# MATHS

## BOOKS - JMD MATHS (PUNJABI ENGLISH)

## PROBABILITY

**Example**

**1.** The length of the perpendicular drawn from the origin to

$2x - 3y + 6z + 21 = 0$

A. 21

B. 5

C. 3

D. 7

**Answer: C**

**2.** Find the distance of plane 3x + 4z + 15 = 0 from (5, 0, 0)

A. 6

B. 5

C. 7

D. 3

**Answer: D**

**3.** The intercept cut off by plane 2x + 3y - z = 6 on y-axis

A. 3

B. 6

C. $-3$

D. 2

**Answer: D**

**4.** Find d.r. of the line $\dfrac{4-x}{2} = \dfrac{y}{6} = \dfrac{1-z}{3}$

A. $\leftarrow 2, 6, -3 >$

B. $< 2, 6, -3 >$

C. $< 2, 6, 3 >$

D. $< 2, -6, -3 >$

**Answer: A**

**5.** If P = (1, 5, 4) and Q = (4, 1, -2) then find the d.r. of PQ.

A. $< 3, 4, 6 >$

B. $< 3, -4, -6 >$

C. $\leftarrow 3, -4, -6 >$

D. $< 3, 4, -6 >$

**Answer: B**

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**6.** Direction cosines of the line parallel to line $\dfrac{x-5}{2} = \dfrac{y+3}{-3} = \dfrac{z-5}{6}$

A. $< 2, -3, 6 >$

B. $< 5, -3, 5 >$

C. $< \dfrac{2}{7}, \dfrac{-3}{7}, \dfrac{6}{7} >$

D. $\leftarrow 5, 3, -5 >$

**Answer: C**

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**7.** Find distance of (-2, 3, 4) from x-axis is

A. $-2$

B. 5

C. 2

D. 3

**Answer: B**

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**8.** Find the d.r. of the normal to the plane 4x + 3y - z + 6 = 0 and

A. $< -4, -3, 1 >$

B. $< 4, -3, -1 >$

C. $< 4, -3, -1 >$

D. $< 4, 3, -1 >$

**Answer: D**

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**9.** The distance between the planes, 3x+ 2y-6z-14=0 and 3x+ 2y-6z+21 =0 is,

A. 35

B. 5

C. 7

D. 0

**Answer: B**

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**10.** The point which lies in the plane given by the equation $5x + y - z = 7$ is

A. $(0, \ -7, 0)$

B. $(-7, 0, 0)$

C. $(0, 0, \ -7)$

D. $(0, 0, 0)$

**Answer: C**

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**11.** If $\cos \alpha$, $\cos \beta$, $\cos \gamma$ are the direction-cosines of a line, then the value of $\sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma =$

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**12.** Fill in the blanks :

The direction cosines of the line joining points (1, 0, 0) and (0, 1, 1) are ..........
.

**13.** Fill in the blanks :

The direction ratios of the line $\dfrac{2x - 1}{3} = \dfrac{4 - y}{1} = \dfrac{3z + 6}{6}$ are .......... .

**14.** Fill in the blanks :

The equation of the line passing through (1, 2, 3) and parallel to $3\hat{i} - \hat{j} + 2\hat{k}$ is .......... .

**15.** Fill in the blanks :

The x-intercept of the plane 2x - 3y + 5z + 4 = 0 is ......... .

**16.** State whether it is true or false:If a line makes angles alpha, beta, gamma which positive direction of axes then $\cos 2\alpha + \cos 2\beta + \cos 2\gamma = 1.$

**17.** State True/False.

the x-intercept of 3x - 4y + 6z = 12 is 3.

**18.** State True/False.

the length of perpendicular from origin to plane 4x + 3y + z = 13 is $\sqrt{13}$ units.

**19.** Find the length of the perpendicular drawn from the point (2, 3, 7) to the plane 3x - y - z = 7. Also find the coordinates of the foot of the perpendicular.

**20.** Show that the lines

$$\overrightarrow{r} = 3\hat{i} + 2\hat{j} - 4\hat{k} + \lambda\left(\hat{i} + 2\hat{j} + 2\hat{k}\right) \text{ and } \overrightarrow{r} = 5\hat{i} - 2\hat{j} + \mu\left(3\hat{i} + 2\hat{j} + 6\right)$$

are intersecting. Also, find the point of intersection.

