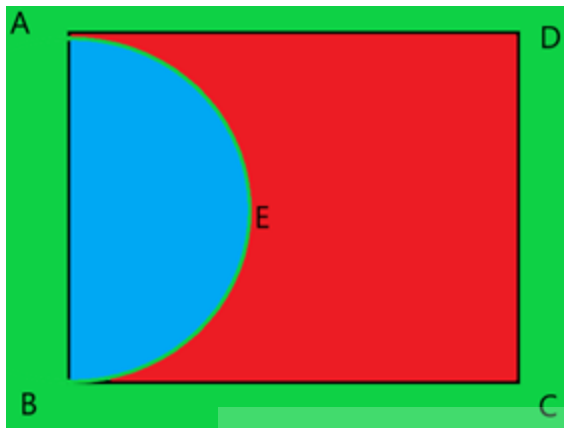
###TOPIC###Quantitative Aptitude||Progression||Sequence & Series###

6. From a rectangle ABCD of area 768 sq. cm, a semi-circular part with diameter AB and area 72π sq. cm is removed. The perimeter of the leftover portion, in cm, is

- A. $88 + 12\pi$
- B. $80 + 16\pi$
- C. $86 + 8\pi$
- D. $82 + 24\pi$

Answer: D

Solution:



Let, the radius of the semi-circular area be r cm.

So, $\frac{1}{2} \times \pi r^2 = 72\pi$ and $r = 12$

Then, $AB = \text{diameter} = 2r = 24$ cm and $AD = BC = y$

And $24y = 768$, $y = 32$

Now, for the semi-circular part AEB, the length = half of the perimeter of the total circle = $\frac{1}{2} \times 2\pi r = \pi \times 12 = 12\pi$

Now, $BC + CD + AD = 32 + 24 + 32 = 88$

So, the total perimeter is $88 + 12\pi$.

So, option D is the correct answer.

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

7. If N and x are positive integers such that $N^N = 2^{160}$, and $N^2 + 2^N$ is an integral multiple of 2^x , then the largest possible x is

Answer: 10

Solution:

Since $N^N = 2^{160}$

$$N^N = 2^{5 \times 32} = (2^5)^{32} = 32^{32}$$

$$N = 32$$

Now, $N^2 + 2^N = 32^2 + 2^{32} = 2^{10} + 2^{32} = 2^{10}(1 + 2^{22}) = \text{divisible by } 2^x$

Hence, the maximum value of x will be 10.

Hence, 10 is the correct answer.

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

8. A chord of length 5 cm subtends an angle of 60° at the centre of a circle. The length, in cm, of a chord that subtends an angle of 120° at the centre of the same circle is

- A. 2π
- B. $5\sqrt{3}$
- C. $6\sqrt{2}$
- D. 8

Answer: B

Solution:

The chord AB subtends an angle 60° at the centre O.

Since OA and OB are two radii of the circle hence, $\angle OAB = \angle OBA = 60^\circ$.

Hence, $\triangle OAB$ is an equilateral triangle and $OA = OB = AB = 5\text{ cm}$.

The chord CD subtends an angle of 120° at the centre O.

Similarly, $\triangle OCD$ is an isosceles triangle in which $OC = OD = 5\text{ cm}$ (As they are the radii of the same circle).

Hence $\angle OCD = \angle ODC = (180 - 120)/2 = 30^\circ$

Now in $\triangle OCD$, by the sine rule,

$$OC/(\sin 30) = CD/(\sin 120)$$

$$5/(1/2) = CD/(\sqrt{3}/2)$$

$$CD = 5\sqrt{3}$$

Hence the length of the required chord = $5\sqrt{3}\text{ cm}$

Hence, option (B) is the correct answer.

