

AFM - Probability Unit
 HW 1 - Probability and Odds

NAME Key

Suppose you pick one card from a standard deck of 52, find the following:

- $P(\text{diamond}) = \frac{13}{52} = \frac{1}{4}$
- $P(\text{red}) = \frac{26}{52} = \frac{1}{2}$
- $P(\text{number greater than 8}) = \frac{8}{52} = \frac{2}{13}$
- $P(\text{face card}) = \frac{12}{52} = \frac{3}{13}$
- $P(\text{ace}) = \frac{4}{52} = \frac{1}{13}$
- $P(\text{Odds (black)}) = \frac{26}{52} = \frac{1}{1}$
- Odds in favor of getting a spade
 $\frac{\text{spades}}{\text{not spades}} = \frac{13}{39} = \frac{1}{3}$
- Odds against getting a number less than 6
 $\frac{\text{not less than 6}}{\text{less than 6}} = \frac{36}{16} = \frac{9}{4}$

State the odds of an event occurring given the probability of the event:

- $\frac{2}{3}$ → $\frac{2}{1}$
- $\frac{5}{9}$ → $\frac{5}{4}$

State the probability of an event given the odds in favor of the event occurring:

- $\frac{3}{5}$ → $\frac{3}{8}$
- $\frac{4}{3}$ → $\frac{4}{7}$

State the probability of an event given the odds against the event occurring:

- $\frac{4}{3}$ → $\frac{3}{7}$
- $\frac{12}{5}$ → $\frac{5}{17}$

You spin a spinner that has 12 equal-sized sections numbered 1 to 12. Find each probability. 1 2 3 4 5 6 7 8 9 10 11 12

- $P(3 \text{ or } 4) = \frac{2}{12} = \frac{1}{6}$
- $P(\text{even or } 7) = \frac{6}{12} + \frac{1}{12} = \frac{7}{12}$
- $P(\text{even or odd}) = \frac{12}{12}$
- $P(\text{multiple of 3 or odd}) = \frac{4}{12} + \frac{6}{12} - \frac{2}{12} = \frac{8}{12} = \frac{2}{3}$
- $P(\text{multiple of 2 or multiple of 3}) = \frac{6}{12} + \frac{4}{12} - \frac{2}{12} = \frac{8}{12} = \frac{2}{3}$
- $P(\text{less than 5 or greater than 9}) = \frac{4}{12} + \frac{3}{12} = \frac{7}{12}$

You pick a card from a standard deck of 52 cards. Find each probability.

- $P(\text{a 4 or a diamond}) = \frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52} = \frac{4}{13}$
- $P(\text{a 2 or a black card}) = \frac{4}{52} + \frac{26}{52} - \frac{2}{52} = \frac{28}{52} = \frac{7}{13}$
- $P(\text{an ace or a queen}) = \frac{4}{52} + \frac{4}{52} = \frac{8}{52} = \frac{2}{13}$
- $P(\text{even number or number } > 5) = \frac{20}{52} + \frac{20}{52} - \frac{12}{52} = \frac{28}{52} = \frac{7}{13}$
- $P(\text{number } < 8 \text{ or a spade}) = \frac{24}{52} + \frac{13}{52} - \frac{6}{52} = \frac{31}{52}$
- $P(\text{face card or club}) = \frac{12}{52} + \frac{13}{52} - \frac{3}{52} = \frac{22}{52} = \frac{11}{26}$
- $P(\text{red card or club}) = \frac{26}{52} + \frac{13}{52} = \frac{39}{52} = \frac{3}{4}$
- $P(\text{heart or king}) = \frac{13}{52} + \frac{4}{52} - \frac{1}{52} = \frac{16}{52} = \frac{4}{13}$

29. odds in favor of picking a red card or club 30. odds against picking a heart or a king

* Probability was $\frac{3}{4}$ so odds are $\frac{3}{1}$ * Probability for success was $\frac{4}{13}$ so odds against are $\frac{9}{4}$

The FVHS yearbook staff is made up of girls and boys from every single grade. There are 35 seniors, and 15 of the seniors are girls. 17 of the juniors are boys. There are 4 freshmen girls and 3 freshmen boys. There are a total of 49 boys on the yearbook staff. There are 20 sophomores on the staff, 11 of whom are girls. There are 25 total juniors on the yearbook staff.

Create a chart depicting each category and use the chart to find the following:

	F	S.	J	Sen	
B	3	9	17	20	49
G	4	11	8	15	38
		20	25	35	87

31. P(girl) $\frac{38}{87}$

32. P(sophomore) $\frac{20}{87}$

33. P(boy or junior) $\frac{49}{87} + \frac{25}{87} - \frac{17}{87} = \frac{57}{87} = \frac{19}{29}$

34. P(senior or freshmen) $\frac{35}{87} + \frac{7}{87} = \frac{42}{87} = \frac{14}{29}$

35. P(girl who is a junior) $\frac{8}{87}$

36. P(freshmen or junior) $\frac{7}{87} + \frac{25}{87} = \frac{32}{87}$

37. odds against picking a junior girl
prob. for success is $\frac{8}{87}$
odds are $\frac{79}{8}$

38. odds in favor of picking a sophomore or a boy
Prob. of Soph. or Boy: $\frac{20}{87} + \frac{49}{87} - \frac{9}{87} = \frac{60}{87} = \frac{20}{29}$
so odds in favor are $\frac{20}{9}$

On a spinner that has eight sectors, there are two yellow, one orange, three blue and two red. Calculate the following:

Y Y O B B B R R

39. P(yellow) $\frac{2}{8} = \frac{1}{4}$

40. P(not blue) $\frac{5}{8}$

41. odds in favor of orange
 $\frac{\text{orange}}{\text{not orange}} = \frac{1}{7}$

42. odds against a primary color
 $\frac{\text{not primary}}{\text{primary}} = \frac{1}{7}$
→ primary colors are red, yellow, and blue