

Name : Keyur Patel

Roll No : 16010421073

Branch : IT

Batch : A2

MS IA-1

a) To simulate rolling a six-sided die 100 times.

1. Creating required tables and naming the columns

Keyur Patel_16010421073_A2_MS_IA-1					
a) To simulate rolling a six-sided die 100 times.					
Probability Distribution Table		Simulation Table		Frequency Table	
Numbers on a Die	Probability of Occurrence of each number	Number of Throws	Occurrence	Digit	Frequency of occurrence of each Digit
1					
Sum				Sum	

2. Applying Formulae to generate-
Numbers on a die (C9 +1) –

Dragging down-

Probability of occurrence of each number = $1/6$ –

Keyur Patel_16010421073_A2_MS_IA-1										
a) To simulate rolling a six-sided die 100 times.										
Probability Distribution Table				Simulation Table			Frequency Table			
Numbers on a Die		Probability of Occurrence of each number			Number of Throws		Occurrence	Digit		Frequency of occurrence of each Digit
1		0.166666667								
2										
3										
4										
5										
6										
Sum								Sum		

Dragging down –

Keyur Patel_16010421073_A2_MS_IA-1										
a) To simulate rolling a six-sided die 100 times.										
Probability Distribution Table				Simulation Table			Frequency Table			
Numbers on a Die		Probability of Occurrence of each number			Number of Throws		Occurrence	Digit		Frequency of occurrence of each Digit
1		0.166666667								
2		0.166666667								
3		0.166666667								
4		0.166666667								
5		0.166666667								
6		0.166666667								
Sum		1						Sum		

Number of throws (F9+1) –

	C	D	E	F	G	H	I	J	K
	Keyur Patel_16010421073_A2_MS_1A-1								
	a) To simulate rolling a six-sided die 100 times.								
	Probability Distribution Table		Simulation Table		Frequency Table				
	Numbers on a Die	Probability of Occurrence of each number	Number of Throws	Occurrence	Digit	Frequency of occurrence of each Digit			
	1	0.166666667	1						
	2	0.166666667	=F9+1						
	3	0.166666667							
	4	0.166666667							
	5	0.166666667							
	6	0.166666667							
	Sum	1			Sum				

Dragging down –

	C	D	E	F	G	H	I	J	K	L
	Probability Distribution Table		Simulation Table		Frequency Table					
	Numbers on a Die	Probability of Occurrence of each number	Number of Throws	Occurrence	Digit	Frequency of occurrence of each Digit				
	1	0.166666667	1							
	2	0.166666667	2							
	3	0.166666667	3							
	4	0.166666667	4							
	5	0.166666667	5							
	6	0.166666667	6							
	Sum	1	7		Sum					
			8							
			9							
			10							
			11							
			12							
			13							
			14							
			15							
			16							
			17							
			18							
			19							
			20							
			21							
			22							

Till 100 –

D	E	F	G	H	I	J	K
		81					
		82					
		83					
		84					
		85					
		86					
		87					
		88					
		89					
		90					
		91					
		92					
		93					
		94					
		95					
		96					
		97					
		98					
		99					
		100					

Occurrence –

For occurrence, we will use the “Data Analytics” tool pack in excel.

Selecting Data Analysis option –

Keyur Patel_16010421073_A2_MS_IA-1							
a) To simulate rolling a six-sided die 100 times.							
Probability Distribution Table			Simulation Table		Frequency Table		
Numbers on a Die	Probability of Occurrence of each number		Number of Throws	Occurrence	Digit	Frequency of occurrence of each Digit	
1	0.166666667		1				
2	0.166666667		2				
			3				
			4				
			5				
			6				
			7				
			8				
			9				
			10				
			11				
			12				
			13				
			14				
			15				
			16				
			17				
					Sum		

