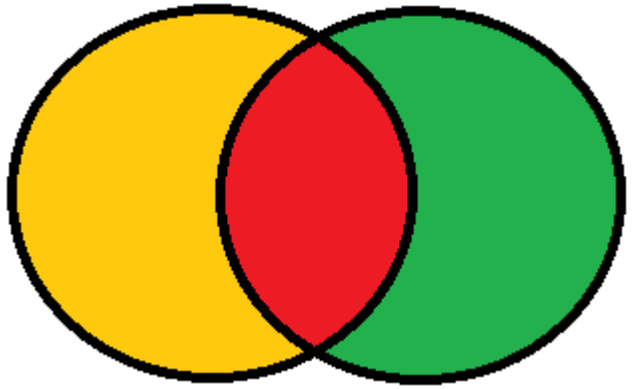
Additive Principle

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

A.1.5 recognize and describe an event as a set of outcomes and as a subset of a sample space, determine the complement of an event, determine whether two or more events are mutually exclusive or non-mutually exclusive (e.g., the events of getting an even number or getting an odd number of heads from tossing a coin 5 times are mutually exclusive), and solve related probability problems [e.g., calculate P(~A), P(A and B), P(A or B)] using a variety of strategies (e.g., Venn diagrams, lists, formulas)



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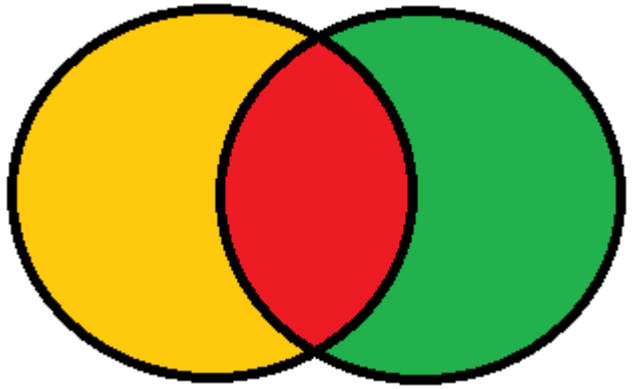
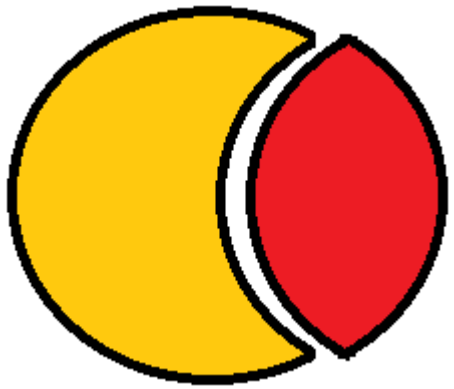
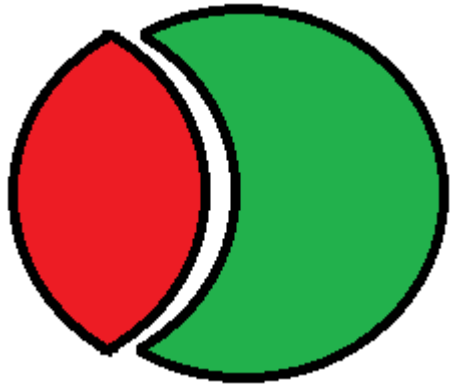

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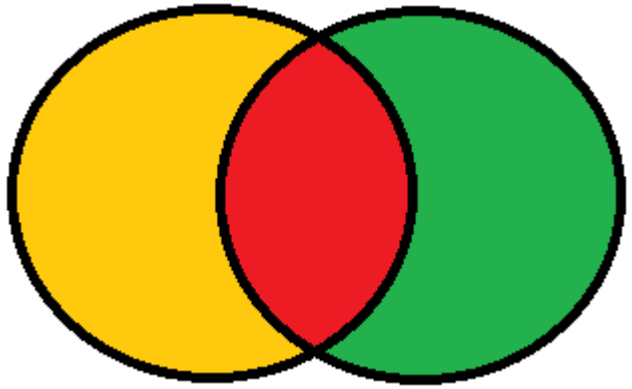
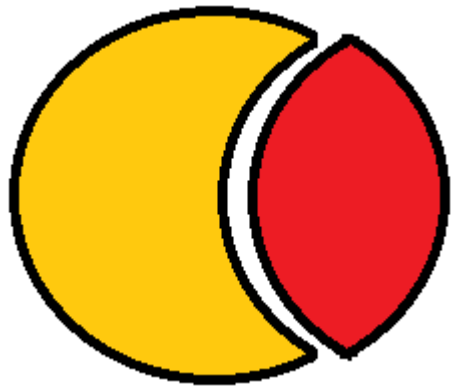
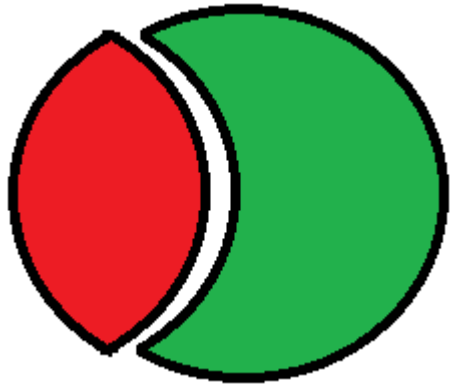

