



## Problem 1 – Tossing a coin

When you toss a coin, there are two possible outcomes. The sample space, or set of all possible outcomes, is heads or tails, {H, T}.

In this activity, we will use the calculator to simulate the tossing of a coin many times. The command **randInt()** that randomly generates integers.

You can choose any two integers. We will use `randInt(0,1)`, letting 0 represent a tail and 1 represent a head.

On the Home screen, "toss a coin" 5 times by entering **randint(0,1)** and then pressing enter 5 times.

Note: **randInt** can be entered by pressing **MATH**, arrow to the PRB menu and select the command.

```

MATH NUM CPX PRB
1:rand
2:nPr
3:nCr
4:!
5:randInt(
6:randNorm(
7:randBin(

```

- How many heads did you get?
- Now, enter **randInt(0,1,5)**. What happens? What would you need to type to toss the coin 10 times?

On the Home screen, simulate the tossing of a coin and find the number of heads by entering **sum(randint(0,1,# of trials))**.

Repeat this for each number of tosses listed in the second column. Press **2nd** [ENTRY] to recall the last entry.

Record your results in the table.

```

sum(randInt(0,1,
10))

```

Heads	Tosses	Percent (=L1/L2)
	5	
	10	
	20	
	30	
	40	
	50	
	75	
	100	
	200	
	300	
	400	
	500	
	900	

# To Toss or To Simulate?

Press **[STAT]** **[ENTER]**. Enter the number of heads in list L1 and the number of tosses in list L2.

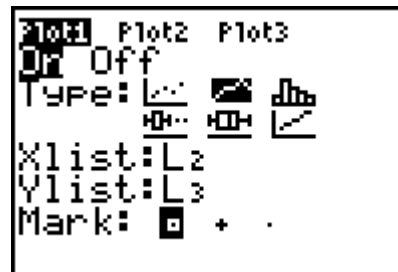
To calculate the percent of heads for each trial, move to the top of list L3 and enter **L1/L2**.

L1	L2	L3	1
████████	5	-----	
	10		
	20		
	30		
	40		
	50		
	75		

L1() =

Now create a connected scatter plot of **percent heads (L3)** versus **tosses (L2)**. Press **[2nd]** **[STAT PLOT]** and select **Plot1**. Match the settings to those shown at the right.

Press **[ZOOM]** and select **ZoomStat** to view the plot.



- Sketch your connected scatter plot of percent heads versus tosses.



- What do you notice about the shape of the graph? Why do you think this happens?
- What can you conclude about the percent of getting heads as the number of trials increases?

**Problem 2 – Rolling a die**

You will now use the **randInt()** function to simulate the rolling of a six-sided die.

- How many possible outcomes are there? What is the sample space?

On the Home screen, simulate the rolling of a die by entering **randInt(1,6,# of trials)→L1**. Then sort list L1 in ascending order by entering **SortA(L1)**.

Note: Press **[STAT]** and select the command to sort.

Press **[STAT]** **[ENTER]** and arrow up twice. To determine the number of 6s in the list, subtract the row number of the first 6 from row number of the last 6 and then add 1. For example, if the first 6 is at L1(16) and the last 6 is at L1(20), it is  $20 - 16 + 1 = 5$ .

Repeat these steps for each number of rolls listed in the second column. Press **[2nd]** **[ENTRY]** **[2nd]** **[ENTRY]** to recall the second previous entry.

Record your results in the table.

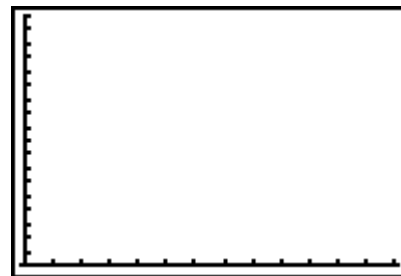
```
randInt(1,6,20)→
L1
{1 4 2 5 1 5 3 ...
SortA(L1)
Done
```

Heads	Rolls	Percent (=L1/L2)
	5	
	10	
	20	
	30	
	40	
	50	
	75	
	100	
	200	
	300	
	400	
	500	
	900	

Clear list L1 (arrow to the top of L1 and press **[CLEAR]** **[ENTER]**) and enter the data in the table into lists L1 and L2. Calculate the percent of 6s in list L3.

Then create a scatter plot of the percent of 6s versus rolls.

- Sketch your connected scatter plot.

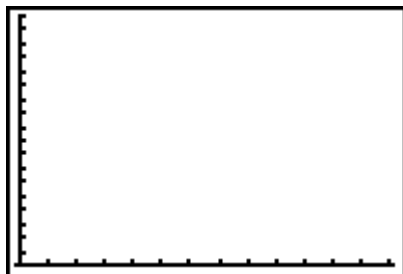


- What can you conclude about the percent of rolling a 6 as the number of trials increases?

**Extension – Rolling Two Dice**

Use what you have learned in the previous problems to simulate rolling two dice and finding the sum. Record the number of sums that are 7.

- Sketch your connected scatter plot.



- What can you conclude about the percent of rolling a sum of 7 as the number of trials increases?

Sum of 7	Rolls	Percent (=L1/L2)
	5	
	10	
	20	
	30	
	40	
	50	
	75	
	100	
	200	
	300	
	400	
	500	
	900	