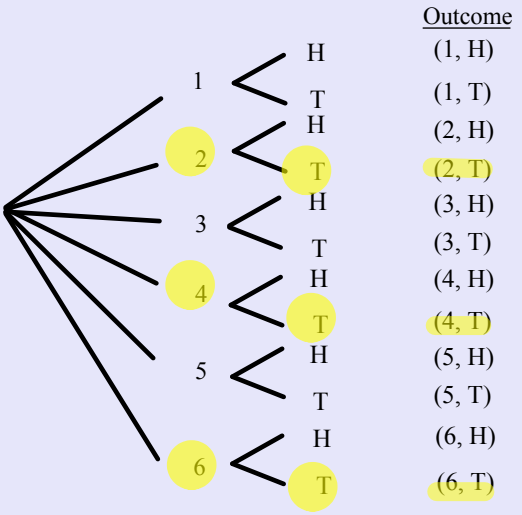
Probability Using Sets

Option 1: Solution

A tree diagram can be used to represent the possible results.



Based on the diagram, the $P(\text{even roll, tails}) = \frac{3}{12} = \frac{1}{4}$

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Option 2: Solution

Consider the addition table provided below.

+	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

The event of rolling a sum of 2 shares no elements with that of rolling a sum of 12.

In this case, we say that the events are **mutually exclusive** .

Mutually exclusive events can be modelled by a Venn diagram (above, right), where the events are shown and said to be **disjoint**.

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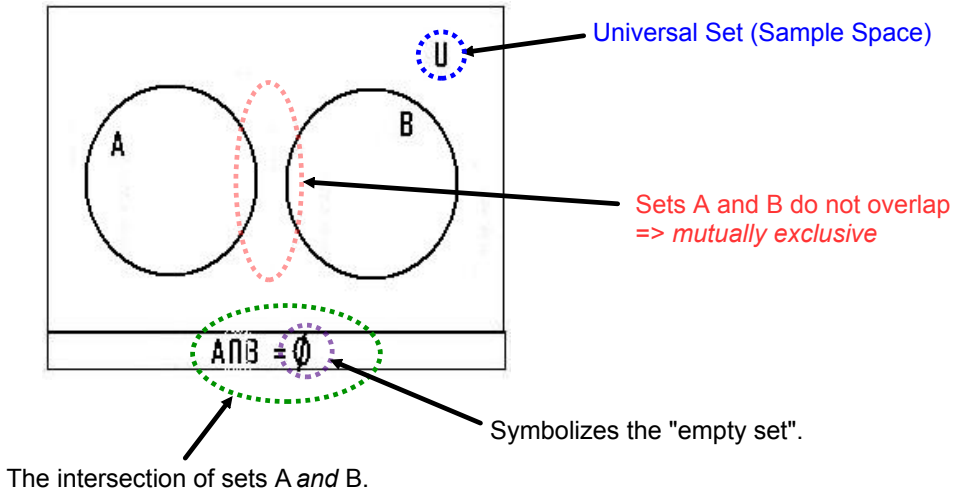
Probability Using Sets



Universal Set (Sample Space)

Sets A and B do not overlap
=> *mutually exclusive*

Symbolizes the "empty set".

The intersection of sets A *and* B.

Option 3: Solution

Consider the addition table provided.

+	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

Let A represent the event of rolling a pair; B, the event of rolling a sum of 4.

It is clear that these events are NOT mutually exclusive as $n(A \cap B) = 1$--the pair of 2's will result in a sum of 4 being double-counted.

The Venn diagram for such a situation is shown (above, right).

