F.5 Mathematics

MC Exercise

5A6 More about Probability

1. An integer is selected at random from 1 to 5. Let S be the sample space. Under which of the following conditions will $X \cup Y = S$ hold?

A. X is the event of selecting a number smaller than 5,
Y is the event of selecting a number greater than 5.

B. X is the event of selecting a number smaller than 3,
Y is the event of selecting a number greater than 3.

C. X is the event of selecting a number smaller than 3,
Y is the event of selecting a number greater than 2.

D. X is the event of selecting a number greater than 3,
Y is the event of selecting a number smaller than 2.

2. Suppose the universal set $S = \{0, 1, 2, 3, 4, 5, 6, 7, 8\}$. M and N are two subsets of S such that $M = \{0, 2, 4, 8\}$ and $N = \{\text{Prime numbers}\}$. Find $M \cap N'$.

A. $\{2\}$

B. $\{0, 4, 8\}$

C. $\{0, 1, 2, 4, 6, 8\}$

D. $\{0, 2, 3, 4, 5, 7, 8\}$

3. 2 digits are randomly selected one by one from digits 1, 2, 3, 4, 5 without repetition to form a 2-digit number. Suppose that a number 12 is formed when the digits 1 and 2 are selected in the first and the second selections respectively. Let A be the event that a prime number is formed. Which of the following number is a possible outcome of A?

A. 11

B. 13

C. 25

D. 37

4. An integer is selected at random from 20 to 29. Let X be the event of selecting a multiple of 4, and Y be the event of selecting a multiple of 3. Which of the following is **NOT** a possible outcome of $X' \cap Y'$?

A. 22

B. 23

C. 24

D. 25

5. A quiz consists of 3 true or false questions. A student attempting the quiz randomly answers all three questions. Let A be the event that the student answers true for the first questions, B be the event that the student answers false for the second questions, and C be the event that the student answers true and false alternately for the three questions. Which of the following is/are **NOT** certain event(s)?

I. $A \cup B$

II. $A \cup C'$

III. $A \cup B \cup C$

A. II only

B. I and II only

C. I and III only

D. I, II and III

6. The table below shows the results of choosing a letter randomly from the word STAGE for 100 times with replacement.

Letter	S	T	A	G	E
Frequency	20	26	13	18	23

Find the experimental probability of choosing a letter T.

A. $\frac{1}{5}$

B. $\frac{13}{50}$

C. $\frac{37}{50}$

D. $\frac{4}{5}$

7. A bag contains red, orange, brown and yellow balls only. A ball is randomly drawn from the bag for 500 times with replacement and the colour of each ball drawn is recorded in the following table.

Colour	Red	Orange	Brown	Yellow
Frequency	140	97	121	142

Find the experimental probability that the colour of the ball drawn is not red.

A. $\frac{1}{4}$

B. $\frac{7}{25}$

C. $\frac{18}{25}$

D. $\frac{3}{4}$

8. A letter is chosen at random from the words MACHINE and MADE each. Find the probability that the two letters chosen are the same.

A. $\frac{1}{28}$

B. $\frac{3}{28}$

C. $\frac{3}{7}$

D. $\frac{3}{4}$

9. There are n packs of fruit juice in a refrigerator, of which x packs are apple juice, y packs are orange juice and the rest are watermelon juice. If a pack of juice is selected at random, find the probability that the pack of juice selected is apple juice or watermelon juice.

A. $\frac{n-x-y}{n}$

B. $\frac{n-x}{n}$

C. $\frac{n-y}{n}$

D. $\frac{x+y}{n}$

10. There are several gold coins and silver coins in a bag. It is known that the probability of drawing a silver coin at random is $\frac{2}{5}$. If 10 more silver coins are put into the bag, the probability of drawing a silver coin at random becomes $\frac{7}{10}$. Find the number of gold coins in the bag.

A. 5

B. 6

C. 7

D. 8

11. In a country park, 20 wild monkeys are caught and each monkey has a chip implanted. After that, these monkeys are released back to the country park. Two days later, 60 wild monkeys in the country park are caught at random, and it is found that 3 of them have chips implanted. Estimate the number of monkeys in the country park.

A. 100
B. 200
C. 300
D. 400

12. In which of the following cases, must A and B be mutually exclusive events?

A. An integer is selected at random from 1 to 50.
A is the event of selecting a multiple of 3,
B is the event of selecting a multiple of 5.

B. Two fair dice are rolled once.
A is the event that the difference of the two numbers obtained is 3.
B is the event that two odd numbers are obtained.

C. A card is drawn at random from a pack of 52 playing cards without jokers.
A is the event of drawing a black card.
B is the event of drawing a face card.

D. A letter is selected at random from the word EXCLUSIVE.
A is the event of selecting a vowel.
B is the event of selecting a letter E.

13. A card with a number on one side is thrown at random in the air. The probability that the side with the number shows up is 0.73. Find the probability that the side without the number shows up.