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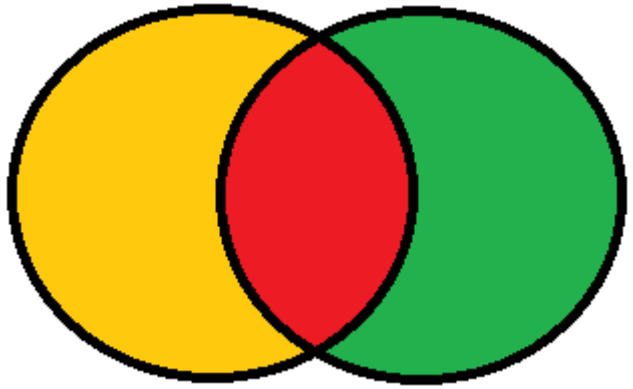
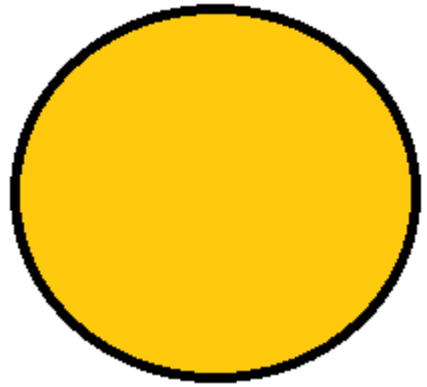
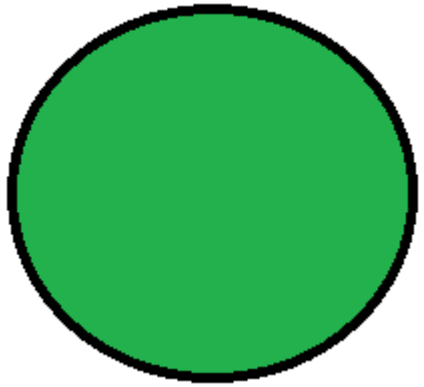
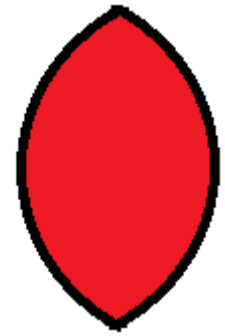

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$$n(Y \cup L) = n(Y) + n(L) - n(Y \cap L)$$
$$= 6 + 12 - 4$$
$$= 14$$

You have a fruit stand. You have 20 apples. You have 15 red apples. The number of fruit that are apples or red is 30. How many red fruit do you have?

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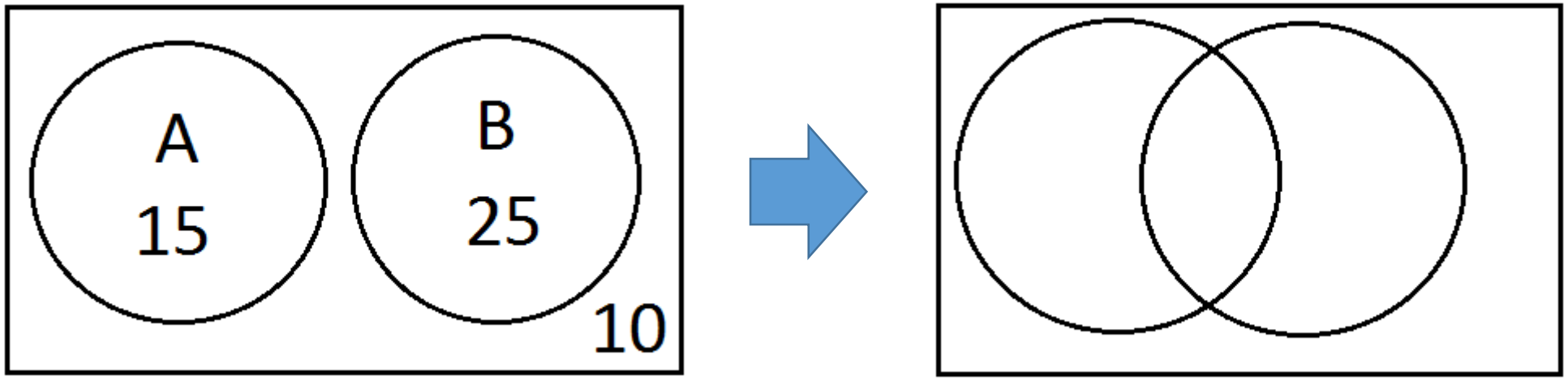
$$30 = n(R) + 20 - 15$$

$$30 = n(R) + 5$$

$$25 = n(R)$$

Convert the first diagram into the layout of the second.



