

# Conic Sections

## 12<sup>th</sup> Maths - Chapter 16

### Exercise 16.3

#### Short Answer Type Questions

1. If the letters of the word **ALGORITHM** are arranged at random in a row what is the probability the letters *GOR* must remain together as a unit?
2. Six new employees, two of whom are married to be assigned six desks that are lined up in a row. If the assignment of employees to desks is made randomly, what is the probability that the married couple will have non adjacent desks: [Hint: First find the probability that the couple has adjacent desks, and then subtract it from 1.]
3. Suppose an integer from 1 through 1000 is chosen at random, find the probability that the integer is a multiple of 2 or a multiple of a
4. An experiment consists of rolling a die until a 2 appears.
  - (a) How many elements of the sample space correspond to the event that the 2 appears on the  $k^{th}$  roll of the die?
  - (b) How many elements of the sample space correspond to the event that the 2 appears not later than the  $k^{th}$  [Hint:(a) First  $(k - 1)$  rolls have 5 outcomes each and  $k^{th}$  rolls should result in 1 outcome. (b)  $1+5+5^2+....+5^{k-1}$ ].
5. A die is loaded in such a way that each odd number is twice as likely to occur as each even number. Find  $P(G)$ , where  $G$  is the event that a number greater than 3 occurs on a single roll of the die

6. In a large metropolitan area, the probabilities are .87, .36, .30 that a family has randomly chosen for a sample survey) owns a colour television set, a black and white television set, or both kinds of sets what is the probability that a family owns either any one or both kinds of sets
7. If  $A$  and  $B$  are mutually exclusive events.  $P(A) = 0.35$  and  $P(B) = 0.45$  find
  - (a)  $\Pr(A)$
  - (b)  $\Pr(B)$
  - (c)  $\Pr(A \cup B)$
  - (d)  $\Pr(A \cap B)$
  - (e)  $\Pr(A \cup B)$
  - (f)  $\Pr(A \cap B)$
8. A team of medical students doing their internship have to assist during surgeries at a city hospital. The probabilities of surgeries are rated as very complex, complex, routine, simple or very simple is respectively, .015, 0.20, 0.31, 0.26, 0.08. Find the probabilities that a particular surgery will be rated
  - (a) complex or very complex:
  - (b) neither very complex nor very simple:
  - (c) routine or complex
  - (d) routine or simple.
9. Four candidates  $A, B, C$ , and  $D$  have applied for the assignment to coach a school cricket team. If  $A$  is twice as likely to be selected as  $B$ , and  $B$  and  $C$  are given about the same chance of being selected. while  $C$  is twice as likely to be selected as  $D$ , what are the probabilities that
  - (a)  $C$  will be selected?
  - (b)  $A$  will not be selected?

10. one of the four persons John, Rita, Aslam or Gurpreet will be promoted next month. consequently, the sample space consists of four elementary outcomes=[John promoted, Rita, promoted, Aslam promoted, Gurpreet promoted] you are told that the chances of John's promotion is same as that of Gurpreet, Rita's chances of promotion are twice as likely as John's. Aslam's chances are four times that of John.
- Determine  $P(\text{John promoted})$ ,  $P(\text{Rita promoted})$ ,  $P(\text{Aslam promoted})$ ,  $P(\text{Gurpreet promoted})$
  - If  $A = \text{John promoted or Gurpreet promoted}$  find  $P(A)$ .
11. The accompanying venn diagram shows three events'  $A$ ,  $B$ , and  $C$ , and also the probabilities of the various intersections (for instance  $(A \cap B) = 0.7$ ). Determine
- $\Pr(A)$
  - $\Pr(B \cap C)$
  - $\Pr(A \cap B)$
  - $\Pr(A \cap C)$
  - $\Pr(A \cap B \cap C)$
  - $\Pr(B \cap C)$
12. Probability of exactly one of the three occurs.
13. One urn contains two black balls (labelled  $B$  and  $B^2$ ) and one white ball and two white balls (labelled  $w$ , and  $w^2$ ). suppose the following experiment is performed one of the two urns is chosen at random. then a ball is randomly chosen from the urn. Then a second ball is chosen at random from the same urn without replacing the first ball.
- Write the sample space showing all possible outcomes.
  - What is the probability that two black balls are chosen?
  - what is the probability that two balls of opposite colour are chosen
14. A bag contains 8 red and 5 white balls Three balls are drawn at random Find the probability that
- All the three balls are white

