

Algebra 2
Chapter 12 Probability review

1. How many 3 digit numbers can be formed from the digits 1,3,5,7, and 9 if repetitions are allowed? $\underline{5} \times \underline{5} \times \underline{5} = 125$
2. How many different 3 person groups can be formed using 13 people?
no order ${}_{13}C_3 = 286$
3. If the first letter of a radio station's name must be W or K, how many arrangements of 4 letters are possible (repeats allowed)?
 $\underline{2} \cdot \underline{26} \cdot \underline{26} \cdot \underline{26} = 35152$
4. How many different ways can the letters of the word GERMANY be arranged if each letter is used once? $7! = 5040$
 ${}_{7}P_7$ or
5. How many different ways can the letters of the word BEARS be arranged if each letter is used once? ${}_{5}P_5$ or $5! = 120$
6. How many ways can 8 books be arranged on a shelf? *from 10 total?*
order matters ${}_{10}P_8 = 1814400$
7. How many four man bobsled teams can be chosen from a group of nine athletes?
no order ${}_{9}C_4 = 126$

One bag of candy gummy fish contains 15 red fish, 10 yellow fish and 6 green fish. Find the following probabilities. (problems 8-12) 31 total

8. P(red fish) $15/31 = 48.4\%$
9. P(yellow fish) $10/31 = 32.3\%$
10. P(yellow or red fish) $15/31 + 10/31 = 25/31 = 80.6\%$
11. P(red and red fish) (two draws without replacement) $\frac{15}{31} \cdot \frac{14}{30} = \frac{7}{31} = 22.6\%$
12. P(not a red fish) $1 - 15/31 = 16/31 = 51.6\%$

Grandma has four gray kittens, seven white kittens and ten orange kittens. She is randomly giving two to you. Find the following probabilities. (#13-15)

13. P(gray and white) $\frac{4}{21} \cdot \frac{7}{20} = \frac{1}{15} = 6.7\%$
14. P(orange and orange) $\frac{10}{21} \cdot \frac{9}{20} = \frac{3}{14} = 21.4\%$

15. P(2 same color) GG + WW + OO = 2.8 + 10 + 21.4 = 34.2

GG = $\frac{4}{21} \cdot \frac{3}{21} = \frac{1}{35} \approx 2.8\%$ WW = $\frac{7}{21} \cdot \frac{6}{20} = 10\%$ OO = 21.4

16. Create a tree diagram for the following event.
The number of heads obtained when you flip 3 coins.

- Find the Probability for each outcome (0,1,2,3 heads).
- What is P(at least 2 heads)?
- What is P(at least 1 tail)?
- What is P(exactly 2 tails)?



$P(0H) = \frac{1}{8} = 12.5\%$
 $P(1H) = \frac{3}{8} = 37.5\%$
 $P(2H) = \frac{3}{8} = 37.5\%$
 $P(3H) = \frac{1}{8} = 12.5\%$

$P(\text{at least 2H}) = \frac{1}{2} = 50\%$
 $P(\text{1 tail}) = \frac{7}{8} = 87.5\%$
 $P(\text{2 tails}) = \frac{3}{8} = 37.5\%$

17. Many states have a lottery in which you select 6 winning numbers from a sample space of 49 numbers. What is the probability that you select all six numbers correctly?

$49C_6 = 13,983,816$

$\frac{1}{13,983,816} = 0.0000000715$
 $= 0.000000715\%$

18. Differentiate between a combination and a permutation.

order matters in a permutation

19. Explain why a probability greater than one is not possible.

the denominator is always the total possible so it will always be the biggest number

20. A bag contains 4 blue tiles and 4 yellow tiles. Three tiles are drawn from the bag without replacement. What is the probability that all three tiles are blue (hint this is a combination).

Total: $8C_3 = 56$ $4C_3 = 4$ $4C_0 = 1$

$\frac{4 \cdot 1}{56} = 7\%$

21. Three marbles are drawn simultaneously from a bag containing 7 blue and 13 green marbles. What is the probability that at least two are green (Hint: this is a combination).

$P(2) + P(3)$
 $P(2) = {}_7C_2 \cdot {}_{13}C_1 = 21 \cdot 13 / 1140 = 273 / 1140$
 $P(3) = {}_7C_3 \cdot {}_{13}C_0 = 35 \cdot 1 = 35 / 1140$
 $\frac{273}{1140} + \frac{35}{1140} = \frac{308}{1140} \approx 27\%$

22. Mom has 10 necklaces in her jewelry box. 7 are gold and 3 are silver. If she randomly selects 3 from her jewelry box, Find the following probabilities: (Hint: this is a combination).

total = ${}_{10}C_3 = 120$
 a. $P(\text{only one silver}) = \frac{{}_3C_1 \cdot {}_7C_2}{{}_{10}C_3} = \frac{3 \cdot 21}{120} = \frac{63}{120} = 52.5\%$
 b. $P(\text{exactly 2 gold}) = \frac{{}_7C_2 \cdot {}_3C_1}{{}_{10}C_3} = \frac{21 \cdot 3}{120} = 52.5\%$

Use the table to find each probability.

Guitars

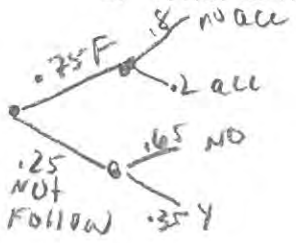
	Acoustic	Electric	
Tan	78	42	120
Black	34	56	90
Blue	12	16	28
	124	114	

23. a. $P(\text{black|acoustic}) = \frac{34}{124} = 27.4\%$
 b. $P(\text{tan|electric}) = \frac{42}{114} = 36.8\%$
 c. $P(\text{blue|electric}) = \frac{16}{114} = 14\%$

24. A car insurance company compiled the following information from a recent survey.

- 75% of drivers carefully follow the speed limit.
- Of the drivers who carefully follow the speed limit, 80% have never had an accident.
- Of the drivers who do not carefully follow the speed limit, 65% have never had an accident.

- a. What is the p(driver does not follow the speed limit and has never had an accident)?
- b. What is the P(had an accident|follow the speed limit)



a) $P(\text{NF and NA}) = P(\text{NF}) \cdot P(\text{NA|NF}) = .25 \cdot .65 = .1625 = 16.25\%$
 b) $P(\text{A|F}) = .2$ Follow the tree