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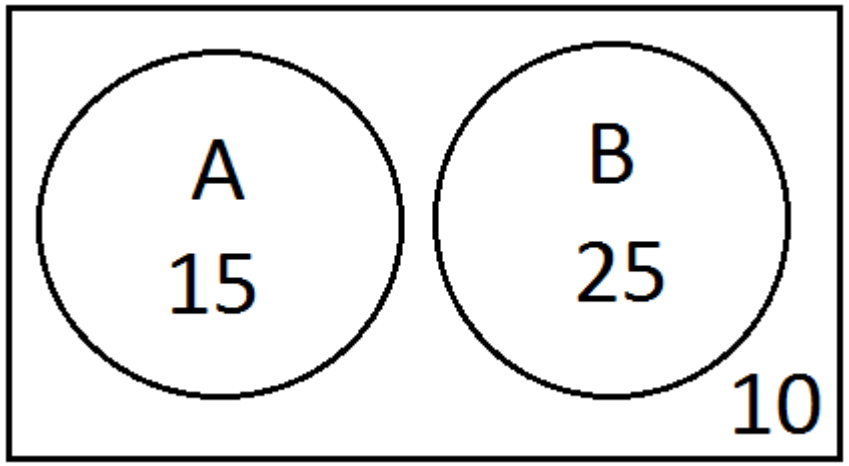
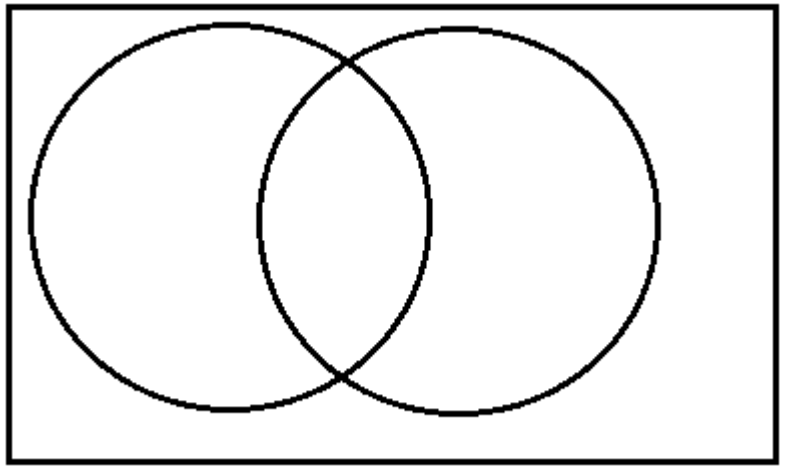
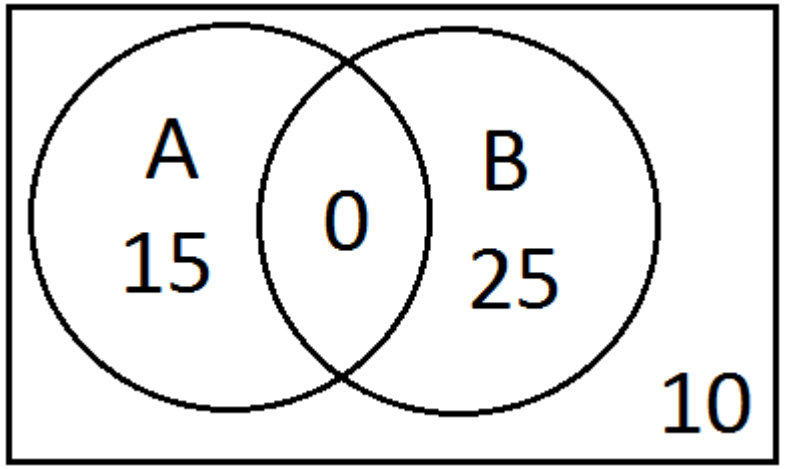