**21.** Find the equation of the plane passing through the points (-1, 2, 0) , (2, 2, -1) and parallel to the line $\dfrac{x-1}{1} = \dfrac{2y+1}{2} = \dfrac{z+1}{-1}$.

**22.** Find the equation of the line passing through the point P(4, 6, 2) and the point of intersection of the line $\dfrac{x-1}{3} = \dfrac{y}{2} = \dfrac{z+1}{7}$ and the plane x + y - z = 8.

**23.** Find the shortest distance between the lines whose equations are :

$$\overrightarrow{r} = \hat{i} + 2\hat{j} + \hat{k} + \lambda\left(\hat{i} - \hat{j} + \hat{k}\right)$$ and

$$\overrightarrow{r} = 2\hat{i} - \hat{j} - \hat{k} + \mu\left(2\hat{i} + \hat{j} + 2\hat{k}\right).$$

**24.** Find the distance of the point (-1 , -5 , -10) from the point of intersection of the line $\vec{r} = 2\hat{i} - \hat{j} + 2\hat{k} + \lambda\left(3\hat{i} + 4\hat{j} + 2\hat{k}\right)$ and the plane $\vec{r} \cdot \left(\hat{i} - \hat{j} + \hat{k}\right) = 5$.

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**25.** Find the coordinates of the foot of perpendicular drawn from the point A(1, 8, 4) to the line joining the points B(0, -1, 3) and C(2, -3, -1). Hence find the image of the point A in the line BC.

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**26.** Find the equation of the plane passing through the point ( 1, -1 , 2) and perpendicular to the planes 2x + 3y - 2z = 5 and x + 2y - 3z = 8.

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**27.** A variable plane which is at a constant distance 3p from the origin meets the axes in points A, B and C respectively. Show that the locus of the centroid of $\triangle$ABC is $\dfrac{1}{x^2} + \dfrac{1}{y^2} + \dfrac{1}{z^2} = \dfrac{1}{p^2}$

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**28.** Find the equation of the plane passing through the points (3,4,1) and (0,1,0) and parallel to the line $\dfrac{x+3}{2} = \dfrac{y-3}{7} = \dfrac{z-2}{5}$.

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**29.** Find the equation of the plane determined by the points A(3, -1, 2), B(5, 2, 4) and C(-1, -1, 6). Also find the distance of the point P(6, 5, 9) from the plane.

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**30.** Find the equation of the plane passing through the point (-1, 3, 2) and perpendicular to each of the planes x + 2y + 3z = 5 and 3x + 3y + z = 0.

**31.** Find the coordinates of the foot of the perpendicular and the perpendicular distance of the point P (3, 2, 1) from the plane 2x - y + z + 1 = 0. Find also, the image of the point in the plane.

**32.** Find the vector equation of the line passing through (1, 2, 3) and parallel to the planes

$$\vec{r} \cdot \left( \hat{i} - \hat{j} + 2\hat{k} \right) = 5 \text{ and } \vec{r} \cdot \left( 3\hat{i} + \hat{j} + \hat{k} \right) = 6.$$

**33.** Choose the correct answer :

If E and F are events such that P(E) = 0•6, P(F) = 0.3, P(E ∩ F) = 0.2 then

P(E/F) is :

   A. 1/3

   B. 1/2

   C. 3/4

   D. 2/3

**Answer:**

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**34.** Choose the correct answer :

If 2P(A) = P(B) = 5/13, P(A/B) = 2/5, then P(A ∩ B) is :

   A. 11/26

   B. 11/13

C. 2/13

D. 2/15

**Answer:**

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**35.** Choose the correct answer :

If $P(A) = 0.8$, $P(B) = 0.5$ $P(B/A) = 0.4$, find $P(A \cap B)$

A. 0.32

B. 0.13

C. 0.032

D. 0.2

**Answer:**

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**36.** Choose the correct answer :

If A and B are independent sets such that P(A) = 0.3, P(B) = 0.6 then find

P(A ∩ B)

   A. 0.018

   B. 0.009

   C. 0.9

   D. 0.18

**Answer:**

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**37.** Fill in the Blanks :

A and B are two events such that P(A) = 1/2, P(B) = 1/3, P(A ∩ B) = 1/4, then

P(A/B) =..

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**38.** Fill in the Blanks :

If $E_1$ and $E_2$ are independent events, then $P(E_1 \cap E_2)$ =..

