## CBSE 10th Mathematics Question Paper 2023 with Solutions - Set 2

Section A:
1: In what ratio, does the x-axis divide the line segment joining the points $A(3,6)$ and $B(-12,-3)$ ?
(A) $1: 2$
(B) $1: 4$
(C) $4: 1$
(D) $2: 1$

## Solution: (D)

Given points are $A(3,6)$ and $B(-12,-3)$.
Let $P(x, 0)$ be the point on the $x$ axis.
Using the section formula, we have $P(x, y)=\left(\left(m_{1} x_{2}+m_{2} x_{1}\right) /\left(m_{1}+m_{2}\right),\left(m_{1} y_{2}+m_{2} y_{1}\right) /\left(m_{1}+m_{2}\right)\right)$ $(x, y)=(x, 0)$
Equate y component to zero
$\left.=>m_{1}(-3)+m_{2} 6\right) /\left(m_{1}+m_{2}\right)=0$
$3 m_{1}=6 m_{2}$
$=>m_{1} / m_{2}=6 / 3$
= $2 / 1$
The required ratio is 2:1.
Hence option D is the answer.
2: In the given figure, $P Q$ is a tangent to the circle centred at $O$. If $\angle A O B=95^{\circ}$, then the measure of $\angle A B Q$ will be

(A) $47.5^{\circ}$
(B) $42.5^{\circ}$
(C) $85^{\circ}$
(D) $95^{\circ}$

## Solution:

We know the tangent at any point of a circle is perpendicular to the radius through the point of contact.
$\angle \mathrm{OBQ}=90^{\circ}$
$\mathrm{OA}=\mathrm{OB}$ (Radius of circle)
So $\angle \mathrm{OAB}=\angle \mathrm{OBA}$
$95+2 x=180$ (Sum of angles of a triangle is 180)
$2 x=85$
$\Rightarrow x=42.5$
$\angle A B Q=90-42.5$
$=47.5$
Hence option A is the answer.
3. If $2 \tan A=3$, then the value of $(4 \sin A+3 \cos A) /(4 \sin A-3 \cos A)$ is
(A) $7 / \sqrt{ } 13$
(B) $1 / \sqrt{ } 13$
(C) 3
(D) does not exist

## Solution:

Given $2 \tan \mathrm{~A}=3$
$\tan A=3 / 2$
$\sin A=3 / \sqrt{ } 13$
$\cos A=2 / \sqrt{13}$
So $(4 \sin A+3 \cos A) /(4 \sin A-3 \cos A)=3$
Hence option C is the answer.
Question 4. In a group of 20 people, 5 can't swim. If one person is selected at random, then the probability that he/she can swim, is
(A) $3 / 4$
(B) $1 / 3$
(C) 1
(D) $1 / 4$

## Solution:

Total number of people $=20$
No. of people who can swim $=15$
Required probability $=15 / 20=3 / 4$
Hence option $A$ is the answer.
Question 5. The distribution below gives the marks obtained by 80 students on a test.

| Marks | Less than <br> 10 | Less than <br> 20 | Less than <br> 30 | Less than <br> 40 | Less than <br> 50 | Less than <br> 60 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| No. of <br> students | 3 | 12 | 27 | 57 | 75 | 80 |

The modal class of this distribution is
(A) 10-20
(B) 20-30
(C) 30-40
(D) $50-60$

## Solution:

In a frequency distribution, the class that consists of the highest frequency is known as the modal class.

| Marks | Frequency |
| :--- | :--- |
| $0-10$ | 3 |
| $10-20$ | $12-3=9$ |
| $20-30$ | $27-12=15$ |
| $30-40$ | $57-27=30$ |
| $40-50$ | $75-57=18$ |
| $50-60$ | $80-75=5$ |

Modal class is $30-40$.
Hence option C is the answer.
Question 6. The curved surface area of a cone having height $\mathbf{2 4} \mathrm{cm}$ and radius $\mathbf{7 c m}$, is
(A) $528 \mathrm{~cm}^{2}$
(B) $1056 \mathrm{~cm}^{2}$
(C) $550 \mathrm{~cm}^{2}$
(D) $500 \mathrm{~cm}^{2}$

## Solution:

Given that height of cone $=24 \mathrm{~cm}$
Radius $=7 \mathrm{~cm}$
Slant height, $I=\sqrt{ }\left(h^{2}+r^{2}\right)$
$=\sqrt{ } 625$
$=25$
CSA $=\pi r$
$=(22 / 7) \times 7 \times 25$
$=550 \mathrm{~cm}^{2}$
Hence option C is the answer.
Question 7. The end-points of a diameter of a circle are $(2,4)$ and $(-3,-1)$. The radius of the circle is
(A) $2 \sqrt{ } 5$
(B) $(5 / 2) \sqrt{ } 5$
(C) $(5 / 2) \sqrt{ } 2$
(D) $5 \sqrt{ } 2$

## Solution:

The length of the diameter can be found by using the distance formula.

