

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.****Provide an appropriate response.**

- 1) Which of the following cannot be the probability of an event? 1) \_\_\_\_\_

A)  $\frac{\sqrt{5}}{3}$       B) -32      C) 0      D) 0.001

- 2) If A, B, C, and D, are the only possible outcomes of an experiment, find the probability of D using the table below. 2) \_\_\_\_\_

Outcome	A	B	C	D
Probability	1/7	1/7	1/7	

A) 4/7      B) 3/7      C) 1/7      D) 1/4

- 3) The probability that event A will occur is
- $P(A) = \frac{\text{Number of successful outcomes}}{\text{Number of unsuccessful outcomes}}$
- 3) \_\_\_\_\_

A) True      B) False

- 4) The probability that event A will occur is
- $P(A) = \frac{\text{Number of successful outcomes}}{\text{Total number of all possible outcomes}}$
- 4) \_\_\_\_\_

A) False      B) True

- 5) In terms of probability, a(n) \_\_\_\_\_ is any process with uncertain results that can be repeated. 5) \_\_\_\_\_

A) Experiment      B) Event      C) Sample space      D) Outcome

- 6) A(n) \_\_\_\_\_ of a probability experiment is the collection of all outcomes possible. 6) \_\_\_\_\_

A) Event set      B) Prediction set      C) Bernoulli space      D) Sample space

- 7) True or False: An outcome is any collection of events from a probability experiment. 7) \_\_\_\_\_

A) False      B) True

- 8) In a 1-pond bag of skittles the possible colors were red, green, yellow, orange, and purple. The probability of drawing a particular color from that bag is given below. Is this a probability model? Answer Yes or No. 8) \_\_\_\_\_

Color	Probability
Red	0.2299
Green	0.1908
Orange	0.2168
Yellow	0.1889
Purple	0.1816

A) Yes      B) No

- 9) An unusual event is an event that has a 9) \_\_\_\_\_

A) Probability of 1      B) Low probability of occurrence  
C) A negative probability      D) Probability which exceeds 1

- 10) The table below represents a random sample of the number of deaths per 100 cases for a certain illness over time. If a person infected with this illness is randomly selected from all infected people, find the probability that the person lives 3–4 years after diagnosis. Express your answer as a simplified fraction and as a decimal. 10) \_\_\_\_\_

Years after Diagnosis	Number deaths
1–2	15
3–4	35
5–6	16
7–8	9
9–10	6
11–12	4
13–14	2
15+	13

- A)  $\frac{1}{35}$ ; 0.029      B)  $\frac{35}{100}$ ; 0.35      C)  $\frac{35}{65}$ ; 0.538      D)  $\frac{7}{120}$ ; 0.058
- 11) A die is rolled. The set of equally likely outcomes is {1, 2, 3, 4, 5, 6}. Find the probability of getting a 2. 11) \_\_\_\_\_
- A) 0      B)  $\frac{1}{6}$       C) 2      D)  $\frac{1}{3}$
- 12) A fair coin is tossed two times in succession. The set of equally likely outcomes is {HH, HT, TH, TT}. Find the probability of getting the same outcome on each toss. 12) \_\_\_\_\_
- A)  $\frac{3}{4}$       B)  $\frac{1}{4}$       C) 1      D)  $\frac{1}{2}$
- 13) A single die is rolled twice. The set of 36 equally likely outcomes is {(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)}. Find the probability of getting two numbers whose sum is greater than 10. 13) \_\_\_\_\_
- A)  $\frac{1}{18}$       B) 3      C)  $\frac{5}{18}$       D)  $\frac{1}{12}$
- 14) A single die is rolled twice. The set of 36 equally likely outcomes is {(1, 1), (1, 2), (1, 3), (1, 4), (1, 5), (1, 6), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), (4, 1), (4, 2), (4, 3), (4, 4), (4, 5), (4, 6), (5, 1), (5, 2), (5, 3), (5, 4), (5, 5), (5, 6), (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6)}. Find the probability of getting two numbers whose sum is less than 13. 14) \_\_\_\_\_
- A)  $\frac{1}{2}$       B)  $\frac{1}{4}$       C) 1      D) 0
- 15) Three fair coins are tossed in the air and land on a table. The up side of each coin is noted. How many elements are there in the sample space? 15) \_\_\_\_\_
- A) 4      B) 6      C) 8      D) 3
- 16) In a survey of college students, 880 said that they have cheated on an exam and 1721 said that they have not. If one college student is selected at random, find the probability that the student has cheated on an exam. 16) \_\_\_\_\_
- A)  $\frac{880}{2601}$       B)  $\frac{2601}{880}$       C)  $\frac{1721}{2601}$       D)  $\frac{2601}{1721}$