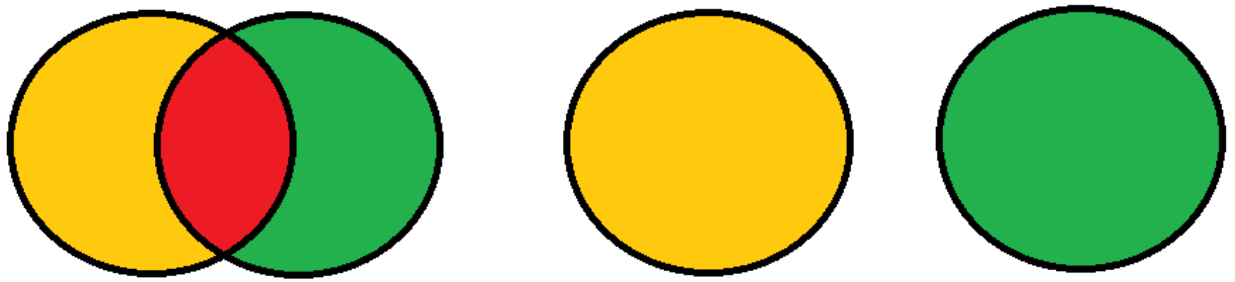


These events are “Mutually Exclusive”



Mutually Exclusive Events are events that can not occur together.

If the events are mutually exclusive, the formula can be simplified.



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

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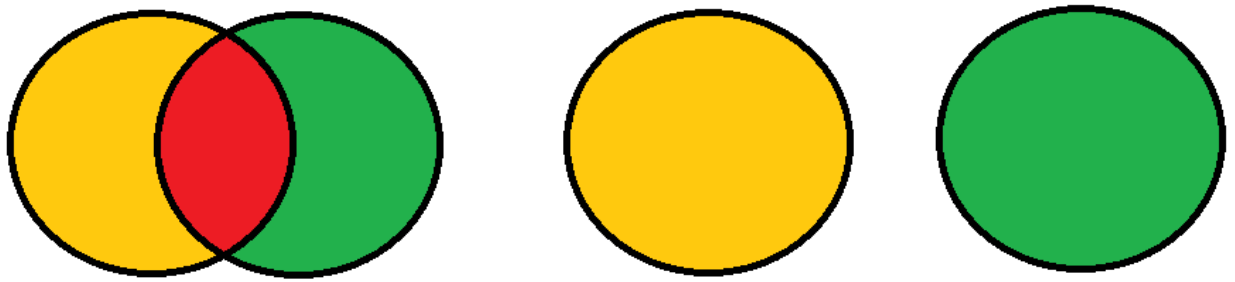

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$P(A \cup B) = P(A) + P(B) - 0$$

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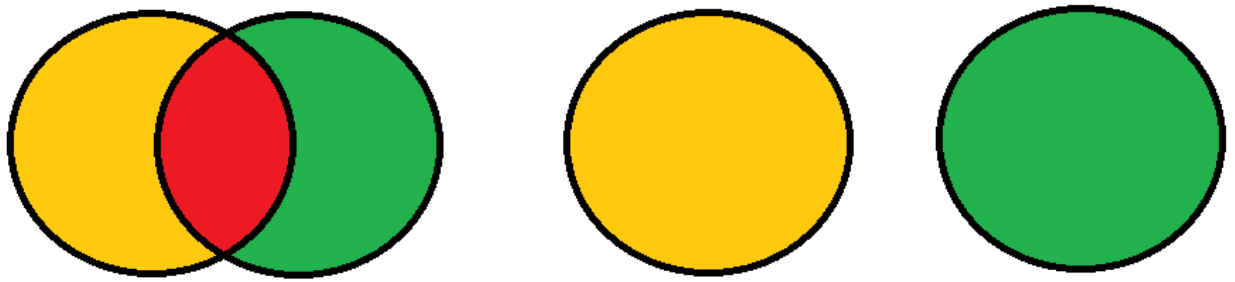

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$$P(A \cup B) = P(A) + P(B) - 0$$

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

Are these events mutually exclusive or not?

(a) Tossing 2 coins	At least 1 head	Two heads
(b) Rolling a die	Greater than 3	Even
(c) Dealing a card	Face Card	Smaller than 7
(d) Choosing a student	Female	Wears glasses
(e) Choosing a chocolate bar	Has nuts	Contains caramel
(f) Answering a multiple choice question	Answer is correct	Choice is part (i)
(g) Choosing a tie	Tie is a solid colour	Tie is polka dotted.

The probability of an alien being adfapet is 0.4.
The probability of an alien being baflewr is 0.2.
The probability of being adfapet or baflewr is 0.6.

Is being adfapet and baflewr mutually exclusive?

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$LS = P(A \cup B)$ $RS = P(A) + P(B)$

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As the right side equals the left side, adfapet and baflewr ARE mutually exclusive.