

Lesson 2-6: Theoretical and Experimental Probability

Part 1: Theoretical Probability

1. 060630a, P.I. A.S.20

Which inequality represents the probability, x , of any event happening?

- [A] $0 \leq x \leq 1$ [B] $0 < x < 1$
[C] $x < 1$ [D] $x \geq 0$

2. 069901a, P.I. A.S.20

A fair coin is thrown in the air four times. If the coin lands with the head up on the first three tosses, what is the probability that the coin will land with the head up on the fourth toss?

- [A] $\frac{1}{8}$ [B] 0 [C] $\frac{1}{2}$ [D] $\frac{1}{16}$

3. 010209a, P.I. A.S.20

A fair coin is tossed three times. What is the probability that the coin will land tails up on the second toss?

- [A] $\frac{1}{2}$ [B] $\frac{1}{3}$ [C] $\frac{2}{3}$ [D] $\frac{3}{4}$

4. 060712a, P.I. A.S.20

When a fair coin was tossed ten times, it landed heads up the first seven times. What is the probability that on the eighth toss the coin will land with tails up?

- [A] $\frac{3}{7}$ [B] $\frac{7}{10}$ [C] $\frac{1}{2}$ [D] $\frac{3}{10}$

5. 010709a, P.I. A.S.20

Seth tossed a fair coin five times and got five heads. The probability that the next toss will be a tail is

- [A] 0 [B] $\frac{1}{2}$ [C] $\frac{1}{6}$ [D] $\frac{5}{6}$

6. 010832a, P.I. A.S.20

As captain of his football team, Jamal gets to call heads or tails for the toss of a fair coin at the beginning of each game. At the last three games, the coin has landed with heads up. What is the probability that the coin will land with heads up at the next game? Explain your answer.

7. 060415a, P.I. A.S.20

Mary chooses an integer at random from 1 to 6. What is the probability that the integer she chooses is a prime number?

- [A] $\frac{4}{6}$ [B] $\frac{3}{6}$ [C] $\frac{2}{6}$ [D] $\frac{5}{6}$

8. 080011a, P.I. A.S.20

A box contains six black balls and four white balls. What is the probability of selecting a black ball at random from the box?

- [A] $\frac{6}{10}$ [B] $\frac{1}{10}$ [C] $\frac{4}{6}$ [D] $\frac{6}{4}$

9. 060705a, P.I. A.S.20

A six-sided number cube has faces with the numbers 1 through 6 marked on it. What is the probability that a number less than 3 will occur on one toss of the number cube?

- [A] $\frac{4}{6}$ [B] $\frac{3}{6}$ [C] $\frac{2}{6}$ [D] $\frac{1}{6}$

10. 080604a, P.I. A.S.20

The faces of a cube are numbered from 1 to 6. What is the probability of *not* rolling a 5 on a single toss of this cube?

- [A] $\frac{5}{6}$ [B] $\frac{1}{5}$ [C] $\frac{1}{6}$ [D] $\frac{4}{5}$

11. 060202a, P.I. A.S.20

If the probability that it will rain on Thursday is $\frac{5}{6}$, what is the probability that it will *not* rain on Thursday?

- [A] $\frac{5}{6}$ [B] 1 [C] 0 [D] $\frac{1}{6}$

12. 010017a, P.I. A.S.20

The party registration of the voters in Jonesville is shown in the table below.

Registered Voters in Jonesville	
Party Registration	Number of Voters Registered
Democrat	6,000
Republican	5,300
Independent	3,700

If one of the registered Jonesville voters is selected at random, what is the probability that the person selected is *not* a Democrat?

- [A] 0.667 [B] 0.400
[C] 0.333 [D] 0.600

13. 010805a, P.I. A.S.20

A box contains 6 dimes, 8 nickels, 12 pennies, and 3 quarters. What is the probability that a coin drawn at random is *not* a dime?

