*AAT (IC/HW)-Days 1-2 — Name: Key — Date: ________ Period: ________

Chapter 10: 10-8 Probability

A single card is drawn from a deck. Find the probability and the odds that the card is as specified.

1. (a) a king

$P(E) = \frac{4}{52} = \frac{1}{13}$

Odds : $N(E)$ to $N(E')$; 4 to 48 = 1 to 12

(b) a king or a queen $P(E) = \frac{4}{52} + \frac{4}{52} = \frac{8}{52} = \frac{2}{13}$

$O(E) =$ 8 to 44 = 2 to 11

(c) a king, a queen, or a jack

$P(E) = \frac{4}{52} + \frac{4}{52} + \frac{4}{52} = \frac{12}{52} = \frac{3}{13}$

$O(E) =$ 12 to 40 = 3 to 10

A single die is tossed. Find the probability and the odds that the die is as specified.

2. (a) a 4

$P(E) = \frac{1}{6}$

$O(E) =$ 1 to 5

(b) a 6

$P(E) = \frac{1}{6}$

$O(E) =$ 1 to 5

(c) a 4 or a 6

$P(E) = \frac{1}{6} + \frac{1}{6} = \frac{2}{6} = \frac{1}{3}$

$O(E) =$ 2 to 4 = 1 to 2

An urn contains five red balls, six green balls, and four white balls. If a single ball is drawn, find the probability and the odds that the ball is as specified.

3. (a) red

$P(E) = \frac{5}{15} = \frac{1}{3}$

$O(E) =$ 5 to 10 = 1 to 2

(b) green

$P(E) = \frac{6}{15} = \frac{2}{5}$

$O(E) =$ 6 to 9 = 2 to 3

(c) red or white

$P(E) = \frac{5}{15} + \frac{4}{15} = \frac{9}{15} = \frac{3}{5}$

$O(E) =$ 9 to 6 = 3 to 2

Two dice are tossed. Find the probability and the odds that the sum is as specified.

4. (a) 8

$P(E) = \frac{5}{36}$, $O(E) =$ 5 to 31

(b) 11 or 8 $P(E) = \frac{2}{36} + \frac{5}{36} = \frac{7}{36}$

$O(E) =$ 7 to 29

(c) greater than 9

$P(10) + P(11) + P(12)$

$\frac{3}{36} + \frac{2}{36} + \frac{1}{36} = \frac{6}{36} = \frac{1}{6}$

$O(E) =$ 6 to 30 = 1 to 5

* Sum of 2 dice	2	3	4	5	6	7	8	9	10	11	12	*
# ways to obtain	1	2	3	4	5	6	5	4	3	2	1	

5. Three dice are tossed. Find the probability of a sum of 5

1, 1, 3 1, 2, 2
1, 3, 1 2, 2, 1
3, 1, 1 2, 1, 2

$\frac{6}{216} = \frac{1}{36}$

6. If three coins are flipped, find the probability that exactly two heads turn up. (So 1 tail)

There are 3 ways for 1 tail to turn up

so, $\frac{3}{2^3} = \frac{3}{8}$

7. If $P(E) = \frac{5}{7}$, find O(E) and O(E').

O(E) = 5 to 2

O(E') = 2 to 5

8. If O(E) are 9 to 5, find O(E') and P(E).

O(E') = 5 to 9

$P(E) = \frac{9}{14}$

9. For the given value of P(E)≈0.659, approximate O(E) in terms of "X to 1."

$\approx \frac{659}{1000}$ O(E) = 659 to 341 = 1.93 to 1

n(E) = 659; n(E') = 341

Suppose five cards are drawn from a deck. Find the probability of obtaining the indicated cards.

10. Four of a kind (such as four aces or four kings)

$\frac{C(4,4) \cdot C(48,1) \cdot 13}{C(52,5)} = \frac{1}{4165}$

11. Four diamonds and one spade

$\frac{C(13,4) \cdot C(13,1)}{C(52,5)} = \frac{143}{39,984}$

12. Five face cards

$\frac{C(12,5)}{C(52,5)} = \frac{33}{108,290}$

13. A flush (five cards of the same suit)

$\frac{C(13,5) \cdot 4}{C(52,5)} = \frac{33}{16,660}$

14. If a single die is tossed, find the probability of obtaining an odd number or a prime number.

$E_1 = \{1, 3, 5\}$

$E_2 = \{2, 3, 5\}$

$$\frac{3}{6} + \frac{3}{6} - \frac{2}{6} = \frac{4}{6} = \frac{2}{3}$$

15. If the probability of a baseball player's getting a hit in one at bat is 0.326, find the probability that the player gets no hits in 4 times at bat.

$P(E) + P(E') = 1$

(getting hit) (not getting hit)

$P(E') = 1 - P(E)$

$= 1 - .326 = 0.674$

$(0.674)^4 \approx 0.2064$

16. A true-or-false test consists of eight questions. If a student guesses the answer for each question, find the probability that

(a) eight answers are correct

$$\frac{C(8,8)}{2^8} = \frac{1}{256}$$

(b) seven answers are correct and one is incorrect

$$\frac{C(8,7)}{2^8} = \frac{1}{32}$$

(c) six answers are correct and two are incorrect

$$\frac{C(8,6)}{2^8} = \frac{7}{64}$$

(d) at least six answers are correct

$$\frac{C(8,6) + C(8,7) + C(8,8)}{2^8} = \frac{37}{256}$$

17. If two dice are tossed, find the probability that the sum is greater than 5.

$P(K > 5) = 1 - P(K \leq 5)$

$= 1 - \left(\frac{1}{36} + \frac{2}{36} + \frac{3}{36} + \frac{4}{36}\right)$

$= 1 - \frac{10}{36} = \frac{26}{36} = \frac{13}{18}$

18. Assuming that girl-boy births are equally probable, find the probability that a family with five children has

(a) all boys

$\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{32}$

(b) at least one girl

$1 - \frac{1}{32} = \frac{31}{32}$

19. A standard slot machine contains three reels, and each reel contains 20 symbols. If the first reel has five bells, the middle reel four bells, and the last reel two bells, find the probability of obtaining three bells in a row.

$$\frac{5}{20} \cdot \frac{4}{20} \cdot \frac{2}{20} = \frac{40}{8000} = \frac{1}{200}$$

20. In one version of a popular lottery game, a player selects six of the numbers from 1 to 54. The agency in charge of the lottery also selects six numbers. What is the probability that the player will match the six numbers if two $0.50 tickets are purchased? (This jackpot is worth at least $2 million in prize money and grows according to the number of tickets sold.)

1 ticket $P(E) = \frac{n(E)}{n(S)} = \frac{C(6,6)}{C(54,6)} = \frac{1}{25{,}827{,}165}$

2 tickets $P(E) = \frac{2 \times 1}{25{,}827{,}165} \approx$ 1 chance in 13 million