After clicking on “Random Number Generation”-

		76			
		77			
		78			
		79			
		80			
		81			
		82			
		83			
		84			
		85			
		86			
		87			
		88			
		89			
		90			
		91			
		92			
		93			
		94			
		95			
		96			
		97			

a) To simulate rolling a six-sided die 100 times.					
		Simulation Table		Frequency Table	
		Number of Throws	Occurrence	Digit	Frequency of occurrence of each Digit
		1	5		
		2	2		
		3	4		
		4	4		
		5	2		
		6	5		
		7	2		
		8	2		
		9	6		
		10	6		
		11	6		
		12	1		
		13	6		
		14	3		
		15	1		
		16	4		
		17	6		
		18	3		
		19	2		
		20	4		

After clicking on OK, the random numbers get generated –

a) To simulate rolling a six-sided die 100 times.			
Probability Distribution Table		Simulation Table	Frequency Table
Numbers on a Die	Probability of Occurrence of each number	Number of Throws	Occurrence
1	0.166666667	1	5
2	0.166666667	2	2
3	0.166666667	3	4
4	0.166666667	4	4
5	0.166666667	5	2
6	0.166666667	6	5
Sum	1	7	2
		8	2
		9	6
		10	6
		11	6
		12	1
		13	6
		14	3
		15	1
		16	4
		17	6
		18	3
		19	2
		20	1

Frequency & digit – We are doing this to tally our answer which we will get from histogram.
 This step can be excluded.
 Digit –

Keyur Patel_16010421073_A2_MS_IA-1										
a) To simulate rolling a six-sided die 100 times.										
Probability Distribution Table		Simulation Table		Frequency Table						
Numbers on a Die	Probability of Occurrence of each number	Number of Throws	Occurrence	Digit	Frequency of occurrence of each Digit					
1	0.166666667	1	5	1						
2	0.166666667	2	2							
3	0.166666667	3	4							
4	0.166666667	4	4							
5	0.166666667	5	2							
6	0.166666667	6	5							
Sum	1	7	2	Sum						
		8	2							
		9	6							
		10	6							
		11	6							
		12	1							
		13	6							
		14	3							
		15	1							

Dragging down –

Keyur Patel_16010421073_A2_MS_IA-1									
a) To simulate rolling a six-sided die 100 times.									
Probability Distribution Table				Simulation Table		Frequency Table			
Numbers on a Die	Probability of Occurrence of each number			Number of Throws	Occurrence	Digit	Frequency of occurrence of each Digit		
1	0.166666667			1	5	1			
2	0.166666667			2	2	2			
3	0.166666667			3	4	3			
4	0.166666667			4	4	4			
5	0.166666667			5	2	5			
6	0.166666667			6	5	6			
Sum	1			7	2	Sum			
				8	2				
				9	6				
				10	6				
				11	6				
				12	1				
				13	6				
				14	3				

Frequency of occurrence of each digit –

We will use “COUNTIF” function of excel to calculate frequency of each digit.

First parameter is the range and the second parameter is the criteria

=COUNTIF(G9:G108,I9:I14\$)									
	D	E	F	G	H	I	J		
Keyur Patel_16010421073_A2_MS_IA-1									
a) To simulate rolling a six-sided die 100 times.									
Probability Distribution Table				Simulation Table		Frequency Table			
Die	Probability of Occurrence of each number			Number of Throws	Occurrence	Digit	Frequency of occurrence of each Digit		
	0.166666667			1	5	1	=COUNTIF(G9:G108,I9:I14\$)		
	0.166666667			2	2	2	COUNTIF(range, criteria)		
	0.166666667			3	4	3	14		
	0.166666667			4	4	4	21		
	0.166666667			5	2	5	19		
	0.166666667			6	5	6	18		
	1			7	2	Sum	100		
				8	2				
				9	6				
				10	6				

Dragging down –

Keyur Patel_16010421073_A2_MS_IA-1										
a) To simulate rolling a six-sided die 100 times.										
Probability Distribution Table			Simulation Table		Frequency Table					
Numbers on a Die	Probability of Occurrence of each number		Number of Throws	Occurrence	Digit	Frequency of occurrence of each Digit				
1	0.166666667		1	5	1	8				
2	0.166666667		2	2	2	20				
3	0.166666667		3	4	3	14				
4	0.166666667		4	4	4	21				
5	0.166666667		5	2	5	19				
6	0.166666667		6	5	6	18				
Sum	1		7	2	Sum	100				
			8	2						
			9	6						
			10	6						
			11	6						
			12	1						
			13	6						

3. Creating a Histogram

For this again we will use “Data Analysis” tool pack in excel.

Keyur Patel_16010421073_A2_MS_IA-1										
a) To simulate rolling a six-sided die 100 times.										
Probability Distribution Table			Simulation Table		Frequency Table					
Numbers on a Die	Probability of Occurrence		Number of Throws	Occurrence	Digit	Frequency of occurrence of each Digit				
1	0.16666		9	6	1	8				
2	0.16666		10	6	2	20				
3	0.16666		11	6	3	14				
4	0.16666		12	1	4	21				
5	0.16666		13	6	5	19				
6	0.16666		14	3	6	18				
Sum	1		15	1	Sum	100				

After clicking on “OK” –

IA-1

to simulate rolling a six-sided die 100 times.

Probability

Numbers on a Die	Probability
1	
2	
3	
4	
5	
6	
Sum	1

Frequency Table

Digit	Frequency of occurrence of each Digit
1	8
2	20
3	14
4	21
5	19
6	18
Sum	100

Histogram Dialog Box:

Input Range:

Bin Range:

☐ Labels

Output options:

- ☒ Output Range:
- ☐ New Worksheet Ply:
- ☐ New Workbook
- ☐ Pareto (sorted histogram)
- ☐ Cumulative Percentage
- ☒ Chart Output

Buttons: OK, Cancel, Help

Selecting the input range –

Keyur Patel_16010421073_A2_MS_IA-1

to simulate rolling a six-sided die 100 times.

Simulation Table

Number of Throws	Occurrence
1	5
2	2
3	4
4	4
5	2
6	5
7	2
8	2
9	6
10	6
11	6
12	1
13	6
14	3
15	1
16	4
17	6

Histogram Dialog Box:

Input Range:

Bin Range:

☐ Labels

Output options:

- ☒ Output Range:
- ☐ New Worksheet Ply:
- ☐ New Workbook
- ☐ Pareto (sorted histogram)
- ☐ Cumulative Percentage
- ☒ Chart Output

Buttons: OK, Cancel, Help

Selecting bin range –

Probability Distribution Table	
Numbers on a Die	Probability of Occurrence of each number
1	0.16666667
2	0.16666667
3	0.16666667
4	0.16666667
5	0.16666667
6	0.16666667
Sum	1

Histogram

Input
Input Range: \$G\$9:\$G\$108
Bin Range: \$C\$8:\$C\$14
☐ Labels

Output options
☒ Output Range:
☐ New Worksheet Ply:
☐ New Workbook
☐ Pareto (sorted histogram)
☐ Cumulative Percentage
☒ Chart Output

Selecting the output range –

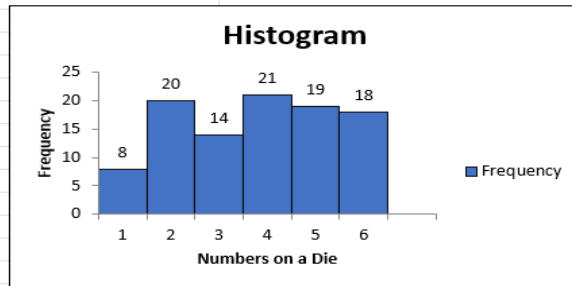
Histogram

Input
Input Range: \$G\$9:\$G\$108
Bin Range: \$C\$8:\$C\$14
☐ Labels

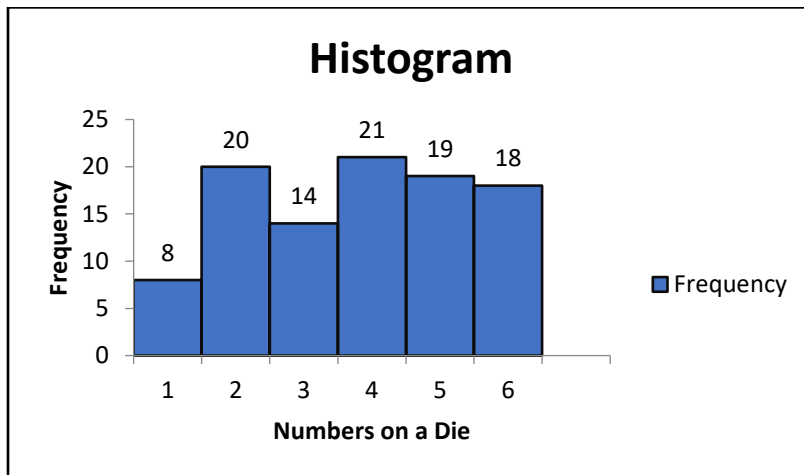
Output options
☒ Output Range: \$I\$20:\$K\$32
☐ New Worksheet Ply:
☐ New Workbook
☐ Pareto (sorted histogram)
☐ Cumulative Percentage
☒ Chart Output

After clicking on “OK” –

<i>Numbers on a Die</i>	<i>Frequency</i>
1	8
2	20
3	14
4	21
5	19
6	18



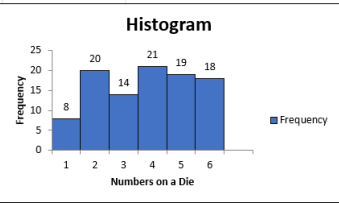
Hence this is the final histogram –



4. Final

a) To simulate rolling a six-sided die 100 times.

Probability Distribution Table	
Numbers on a Die	Probability of Occurrence of each number
1	0.16666667
2	0.16666667
3	0.16666667
4	0.16666667
5	0.16666667
6	0.16666667
Sum	1



Simulation Table	
Number of Throws	Occurrence
1	5
2	2
3	4
4	4
5	2
6	5
7	2
8	2
9	6
10	6
11	6
12	1
13	6
14	3
15	1
16	4
17	6
18	3
19	2
20	4
21	1
22	6
23	3
24	4

Frequency Table	
Digit	Frequency of occurrence of each Digit
1	8
2	20
3	14
4	21
5	19
6	18
Sum	100

<i>Numbers on a Die</i>	<i>Frequency</i>
1	8
2	20
3	14
4	21
5	19
6	18

d) To simulate rolling two six-sided dice and recording the sum 250 times.

Creating required tables and naming the columns

Keyur Patel_16010421073_A2_MS_IA-1

d) To simulate rolling two six-sided dice and recording the sum 250 times.

[illegible][illegible]

Sum Table

1) To find the probability of occurrence of sum of each digit, we need to make a sum table as follows –

d) To simulate rolling two six-sided dice and recording the sum 250 times.

[illegible]

The light blue numbers depict the digits on 2 dies and white cell digits depicts the sum.

- 2) Based on the sum table, we can calculate the probability of occurrence of sum of each digit for numbers from 2-12 –

[illegible]

As seen from the sum table, there are total 36 possibilities. We count the number of times each digit has appeared and then divide it by 36 to get the probability.

- ### 3) Applying Formulae to generate-

Number of throws –

Probability Distribution Table			Simulation Table		Sum Table						
Sum of Numbers on 2 die	Probability in decimal	Probability	Number of Throws	Sum							
2	0.03	1/36	1		1	2	3	4	5	6	7
3	0.06	2/36	2		2	3	4	5	6	7	8
4	0.08	3/36	3		3	4	5	6	7	8	9
5	0.11	4/36	4		4	5	6	7	8	9	10
6	0.14	5/36	5		5	6	7	8	9	10	11
7	0.17	6/36	6		6	7	8	9	10	11	12
8	0.14	5/36	7		7						
9	0.11	4/36	8		8						
10	0.08	3/36	9		9						
11	0.06	2/36	10		10						
12	0.03	1/36	11		11						
Sum	1.00		12		12						
			13		13						
			14		14						
			15		15						
			16		16						
			17		17						
			18		18						
			19		19						
			20		20						
			21		21						

Till 250 –

	228										
	229										
	230										
	231										
	232										
	233										
	234										
	235										
	236										
	237										
	238										
	239										
	240										
	241										
	242										
	243										
	244										
	245										
	246										
	247										
	248										
	249										
	250										

Sum –

To simulate the sum, we will use the “Data Analytics” tool kit of excel.

Keyur Patel_16010421073_A2_MS_IA-1

Analysis Tools

- Correlation
- Covariance
- Descriptive Statistics
- Exponential Smoothing
- F-Test Two-Sample for Variances
- Fourier Analysis
- Histogram
- Moving Average
- Random Number Generation**
- Rank and Percentile

OK Cancel Help

Simulation Table

Sum Table

Sum of Numbers on 2 d	Probability in decimal	Probability
2	0.03	1/36
3	0.06	2/36
4	0.08	3/36
5	0.11	4/36
6	0.14	5/36
7	0.17	6/36
8	0.14	5/36
9	0.11	4/36
10	0.08	3/36
11	0.06	2/36
12	0.03	1/36
Sum	1.00	

Number of Throws	Sum
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	

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

Selecting the value and probability range –

Keyur Patel_16010421073_A2_MS_IA-1

d) To simulate rolling two six-

Probability Distribution Table

Sum of Numbers on 2 die	Probability in decimal	Probability
2	0.03	1/36
3	0.06	2/36
4	0.08	3/36
5	0.11	4/36
6	0.14	5/36
7	0.17	6/36
8	0.14	5/36
9	0.11	4/36
10	0.08	3/36
11	0.06	2/36
12	0.03	1/36
Sum	1.00	

Random Number Generation

Number of Variables: 1

Number of Random Numbers: 250

Distribution: Discrete

Parameters

Value and Probability Input Range: \$C\$9:\$D\$19

Random Seed:

Output options

☒ Output Range: \$H\$9:\$H\$250

☐ New Worksheet Ply:

☐ New Workbook

3	4	5	6
4	5	6	7
5	6	7	8
6	7	8	9
7	8	9	10
8	9	10	11
9	10	11	12

Selecting the output range –

Random Number Generation

Number of Variables: 1

Number of Random Numbers: 250

Distribution: Discrete

Parameters

Value and Probability Input Range: \$C\$9:\$D\$19

Random Seed:

Output options

☒ Output Range: \$H\$9:\$H\$250

☐ New Worksheet Ply:

☐ New Workbook

232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250

After clicking on “OK” , random numbers for sum get generated–

Probability Distribution Table			Simulation Table		Sum Table						
Sum of Numbers on 2 die	Probability in decimal	Probability	Number of Throws	Sum							
2	0.03	1/36	1	8		1	2	3	4	5	6
3	0.06	2/36	2	6		2	3	4	5	6	7
4	0.08	3/36	3	8		3	4	5	6	7	8
5	0.11	4/36	4	4		4	5	6	7	8	9
6	0.14	5/36	5	10		5	6	7	8	9	10
7	0.17	6/36	6	4		6	7	8	9	10	11
8	0.14	5/36	7	8		6	7	8	9	10	11
9	0.11	4/36	8	9							
10	0.08	3/36	9	11							
11	0.06	2/36	10	8							
12	0.03	1/36	11	7							
Sum	1.00		12	10							
			13	10							
			14	4							
			15	7							
			16	8							
			17	8							
			18	11							
			19	8							
			20	6							

4) Creating a histogram

For creating histogram, we will again use “Data Analysis” tool pack in excel.

Probability Distribution Table			Simulation Table		Sum Table						
Sum	Probability in decimal	Probability	Number of Throws	Sum							
10	0.08	3/36	1	8		1	2	3	4	5	6
11	0.06	2/36	2	6		2	3	4	5	6	7
12	0.03	1/36	3	8		3	4	5	6	7	8
Sum	1.00		4	4		4	5	6	7	8	9
			5	10		5	6	7	8	9	10
			6	4		6	7	8	9	10	11
			7	8		6	7	8	9	10	11
			8	9		7	8	9	10	11	12
			9	11							
			10	8							
			11	7							
			12	10							
			13	10							
			14	4							
			15	7							
			16	8							
			17	8							
			18	11							
			19	8							
			20	6							
			21	4							

After clicking on “OK” –

d) To simulate rolling two six-sided dice and recording the sum 250 times.

Histogram

Input

Input Range:

Bin Range:

☒ Labels

Output options

☒ Output Range:

☐ New Worksheet Ply:

☐ New Workbook

☐ Pareto (sorted histogram)

☐ Cumulative Percentage

☒ Chart Output

OK Cancel Help

Simulation Table

Number of Throws	Sum
1	8
2	6
3	8
4	4
5	10
6	4
7	8
8	9
9	11
10	8
11	7
12	10
13	10
14	4
15	7
16	8
17	8
18	11

Sum Table

	1	2	3
1	2	3	4
2	3	4	5
3	4	5	6
4	5	6	7
5	6	7	8
6	7	8	9

Selecting input range –

Keyur Patel_16010421073_A2_MS_1A-1

ate rolling two six-sided dice and recording the sum 250 times.

Histogram

Input

Input Range:

Bin Range:

☒ Labels

Output options

☒ Output Range:

☐ New Worksheet Ply:

☐ New Workbook

☐ Pareto (sorted histogram)

☐ Cumulative Percentage

☒ Chart Output

OK Cancel Help

Simulation Table

Number of Throws	Sum
1	8
2	6
3	8
4	4
5	10
6	4
7	8
8	9
9	11
10	8
11	7
12	10
13	10
14	4

Sum Table

	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

Selecting bin range –

d) To simulate rolling two six-sided dice and recording the sum 250 times.

Probability Distribution Table		
Sum of Numbers on 2 die	Probability in decimal	Probability
2	0.03	1/36
3	0.06	2/36
4	0.08	3/36
5	0.11	4/36
6	0.14	5/36
7	0.17	6/36
8	0.14	5/36
9	0.11	4/36
10	0.08	3/36
11	0.06	2/36
12	0.03	1/36
Sum	1.00	

Simulation Table	
13	10
14	4
15	7
16	8
17	8
--	--

Histogram

Input Range: \$H\$9:\$H\$258

Bin Range: \$C\$8:\$C\$19

☒ Labels

Output options

☒ Output Range:

☐ New Worksheet Ply:

☐ New Workbook

☐ Pareto (sorted histogram)

☐ Cumulative Percentage

☒ Chart Output

OK Cancel Help

Selecting output range –

of Numbers on 2 die	Probability in decimal	Probability
2	0.03	1/36
3	0.06	2/36
4	0.08	3/36

Histogram

Input Range: \$H\$9:\$H\$258

Bin Range: \$C\$8:\$C\$19

☒ Labels

Output options

☒ Output Range: \$J\$16:\$P\$28

☐ New Worksheet Ply:

☐ New Workbook

☐ Pareto (sorted histogram)

☐ Cumulative Percentage

☒ Chart Output

OK Cancel Help

	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

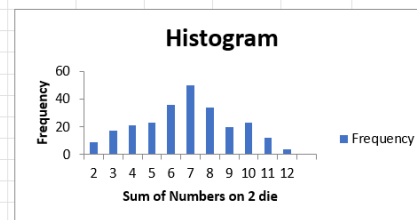
Number of Throws	Sum
1	8
2	6
3	8
4	4
5	10
6	4
7	8
8	9
9	11
10	8
11	7
12	10
13	10
14	4
15	7
16	8
17	8
18	11
19	8
20	6
21	4
22	7
23	5
24	6
25	9
--	--

After clicking on “OK” –

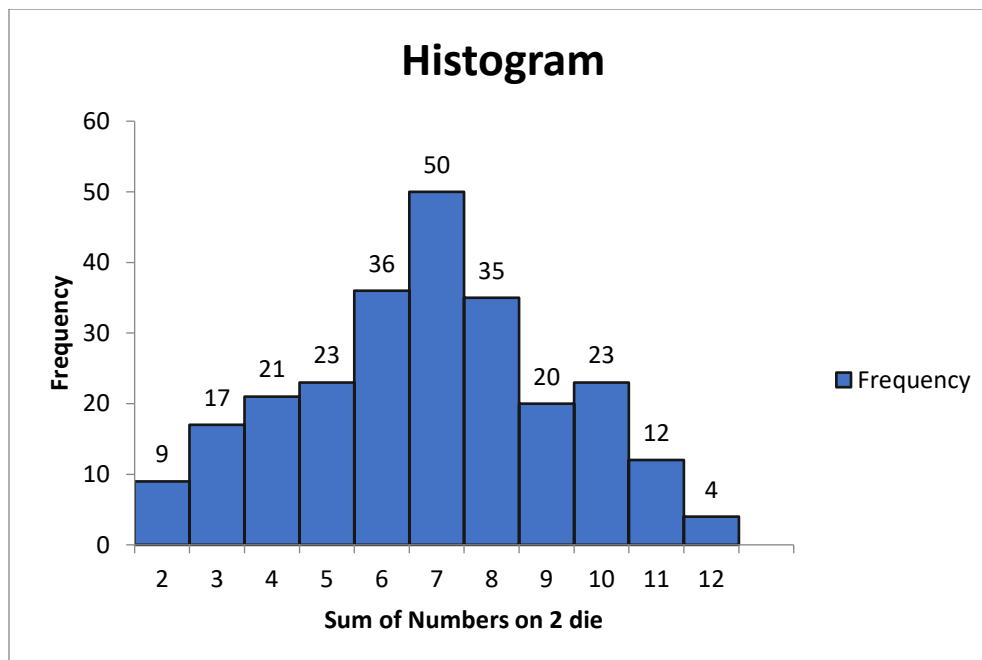
Number of Throws	Sum
1	8
2	6
3	8
4	4
5	10
6	4
7	8
8	9
9	11
10	8
11	7
12	10
13	10
14	4
15	7
16	8
17	8
18	11
19	8
20	6
21	4
22	7
23	5

	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

Sum of Numbers on 2 die	Frequency
2	9
3	17
4	21
5	23
6	36
7	50
8	34
9	20
10	23
11	12
12	4



Final histogram –



5) Final

4) To simulate rolling two six-sided dice and recording the sum 250 times.

Probability Distribution Table

Sum of Numbers on 2 die	Probability in decimal	Probability
2	0.03	1/36
3	0.06	2/36
4	0.08	3/36
5	0.11	4/36
6	0.14	5/36
7	0.17	6/36
8	0.14	5/36
9	0.11	4/36
10	0.08	3/36
11	0.06	2/36
12	0.03	1/36
Sum	1.00	

Simulation Table

Number of Throws	Sum
1	8
2	6
3	8
4	4
5	10
6	4
7	8
8	9
9	11
10	8
11	7
12	10
13	10
14	4
15	7
16	8
17	8
18	11
19	8
20	6
21	4
22	7
23	5
24	6
25	9

Sum Table

	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

Sum of Numbers on 2 die	Frequency
2	9
3	17
4	21
5	23
6	36
7	50
8	35
9	20
10	23
11	12
12	4

250

