CBSE EXAMINATION PAPER-2021

MATHEMATICS

(Solved)

Time allowed : 3 hours | Maximum Marks : 48

General Instructions :

Read the following instructions carefully and follow them :

i. This question paper contains **18 questions.** All questions are **compulsory.**

ii. This question paper is divided into **4 sections.**

iii. **Section A** – questions number **1 to 1** are case based questions

iv. **Section B** – questions number **2 to 8** are very short answer

v. **Section C** – questions number **9 to 14** are short answer

vi. **Section D** – questions number **15 to 18** are long answer

vii. There is no overall choice given in the question paper. However, an internal choice has been provided in few questions.

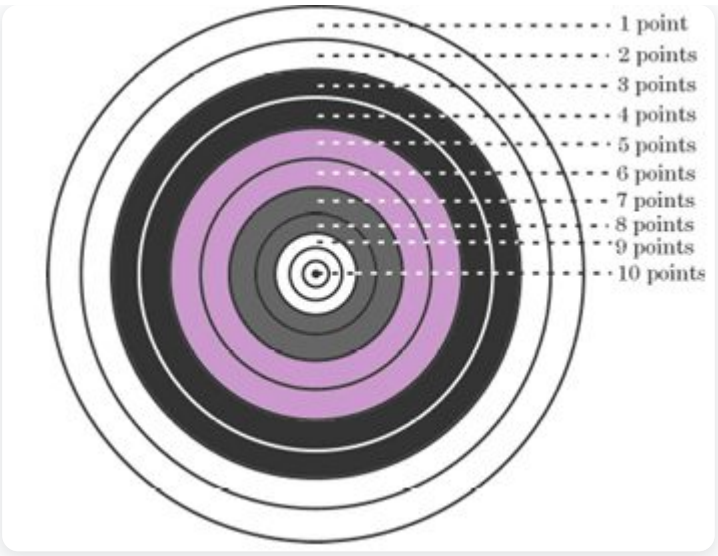
viii. Use of calculator is NOT allowed.

Section A

Question 1.

In a game of Archery, each ring of the Archery target is valued. The centremost ring is worth 10 points and rest of the rings are allotted points 9 to 1 in sequential order moving outwards. Archer A is likely to earn 10 points with a probability of 0·8 and Archer B is likely the earn 10 points with a probability of 0·9.

Based on the above information, answer the following questions : If both of them hit the Archery target, then find the probability that



(1) exactly one of them earns 10 points

[2 Marks]

(2)

both of them earn 10 points.

[2 Marks]

Section B

Question 2. A bag contains 3 red and 4 white balls. Three balls are drawn at random, one-by-one without replacement from the bag. If the first ball drawn is red in colour, then find the probability that the remaining two balls drawn are also red in colour.

[2 Marks]

Question 3.

A coin is tossed twice. The following table shows the probability distribution of number of tails:

(a) Find the value of K. (b) Is the coin tossed biased or unbiased? Justify your answer.

[2 Marks]

X	0	1	2
P(X)	K	6K	9K

Question 4.

The foot of a perpendicular drawn from the point (-2, -1, -3) on a plane is (1, -3, 3). Find the equation of the plane.

[2 Marks]

Question 5.

If $|\square\square\times\square\square|^2+|\square\square\cdot\square\square|^2=400$ and $|\square\square|=5$, then find the value of $|\square\square|$.

[2 Marks]

Question 6.

Find all the possible vectors of magnitude $5\sqrt{3}$ which are equally inclined to the coordinate axes.

[2 Marks]

Question 7. Find the general solution of the differential equation $\sec^2x\cdot\tan y\,dx + \sec^2y\cdot\tan x\,dy = 0$.

[2 Marks]

Question 8.

Evaluate:

[2 Marks]

$$\int_0^1 x^2e^x\,dx$$

Section C

Question 9.

Find the area of the region $\{(x, y) : x^2 \le y \le x + 2\}$, using integration.

[3 Marks]

Question 10.

Find the $\int 1/+ e^{x} +1\,dx$.

[3 Marks]

Question 11.

Evaluate

[3 Marks]

$$\int_1^4 \{|x|+|3-x|\}\,dx$$

Question 12.

If □□, □□ and □□ (2□□+□□+2□□) is equally inclined to both □□ and □□. Also, find the angle between □□ and (2□□+□□+2□□).

[3 Marks]

Question 13. If a line makes 60° and 45° angles with the positive directions of the x-axis and z-axis respectively, then find the angle that it makes with the positive direction of y-axis. Hence, write the direction cosines of the line.

[3 Marks]

Question 14.

Check whether the lines x-1/2=y - 2/3=z-3/4 and x-4/5=y-1/2 = z are skew or not.

[3 Marks]

Section D

Question 15.

Find the equations of the planes passing through the line of intersection of the planes □□·($\hat{i}$+3$\hat{j}$)=6and □□·(3$\hat{i}$−$\hat{j}$−4$\hat{k}$) =0, which are at a distance of 1 unit from the origin.

[4 Marks]

Question 16.

Find the particular solution of the differential equation x dy/dx + y+1/1+x^2 = 0, given that y(1) = 0.

[4 Marks]

Question 17. Find the general solution of the differential equation x (y^3 + x^3) dy = ($2y^4$ + $5x^3$ y) dx.

[4 Marks]

Question 18.

Evaluate

[4 Marks]

$$\int_0^{\pi/2} (2 \log \cos x - \log \sin 2x)\, dx$$