

Part I: Multiple Choice. Write the correct answer in the space provided at the end of this section.

1. Julie draws a card at random from a standard deck of 52 playing cards. Determine the odds in favour of the card being a heart.

- (A) 3 : 1
 (B) 1 : 3
 (C) 1 : 1
 (D) 3 : 13

$$\text{favs: } 13$$

$$\text{total: } 52$$

$$\text{unfavs: } 52 - 13 = 39$$

$$\text{favs: } 4 \text{ unfavs}$$

$$13 : 39$$

$$1 : 3$$

2. Julie draws a card at random from a standard deck of 52 playing cards. Determine the probability of the card being a diamond.

- (A) 0.250
 (B) 0.500
 (C) 0.625
 (D) 0.750

$$P = \frac{13}{52} = 0.25$$

3. The weather forecaster says that there is an 80% probability of rain tomorrow. Determine the odds against rain.

- (A) 4 : 5
 (B) 4 : 1
 (C) 1 : 5
 (D) 1 : 4

$$\text{fav: } 80 \quad \text{unfav: } 20$$

$$20 : 80$$

$$1 : 4$$

4. A credit card company randomly generates temporary three-digit pass codes for cardholders. The pass code will consist of three different even digits. Determine the total number of pass codes using three different even digits.

- (A) ${}_5P_5$
 (B) ${}_5P_3$
 (C) ${}_5P_4$
 (D) ${}_5P_1$

$$0, 2, 4, 6, 8 \quad \text{total} = 5$$

$${}_5P_3$$

5. Nine boys and twelve girls have signed up for a trip. Only six students will be selected to go on the trip. Determine the probability that there will be equal numbers of boys and girls on the trip.

total = 6 equal girls & boys mean 3 and 3

favs: $9C_3 \times 12C_3 = 84 \times 220 = 18400$

total: $21C_6 = 54264$

$P_r = \frac{f}{t} = \frac{18400}{54264} = 0.3406$

- (A) 17.23%
- (B) 22.61%
- (C) 27.35%
- (D) 34.06%

6. Four boys and three girls will be riding in a van. Only two people will be selected to sit at the front of the van. Determine the probability that there will be equal numbers of boys and girls sitting at the front.

favs: $4C_1 \times 3C_1 = 4 \times 3 = 12$

total: $7C_2 = 21$

$P_r = \frac{f}{t} = \frac{12}{21} = 0.57$
or 57%

- (A) 53.07%
- (B) 57.14%
- (C) 59.36%
- (D) 62.23%

7. Cai tosses four coins. Determine the probability that they all land as tails.

independent events

$P(TNTNT) = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{16} = 0.0625$

- (A) 6.25%
- (B) 12.50%
- (C) 18.75%
- (D) 25.00%

8. Two dice are rolled. Let A represent rolling a sum greater than 6. Let B represent rolling a sum that is a multiple of 4. Determine $P(A \cap B)$.

8, 12
 $\frac{8}{2+6}$ $\frac{12}{6+6}$ favs = 6
 6+2
 3+5
 5+3
 4+4
 total = $6 \times 6 = 36$

$P_r = \frac{6}{36} = \frac{1}{6}$

- (A) $\frac{1}{9}$
- (B) $\frac{1}{6}$
- (C) $\frac{1}{4}$
- (D) $\frac{7}{12}$

9. Select the events that are mutually exclusive.

- (A) Drawing a 7 or drawing a heart from a standard deck of 52 playing cards.
- (B) Rolling a sum of 4 or rolling an even number with a pair of four-sided dice, numbered 1 to 4.
- (C) Drawing a black card or drawing a Queen from a standard deck of 52 playing cards.
- (D) Rolling a sum of 8 or a sum of 11 with a pair of six-sided dice, numbered 1 to 6.

10. Select the events that are mutually exclusive.

- (A) Drawing a red card or drawing a diamond from a standard deck of 52 playing cards.
- (B) Rolling a sum of 8 or rolling an even number with a pair of six-sided dice, numbered 1 to 6.
- (C) Drawing a black card or drawing a Queen from a standard deck of 52 playing cards.
- (D) Drawing a 3 or drawing an even card from a standard deck of 52 playing cards.

