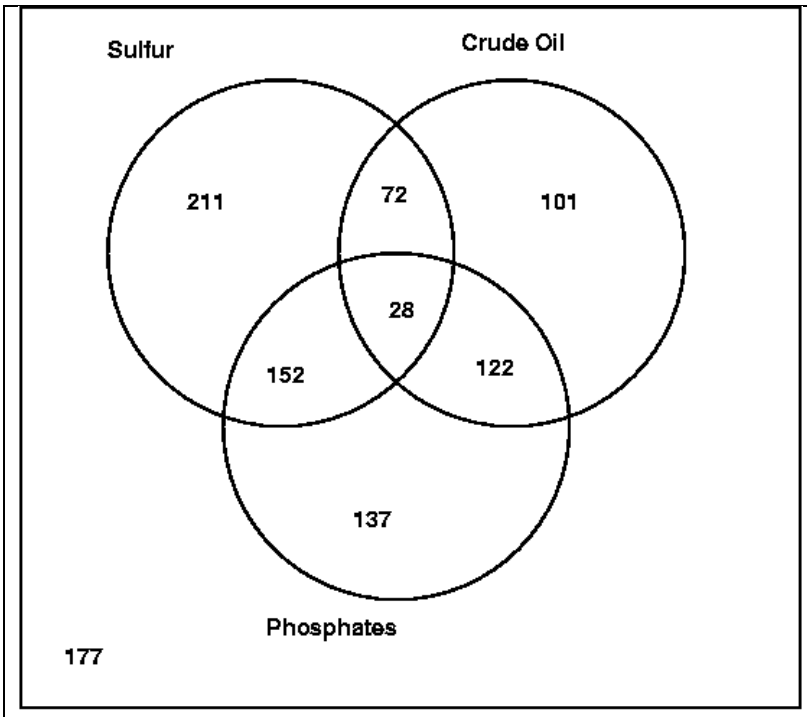
Venn Diagrams and Probability Formulas

Pollutants A study was made of 1000 rivers to determine what pollutants were in them. For probability questions assume a river is selected at random from the 1000 rivers.

Use the Venn Diagram that represents this data to answer the questions.



1] What does the number 28 represent in this Venn Diagram?

2] What does the number 122 represent?

3] What does 177 represent?

4] What does 72+28 represent?

5] P(a river is polluted with Sulfur, Crude Oil and Phosphates)?

6] How many rivers in the study are polluted with Sulfur?

7] P(S)=

8] How many rivers are polluted with Crude Oil?

9] P(C)=

10] How many rivers are polluted with both Sulfur and Crude oil?

11] P(Sand C)=

12] How many rivers are polluted with Sulfur or Crude Oil?

13] P(S or C)=

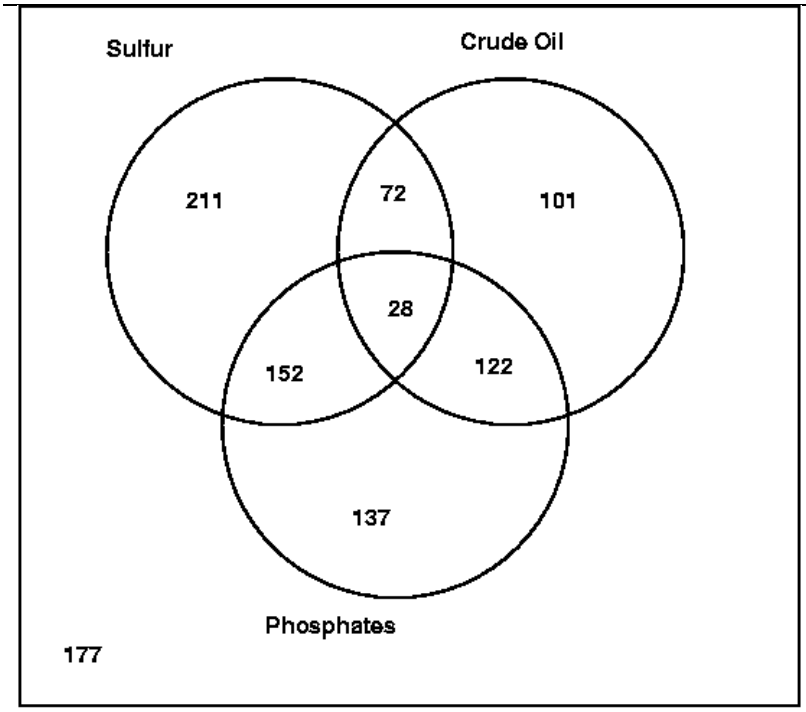
14] To find P(C/S) Look at the Sulfur Circle only, in that circle find the number of rivers in a C circle.

