Activity 14

Objective

To find the number of ways in which three cards can be selected from given five cards.

Material Required

Cardboard sheet, white paper sheets, sketch pen, cutter.

Method of Construction

1. Take a cardboard sheet and paste white paper on it.
2. Cut out 5 identical cards of convenient size from the cardboard.
3. Mark these cards as C_1, C_2, C_3, C_4 and C_5.

Demonstration

1. Select one card from the given five cards.
2. Let the first selected card be C_1. Then other two cards from the remaining four cards can be : C_2C_3, C_2C_4, C_2C_5, C_3C_4, C_3C_5 and C_4C_5.Thus, the possible selections are : $C_1C_2C_3$, $C_1C_2C_4$, $C_1C_2C_5$,$C_1C_3C_4$, $C_1C_3C_5$, $C_1C_4C_5$. Record these on a paper sheet.
3. Let the first selected card be C_2. Then the other two cards from the remaining 4 cards can be : C_1C_3, C_1C_4, C_1C_5, C_3C_4, C_3C_5, C_4C_5.Thus, the possible selections are: $C_2C_1C_3$, $C_2C_1C_4$, $C_2C_1C_5$,$C_2C_3C_4$, $C_2C_3C_5$, $C_2C_4C_5$. Record these on the same paper sheet.
4. Let the first selected card be C_3. Then the other two cards can be : C_1C_2, C_1C_4, C_1C_5, C_2C_4, C_2C_5, C_4C_5.Thus, the possible selections are : $C_3C_1C_2$, $C_3C_1C_4$, $C_3C_1C_5$,$C_3C_2C_4$, $C_3C_2C_5$, $C_3C_4C_5$. Record them on the same paper sheet.
5. Let the first selected card be C_4. Then the other two cards can be : C_1C_2, C_1C_3, C_2C_3, C_1C_5, C_2C_5, C_3C_5 Thus, the possible selections are: $C_4C_1C_2$, $C_4C_1C_3$,$C_4C_2C_3$, $C_4C_1C_5$, $C_4C_2C_5$, $C_4C_3C_5$. Record these on the same paper sheet.

6. Let the first selected card be C_5. Then the other two cards can be: C_1C_2, C_1C_3, C_1C_4, C_2C_3, C_2C_4, C_3C_4 Thus, the possible selections are: $C_5C_1C_2$,$C_5C_1C_3$, $C_5C_1C_4$, $C_5C_2C_3$, $C_5C_2C_4$, $C_5C_3C_4$. Record these on the same paper sheet.

7. Now look at the paper sheet on which the possible selectios are listed. Here, there are in all 30 possible selections and each of the selection is repeated thrice. Therefore, the number of distinct selection $= 30 \div 3 = 10$ which is same as $5C_3$.

OBSERVATION

1. $C_1C_2C_3$, $C_2C_1C_3$ and $C_3C_1C_2$ represent the _______ selection.
2. $C_1C_2C_4$, ______________, _____________ represent the same selection.
3. Among $C_2C_1C_5$, $C_1C_2C_5$, $C_1C_2C_3$, _________ and _________ represent the same selection.
4. $C_2C_1C_5$, $C_1C_2C_3$, represent _______ selections.
5. Among $C_3C_1C_5$, $C_1C_4C_3$, $C_5C_3C_4$, $C_4C_2C_5$, $C_2C_4C_3$, $C_1C_3C_5$

   $C_3C_1C_5$, _________ represent the same selections.

   $C_3C_1C_5$, $C_1C_4C_5$, _______, ______, represent different selections.

APPLICATION

Activities of this type can be used in understanding the general formula for finding the number of possible selections when *r* objects are selected from given *n* distinct objects, i.e., ${}^{n}C_r = \dfrac{n!}{r!(n-r)!}$.