

A.S.22: Theoretical Probability: Determine if some or all events are equally likely, one event is more likely than another, an event is certain to happen or not to happen

- 1 Which event is certain to happen?
- 1) Everyone walking into a room will have red hair.
 - 2) All babies born in June will be males.
 - 3) The Yankees baseball team will win the World Series.
 - 4) The Sun will rise in the east.

- 2 The faces of a cube are numbered from 1 to 6. If the cube is rolled once, which outcome is *least* likely to occur?
- 1) rolling an odd number
 - 2) rolling an even number
 - 3) rolling a number less than 6
 - 4) rolling a number greater than 4

- 3 Maria has a set of 10 index cards labeled with the digits 0 through 9. She puts them in a bag and selects one at random. The outcome that is most likely to occur is selecting
- 1) an odd number
 - 2) a prime number
 - 3) a number that is at most 5
 - 4) a number that is divisible by 3

- 4 A cube with faces numbered 1 through 6 is rolled 75 times, and the results are given in the table below.

Number	Frequency
1	7
2	22
3	14
4	6
5	20
6	6

Based on these results, which statement is true?

- 1) $P(\text{odd}) < P(\text{even})$
 - 2) $P(3 \text{ or less}) < P(\text{odd})$
 - 3) $P(\text{even}) < P(2 \text{ or } 4)$
 - 4) $P(2 \text{ or } 4) < P(3 \text{ or less})$
- 5 Which event has a probability of zero?
- 1) choosing a letter from the alphabet that has line symmetry
 - 2) choosing a number that is greater than 6 and is even
 - 3) choosing a pair of parallel lines that have unequal slopes
 - 4) choosing a triangle that is both isosceles and right

- 6 Three storage bins contain colored blocks. Bin 1 contains 15 red and 14 blue blocks. Bin 2 contains 16 white and 15 blue blocks. Bin 3 contains 15 red and 15 white blocks. All of the blocks from the three bins are placed into one box. If one block is randomly selected from the box, which color block would most likely be picked? Justify your answer.
- 7 Jon is buying tickets for himself for two concerts. For the jazz concert, 4 tickets are available in the front row, and 32 tickets are available in the other rows. For the orchestra concert, 3 tickets are available in the front row, and 23 tickets are available in the other rows. Jon is randomly assigned one ticket for each concert. Determine the concert for which he is more likely to get a front-row ticket. Justify your answer.
- 8 Each of the hats shown below has colored marbles placed inside. Hat *A* contains five green marbles and four red marbles. Hat *B* contains six blue marbles and five red marbles. Hat *C* contains five green marbles and five blue marbles.



Hat A



Hat B



Hat C

If a student were to randomly pick one marble from each of these three hats, determine from which hat the student would most likely pick a green marble. Justify your answer. Determine the fewest number of marbles, if any, and the color of these marbles that could be added to *each* hat so that the probability of picking a green marble will be one-half in each of the three hats.

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Answer Section

1 ANS: 4 REF: 081303ia

2 ANS: 4

$$P(O) = \frac{3}{6}, P(E) = \frac{3}{6}, P(< 6) = \frac{5}{6}, P(> 4) = \frac{2}{6}$$

REF: 010903ia

3 ANS: 3

$$P(O) = \frac{5}{10}, P(P) = \frac{4}{10}, P(\leq 5) = \frac{6}{10}, P(/3) = \frac{4}{10}$$

REF: 081125ia

4 ANS: 4

$$P(\text{odd}) = \frac{7+14+20}{75} = \frac{41}{75}. P(\text{even}) = \frac{22+6+6}{75} = \frac{34}{75}. P(3 \text{ or less}) = \frac{14+22+7}{75} = \frac{43}{75}.$$

$$P(2 \text{ or } 4) = \frac{22+6}{75} = \frac{28}{75}$$

REF: 011325ia

5 ANS: 3 REF: 010811a

6 ANS:

White. There are 31 white blocks, 30 red blocks and 29 blue blocks.

REF: 061232ia

7 ANS:

$$\text{orchestra: } \frac{3}{26} > \frac{4}{36}$$

REF: 011033ia

8 ANS:

Hat A, add 1 not green to Hat A, add 11 green to Hat B, and add none to Hat C.

REF: 081038ia