- [A] $\frac{23}{29}$ [B] $\frac{6}{29}$ [C] $\frac{12}{29}$ [D] $\frac{8}{29}$

14. fall0702ia, P.I. A.S.20
Throughout history, many people have contributed to the development of mathematics. These mathematicians include Pythagoras, Euclid, Hypatia, Euler, Einstein, Agnesi, Fibonacci, and Pascal. What is the probability that a mathematician's name selected at random from those listed will start with either the letter *E* or the letter *A*?
- [A] $\frac{3}{8}$ [B] $\frac{2}{8}$ [C] $\frac{6}{8}$ [D] $\frac{4}{8}$
15. 010811a, P.I. A.S.20
Which event has a probability of zero?
- [A] choosing a triangle that is both isosceles and right
- [B] choosing a letter from the alphabet that has line symmetry
- [C] choosing a pair of parallel lines that have unequal slopes
- [D] choosing a number that is greater than 6 and is even
16. 010321a, P.I. A.S.19
If Laquisha can enter school by any one of three doors and the school has two staircases to the second floor, in how many different ways can Laquisha reach a room on the second floor? Justify your answer by drawing a tree diagram or listing a sample space.
17. 010731a, P.I. A.S.19
Kimberly has three pair of pants: one black, one red, and one tan. She also has four shirts: one pink, one white, one yellow, and one green. Draw a tree diagram or list the sample space showing all possible outfits that she could wear, if an outfit consists of one pair of pants and one shirt. How many different outfits can Kimberly wear?
18. 089922a, P.I. A.S.19
The Grimaldis have three children born in different years.
- a* Draw a tree diagram or list a sample space to show all the possible arrangements of boy and girl children in the Grimaldi family.
- b* Using your information from part *a*, what is the probability that the Grimaldis have three boys?
19. fall0736ia, P.I. A.S.19
Mr. Laub has three children: two girls (Sue and Karen) and one boy (David). After each meal, one child is chosen at random to wash dishes. If the same child can be chosen for both lunch and dinner, construct a tree diagram or list a sample space of all the possible outcomes of who will wash dishes after lunch and dinner on Saturday. Determine the probability that one boy and one girl will wash dishes after lunch and dinner on Saturday.

[1] A

[2] C

[3] A

[4] C

[5] B

[2] $\frac{1}{2}$ or an equivalent answer, and an

appropriate explanation is written.

[1] A correct explanation is written, but the probability is not stated.

or [1] $\frac{1}{2}$ or an equivalent answer, but no

explanation is written.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[6] incorrect procedure.

[7] B

[8] A

[9] C

[10] A

[11] D

[12] D

[13] A

[14] D

[15] C

[2] 6, and a correct tree diagram is drawn or sample space is listed.

[1] A correct tree diagram is drawn or sample space is listed, but no answer or an incorrect answer is found.

or [1] An appropriate answer is found, based on an incorrect tree diagram or sample space.

or [1] 6, but no tree diagram is drawn or sample space is listed.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[16] incorrect procedure.

[2] 12, and a correct tree diagram or a correct sample space is shown.

[1] An incomplete tree diagram or sample space is shown with at least 8 possible combinations shown, and an appropriate number of outfits is found.

or [1] A correct tree diagram or sample space is shown, but the number of possible outfits is missing or is incorrect.

or [1] 12, but 3×4 is used to find the number of outfits.

[0] 12, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[17] obviously incorrect procedure.

a [1] A correct tree diagram or listing of all 8 possibilities is shown.

b [1] $\frac{1}{8}$

or [1] An appropriate answer is given for an incorrect part a tree diagram or listing.

a and b

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[18] incorrect procedure.

[3] $\frac{4}{9}$, and a correct tree diagram or sample

space is shown.

[2] A correct tree diagram or sample space is shown, but no probability or an incorrect probability is given.

or [2] An incorrect tree diagram or sample space is shown, but an appropriate probability is found.

[1] Appropriate work is shown, but one conceptual error is made.

or [1] $\frac{4}{9}$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[19] incorrect procedure.