A. 0.27
B. 0.5
C. 0.532 9
D. 0.73

14. A company holds a lucky draw. For each participant in the lucky draw, the probabilities of winning a \$10 and a \$20 coupons are $\frac{1}{3}$ and $\frac{1}{5}$ respectively. Suppose every prize-winner cannot get both coupons simultaneously. Find the probability that a participant in the lucky draw wins one of these coupons.

A. $\frac{7}{15}$
B. $\frac{8}{15}$
C. $\frac{2}{3}$
D. $\frac{14}{15}$

15. There are some \$1 and \$2 coins in James's and Amy's wallets. Now a coin is drawn at random from each wallet. It is given that the probabilities of drawing two \$1 coins and two \$2 coins are $\frac{7}{30}$ and $\frac{1}{4}$ respectively. Find the probability that the two coins drawn are of different values.

A. $\frac{11}{24}$
B. $\frac{29}{60}$
C. $\frac{31}{60}$
D. $\frac{13}{24}$

16. The following table shows the nationality and gender of a group of tourists visiting Hong Kong.

	French	Russian	Japanese	Chinese
Male	2	3	2	6
Female	5	7	4	7

If a tourist is selected at random from the group, find the probability that the person is a male or a Russian.

A. $\frac{13}{36}$

B. $\frac{4}{9}$

C. $\frac{5}{9}$

D. $\frac{23}{36}$

17. A computer programme is used to randomly generate an integer from 1 to 150. Find the probability that the number generated is neither a multiple of 3 nor a multiple of 7.

A. $\frac{32}{75}$

B. $\frac{71}{150}$

C. $\frac{79}{150}$

D. $\frac{43}{75}$

18. In a school, 70% of the teachers are males or teach English, 37.5% of the teachers are females and 2.5% of the teachers are males who teach English. If a teacher is randomly selected from the school, find the probability that the teacher teaches English.

A. 0.1

B. 0.35

C. 0.65

D. 0.9

19. Two letters are randomly selected one by one from the word TANK with replacement. Find the probability that two vowels are selected.

A. 0

B. $\frac{1}{16}$

C. $\frac{1}{4}$

D. $\frac{1}{2}$

20. Jacky participates in two writing competitions. If the probability for Jacky to win each writing competition is 0.1, find the probability that he wins exactly one writing competition.

A. 0.01

B. 0.09

C. 0.18

D. 0.19

21. In an archery competition, the probabilities for two participants Alex and Jennifer to hit the target are $\frac{1}{3}$ and $\frac{4}{7}$ respectively. If they shoot at the target independently, find the probability that both of them hit the target.

A. $\frac{4}{21}$

B. $\frac{2}{7}$

C. $\frac{5}{7}$

D. $\frac{19}{21}$

22. In company A, 36% of the employees drink coffee every day. In company B, 62.5% of the employees drink coffee every day. If an employee is selected at random from each company, find the probability that at least one of them drinks coffee every day.

A. 0.225 B. 0.24
C. 0.535 D. 0.76

23. In a quality control process, the probabilities that a new fan passes two independent tests A and B are $\frac{7}{10}$ and $\frac{5}{12}$ respectively. Find the probability that a new fan passes at most one test.

A. $\frac{7}{24}$ B. $\frac{8}{15}$
C. $\frac{17}{24}$ D. $\frac{33}{40}$

24. In a company, the probability for an employee to wear a suit every working day is $\frac{3}{5}$. If 4 employees are randomly selected one by one from the company with replacement, find the probability that exactly 2 selected employees wear suits every working day.

A. $\frac{36}{625}$ B. $\frac{216}{625}$
C. $\frac{9}{25}$ D. $\frac{1}{2}$

25. In a city, the probabilities that the next three days will be sunny days are $\frac{1}{3}$, x and $\frac{2}{5}$ respectively. Assume that the weather condition of each day is independent. If the probability for only one out of the next three days to be a sunny day is $\frac{9}{20}$, then $x =$

A. $\frac{1}{4}$. B. $\frac{1}{3}$.
C. $\frac{29}{40}$. D. $\frac{25}{28}$.

26. Ken plays a dart game. He throws darts repeatedly until a dart hits the dartboard. The results in any two throws are independent, and the probability for Ken to hit the dartboard in each throw is $\frac{1}{3}$. Find the probability that he hits the dartboard in at most two throws.

A. $\frac{2}{9}$ B. $\frac{1}{3}$
C. $\frac{5}{9}$ D. $\frac{2}{3}$

27. In the game of Monopoly, a player can be released from jail if he / she obtains the same number from two fair dice in 1 out of 3 throws of dice. If the player fails to obtain the same number after these three throws, he / she must pay a fine to be released from jail. Find the probability that a player can be released from jail without paying a fine.

A. $\frac{1}{6}$ B. $\frac{1}{12}$
C. $\frac{91}{216}$ D. $\frac{125}{216}$

28. Two letters are randomly selected from the word ATTRACT without replacement. Find the probability that 2 Ts are selected.