Distance between $(2,4)$ and $(-3,-1)=\sqrt{ }\left((-3-2)^{2}+(-1-4)^{2}\right)$
$=\sqrt{ } 50$
$=5 \sqrt{ } 2$
Radius $=$ diameter $/ 2$
$=(5 / 2) \sqrt{ } 2$
Hence option C is the answer.
Question 8. Which of the following is a quadratic polynomial with zeros (5/3) and 0 ?
(A) $3 x(3 x-5)$
(B) $3 x(x-5)$
(C) $x^{2}-5 / 3$
(D) $5 x^{2} / 3$

## Solution:

Sum of zeros, $S=5 / 3$
Product of zeros, $\mathrm{P}=0$
Quadratic polynomial is given by $x^{2}-S x+P$
Check the given options
$3 x(3 x-5)=0$
$=>9 x^{2}-15 x=0$
Solving using quadratic formula, we get zeros are $5 / 3$ and 0 .
Hence option $A$ is the answer.
Question 9. The graph of $y=p(x)$ is given, for a polynomial $p(x)$. The number of zeroes of $p(x)$ from the graph is

(A) 3
(B) 1
(C) 2
(D) 0

## Solution:

Look at the graph and find how many points the graph cuts or touches the x-axis.
Here it is only at 1 point.
Hence option B is the answer.

Question 10. The value of $k$ for which the pair of equations $k x=y+2$ and $6 x=2 y+3$ has infinitely many solutions,
(A) $k=3$
(B) does not exist
(C) $k=-3$
(D) $k=4$

## Solution:

Given that $k x=y+2$
$6 x=2 y+3$
Rearranging above equations
$k x-y=2$
$6 x-2 y=3$
Condition for infinite solutions is $\mathrm{a}_{1} / \mathrm{a}_{2}=\mathrm{b}_{1} / \mathrm{b}_{2}=\mathrm{c}_{1} / \mathrm{c}_{2}$
$k / 6=1 / 2=2 / 3$
No value of $k$ satisfies the equation.
=> does not exist.
Hence option B is the answer.
11. If $a, b, c$ form an A.P. with common difference $d$, then the value of $a-2 b-c$ is equal to
(A) $2 a+4 d$
(B) 0
(C) $-2 a-4 d$
(D) $-2 a-3 d$

Solution:
Given a, b, c are in AP
$b=a+d$
$c=a+2 d$
$a-2 b-c=a-2(a+d)-a-2 d$
$=a-2 a-2 d-a-2 d$
$=-2 a-4 d$
Hence option C is the answer.
12. If the value of each observation of a statistical data is increased by 3 , then the mean of the data
(A) remains unchanged
(B) increases by 3
(C) increases by 6
(D) increases by $3 n$

## Solution:

If each observation of the data is increased by 3 , then their mean is increased by 3 .
Hence option B is the answer.
13. Probability of happening of an event is denoted by $p$ and probability or non-happening of the event is denoted by $q$. Relation between $p$ and $q$ is (A) $p+q=1$
(B) $p=1, q=1$
(C) $p=q-1$
(D) $p+q+1=0$

## Solution:

We know that $P($ Event $A$ will occur $)+P($ Event $A$ will not occur $)=1$
So $p+q=1$
Hence option $A$ is the answer.
14. A girl calculates that the probability of her winning the first prize in a lottery is 0.08 . If $\mathbf{6 0 0 0}$ tickets are sold, how many tickets has she bought?
(A) 40
(B) 240
(C) 480
(D) 750

## Solution:

Given, total number of tickets sold $=6000$
Probability of her winning $=0.08$
Total number of tickets she bought $=6000 \times 0.08$
$=480$
Hence option C is the answer.
15. If $\alpha, \beta$ are the zeroes of a polynomial $p(x)=x^{2}+x-1,(1 / \alpha)+(1 / \beta)$ equals is
(A) 1
(B) 2
(C) -1
(D) $-1 / 2$

## Solution:

Given $x^{2}+x-1=0$
Here $a=1, b=1, c=-1$
Sum of roots $=\alpha+\beta$
$=-b / a$
= -1
Product of roots $=\alpha \beta$
= c/a
$=-1$
$(1 / \alpha)+(1 / \beta)=\alpha+\beta) / \alpha \beta$
$=-1 /-1$
= 1
Hence option $A$ is the answer.
16. The least positive value of $k$, for which the quadratic equation $x^{2}+k x-4=0$ has rational roots, is
A) $\pm 2 \sqrt{ } 2$
(B) 2
(C) $\pm 2$
(D) $\sqrt{ } 2$

