

Pre-Calculus/Trig3
 Chapter 14 Review Problems
 14.1-14.6 Combinatorics and Probability

Name _____
 Block _____ Date _____

Find each value

1. ${}_6P_3$

120

2. ${}_8P_6$

20160

3. ${}_nP_n = \frac{n!}{(n-n)!} = 0!$

4. ${}_5C_3$

10

5. ${}_{11}C_8$

165

6. ${}_5C_5 \cdot {}_3C_2$

$\frac{1 \cdot 3}{3} = 1$

7. Carrie has 5 scarves & 10 pairs of gloves.
 How many ways can Carrie pick a scarf glove set?

(I) $5 \cdot 10 = 50$

8. How many ways can six different books be placed
 on a shelf if the only dictionary must be on an end?

$5! = 120$
 $5! \cdot 2 = 240$

~~9. How many ways can 10 people sit in a circle?~~

~~10. How many ways can 6 people sit around
 table where the person closest to the door has to
 answer the door?~~

~~11. There are 9 beads on a bracelet with a clasp.
 How many possible ways can the charms be
 arranged on the bracelet?~~

12. How many ways can 8 people be seated
 in a row if two people need to sit next to
 each other?

(I) $7! \cdot 2 = 10080$

13. From a group of 3 men and 7 women, how
 many committees of 2 men and 2 women
 can be formed?

(C) $C(3,2) \cdot C(7,2) = 3 \cdot 21 = 63$

14. How many ways can 4 shirts and 10
 pairs of pants be combined to make an
 outfit?

(I) $4 \cdot 10 = 40$

How many different ways can the letters of each word be arranged?

15. LEVEL

$$\frac{5!}{2!2!4} = \frac{120}{4} = 30$$

16. CINCINNATI

$$\frac{10!}{2!3!3!2!6!} = 50,400$$

17. GRADUATE

$$\frac{8!}{2!} = 20,160$$

18. BANANA

$$\frac{6!}{3!2!} = 60$$

State the odds if an event occurring given the probability of the event.

19. 4/9

$$4:5$$

20. 1/12

$$1:11$$

A bag contains 7 pennies, 4 nickels, and 5 dimes. Three coins are selected at random with replacement. What is the probability of each of the following selections?

21. all 3 pennies

$$\left(\frac{7}{16}\right)^3 = \frac{343}{4096}$$

22. 2 pennies and 1 nickel

$$\frac{7}{16} \cdot \frac{7}{16} \cdot \frac{4}{16} = \frac{196}{1024} = \frac{49}{256}$$

23. 2 pennies and 1 quarter

$$\frac{7}{16} \cdot \frac{7}{16} \cdot \frac{1}{4} = \frac{49}{1024}$$

A green die and a red die are thrown. What is the probability that each of the following occurs?

19. the red die shows a 1 & the green die shows any other number

$$\frac{1}{6} \cdot \frac{5}{6} = \frac{5}{36}$$

20. neither die shows a 1

$$\left(\frac{5}{6}\right)^2 = \frac{25}{36}$$

A box contains slips of paper numbered from 1 to 14. A slip of paper is drawn at random. What is the probability that each of the following occurs?

21. The number is prime or is a multiple of 4.

$$\frac{6}{14} + \frac{3}{14} = \frac{9}{14}$$

22. The number is a multiple of 2 or 3.

$$\frac{9}{14}$$

23. A class has 12 boys & 4 girls. If 3 students are selected, what are the odds they are all boys?

$$\frac{C(12, 3)}{C(16, 3)} = \frac{220}{560} = \frac{11}{28} = 11:17$$

1. If a die is thrown, what is the probability that the upper face shows a five? More than a five? Less than a five? An even number? An odd number?

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

$$\frac{1}{2}$$

$$\frac{1}{2}$$

$$\frac{1}{6}$$

$$\frac{1}{6}$$

2. From a class of 30 students with 20 girls, one student is chosen by lot. What is the probability that a boy is chosen?

$$\frac{10}{30} = \frac{1}{3}$$

3. A bag contains 10 red marbles and 8 white marbles. If one marble is drawn from a bag at random, what is probability that it is white? That it is red?

$$P(W) = \frac{8}{18} = \frac{4}{9} \quad P(R) = \frac{10}{18} = \frac{5}{9}$$

4. In a family of four children, what is the probability that all four are girls? (Assume that a girl and boy have the same probability of being born)

$$\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{16}$$

5. A perfectly balanced wheel of change contains the numbers from 1 to 20. If the wheel is spun, what is the change that an odd number will show?

$$\frac{10}{20} = \frac{1}{2}$$

6. What is the probability of drawing a red card from a deck of 52 cards? What is the probability of drawing a king? What is the probability of drawing a queen?

$$P(R) = \frac{26}{52} = \frac{1}{2} \quad P(K) = \frac{4}{52} = \frac{1}{13} \quad P(Q) = \frac{4}{52} = \frac{1}{13}$$

7. A letter is chosen a random from the word *probability*. What is the probability that the letter is a vowel? A consonant? The better b?

$$P(V) = \frac{4}{11} \quad P(C) = \frac{7}{11} \quad P(B) = \frac{2}{11}$$

8. Jim holds a ticket in a raffle that offers 10 prizes and sells 540 tickets. What is the probability that he will win a prize? That he will not win the prize?

$$P(\text{win}) = \frac{C(10,1)}{C(540,1)} = \frac{10}{540} = \frac{1}{54} \quad P(\text{lose}) = \frac{C(530,1)}{C(540,1)} = \frac{53}{54}$$

9. If a card is drawn from a deck of 52 cards, what is the probability that neither an ace nor a king will be drawn?

$$P(\text{No A, K}) = \frac{44}{52} = \frac{11}{13}$$

$$4 \quad 4$$

10. In problems 10-14 refer to the fact that a bag contains only 2 white marbles and 3 red marbles.

11. What is the probability of drawing a white marble?

$$\frac{2}{5}$$

12. What is the probability of drawing a red marble?

$$\frac{3}{5}$$

13. What are the odds in favor of drawing a white marble?

$$2:3$$

14. What are the odds against drawing a white marble?

$$3:2$$

15. What are the odds in favor of drawing a red marble?

$$3:2$$

16. In problems 15-17 use the fact that the probability of an event is $\frac{2}{5}$:

17. What are the odds in favor of this happening?

$$2:3$$

18. What are the odds against its happening?

$$3:2$$

19. What is the probability of it not occurring?

$$\frac{3}{5}$$

20. In problems 18-19 use the fact that the odds against an event are $\frac{6}{5}$.

21. What are the odds in favor of the event?

$$5:6$$

22. What is the probability that it will occur?

$$\frac{5}{11}$$

23. A bag contains 5 black marbles, 4 red marbles, and 3 white marbles. Three marbles are drawn in succession, each marble being replaced before the next one is drawn. What is the probability that the first marble is black, the second marble is red and the third is white?

$$\frac{5}{10} \cdot \frac{4}{10} \cdot \frac{3}{10} = \frac{5}{144}$$