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

9. If $p^3 = q^4 = r^5 = s^6$, then the value of $\log_s(pqr)$ is equal to

- A. $24/5$
- B. 1
- C. $47/10$
- D. $16/5$

Answer: C

Solution:

$p^3 = q^4 = r^5 = s^6 = k^{60}$, where K is a non-zero constant.

so, $p = k^{20}$

$q = k^{15}$

$r = k^{12}$

$s = k^{10}$

So, $\log_s(pqr) = \log_{k^{10}}(k^{20} \times k^{15} \times k^{12}) = \frac{47}{10}$

Hence, option (C) is the correct answer.

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

10. In a tournament, there are 43 junior level and 51 senior level participants. Each pair of juniors play one match. Each pair of seniors play one match. There is no junior versus senior match. The number of girl versus girl matches in junior level is 153, while the number of boy versus boy matches in senior level is 276. The number of matches a boy plays against a girl is

Answer: 1098

Solution:

The number of girl versus girl matches in junior level is 153.

Let, the number of girls in the junior level be "g".

So, ${}^gC_2=153$

$g(g-1)/2=153$

$g(g-1)=306$ or $g=18$, number of boys in junior level = $b = 43 - 18 = 25$

While the number of boy versus boy matches in senior level is 276.

Let, the number of boys be B

So, ${}^BC_2=276$

$B(B-1)/2=276$

$B(B - 1) = 552$ or $B= 24$, number of girls in senior level = $G = 51 - 24 = 27$

So, number of boy vs girl match in junior level = $18 \times 25=450$

And the number of boy vs girl match in senior level = $27 \times 24=648$

So, the total = $450+648=1098$.

Hence, 1098 is the correct answer.

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

11. A 20% ethanol solution is mixed with another ethanol solution, say, S of unknown concentration in the proportion 1:3 by volume. This mixture is then mixed with an equal volume of 20% ethanol solution. If the resultant mixture is a 31.25% ethanol solution, then the unknown concentration of S is

- A. 50%
- B. 55%
- C. 48%
- D. 52%

Answer: A

Solution:

Let, the unknown concentration be C%

Let us take 100 units of the first solution and 300 units of the second solution.

So, total ethanol = $(20+3C)$ in $(100+300)=400$ units

Now, we have taken 400 units of another 20% solution.

So, total ethanol = $(20+3C+80)$ units in $(400+400)=800$ units

So, final percentage of ethanol = $(100+3C)/800 = 31.25\%$

$$100+3C=250$$

$$3C=150$$

$$C=50$$

Hence, option (A) is the correct answer.

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

12. The area of a rectangle and the square of its perimeter are in the ratio 1 : 25. Then the lengths of the shorter and longer sides of the rectangle are in the ratio

$$3 : 8$$

$$2 : 9$$

$$1 : 4$$

$$1 : 3$$

Answer: C

Solution:

Let, the length, or the longer side of the rectangle be L units and the breadth, or the shorter side of that rectangle be B units.

So, Area = LB and Perimeter = $2(L+B)$

So, $LB : 4(L+B)^2 = 1 : 25$

$$LB/(4(L+B)^2) = 1/25$$

$$25LB = 4L^2 + 8LB + 4B^2$$

$$4L^2 - 17LB + 4B^2 = 0$$

$$4L^2 - LB - 16LB + 4B^2 = 0$$

$$L(4L - B) - 4B(4L - B) = 0$$

$$(4L - B)(L - 4B) = 0$$

$$L = B/4 \text{ or } 4B$$

$$L:B = 1:4 \text{ or } 4:1$$

Since L is longer, the correct solution will be 4:1.

So, shorter : longer = 1:4

Hence, option (C) is the correct answer.

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

13. The smallest integer n for which $4^n > 17^{19}$ holds, is closest to

A. 33

B. 39

C. 37

D. 35

Answer: B

Solution:

Given that,

$$4^n > 17^{19} > 16^{19} = 4^{38}$$

So, $n > 38$

From the option, only 39 satisfies the given condition.

Hence, option (B) is the correct answer.