11. Helen is about to draw a card at random from a standard deck of 52 playing cards. Determine the probability that she will draw a black card or a spade.

(A) $\frac{1}{4}$

(B) $\frac{1}{2}$

(C) $\frac{29}{52}$

(D) $\frac{5}{6}$

$$\begin{aligned} P(B) &= \frac{26}{52} & P(S) &= \frac{13}{52} & P(B \cap S) &= \frac{13}{52} \\ P(B \cup S) &= P(B) + P(S) - P(B \cap S) \\ &= \frac{26}{52} + \frac{13}{52} - \frac{13}{52} \\ &= \frac{26}{52} = \frac{1}{2} \end{aligned}$$

12. There are 40 males and 60 females in a graduating class. Of these students, 10 males and 20 females plan to attend a certain university next year. Determine the probability that a randomly selected student plans to attend the university.

(A) 0.3

(B) 0.4

(C) 0.5

(D) 0.6

$$\begin{aligned} \text{Females: } & 30 C_1 \\ \text{Total: } & 100 C_1 \\ P_r &= \frac{F}{T} = \frac{30 C_1}{100 C_1} = 0.3 \end{aligned}$$

13. Rino has six loonies, four toonies, and two quarters in his pocket. He needs two loonies for a parking meter. He reaches into his pocket and pulls out two coins at random. Determine the probability that both coins are loonies.

- (A) 16.3%
 (B) 18.4%
 (C) 22.7%
 (D) 25.9%

favours: $6C_2 = 15$ $P_r = \frac{15}{66} = 0.227$
 or $\frac{15}{66}$ or 22.7%
 total: $12C_2 = 66$
 $P = \frac{6}{12} \times \frac{5}{11} = 0.227$

14. Rashid goes to the gym and does two different cardio workouts each day. His choices include using a treadmill, a stepper, a stationary bike, an elliptical walker, and running the track. Determine the probability that the next time Rashid goes to the gym he will use the stepper and then run the track.

- (A) 1%
 (B) 5%
 (C) 8%
 (D) 14%

$P(A \cap B) = P(A) \times P(B)$
 $= \frac{1}{5} \times \frac{1}{4} = \frac{1}{20} = 5\%$

15. A five-colour spinner is spun, and a die is rolled. Determine the probability of spinning yellow and rolling a 6.

- (A) 2.42%
 (B) 3.33%
 (C) 6.13%
 (D) 7.75%

$P = \frac{1}{5} \times \frac{1}{6} = \frac{1}{30}$

16. There are 20 cards, numbered 1 to 20, in a box. Two cards are drawn, one at a time, with replacement. Determine the probability of drawing an even number then drawing a number that is a multiple of 4.

- (A) 8.8%
 (B) 9.3%
 (C) 10.7%
 (D) 12.5%

$P(A) = \frac{10}{20}$, $P(B) = \frac{5}{20}$
 $P(A \cap B) = P(A) \times P(B) \rightarrow = 0.125$
 or 12.5%
 $= \frac{10}{20} \times \frac{5}{20}$
 $= \frac{50}{400}$

17. Select the independent events.

- (A) $P(A) = 0.21$, $P(B) = 0.57$, and $P(A \cap B) = 0.122$
- (B) $P(A) = 0.8$, $P(B) = 0.52$, and $P(A \cap B) = 0.423$
- (C) $P(A) = 0.74$, $P(B) = 0.85$, and $P(A \cap B) = 0.629$
- (D) $P(A) = 0.46$, $P(B) = 0.9$, and $P(A \cap B) = 0.416$

$$0.74 \times 0.85 = 0.629$$

\therefore independent

Part II: Constructed Response. Answer each question in the space provided. Show all workings.