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**39.** Fill in the Blanks :

If P(A) = 6/11, P(B) = 5/11, P(A $\cup$ B) = 7/11, then P(A $\cap$ B) = ..

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**40.** State True/False

If A and B are independent events then P(A $\cap$ B) = P(A).P(B/A)

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**41.** State True/False

If A and B are mutually exclusive events then P(A $\cap$ B) = P(A) + P(B)

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**42.** State True/False

P(A) = 0.6, P(B) = 07 and P(A/B) = 0.3, then P(A ∩ B) is 0.21

**43.** TWO cards are drawn simultaneously from a well shuffled pack of 52 cards. Find the mean and standard deviation of the number of kings.

**44.** A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a 6. Find the probability that it is actually 6.

**45.** In a bolt factory, three machines A, B and C manufacture 25, 35 and 40 per cent of the total bolts manufactured. Of their output, 5, 4, and 2 per cent are defective respectively. A bolt is drawn at random and is found to be defective. Find the probability that it was manufactured by either machine B.

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**46.** In a class having 60% boys, 5% of the boys and 10% of the girls have an I.Q. of more than 150. A student is selected at random and found to have an I.Q. of more than 150. Find the probability that the selected student is a boy.

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**47.** An insurance company insured 3000 scooter drivers, 5000 car drivers and 7000 truck drivers. The probabilities of their meeting with an

accident respectively are 0.04, 0.05 and 0.15. One of the insured persons meets with an accident. Find the probability that he is a car driver.

**48.** A candidate has to reach the examination centre in time. Probability of him going by bus or scooter by other means of transport are 3/10, 1/10, 3/5 respectively. The probability that he will be late is 1/4 and 1/3 respectively, if he travels by bus or scooter. But he reaches in time if he uses any other mode of transport. He reached late at the centre. Find the probability that he travelled by bus

**49.** Three bags contain balls as shown in the table below :

| Bag | Number of White balls | Number of Black balls | Number of Red balls |
|-----|-----------------------|-----------------------|---------------------|
| I   | 1                     | 2                     | 3                   |
| II  | 2                     | 1                     | 1                   |
| III | 4                     | 3                     | 2                   |

A bag is chosen at random and two balls are drawn from it. They happen to be white and red. What is the probability that they came from the III bag ?

**50.** A letter in known to have come from either TATANAGAR or CALCUTTA. On the envelope just two consecutive letters TA are visible. What is the probability thet the letter has come from (i) Tatanagar (ii) Calcutta.

**51.** There see three coins,one is a two headed coin (having head on both the faces),another is a biased coin that comes up heads 75% of the time and the third is anunbiased coin.One of the three coins is choosen at random and tossed.Of it shows head,what is probability that it was the two headed coin?

**52.** Find the probability distribution of the number of white balls drawn in a random draw of 3 balls without replacement from a bag containing 4 white and 6 red balls. Also find the mean and variance of the distribution.

**53.** Two cards are drawn (without replacement) from a well shuffled deck of 52 cards. Find the probability distribution and mean of number of cards numbered.

**54.** From a lot of 30 bulbs which includes 6 defectives, a sample of 4 bulbs is drawn at random with replacement. Find the mean and variance of the number of defective bulbs

**55.** Three persons A, B and C apply for a job of Manager in a Private Company. Chances of their selection (A, B and C) are in the ratio 1 : 2 : 4. The probabilities that A, B and C can introduce changes to improve profits of the company are 0.8, 0.5 and 0.3 respectively. If the change does not take place, find the probability that it is due to the appointment of C.

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**56.** An unbiased coin is tossed 4 times. Find the mean and variance of the number of heads obtained.

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**57.** Of the students in a college, it is known that 60% reside in hostel and 40% are day-scholars (not residing in hostel). Previous year results report that 30% of all students who reside in hostel attain A grade and 20% of day-scholars attain A grade in their annual examination. At the end of the

year, one student is chosen at random from the college and he has an A grade. What is the probability that the student is a hostlier ?

58. Suppose a girl throws a die. If she gets a 5 or 6, she tosses a coin three times and notes the number of heads. If she gets 1, 2, 3 or 4, she tosses a coin once and notes whether a head or tail is obtained. If she obtained exactly one head, what is the probability that she threw 1, 2, 3 or 4 with the die ?