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

14. The smallest integer n such that $n^3 - 11n^2 + 32n - 28 > 0$ is

Answer: 8

Solution:

$$n^3 - 11n^2 + 32n - 28 > 0$$

Factorising $n^3 - 11n^2 + 32n - 28$, we have

$$n^3 - 11n^2 + 32n - 28 = (n-2)(n^2 - 9n + 14) = (n-2)^2(n-7)$$

$$\text{So, } (n-2)^2(n-7) > 0$$

Since the square term is always positive,

to make the above inequality correct, $n - 7$ must be positive.

So the smallest integer for n is 8.

Hence, 8 is the correct answer.

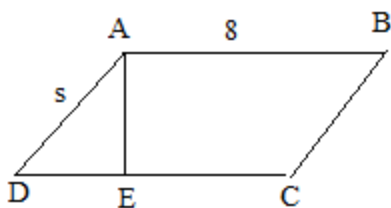
###TOPIC###Quantitative Aptitude||Algebra||Higher Degree Equations###

15. A parallelogram ABCD has area 48 sqcm. If the length of CD is 8 cm and that of AD is 's' cm, then which one of the following is necessarily true?

- A. $s \geq 6$
- B. $s \neq 6$
- C. $5 \leq s \leq 7$
- D. $s \leq 6$

Answer:

Solution:



Let AE is perpendicular on CD.

So, the area of the parallelogram = $CD \times AE = 48$

$$8 \times AE = 48$$

$$AE = 6$$

In right-angled triangle ADE, AD is the hypotenuse, so, $AD > AE$

If the parallelogram ABCD becomes a rectangle, then $AD = AE$

Now, $AD \geq AE = 6$ or $s \geq 6$.

Hence, option (C) is the correct answer.

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

16. The value of the sum $7 \times 11 + 11 \times 15 + 15 \times 19 + \dots + 95 \times 99$ is

- A. 80707
- B. 80751
- C. 80730
- D. 80773

Answer: A

Solution:

The n -th term $= (4n+3)(4n+7) = 16n^2 + 40n + 21$

So, sum will be $16(1^2+2^2+\dots+n^2) + 40(1+2+\dots+n) + 21n$

$$= 16n(n+1)(2n+1)/6 + 40n(n+1)/2 + 21n$$

$$= 8n(n+1)(2n+1)/3 + 20n(n+1) + 21n$$

$$= 4/3 n(n+1)(4n+2+15) + 21n$$

$$= 4/3 n(n+1)(4n+17)+21n$$

Now, the last term given is $95 \times 99 = (4n+3)(4n+7)$

$$4n+3=95 \quad 4n=92 \quad n=23$$

So, the sum of the given series $= 4/3 [23(23+1)(4 \times 23+17)] + 21 \times 23 = 80707$.

Hence, option (A) is the correct answer.

###TOPIC###Quantitative Aptitude||Progression||Sequence & Series###

17. On a long stretch of east-west road, A and B are two points such that B is 350 km west of A. One car starts from A and another from B at the same time. If they move towards each other, then they meet after 1 hour. If they both move towards the east, then they meet in 7 hrs. The difference between their speeds, in km per hour, is

Answer: 50

Solution:

Let their respective speeds be a km/h and b km/h, respectively.

When they are moving in the same direction, their relative speed will be the difference between their respective speeds, that is, $(a - b)$ km/h.

Here, as they move towards east and meet, the speed of the car towards west must be greater than that of the car towards east.

Otherwise, they can never meet.

$$\text{So, } 7(a - b) = 350 \dots\dots\dots(2)$$

$$(a - b) = 50 \dots\dots\dots(3)$$

Hence, 50 is the correct answer.

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

18. If the sum of squares of two numbers is 97, then which one of the following cannot be their product?

- A. 64
- B. -32
- C. 16
- D. 48

Answer: A

Solution:

Let, the two numbers be a and b.

$$\text{So, } a^2 + b^2 = 97$$

Now, $(a - b)^2$ must be non-negative.

$$\text{So, } a^2 + b^2 - 2ab \geq 0$$

$$97 - 2ab \geq 0$$

$$48.5 \geq ab$$

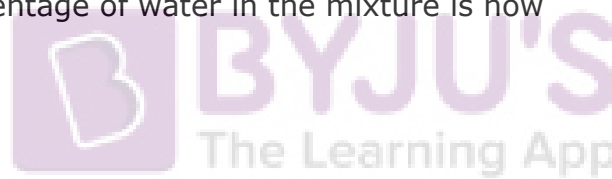
So, the product can never exceed 48.5.