## Practice on Z-Score

Harry was in four classes, each with 20 students. Harry's score, the class mean, and the class standard deviation are given below. Compute his standardized grade in each class. If we judged by standardized grades, where did he do best? Where did he do worst?

	Harry's Score	Mean	Std Dev
Care of Magical Creatures	3.80	3.75	.15
Defense Against the Dark Arts	3.60	3.25	.60
Transfiguration	3.10	3.20	.38
Potions	2.50	2.90	.75

Find the z score for Harry and decide in which category he did relatively better than the rest.  
Answers on the last page.

## Practice on Multiplication rules

Answers on the last page.

1. A coin is flipped, and die is rolled. Find prob. of tails on coin and a 4 on die.
2. A card is drawn from deck, replaced, then a 2nd card drawn. Find the prob. of getting a queen then a black card.
3. A jar with M&M's has 3 red, 2 blue and 5 brown. One is selected, recorded, then replaced. Then a 2nd is selected. Find the prob:
  - a) 2 blues.
  - b) 1 blue then 1 brown.
  - c) 1 red then 1 blue.
- 4) A poll finds 46% of Americans are greatly stressed once a week. If 3 people randomly selected, find prob. That all 3 are greatly stressed once a week.
- 5) If a card is drawn from a deck, not replaced, and then a 2nd card drawn, find prob. that an ace is drawn 1st, then a king.
- 6) State Farm found that 53% of residents had home insurance and of these, 27% also had auto.  
If a resident is selected at random, find prob. that he/she will have both home and auto insurance with State Farm.
- 7) 3 cards are drawn from deck and not replaced. Find prob. of getting:
  - a) 3 jacks.
  - b) an ace, king, and queen in order
  - c) a club, spade heart in that order.
  - d) 3 clubs

$$P(A \text{ and } B \text{ and } C \text{ and } \dots) = P(A)P(B)P(C)\dots$$

A. There are 14 large and 6 medium size T-shirts for sales. If 2 T-shirts are sold, then

1. Construct the *tree diagram*
2. Write all the possibilities
3. Compute all the probabilities
4. Construct Probability Distribution

$$\begin{aligned} P(LL) &= 47.9\% \\ P(LM) &= 22.1\% \\ P(ML) &= 22.1\% \\ P(MM) &= 7.9\% + \\ \hline &100\% \end{aligned}$$

After two T-shirts are drawn randomly then find the probability that,

$$P(\text{Both Large}) = 47.9\%$$

$$P(\text{Both Medium}) = 7.9\%$$

$$P(\text{At least one Medium}) = 52.1\%$$

$$P(\text{At most one Large}) = 52.1\%$$

B. In a box there are 14 Blue and 6 Red balls. If two balls are drawn at random **with replacement**, then

1. Construct the *tree diagram*
2. Write all the possibilities
3. Compute all the probabilities
4. Construct Probability Distribution

$$\begin{aligned} P(BB) &= 49\% \\ P(BR) &= 21\% \\ P(RB) &= 21\% \\ P(RR) &= 9\% + \\ \hline &100\% \end{aligned}$$

After two balls are drawn randomly then find the probability that,

$$P(\text{Both Blue}) = 49\%$$

$$P(\text{Both Red}) = 9\%$$

$$P(\text{At least one Red}) = 51\%$$

$$P(\text{At most one Red}) = 91\%$$

There are two boxes, first one has 2 reds and 2 blue balls, and the second box has 3 red and 2 blue balls. If one ball from first box is drawn and put it into the second box and then we draw one ball from the second box at random, then