- (b) All the three balls are red
  - (c) One ball is red and two balls are white
15. If the letters of the word *ASSASSINATION* are arranged at random. Find the probability that
- (a) Four S's come consecutively in the word
  - (b) Two 1's and two N' S come together
  - (c) All A'S are not coming together
  - (d) No two A's are coming together
16. A card is drawn from a deck of  $5^2$  cards Find the probability of getting a king or a heart or a red card.
17. A sample space consists of a elementary outcomes  $e_1, e_2, \dots, e^2$  whose probabilities are

$$P(e_1) = P(e_2) = .08, P(e_4) = P(e_4) = p(e_5) = .1 // P(e_6) = p(e_7) = .2, p(e_a) = 0.7$$

(1)

suppose  $A = e_1, e_5, e_8. B = e_2, e_5, e_8, e_a$

- (a) calculate  $P(A)$ ,  $P(B)$ , and  $P(A \cap B)$
  - (b) using the addition law of probability. Calculate  $P(A \cap B)$
  - (c) List the composition of the event  $A \cap B$  and calculate  $\Pr(P)(A \cap B)$  by adding the probabilities of the elementary outcomes
  - (d) Calculate  $P(B)$  from  $P(B)$ , also calculate  $P(B)$  directly from the elementary outcomes of  $B$
18. Determine the probability  $P$ , for each of the following events
- (a) An odd number appears in a single toss of a fair die
  - (b) At least one head appears in two tosses of a fair coin
  - (c) A king, 9 of hearts or 3 of spades appears in drawing a single card from a well-shuffled ordinary deck of 52 cards
  - (d) The sum of 6 appears in a single toss of a pair of fair dice

**objective Type Questions** choose the correct answer out of four given options in each of the exercises 18to29(M.CQ)

19. In a non-leap year. the probability of having 53 tues days bays or 53 Wednesdays is
- (a)  $\frac{1}{7}$
  - (b)  $\frac{2}{7}$
  - (c)  $\frac{3}{7}$
  - (d) None of these
20. Three numbers are chosen from 1 to 20- Find the probability that they are not consecutive
- (a)  $\frac{186}{190}$
  - (b)  $\frac{187}{190}$
  - (c)  $\frac{188}{190}$
  - (d)  $\frac{18}{20 \cap 3}$
21. While shuffling a pack of 52 playing carbs, 2 are accidentally dropped. Find the probability that the missing cords to be of different colours.
- (a)  $\frac{29}{52}$
  - (b)  $\frac{1}{2}$
  - (c)  $\frac{26}{51}$
  - (d)  $\frac{27}{51}$
22. Seven persons are to be seated in a row The probability that two particular persons sit next to each other is
- (a)  $\frac{1}{3}$
  - (b)  $\frac{1}{6}$
  - (c)  $\frac{2}{7}$
  - (d)  $\frac{1}{2}$

23. Without repetition of the numbers four digit numbers are formed with the numbers 0,2,3,5. The probability of such numbers divisible by 5 is
- (a)  $\frac{1}{5}$
  - (b)  $\frac{4}{5}$
  - (c)  $\frac{1}{30}$
  - (d)  $\frac{5}{9}$
24. If  $A$  and  $B$  are mutually exclusive events then
- (a)  $\Pr(A) < \Pr(B)$
  - (b)  $\Pr(A) > \Pr(B)$
  - (c)  $\Pr(A) < \Pr(B)$
  - (d) None of these
25. If  $P(A \cap B) = P(A \cap B)$  for any two events  $A$  and  $B$ , then
- (a)  $\Pr(A) = PB$
  - (b)  $\Pr(A) > PB$
  - (c)  $\Pr(A) < PB$
  - (d) None of these
26. 6 boys and 6 girls sit in a row at random. The probability that all the girls sit together is
- (a)  $\frac{1}{432}$
  - (b)  $\frac{12}{431}$
  - (c)  $\frac{1}{132}$
  - (d) none of these
27. A single letter is selected at random from the word '*PROBABILITY*', The probability that it is a vowel is
- (a)  $\frac{1}{3}$
  - (b)  $\frac{4}{11}$