Hence, option A is the correct answer.

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

19. A jar contains a mixture of 175 ml water and 700 ml alcohol. Gopal takes out 10% of the mixture and substitutes it by water of the same amount. The process is repeated once again. The percentage of water in the mixture is now

- A. 25.4
- B. 20.5
- C. 30.3
- D. 35.2



Answer: D

Solution:

Let the formula be, $F = I(1 - R/T)^N$.

Where, I is the initial percentage of alcohol,

T is the total volume of the liquid,

F is the final percentage of alcohol,

R is the amount of alcohol taken out every time,

And N is the number of times the procedure is repeated.

Here, F = unknown

$$I = 700/875$$

$$T = 875$$

$$R = 87.5$$

So, we will get,

$$F = I(1 - R/T)^N = 700/875 (1 - 87.5/875)^2 = 700/875 \times 81/100 = 567/875$$

So finally, there will be 567 ml of alcohol.

So, finally the volume of water will be $875 - 567 = 308$ ml

So, percentage of water will be $(308/875) \times 100\% = 35.2$

Hence, option (D) is the correct answer.

20. Points A and B are 150 km apart. Cars 1 and 2 travel from A to B, but car 2 starts from A when car 1 is already 20 km away from A. Each car travels at a speed of 100 kmph for the first 50 km, at 50 kmph for the next 50 km, and at 25 kmph for the last 50 km. The distance, in km, between car 2 and B when car 1 reaches B is

Answer: 5

Solution:

The total time taken by car A = $\frac{50}{100} + \frac{50}{50} + \frac{50}{25} = 3$ hours 30 minutes.

Car A covered the first 20 km in $\frac{1}{5}$ hour or 12 minutes.

So, car B gets 12 minutes less.

As the second car gets 12 minutes less,

when the first car reaches the finishing line, the second car will be 12 minutes behind.

In those 12 minutes or $\frac{1}{5}$ hours, he will cover 5 km.

Hence, option (D) is the correct answer.

21. A tank is emptied every day at a fixed time point. Immediately thereafter, either pump A or pump B or both start working until the tank is full. On Monday, A alone completed filling the tank at 8 pm. On Tuesday, B alone completed filling the tank at 6 pm. On Wednesday, A alone worked till 5 pm, and then B worked alone from 5 pm to 7 pm, to fill the tank. At what time was the tank filled on Thursday if both pumps were used simultaneously all along?

- A. 4 : 12 PM
- B. 4 : 24 PM
- C. 4 : 48 PM
- D. 4 : 36 PM

Answer: B

Solution:

Let, pump A can fill "a" litre of water into the tank in 1 hour.

And pump B can fill "b" litre of water into the tank in 1 hour.

So, we can see that A takes 2 hours more than B to fill the tank.

Let B take T hours.

So, A takes (T+2) hours.

So, the total capacity of the tank = C(let) = Tb = (T+2)a

On Wednesday, B worked for 2 hours only. So, it filled 2b litres.

The remaining (Ta - 2b) litres are filled by A in (T+2 - 3)hours = (T - 1) hours

So, (T - 1) a + 2b = C

Ta - a + 2b = C

Ta - a + 2b = C = Tb

Ta - a + 2b = Tb

$$T_a + 2b = T_b + a \dots\dots\dots(1)$$

Similarly, we can get, $T_a - a + 2b = (T+2)a$

$$T_a - a + 2b = T_a + 2a$$

$$3a = 2b = 6k \text{ (let)}$$

$$\text{So, } a = 2k \text{ and } b = 3k \dots\dots\dots(2)$$

$$\text{Total capacity} = 3Tk = 2(T+2)k$$

$$\text{Solving, } T = 4$$

A takes 6 hours and B takes 4 hours to fill the tank while working independently.