$$P(C\ /\ S) = \frac{72 + 28}{211 + 72 + 28 + 152} = \underline{\quad\quad} = \underline{\quad\quad\quad}$$

15] Verify these formulas for probabilities with the answers to the previous questions:

P(Sand C)= P(S) * P(C/S)

P(S or C)= P(S) + P(C) – P (S and C)



16) P(P)

17) P(C)

18) P(P or C)

19) P(P and C)

20) P(S or C or P)

21) P(S and C and P)

22) P(not polluted)

23) P(S/C)

24) P(P/C)

25) P(P/S)

26) P((Sand C)/P)

27) P((P and S)/C)

28) P(not C)

29) P(not P)

30) P(not S)

31) P(not S and not C)

32) P(C or P)

Concert Fill in the Venn Diagram that would represent this data. Cross off clues you use along the way. Check your solution before answering the questions.

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150 people at a Van Halen concert were asked if they knew how to play piano, drums or guitar.

- 18 people could play none of these instruments.
- 10 people could play all three of these instruments.
- 77 people could play drums or guitar but could not play piano.
- 73 people could play guitar.
- 49 people could play at least two of these instruments.
- 13 people could play piano and guitar but could not play drums.
- 21 people could play piano and drums.

Video of how to get the solution http://www.math.tamu.edu/~kahlig/venn/concert/concert.html

First write your answer as a ratio out of the total, then simplify the ratio, then write as a decimal or as a percent.

1) P(plays all 3 of these)
2) P(P and D and G)
3) P(plays only one of these instruments)
4) P(Plays the Drums)= P(D)=
5) P(Guitar)
6) P(Drums and Guitar)
7) P(G/D) (hint: Look only at the Drums circle – total will be your den. Look at guitar circle also in the D circle total will be num.)
8) P(Drums or Guitar)
9) P(Piano)
10) P(Piano and Guitar)
11) P(Piano or Guitar)
12) Use these formulas to get the answer and Verify these formulas work checking your answers above.

P(D or G)= P(D) + P(G) – P(Dand G)

P(D and G)= P(D) * P(G/D)

13) P(P/G)
14) P(D/G)
15) P(D/P)
16) P(G/P)
17) P(notD)
18) P(not P)
19) P(notG)
20) P(not P or not G)
21) P(does not play any of these instruments)
22) P(P or G or D)

Restaurant Fill in the Venn Diagram that would represent this data. Stuck? Watch video on website.

