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A number of probability laws can be established using Venn Diagrams.
This Venn diagram represents a sample space, S , of all children in a class. The event, E, shows all those students with blue eyes.


Determine the probability that a randomly selected child:
a) has blue eyes:
b) does not have blue eyes:

If $A$ and $B$ are two events in the sample space then the $B$ means that any member of this event is in `at least events A or B'. This shaded region is A or B.
$A$ and $B$ means that any member of this event is in B'.


1) Shade the region representing:
a) in A but not in B
b) neither in A nor B .

event A or one of the
`both $A$ and
2) In a class of 30 students, 19 study Physics, 17 study Chemistry and 15 study both of these subjects. Display this information on a Venn diagram and determine the probability that a randomly selected class member studies:
a) both subjects
b) at least one of the subjects
c) Physics, but not Chemistry
d) Chemistry, but not Physics
e) Neither subject

## Extra Practice:



1) On separate Venn diagrams, using two events $A$ and $B$, shade the region representing:
a) in A
b) in B
c) in both A and B
d) in A or B
e) in B but not in A
f) in exactly one of A or B

2) In a class of 40 students, 19 play tennis, 20 play netball and 8 play neither of these sports. A student is randomly chosen from the class. Determine the probability that the student:
a) plays tennis
b) does not play netball
c) plays at least one of the two sports
d) plays one and only one of the sports
e) plays netball, but not tennis
3) 50 married women were asked whether they gave their husband flowers or chocolates for their last birthday. The results were: 31 gave chocolates, 12 gave flowers and 5 gave both chocolates and flowers. If one of the married women was chosen at random, determine the probability that she gave her husband:
a) chocolates or flowers
b) chocolates but not flowers
c) neither chocolates nor flowers
4) The medical records for a class of 30 children showed whether they had previously had measles or chicken pox. The records showed 7 had had measles, 18 had had chicken pox, and 5 had had measles and chicken pox. If one child from the class is selected randomly from the group, determine the probability that he/she has had:
a) chicken pox
b) chicken pox but not measles
c) neither chicken pox nor measles
5) Use the diagram on the right to find:
a) $P(B)$
b) $\mathrm{P}(\mathrm{A}$ and B$)$
c) $\mathrm{P}(\mathrm{A}$ or B$)$
d) $\mathrm{P}(\mathrm{A})+\mathrm{P}(\mathrm{B})-\mathrm{P}(\mathrm{A}$ and B$)$


What is the connection between c) and d)?
6) The 36 students in 8 classes were assigned three challenging problems, A, B and C. A poll of the classes, one week later, showed that each student had solved at least one of the problems. It also showed this additional information.

- 10 students had solved all three problems
- 12 students had solved A and B
- 17 students had solved B and C
- 21 students had solved A and C
- 24 students had solved A
- 22 students had solved B

- 30 students had solved C
a. What is the probability a student solved problem $C$ only?
b. What is the probability a student solved problem A only?
c. What is the probability a student solved exactly one problem?
d. What is the probability a student solved exactly two problems?

7) In a class of 30 students, 17 play video games and 12 watch MTV. It turns out that 5 students play video games and watch MTV. A student in this class is to be selected at rapdom.
a. What is the probability that a student plays video games?
b. What is the probability that a student watches MTV?

c. What is the probability that a student watches MTV and plays video games?
d. What is the probability that a student neither plays video games nor watches MTV?