Capacity of the tank = 12k or starting time = 2 pm

Time taken to fill if the pumps work together = $12k / (2k+3k) = 2.4$ hours

Filling time = 4:24 pm.

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

22. Ramesh and Ganesh can together complete a work in 16 days. After seven days of working together, Ramesh got sick, and his efficiency fell by 30%. As a result, they completed the work in 17 days instead of 16 days. If Ganesh had worked alone after Ramesh got sick, in how many days would he have completed the remaining work?

- A. 12
- B. 14.5
- C. 13.5
- D. 11

Answer: C

Solution:

Let Ramesh do R work in a day and Ganesh can do G work in a day.

Together they will do (R+G) work.

$$\text{So, the total work} = 16(R+G) = T \text{ (let)} \dots\dots\dots(1)$$

$$\text{In 7 days, work done} = 7(R+G)$$

$$\text{So, remaining work} = 9(R+G)$$

Then the efficiency of R becomes 0.7R.

$$\text{Remaining number of days} = 17 - 7 = 10$$

$$\text{So, } 10(0.7R+G) = 9(R+G)$$

$$7R + 10G = 9R + 9G \text{ or } G = 2R$$

Substituting the value in (1), we get,

$$T = 16(3R) = 48R$$

$$\text{So, remaining work} = 27R$$

That G can do in $27R/2R = 13.5$ days.

Hence, option (C) is the correct answer.

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

23. If a and b are integers such that $2x^2 - ax + 2 > 0$ and $x^2 - bx + 8 \geq 0$ for all real numbers x, then the largest possible value of $2a - 6b$ is

Answer: 36

Solution:

$Ax^2+Bx+C=E$ (let)

$AE < 0$ if x lies between the two different real roots of the equation $E=0$

Since $2x^2 - ax + 2 > 0$ and $x^2 - bx + 8 \geq 0$ for all real numbers x ,

We can infer that the equations $2x^2 - ax + 2 = 0$ and $x^2 - bx + 8 = 0$ has no real root

So, both the equations have negative discriminant.

So, from the first equation, we get, $a^2 - 16 < 0$ or $(-4) < a < 4$ (1)

Since a is an integer, values a can take are $(-3), (-2), \dots, 2, 3$

On the other hand, from the second equation, we will get,

$(-4\sqrt{2}) < b < 4\sqrt{2}$ (2)

Since b is an integer, max value = 5, min value = -5

Now, $2a - 6b = 2(3) - 6(-5) = 6 + 30 = 36$.

Hence, 36 is the correct answer.

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

24. The scores of Amal and Bimal in an examination are in the ratio 11 : 14. After an appeal, their scores increase by the same amount and their new scores are in the ratio 47 : 56. The ratio of Bimal's new score to that of his original score is

- A. 3 : 2
- B. 4 : 3
- C. 5 : 4
- D. 8 : 5

Answer: B

Solution:

Let the old scores of Amal and Bimal be $11x$ and $14x$, respectively.

After the appeal, let their marks be increased by m .

Thus, we can write the following:

$$(11x + m)/(14x + m) = 47/56$$

$$616x + 56m = 658x + 47m$$

$$9m = 42x$$

$$m = 14x/3$$

Thus, Bimal's new score becomes $= 14x + 14x/3 = 56x/3$

And the required ratio is $(56x/3)/14x = 4/3$.

Hence, option (B) is the correct answer.