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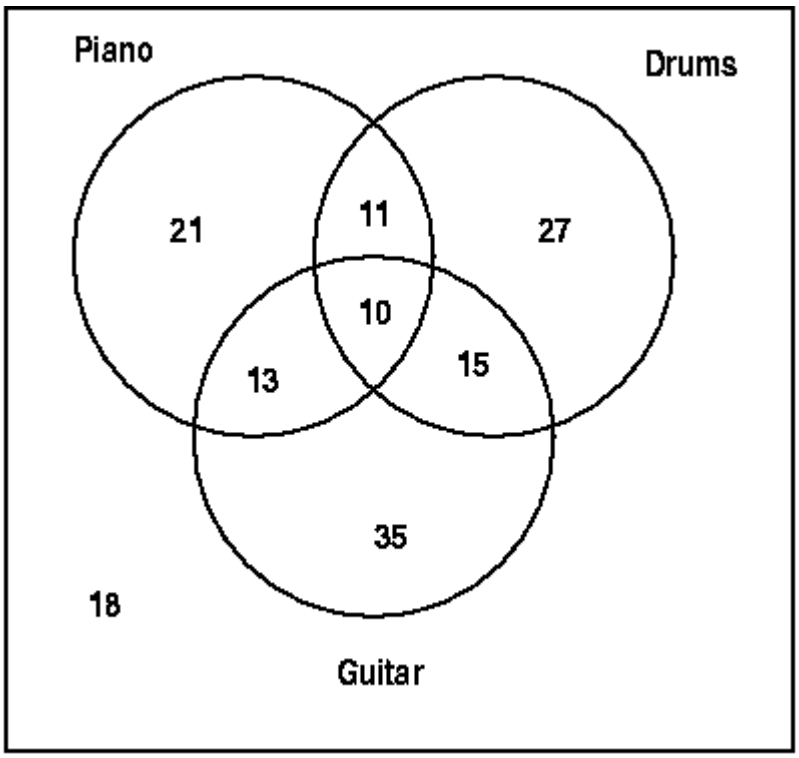
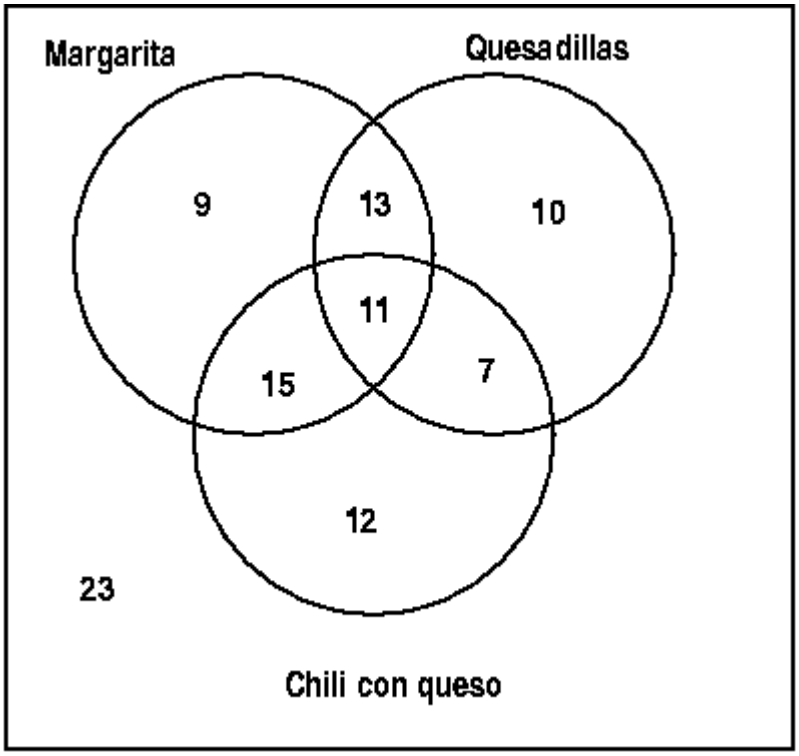
100 people seated at different tables in a Mexican restaurant were asked if their party had ordered any of the following items: margaritas, chili con queso, or quesadillas

- 23 people had ordered none of these items.
- 11 people had ordered all three of these items.
- 29 people had ordered chili con queso or quesadillas but did not order margaritas.
- 41 people had ordered quesadillas.
- 46 people had ordered at least two of these items.
- 13 people had ordered margaritas and quesadillas but had not ordered chili con queso.
- 26 people had ordered margaritas and chili con queso.

Video solution of the Venn Diagram: http://www.math.tamu.edu/~kahlig/venn/concert/concert.html

Check Venn diagram with solution on my website or posted in the room before answering the questions. Write your answer as a ratio out of the total, then as a percent.

1) P(ordered all 3)	10) P(not M)= P(did not order a Margarita)=
2) P(Q)	11) P(chili con queso)=P(C)=
3) P(M)	12) P(C and M)
4) P(Q and M)	13) P(M/C)
5) P(M/Q)	14) Verify this formula: $P(M \ / \ C) = \dfrac{P(C \text{ and M})}{P(C)}$
6) Verify this formula: $P(M \ / \ Q) = \dfrac{P(\text{Q and M})}{P(Q)}$	15) P(C or M)
7) P(Q or M)	16) Verify P(C or M) = P(C) + P(M) – P(C and M)
8) Verify this formula:	
9) P(Q or M) = P(Q) + P(M) – P(Q and M)	

STOP HERE THE LAST PAGE WILL HAVE THE ANSWERS TO THE VENN DIAGRAM- DON’T Peak without trying them first.

Answers to the Venn Diagrams: