



# Exercise 13.2



1. A researcher collected data on number of deaths from Horse-Ricks in Russian Army crops over to years. The table is as follows:

No. of death	0	1	2	3	4	5	6
Frequency	60	50	87	40	32	15	10

Find the relative frequency of the given data.

We already have the total frequency as:

$$\text{Total frequency} = 60 + 50 + 87 + 40 + 32 + 15 + 10 = 294.$$

Now, let's compute the relative frequencies for each category and simplify the fractions.

(1) Number of Deaths = 0

Frequency = 60

$$\frac{60}{294} = \frac{30}{147}$$

(2) Number of Deaths = 1

Frequency = 50

$$\frac{50}{294} = \frac{25}{147}$$

(3) Number of Deaths = 2

Frequency = 87

$$\frac{87}{294} = \frac{29}{98}$$

(4) Number of Deaths = 3

Frequency = 40

$$\frac{40}{294} = \frac{20}{147}$$

(5) Number of Deaths = 4

Frequency = 32

$$\frac{32}{294} = \frac{16}{147}$$



(6) Number of Deaths = 5

Frequency = 15

$$\frac{15}{294} = \frac{5}{98}$$

(7) Number of Deaths = 6

Frequency = 10

$$\frac{10}{294} = \frac{5}{147}$$

**Final Summary Table:**

Number of Deaths	Frequency	Relative Frequency (Simplified Fraction)
0	60	$\frac{30}{147}$
1	50	$\frac{25}{147}$
2	87	$\frac{29}{98}$
3	40	$\frac{20}{147}$
4	32	$\frac{16}{147}$
5	15	$\frac{5}{98}$
6	10	$\frac{5}{147}$
<b>Total</b>	$\Sigma f = 294$	

2. The frequency of defective products in 750 samples are shown in the following table. Find the relative frequency for the given table.

No. of defectives per sample	0	1	2	3	4	5	6	7	8
No. of sample	120	140	94	85	105	50	40	66	50



### Step 1: Data Table

The data provided is:

No. of Defectives per Sample	0	1	2	3	4	5	6	7	8
No. of Samples	120	140	94	85	105	50	40	66	50

### Step 2: Total Number of Samples

The total number of samples is:

$$\begin{aligned} \text{Total Number of Samples} \\ &= 120 + 140 + 94 + 85 + 105 + 50 + 40 + 66 \\ &\quad + 50 = 750 \end{aligned}$$

### Step 3: Compute Relative Frequencies

Now, we'll compute the relative frequencies for each category and express them as simplified fractions:

- **Relative Frequency of 0 defectives:**

$$\frac{120}{750} = \frac{4}{25}$$

- **Relative Frequency of 1 defective:**

$$\frac{140}{750} = \frac{14}{75}$$

- **Relative Frequency of 2 defectives:**

$$\frac{94}{750} = \frac{47}{375}$$

- **Relative Frequency of 3 defectives:**

$$\frac{85}{750} = \frac{17}{150}$$

- **Relative Frequency of 4 defectives:**

$$\frac{105}{750} = \frac{7}{50}$$

- **Relative Frequency of 5 defectives:**

$$\frac{50}{750} = \frac{1}{15}$$

- **Relative Frequency of 6 defectives:**



$$\frac{40}{750} = \frac{8}{150}$$

- **Relative Frequency of 7 defectives:**

$$\frac{66}{750} = \frac{22}{250}$$

- **Relative Frequency of 8 defectives:**

$$\frac{50}{750} = \frac{1}{15}$$

### Final Summary Table

No. of Defectives per Sample	Frequency	Relative Frequency (Simplified Fraction)
0	120	$\frac{4}{25}$
1	140	$\frac{14}{75}$
2	94	$\frac{47}{375}$
3	85	$\frac{17}{150}$
4	105	$\frac{7}{50}$
5	50	$\frac{1}{15}$
6	40	$\frac{8}{150}$
7	66	$\frac{22}{250}$
8	50	$\frac{1}{15}$
Total	$\Sigma f = 750$	

3. A quiz competition on general knowledge is conducted. The number of corrected answers out of 5 questions for 100 sets of questions is given below.

$X$	0	1	2	3	4	5
$f$	10	23	15	25	18	9

Find the relative frequencies for the given data.

**Solution: Step 1: Data Table**

The data provided is:

Number of Correct Answers (X)	0	1	2	3	4	5
Frequency (f)	10	23	15	25	18	9

**Step 2: Total Number of Sets of Questions**

The total number of sets is:

$$\text{Total Number of Sets} = 10 + 23 + 15 + 25 + 18 + 9 = 100$$

**Step 3: Compute Relative Frequencies**

Now, we'll compute the relative frequencies for each number of correct answers and express them as simplified fractions:

- **Relative Frequency of 0 correct answers:**

$$\frac{10}{100} = \frac{1}{10}$$

- **Relative Frequency of 1 correct answer:**

$$\frac{23}{100} = \frac{23}{100}$$

- **Relative Frequency of 2 correct answers:**

$$\frac{15}{100} = \frac{3}{20}$$

- **Relative Frequency of 3 correct answers:**

$$\frac{25}{100} = \frac{1}{4}$$

- **Relative Frequency of 4 correct answers:**

$$\frac{18}{100} = \frac{9}{50}$$

- **Relative Frequency of 5 correct answers:**



$$\frac{9}{100} = \frac{9}{100}$$

### Final Summary Table

Number of Correct Answers (X)	Frequency (f)	Relative Frequency (Simplified Fraction)
0	10	$\frac{1}{10}$
1	23	$\frac{23}{100}$
2	15	$\frac{3}{20}$
3	25	$\frac{1}{4}$
4	18	$\frac{9}{50}$
5	9	$\frac{9}{100}$
<b>Total</b>	$\Sigma f = 100$	

4. A survey was conducted from the 50 students of a class and asked about their favourite food. The responses are as under:

Name of food item	Biryani	Fresh juice	Chicken	Bar. B.Q	Sweets
No. of students	40	07	21	15	25

- (i) how many percentages of students like biryani?
- (ii) how many percentages of students like chicken?
- (iii) which food is the least liked by the students?
- (iv) which food is the most preferred by the students?

**Solution:** Let's solve the given problem step by step.



### Step 1: Data Table

The data provided is:

Name of Food Item	Number of Students
Biryani	40
Fresh Juice	7
Chicken	21
Bar B.Q	15
Sweets	25

Total number of students = 50

### Step 2: Percentage Calculation

To calculate the percentage of students who like each food item, we use the formula:

$$\text{Percentage} = \left( \frac{\text{Number of Students who like the food}}{\text{Total Number of Students}} \right) \times 100$$

(i) **Percentage of students who like Biryani:**

$$\text{Percentage} = \left( \frac{40}{50} \right) \times 100 = 80\%$$

(ii) **Percentage of students who like Chicken:**

$$\text{Percentage} = \left( \frac{21}{50} \right) \times 100 = 42\%$$

### Step 3: Identifying the Least and Most Liked Food

(iii) **Least liked food:**

The food with the lowest number of students is **Fresh Juice**, with only 7 students liking it.

(iv) **Most liked food:**

The food with the highest number of students is **Biryani**, with 40 students liking it.

5. **In 500 trials of a thrown of two dice, what is expected frequency that the sum will be greater than 8?**

To solve this, we first need to determine the probability of the sum of two dice being greater than 8. Then, we'll calculate the expected frequency based on the given number of trials.



### Step 1: Possible outcomes

Two dice have 6 faces each, so there are  $6 \times 6 = 36$  total outcomes.

### Step 2: Outcomes where the sum is greater than 8

We list all combinations of two dice where the sum exceeds 8:

- **Sum = 9:** (3,6), (4,5), (5,4), (6,3) → 4 outcomes
- **Sum = 10:** (4,6), (5,5), (6,4) → 3 outcomes
- **Sum = 11:** (5,6), (6,5) → 2 outcomes
- **Sum = 12:** (6,6) → 1 outcome

Adding these outcomes:  $4 + 3 + 2 + 1 = 10$ .

### Step 3: Probability

The probability of getting a sum greater than 8 is:

$$P(\text{sum} > 8) = \frac{\text{favorable outcomes}}{\text{total outcomes}} = \frac{10}{36} = \frac{5}{18}$$

### Step 4: Expected frequency

The expected frequency is given by:

$$\text{Expected Frequency} = P(\text{sum} > 8) \times \text{Total Trials}$$

Substituting the values:

$$\text{Expected Frequency} = \frac{5}{18} \times 500 = \frac{2500}{18} \approx 138.89$$

6. **What is the expectation of a person who is to get Rs. 120 if he obtains at least 2 heads in single toss of three coins?**

- **Total Outcomes:** Tossing 3 coins gives  $2^3 = 8$  total outcomes.
- **Favorable Outcomes:** You need at least 2 heads:
  - 2 heads:  $HHT, HTH, THH \rightarrow 3$  outcomes.
  - 3 heads:  $HHH \rightarrow 1$  outcome.
  - Total favorable outcomes =  $3 + 1 = 4$ .
- **Probability of at least 2 heads:**

$$P(\text{at least 2 heads}) = \frac{\text{Favorable outcomes}}{\text{Total outcomes}} = \frac{4}{8} = \frac{1}{2}$$



- **Reward:** The person gets Rs. 120 if they get at least 2 heads.
- **Expectation:** Multiply the probability by the reward:

$$\text{Expectation} = \frac{1}{2} \times 120 = 60.$$

**Final Answer:**

The expectation of the person is **Rs. 60**.

7. Find the expected frequencies of the given data if the experiment is repeated 200 times.

<b>x</b>	0	1	2	3	4	5	6
<b>P(x)</b>	0.11	0.21	0.17	0.18	0.09	0.17	0.07

To calculate the **expected frequencies** for the given data when the experiment is repeated 200 times, use the formula:

$$\text{Expected Frequency} = P(x) \times \text{Total Number of Trials.}$$

Given:

- Total trials ( $n$ ) = 200
- $P(x)$  values for  $x = 0, 1, 2, 3, 4, 5, 6$ :  
0.11, 0.21, 0.17, 0.18, 0.09, 0.17, 0.07.

Calculation:

$$\text{Expected Frequency for each } x = P(x) \times 200$$

- For  $x = 0$ :  $0.11 \times 200 = 22$
- For  $x = 1$ :  $0.21 \times 200 = 42$
- For  $x = 2$ :  $0.17 \times 200 = 34$
- For  $x = 3$ :  $0.18 \times 200 = 36$
- For  $x = 4$ :  $0.09 \times 200 = 18$
- For  $x = 5$ :  $0.17 \times 200 = 34$
- For  $x = 6$ :  $0.07 \times 200 = 14$

<b>X</b>	0	1	2	3	4	5	6
<b>P(X)</b>	0.11	0.21	0.17	0.18	0.09	0.17	0.07
<b>Expected Frequency</b>	22	42	34	36	18	34	14

## Results:

The expected frequencies are:

$$x = 0: 22, x = 1: 42, x = 2: 34, x = 3: 36, x = 4: 18, x = 5: 34, x = 6: 14.$$

8. The probability of getting 5 sixes while tossing six dice is  $\frac{2}{5}$ , How many times would you expect it to show 5 sixes?

To solve this, we use the concept of expected value. The expected number of times an event occurs is given by:

$$\text{Expected Count} = \text{Probability of the Event} \times \text{Total Trials.}$$

Given:

- Probability of getting 5 sixes =  $\frac{2}{5}$ .
- Let the total number of trials =  $n$ .

Calculation:

$$\text{Expected Count} = \frac{2}{5} \times n.$$

To find the exact number of expected occurrences, you need to provide the total number of trials ( $n$ ).