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

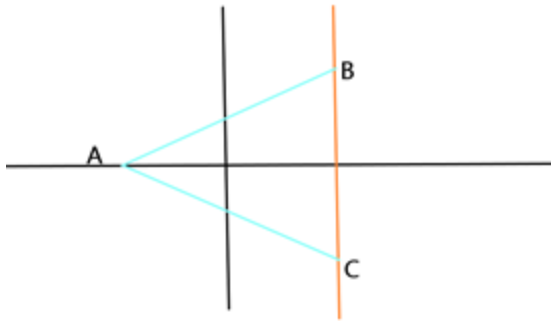
25. A triangle ABC has area 32 sq. units and its side BC, of length 8 units, lies on the line $x = 4$. Then the shortest possible distance between A and the point (0,0) is

- A. $4\sqrt{2}$ units
- B. $2\sqrt{2}$ units
- C. 4 units

D. 8 units

Answer: C

Solution:



In the above diagram, the black lines signify the coordinate axes

The red line signifies the straight-line $x = 4$, which is parallel to the Y axis and is 4 units towards the right of the Y axis

BC = base of the triangle = 8 units

Since, the area of the triangle is 32 square units,

$$\frac{1}{2} \times H \times 8 = 32$$

So, we will get, $H = 8$ units

Now, to get A as close as possible to the origin, that is, $(0,0)$, we need to take the X-axis as the height of the triangle ABC.

Also, consider ABC is isosceles where $AB = AC$

So, A will be 8 units away from the side BC

So, A will be at the point $(-4,0)$

So, A will be 4 units away from the origin.

Hence, option (C) is the correct answer.

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

26. How many two-digit numbers, with a non-zero digit in the unit's place, are there which are more than thrice the number formed by interchanging the positions of its digits?

- A. 5
- B. 8
- C. 7
- D. 6

Answer: D

Solution:

Let, the digit at unit's place be U ($\neq 0$) and the digit at ten's place be T.

So, the number is $10T+U$ and the reversed number will be $10U+T$.

So, $10T+U > 3(10U+T)$

$$10T + U > 30U + 3T$$

$$7T > 29U$$

$$T > \frac{29}{7}U \text{ or } T > 4U$$

So, the possible pairs of (T,U) are (5,1) (6,1) (7,1) (8,1) (9,1) and (9,2).

Hence, option (D) is the answer.

###TOPIC###Quantitative Aptitude||Algebra||Linear Equations###

27. A water tank has inlets of two types A and B. All inlets of type A when open, bring in water at the same rate. All inlets of type B, when open, bring in water at the same rate. The empty tank is completely filled in 30 minutes if 10 inlets of type A and 45 inlets of type B are open, and in 1 hour if 8 inlets of type A and 18 inlets of type B are open. In how many minutes will the empty tank get completely filled if 7 inlets of type A and 27 inlets of type B are open?

Answer: 48

Solution:

Let, each inlet of type A fills 'a' units of water.

And each inlet of type B fills 'b' units of water.

Also let the time taken in the third case to fill the tank be 'm' minutes.

So, $30(10a+45b)=60(8a+18b)=m(7a+27b)$ = total capacity of the water tank

$$150(2a+9b)=120(4a+9b)=m(7a+27b)=T \text{ (let)}$$

$$150(2a+9b)=120(4a+9b)$$

$$5(2a+9b)=4(4a+9b)$$

$$10a+45b=16a+36b$$

$$9b = 6a \text{ or } 3b=2a=6k \text{ (let), Where } k \text{ is a non-zero constant.}$$

$$b=2k \text{ and } a = 3k$$

So, substituting this value in the initial equation, we will get,

$$30(10a+45b)=60(8a+18b)=m(7a+27b)$$

$$30(30k+90k)=60(24k+36k)=m(75k)$$

$$30(120k)=60(60k)=75mk \text{ or } m = 48.$$

Hence, 48 is the correct answer.

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

28. Gopal borrows Rs. X from Ankit at 8% annual interest. He then adds Rs. Y of his own money and lends Rs. X+Y to Ishan at 10% annual interest. At the end of the year, after returning Ankit's dues, the net interest retained by Gopal is the same as that accrued to Ankit. On the other hand, Gopal lent Rs. X+2Y to Ishan at 10%, then the net interest retained by him would have increased by Rs. 150. If all interests are compounded annually, then find the value of X + Y.