A. $\frac{6}{49}$ B. $\frac{1}{7}$
C. $\frac{9}{49}$ D. $\frac{6}{7}$

29. In a refrigerator, there are 8 bottles of drinks of volume 500 mL each and 4 bottles of drinks of volume 1.5 L each. If two bottles of drinks are randomly drawn, find the probability that the total volume of drinks of the two bottles is exactly 2 L.

A. $\frac{4}{9}$

B. $\frac{16}{33}$

C. $\frac{17}{33}$

D. $\frac{5}{9}$

30. There are 4 orange, 5 yellow and 1 pink highlighters. Two highlighters are randomly selected one by one without replacement. Find the probability that one orange and one yellow highlighters are selected.

A. $\frac{1}{5}$

B. $\frac{2}{9}$

C. $\frac{2}{5}$

D. $\frac{4}{9}$

31. There are 3 red balls, 4 blue balls and 2 green balls in a bag. If 3 balls are drawn at random one by one without replacement, find the probability that only the third ball drawn is not green.

A. $\frac{1}{36}$

B. $\frac{2}{9}$

C. $\frac{7}{9}$

D. $\frac{35}{36}$

32. Issac is considering whether or not to join the blood donation campaign. If his friends try to persuade him to join the campaign, the probability that he will join the campaign is $\frac{9}{10}$; otherwise, the probability that he will not join the campaign is x. It is given that the probability for his friends to persuade him to join the campaign is $\frac{1}{6}$, and the probability that Issac will not join the campaign is $\frac{7}{20}$. Find x.

A. $\frac{1}{5}$

B. $\frac{2}{5}$

C. $\frac{3}{5}$

D. $\frac{4}{5}$

33. In a company, 45% of the employees own laptops, and 30% of the employees own both laptops and tablets. An employee is randomly selected from the company. Given that the selected employee is a laptop owner, find the probability that he /she is also a tablet owner.

A. $\frac{3}{20}$

B. $\frac{3}{10}$

C. $\frac{2}{3}$

D. $\frac{17}{20}$

34. Two unbiased dice are rolled once. Given that the product of the two numbers obtained is an even number, find the probability that at least one number obtained is 4.

A. $\frac{11}{36}$

B. $\frac{11}{27}$

C. $\frac{5}{9}$

D. $\frac{3}{4}$

35. In a university, 70% of the students are local students. 60% of the local students and 45% of the non-local students are males. Two students are randomly selected. Given that two males are selected, find the probability that at least one local student is selected, correct to 3 significant figures.

A. 0.591

B. 0.632

C. 0.708

D. 0.941

36. There are 4 black balls and 6 white balls in a bag. Two balls are drawn one by one at random from the bag without replacement. If a black ball is drawn in the first draw, two more white ball will be put into the bag. If a white balls is drawn in the first draw, two more black balls will be put into the bag. Find the probability that two balls of different colours are drawn.

A. $\frac{21}{55}$

B. $\frac{26}{55}$

C. $\frac{29}{55}$

D. $\frac{34}{55}$

37. There are 15 roses and 10 sunflowers. If 4 flowers are selected at random, find the probability that the 4 flowers selected are of the same type.

A. $\frac{21}{1\,265}$

B. $\frac{63}{506}$

C. $\frac{189}{506}$

D. $\frac{273}{2\,530}$

38. A pack of playing cards consist of 10 number cards and 6 face cards. If 5 cards are drawn randomly, find the probability that at most 2 face cards are drawn.

A. $\frac{1}{28}$

B. $\frac{9}{26}$

C. $\frac{22}{91}$

D. $\frac{69}{91}$

39. 3 men and 6 women are arranged in a row at random. Find the probability that the 3 men stand next to each other.

A. $\frac{1}{3}$

B. $\frac{1}{12}$

C. $\frac{1}{21}$

D. $\frac{1}{84}$

40. There are 15 vacant parking spaces in a row in a carpark. 4 vehicles park in the row at random. Find the probability that any two vehicles do not park next to each other.

A. $\frac{2}{13}$

B. $\frac{11}{21}$

C. $\frac{22}{91}$

D. $\frac{33}{91}$

41. There are 4 milk chocolates and 8 black chocolates. Mandy randomly puts these chocolates into 3 different boxes with 4 chocolates each. Find the probability that there is at least 1 milk chocolate in each box.

A. $\frac{32}{165}$

B. $\frac{32}{55}$

C. $\frac{65}{81}$

D. $\frac{85}{99}$

42. There are 24 apples in box A, of which 6 are rotten. There are 24 apples in box B, of which 4 are rotten. 6 apples are selected at random from these 2 boxes. Given that exactly 2 apples selected are rotten, find the probability that all rotten apples selected are from box A.

A. $\frac{5}{376}$

B. $\frac{1}{36}$

C. $\frac{3}{5}$

D. $\frac{1}{3}$