## Solution:

If $D>0$ and a perfect square, then the roots of the quadratic equation are real, unequal and rational.
The least positive value of k is 2 .
Hence option B is the answer.
17. $\left[(5 / 8) \sec ^{2} 60-\tan ^{2} 60+\cos ^{2} 45\right]$ is equal to
(A) $-5 / 3$
(B) $-1 / 2$
(C) 0
(D) $-1 / 4$

## Solution:

We know $\sec ^{2} 60=4$
$\tan ^{2} 60=3$
$\cos ^{2} 45=1 / 2$
Substituting the values in [(5/8) $\left.\sec ^{2} 60-\tan ^{2} 60+\cos ^{2} 45\right]$
We get 0
Hence option C is the answer.
18. Curved surface area of a cylinder of height 5 cm is $94.2 \mathrm{~cm}^{2}$. Radius of the cylinder is
(A) 2 cm
(B) 3 cm
(C) 2.9 cm
(D) 6 cm

## Solution:

Given height of cylinder $=5 \mathrm{~cm}$
Curved surface area $=94.2 \mathrm{~cm}^{2}$
CSA $=2 \pi r h$
$94.2=2 \times 3.14 \times r \times 5$
Solving we get, $r=3$
Hence option B is the answer.
Assertion-Reason Type Questions
In Question 19 and 20, an Assertion (A) statement is followed by a statement of Reason (R). Select the correct option out of the following:
(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true but Reason (R) is false.
(D) Assertion (A) is false but Reason (R) is true.
19. Assertion (A) :The perimeter of triangle ABC is a rational number.

Reason (R) : The sum of the squares of two rational numbers is always rational.


## Solution:

The hypotenuse of the triangle $A B C=\sqrt{ }(4+9)$
$=\sqrt{ } 13$ (irrational)
Assertion is false
Hence option D is the answer.
20. Assertion (A) : Point $P(0,2)$ is the point of intersection of $y$-axis with the line $3 x$ $+2 \mathrm{y}=4$.
Reason $(R)$ : The distance of point $P(0,2)$ from $x$-axis is 2 units.

## Solution:

Put (0, 2) in $3 x+2 y=4$
We get LHS = RHS
Assertion is true.
Reason is also true. But it is not the correct explanation of Assertion (A).
Hence option B is the answer.

## Section B

21. Find the least number which when divided by 12,16 and 24 leaves the remainder 7 in each case.

## Solution:

The least number which is divisible by 12,16 , and 24 is the LCM of 12,16 , and 24.
LCM of 12,16 and $24=48$
So the least number which when divided by 12,16 and 24 leaves the remainder 7 in each case $=48+7$
$=55$
22. A bag contains 4 red, 3 blue and 2 yellow balls. One ball is drawn at random from the bag. Find the probability that drawn ball is
(i) red
(ii) yellow

## Solution:

No. of red balls $=4$
No. of blue balls $=3$
No. of yellow balls $=2$

Total number balls $=4+3+2$
= 9
Probability of getting red ball $=4 / 9$
Probability of getting yellow ball $=2 / 9$
23 (a). Solve the pair of equations $x=5$ and $y=7$ graphically.

## Solution:

Below is the graph of $x=5$ and $y=7$
The lines intersect at $(5,7)$

23. (b) Using graphical method, find whether pair of equations $x=0$ and $y=-3$, is consistent or not.

## Solution:


$x=0$ and $y=-3$ intersect at $(0,-3)$.
Unique solution exists.
Hence the equations are consistent.
24 (a). If $\sin x+\cos x=\sqrt{ } 3$, then find the value of $\sin x \cos x$.

## Solution:

Given $\sin x+\cos x=\sqrt{ } 3$
Squaring both sides
$1+2 \sin x \cos x=3$
$2 \sin x \cos x=2$
So $\sin \mathrm{x} \cos \mathrm{x}=1$

24 (b) If $\sin A=1 / \sqrt{ } 2$ and $\cot B=\sqrt{ } 3$, then find the value of $\operatorname{cosec} A+\operatorname{cosec} B$.

## Solution:

Given $\sin A=1 / \sqrt{ } 2$ and $\cot B=\sqrt{ } 3$
We get $A=45$ and $B=30$
So cosec $A+\operatorname{cosec} B=\sqrt{ } 2+2$
25. In the given figure, $X Z$ is parallel to $B C . A Z=3 \mathrm{~cm}, Z C=2 \mathrm{~cm}, B M=3 \mathrm{~cm}$ and $M C=$ 5 cm . Find the length of $X Y$.


## Solution:

Given that $A Z=3 \mathrm{~cm}, Z C=2 \mathrm{~cm}, B M=3 \mathrm{~cm}$ and $M C=5 \mathrm{~cm}$.
Here triangle $A X Z$ and triangle $A B C$ are similar.
$A Z / A C=X Z / B C=A X / A B$
$3 / 5=X Z / 8$
$X Z=4.8$
Solving $X Y=1.8$