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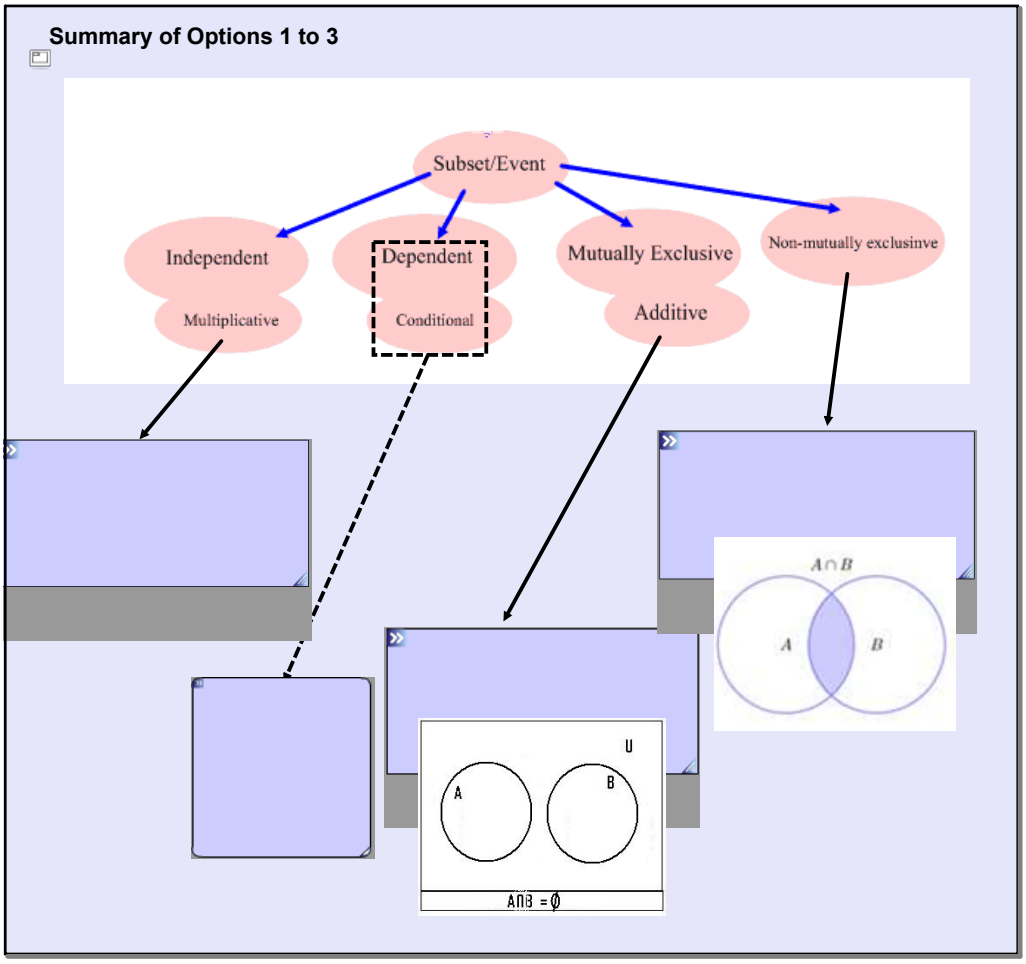
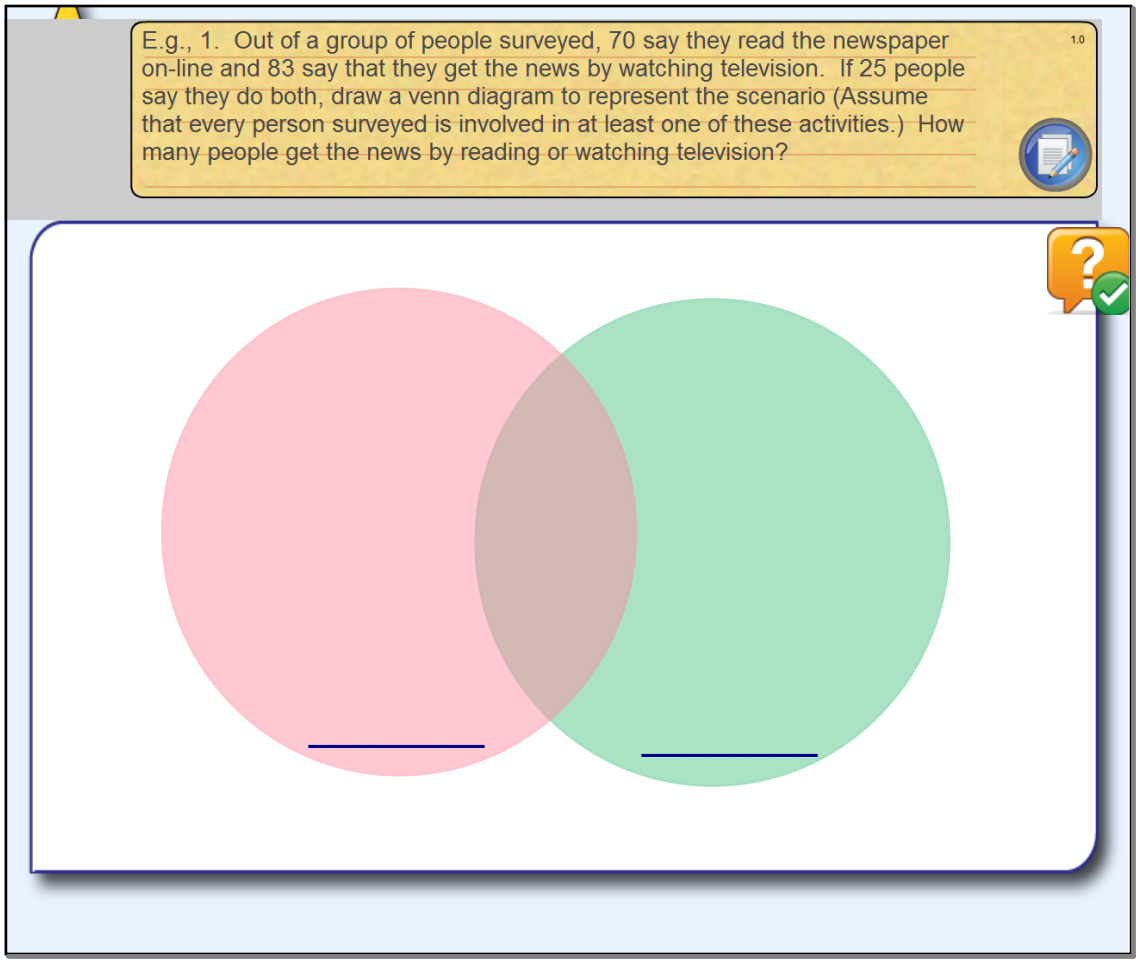
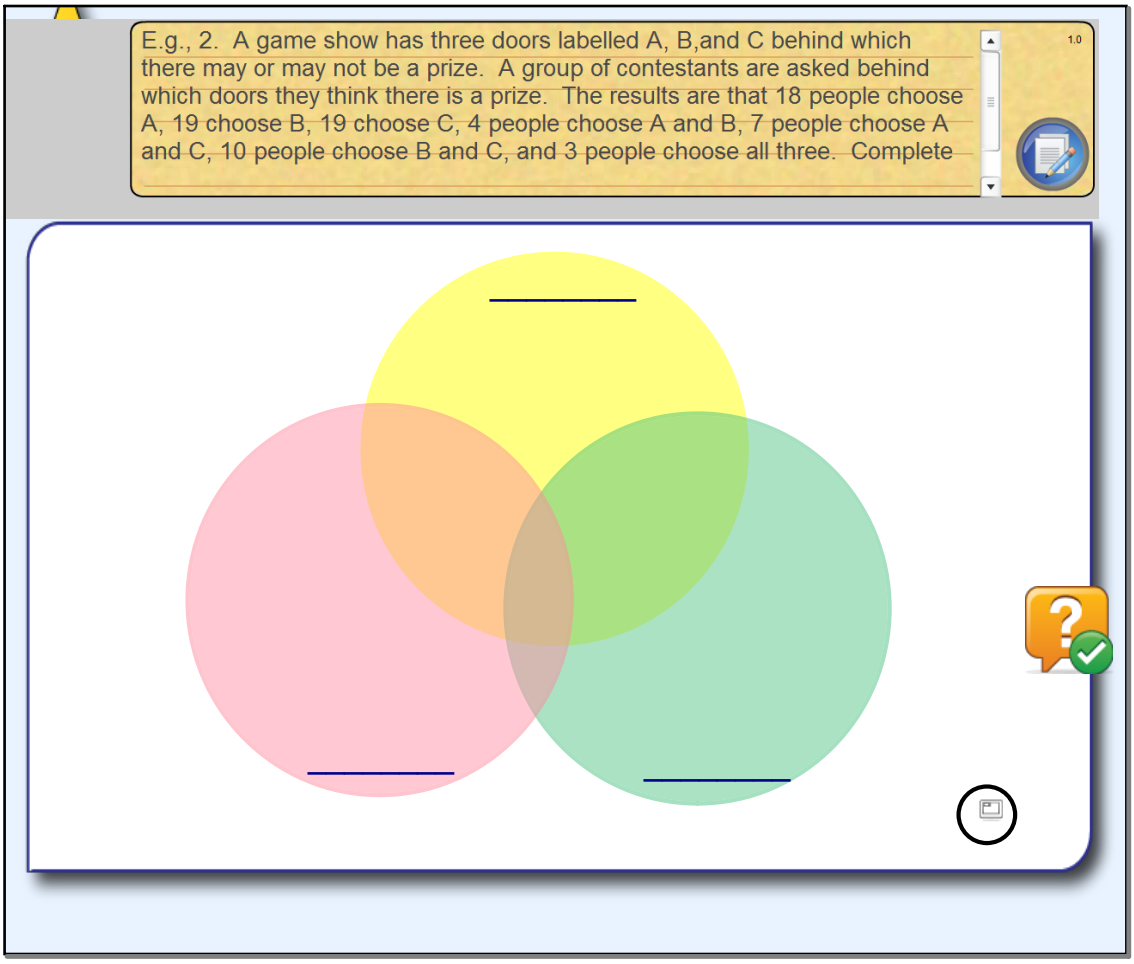
Probability Using Sets





Probability Using Sets



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Practice Problems

Complete p228 #1 to 12, 14 for _____'s class.

Exit Problems

Let's see how things have gone ... ready?

1 Two sets A and B are said to be *disjoint* if

A $n(A \cap B) = n(A) + n(B)$

B $n(A \cap B) = \varnothing$

C $n(A \cap B) = n(A) = n(B)$

D $n(A \cup B) = \varnothing$

2 If A and B are *mutually exclusive* events, then

A $P(A) + P(B) = 1$

B $P(A \cap B) = P(A) + P(B)$

C $P(A \cup B) = P(A) + P(B)$

D $P(A \cup B) = 1$

3 **Given that P(A) = 0.4, P(B) = 0.5, and P(A U B) is 0.6, the value of P(A∩B) is**

A 1.5

B 1

C 0.3

D 0.1

4 The intersection of two sets is <u>best</u> associated with the word

A both

B and

C or

D none of the above