- a) List all possibilities of selecting a ball from second box by drawing a tree diagram.
- b) Find the probability that selected ball from second box is blue. **Ans:** 5/12
- c) Find the probability that selected ball from second box is red. **Ans:** 7/12

## Answers

### *Answers for page 1 and 2*

- |      |       |       |       |       |       |       |       |
|------|-------|-------|-------|-------|-------|-------|-------|
| 1) B | 2) A  | 3) B  | 4) B  | 5) A  | 6) D  | 7) B  | 8) A  |
| 9) B | 10) B | 11) B | 12) D | 13) D | 14) C | 15) C | 16) A |

### *Answers for page 3 (Z score)*

$$(3.80 - 3.75) / .15 = \mathbf{0.33}$$

Care of magical creatures:

Defense against the dark arts:  $(3.60 - 3.25) / .60 = \mathbf{0.58}$

Transfiguration:  $(3.10 - 3.20) / .38 = \mathbf{-0.26}$

Potions:  $(2.50 - 2.90) / .75 = \mathbf{-0.53}$

In terms of standardized scores, Harry did best in Defense Against the Dark Arts, where he was above average in the class. Even though her best grade was in Care of Magical Creatures, the class as a whole had a higher mean, such that Harry was fairly close to the average.

### *Answers for page 3 (Z score) on Multiplication rules*

1. A coin is flipped, and die is rolled. Find prob. of tails on coin and a 4 on die. **Answer:**  $\frac{1}{2} \cdot \frac{1}{6} = \frac{1}{12}$

2. A card is drawn from deck, replaced, then a 2nd card drawn. Find the prob. of getting a queen then a black card.

$$\mathbf{Answer:} \frac{4}{52} \cdot \frac{26}{52} = \frac{1}{13} \cdot \frac{1}{2} = \frac{1}{26}$$

3. A jar with M&M's has 3 red, 2 blue and 5 brown. One is selected, recorded, then replaced. Then a 2nd is selected. Find the prob: a) 2 blues.

$$\mathbf{Answer:} \frac{2}{10} \cdot \frac{2}{10} = \frac{1}{25}$$

b) 1 blue then 1 brown.

$$\mathbf{Answer:} \frac{2}{10} \cdot \frac{5}{10} = \frac{1}{10}$$

c) 1 red then 1 blue.

$$\mathbf{Answer:} \frac{3}{10} \cdot \frac{2}{10} = \frac{3}{50}$$

4) A poll finds 46% of Americans are greatly stressed once a week. If 3 people randomly selected, find prob. That all 3 are greatly stressed once a week.

$$\mathbf{Answer:} \frac{46}{100} \cdot \frac{46}{100} \cdot \frac{46}{100} = 0.097 = 9.7\%$$

5) If a card is drawn from a deck, not replaced, and then a 2nd card drawn, find prob. that an ace is drawn 1st, then a king.

$$\mathbf{Answer:} \frac{4}{52} \cdot \frac{4}{51} = .00603 = 0.603\%$$

6) State Farm found that 53% of residents had homeinsurance and of these, 27% also had auto.

If a resident is selected at random, find prob. That he/she will both home and auto insurance with State Farm.

$$\textbf{Answer: } \frac{53}{100} \cdot \frac{27}{100} = 0.1431 = 14.31\%$$

7) 3 cards are drawn from deck and not replaced. Find prob. of getting:

a) 3 Jacks. 
$$\textbf{Answer: } \frac{4}{52} \cdot \frac{3}{51} \cdot \frac{2}{50} = 0.00018 = 0.018\%$$

b) an ace, king, and queen in order 
$$\textbf{Answer: } \frac{4}{52} \cdot \frac{4}{51} \cdot \frac{4}{50} = 0.00048 = 0.048\%$$

c) a club, spade heart in that order. 
$$\textbf{Answer: } \frac{13}{52} \cdot \frac{13}{51} \cdot \frac{13}{50} = 0.017 = 1.7\%$$

d) 3 clubs 
$$\textbf{Answer: } \frac{13}{52} \cdot \frac{12}{51} \cdot \frac{11}{50} = 0.013 = 1.3\%$$