- (c)  $\frac{2}{11}$   
 (d)  $\frac{3}{11}$
28. If the probability for  $A$  to fail in an examination is 0.2 and that for  $B$  is 0., then the probability that either  $A$  or  $B$  fails is
- (a)  $> 5$   
 (b)  $\dots 5$   
 (c)  $< .5$   
 (d) 0
29. The probability that at least one of the events  $A$  and  $B$  occurs is 0.6 If  $A$  and  $B$  occur simultaneously with probability 0.2' then  $P(A)+P(B)$  is
- (a) 0.4  
 (b) 0.8  
 (c) 1.2  
 (d) 1.6
30. If  $M$  and  $N$  are any two events, the probability that at least one of them occurs is
- (a)  $P(m) + P(N) - 2P(m \cap N)$   
 (b)  $Pcm) + P(N) - P(M \cap N)$   
 (c)  $Pcm) + P(N) + P(m \cap N)$
31. The probability that a person visiting a 200 will see the giraffe is 0-72. the probability that he will see the bears is 0.84 and the probability that he will see both is 0.52.
32. The probability that a student will pass his examination is 0.73, the probability of the student getting a compartment is 0,13, and the probability that the student will either pass or get a compartment is 0.96.
33. The probabilities that a typist will make 0,1,2,3,4,5 or more mistakes in typing a report are, respectively, 0.12,0,25,0.36, 0.14,0.08,0.11.

34. If A and B are two candidates seeking admission in an engineering college. The probability that both A and B are selected is at most. 3 is it possible that the probability of B getting selected is 0.7?
35. The probability of intersection of two events A and B is always less than or equal to those favourable to the event A
36. The probability of an occurrence of event A is .7 and that of the occurrence of event B is .3 and the probability of occurrence of both is 4.
37. The sum of the probabilities of two students getting a distinction in their final examinations is 1.2. Fill in the blanks in the exercises 37 to 41.
38. The probability that the home team will win an upcoming football game is 0.77, the probability that it will tie the game is 0.08, and the probability that it will lose the game is
39. If  $e, e_2, e_3, e_4$  are the four elementary outcomes in a sample space and  $P(e, ) = .1' P(e_3) = .1$ , then the probability of  $e_4$  is
40. Let  $s = 1, 2, 3, 4, 5, 6$  and  $E = \{1, 3, 5\}$ , then E is
41. If A and B are two events associated with a random experiment such that  $P(A) = 0.3, \Pr(B) = 0.2$  and  $\Pr(A) \cap B) = 0.1$  then the value of  $P(A \cap B)$  is
42. The probability of happening of an event A is 0.5 and that of B is 0.3 If A and B are mutually exclusive events, then the probability of neither A nor B is
43. Matches the proposed probability under column c, with the appropriate written description under column  $c_2$

**Column  $C_1$**

**Column  $C_2$**



1. The coordinates of the points P and Q on the line  $x + 5y = 13$  which are at a distance of 2 units from the line  $12x - 5y + 26 = 0$  are
  - a.  $(3,1), (-7,11)$
2. The coordinates of the point on the line  $x + y = 4$ , which are at a unit distance from the line  $4x + 3y - 10 = 0$  are
  - b.  $-\frac{1}{11}, \frac{11}{3}, \frac{4}{3}, \frac{7}{3}$
3. The coordinates of the point on the line joining A  $(-2, 5)$  and B  $(3, 1)$  such that  $AP = PQ = QB$  are
  - c.  $1, \frac{12}{5}, -3, \frac{16}{5}$

**Column  $C_1$**

**Column  $C_2$**

- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. 0.95</li> <li>2. 0.02</li> <li>3. -0.3</li> <li>4. 0.5</li> <li>5. 0</li> </ol> | <ol style="list-style-type: none"> <li>a. An incorrect assignment</li> <li>b. No chance of happening</li> <li>c. As much chance of happening as not</li> <li>d. Very likely to happen</li> <li>e. Very little chance of happening</li> </ol> |
|---|--|

**Column  $C_1$**

**Column  $C_2$**

- |  |  |
|--|--|
| <ol style="list-style-type: none"> <li>1. If E and <math>e_2</math> are the two mutually exclusive events</li> <li>2. If E and E2 are the two mutually exclusive events</li> <li>3. If E and E2 have common outcomes, then</li> <li>4. If E and E2 are two events such that</li> </ol> | <ol style="list-style-type: none"> <li>a. <math>E_1 \cap E_2 = E1</math></li> <li>b. <math>(E, -E2) \cap (E, \cap E_2) = E1</math></li> <li>c. <math>E, \cap E_2 = \emptyset, E, \cap E_2 = s</math></li> <li>d. <math>E_1 c E_2 E, \cap E_2 = \emptyset</math></li> </ol> |
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