Answer: 4000

Solution:

Let, X and Y be Rs. 100a and Rs. 100b respectively.

Since Gopal had borrowed Rs. 100a from Ankit, he owes 8% of Rs.100a=Rs.8a to Ankit at the end of the year.

Similarly, Gopal lends Rs. (100a + 100b) to Ishan at 10% annual interest. Hence, Ishan owes Gopal an interest of 10% of Rs.(100a+100b)=Rs.(10a+10b) at the end of the year.

Now, interest is retained by Gopal after paying Ankit.

$$\text{Rs. } (10a+10b-8a) = \text{Rs. } (2a+10b)$$

According to the question,

Interest retained by Gopal = Interest accrued by Ankit

$$2a+10b=8a$$

$$6a=10b$$

$$a/b=5/3 \dots\dots (i)$$

If Gopal had lent Rs. (X + 2Y) i.e., Rs. (100a+200b) to Ishan at 10% annual interest rate, then, Ishan would have owed to Gopal 10% of Rs.(100a+200b)=Rs.(10a+20b)

Again, interest retained by Gopal after paying to Ankit

$$\text{Rs. } (10a+20b-8a) = \text{Rs. } (2a+20b)$$

According to the question,

Interest retained by Gopal increased by Rs. 150

$$(2a+20b)-(2a+10b)=150$$

$$10b=150$$

$$b=15$$

$$100b=1500$$

Hence, from (i),

$$a/b=5/3$$

$$a/15=5/3$$

$$a=25$$

$$100a=2500$$

Thus, X + Y = 100a + 100b = 2500 + 1500 = 4000.

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

29. The arithmetic mean of x, y and z is 80, and that of x, y, z, u and v is 75, where $u = (x+y)/2$ and $v = (y+z)/2$. If $x \geq z$, then the minimum possible value of x is

Answer: 105

Solution:

$$\text{We get } x + y + z = (3)(80) = 240 \dots\dots\dots(1)$$

$$\text{And } x + y + z + u + v = (5)(75) = 375 \dots\dots\dots(2)$$

$$(2) - (1) \text{ gives } u + v = 135 \dots\dots\dots(3)$$

Now, substituting the values of u and v,

$$\text{we get } (x + y)/2 + (y + z)/2 = 135$$

$$x + 2y + z = 270 \dots\dots\dots(4)$$

$$(4) - (1) \text{ gives us } y = 30 \dots\dots\dots(5)$$

Substituting this value in (4),

$$\text{we get } x + z = 210$$

As $x \geq z$, and considering x and z to be integral,
we can say the minimum value of x is 105.

Hence, 105 is the correct answer.

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

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

Answer: 20

Solution:

We can form the following table:

Case	Min	Max	Eqn	Soln	$f(x)$
1	$5x$	$52 - 2x^2$	$5x < 52 - 2x^2$	$(0, 4)$	$(20, 52)$
2	$52 - 2x^2$	$5x$	$5x > 52 - 2x^2$	$4 < x$	$(20, \text{inf})$

Hence, 20 is the correct answer.

###TOPIC###Quantitative Aptitude||Algebra||Inequalities###

31. For two sets A and B , let $A \Delta B$ denote the set of elements which belong to A or B but not both. If $P = \{1, 2, 3, 4\}$, $Q = \{2, 3, 5, 6\}$, $R = \{1, 3, 7, 8, 9\}$, $S = \{2, 4, 9, 10\}$, then the number of elements in $(P \Delta Q) \Delta (R \Delta S)$ is

- A. 7
- B. 8
- C. 9
- D. 6

Answer: A

Solution:

Now, $R \Delta S = \{1, 3, 7, 8, 2, 4, 10\}$

And $P \Delta Q = \{1, 4, 5, 6\}$

So, $(P \Delta Q) \Delta (R \Delta S)$ is, $\{2, 7, 8, 2, 10, 5, 6\}$

So, there are 7 elements.