18. Salim draws a card at random from a standard deck of 52 playing cards. Determine the probability of the card being black.

$$P(B) = \frac{26}{52} = \frac{1}{2} = 0.5$$

or 50%

19. Denis has 15 coins in his pocket, and 6 of them are toonies. He reaches into his pocket and pulls out a coin at random. Determine the probability of the coin being a toonie.

$$\text{favourable: } {}_6C_1 = 6$$

$$\text{total: } {}_{15}C_1 = 15$$

$$P_r = \frac{f}{t} = \frac{6}{15} = 0.4 \text{ or } 40\%$$

20. Jeff has been awarded a penalty shot in a hockey game. Braden is the goalie. Jeff has scored 6 times in his last 10 penalty shots. Braden has blocked 5 of the last 10 penalty shots. Determine the odds in favour of Jeff scoring, using his data.

$$\text{fav: } 6$$

$$\text{unfav: } 10 - 6 = 4$$

$$\text{fav: unfav}$$

$$6:4$$

$$3:2$$

21. From a committee of 18 people, 3 of these people are randomly chosen to be president, vice-president, and secretary. Determine, to the nearest hundredth of a percent, the probability that Evan, Elise, and Jaime will be chosen.

$$\text{fav: } P = \underline{3} \times \underline{2} \times \underline{1} = 6$$

$$\text{total: } P = \underline{18} \times \underline{17} \times \underline{16} = 4896$$

$$P_r = \frac{f}{t} = \frac{6}{4896} = 0.0012255 \text{ or } 0.12\%$$

22. Veata needs to create a four-digit password to access her voice mail. She can repeat some of the digits, but all four digits cannot be the same. Determine the probability that the first digit of her password will be 7.

$$f_{au} = \frac{1}{7} \times \underline{9} \times \underline{10} \times \underline{10} = 900$$

$$total = \underline{10} \times \underline{10} \times \underline{10} \times \underline{9} = 9000$$

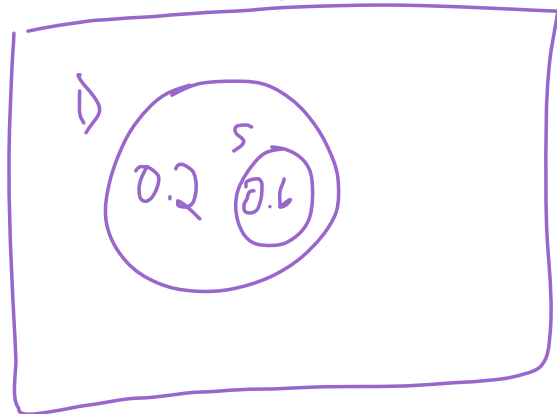
$$P_r = \frac{f}{t} = \frac{900}{9000} = 0.10 \text{ or } 10\%$$

23. The probability that Vince will study on Friday night is 0.6. The probability that he will go out for dinner is 0.8. The probability that he will do at least one of these activities is 0.8. Determine the probability that he will do both activities.

$$P(S) = 0.6$$

$$P(D) = 0.8$$

$$P(S \cup D) = 0.8$$



$$P(S \cap D) = 0.6$$

24. Anneliese draws a card from a well-shuffled standard deck of 52 playing cards. Then she draws another card from the deck without replacing the first card. Determine, to the nearest tenth of a percent, the probability that both cards are red.

$$P(A) = \frac{26}{52}$$

$$P(B) = \frac{25}{51}$$

$$P(A \cap B) = P(A) \times P(B|A)$$

$$= \frac{26}{52} \times \frac{25}{51}$$

$$= \frac{650}{2652}$$

$$= 0.245 \text{ or } 24.5\%$$

25. Cheryl draws a card from a well-shuffled standard deck of 52 playing cards. Then she puts the card back in the deck, shuffles again, and draws another card from the deck. Determine the probability that both cards are black.

$$P(A) = \frac{26}{52}$$

$$P(B) = \frac{26}{52}$$

$$P(A \cap B) = P(A) \times P(B)$$

$$= \frac{26}{52} \times \frac{26}{52}$$

$$= \frac{676}{2704}$$

$$= 0.25 \text{ or } 25\%$$

26. A hockey game has ended in a tie after a 5 min overtime period, so the winner will be decided by a shootout. The coach must decide whether Jules or Vicki should go first in the shootout. The coach would prefer to use her best scorer first, so she will base her decision on the players' shootout records.

Player	Attempts	Goals Scored
Jules	15	7
Vicki	19	12

Who should go first?

$$\text{Jules: } P(s) = \frac{7}{15} = 0.47 \text{ or } 47\%$$

$$\text{Vicki: } P(s) = \frac{12}{19} = 0.63 \text{ or } 63\%$$

Vicki should go first.