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

32. If $A = \{62n - 35n - 1 : n = 1, 2, 3, \dots\}$ and $B = \{35(n-1) : n = 1, 2, 3, \dots\}$ then which of the following is true?

- A. Neither every member of A is in B nor every member of B is in A.
- B. Every member of A is in B and at least one member of B is not in A.
- C. Every member of B is in A.
- D. At least one member of A is not in B.

Answer: B

Solution:

$A = \{62n - 35n - 1 : n = 1, 2, 3, \dots\}$ and $B = \{35(n-1) : n = 1, 2, 3, \dots\}$

For A, $62n - 35n - 1 = (36)n - 35n - 1 = (35+1)n - 35n - 1 = 35n + n - 35n - 1 + \dots + 35n + 1 - 35n - 1 = 35(35n-1+n-35n-2+\dots+35) = \text{multiple of } 35$

Now, for $n = 1$, the element is zero.

In B also, for $n = 1$, the element is zero.

In B, all elements are multiple of 35.

But, we can see that A has larger multiples of 35.

Hence, not all values of B will be in A.

Hence, option (B) is the correct answer.

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

33. The strength of a salt solution is p% if 100 ml of the solution contains p grams of salt. If three salt solutions A, B, C are mixed in the proportion 1 : 2 : 3, then the resulting solution has strength 20%. If instead the proportion is 3 : 2 : 1, then the resulting solution has a strength of 30%. A fourth solution, D, is produced by mixing B and C in the ratio 2 : 7. The ratio of the strength of D to that of A is

- A. 3 : 10
- B. 1 : 3
- C. 2 : 5
- D. 1 : 4

Answer: A

Solution:

Let, strength of the solutions A, B, C, and D be a, b, c and d respectively.

From the first condition,

$$(a+2b+3c)/6=20\%=0.2=1/5 \dots\dots\dots(1)$$

$$\text{From the second condition, } (3a+2b+c)/6=30\%=0.3=3/10 \dots\dots\dots(2)$$

$$\text{And } d=(2b+7c)/9 \dots\dots\dots(3)$$

$$\text{From (1), we get, } a+2b+3c = 1.2 \dots\dots\dots(4) \text{ Or}$$

$$5a+10b+15c=6 \dots\dots\dots(4A)$$

$$\text{From (2) we get, } 3a+2b+c=1.8 \dots\dots\dots(5) \text{ Or}$$

$$15a+10b+5c=9 \dots\dots\dots(5A)$$

$$\text{From (3), we get, } 9d= 2b+7c \dots\dots\dots(6)$$

$$(4A) \times 3 \quad 15a+30b+45c=18 \dots\dots\dots(4B)$$

$$(4B) - (5A) \quad 20b + 40c = 9 \dots\dots\dots(\#)$$

Now, (5) - (4) gives us $2a - 2c = 0.6$

$$a - c = 0.3$$

Hence, option (A) is the correct answer.

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

$$34. \frac{1}{\log_2 100} - \frac{1}{\log_4 100} + \frac{1}{\log_5 100} - \frac{1}{\log_{10} 100} + \frac{1}{\log_{20} 100} - \frac{1}{\log_{25} 100} + \frac{1}{\log_{50} 100} = ?$$

- A. 0
- B. $\frac{1}{2}$
- C. -4
- D. 10

Answer: B

Solution:

$$\text{Given that, } \frac{1}{\log_2 100} - \frac{1}{\log_4 100} + \frac{1}{\log_5 100} - \frac{1}{\log_{10} 100} + \frac{1}{\log_{20} 100} - \frac{1}{\log_{25} 100} + \frac{1}{\log_{50} 100}$$

$$= \log_{100} 2 - \log_{100} 4 + \log_{100} 5 - \log_{100} 10 + \log_{100} 20 - \log_{100} 25 + \log_{100} 50.$$

$$= \log_{100} \left(\frac{2}{4} \times \frac{5}{10} \times \frac{20}{25} \times 50 \right) = \log_{100} 10 = \frac{1}{2}.$$

Hence, option (B) is the correct answer.

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

