

# Paper Airplane Project

Today, we will split into groups of three:

- Each person in the group will construct their own paper airplane
- You will take turns throwing your paper airplanes and measuring the flight distance
- You will throw your paper airplane ten times and will chart the distance it flew (Round to the nearest inch)
- You will then graph the average distance for each of the three paper airplanes. (Double Bar graph)
- You will find the standard deviation of each airplane
- Decide on which was the most consistent, flew the farthest, and had the highest average distance.

Formula for Standard deviation:

$$\sigma = \sqrt{\frac{(\bar{x} - x_1)^2 + (\bar{x} - x_2)^2 + \dots + (\bar{x} - x_n)^2}{n}}$$

n= the number of values in the set

Step 1: Construct 3 different paper airplanes with your group. (Make sure you label them)

Step 2: Stand in one spot and throw the plane. Measure the distance from your feet to where the plane first landed. Record your distance to the nearest inch. Do this process 10 times with each paper airplane.

Step 3: Find the Average or mean Flight distance of each plane.

Step 4: Find the standard deviation

1. Find  $(\text{Measurement 1} - \text{Average Flight distance})^2 + (\text{Measurement 2} - \text{Average Flight distance})^2 + (\text{Measurement 3} - \text{Average Flight distance})^2 \dots + (\text{Measurement 10} - \text{Average Flight distance})^2$
2. Divide group C by n. (n= The number of times you throw the plane)
3. Take the Square root of the number you get in part 2

A	B	C
Plane 1	Measurement (inches)	$(\text{Measurement} - \text{Average Flight distance})^2$
Throw 1		
Throw 2		
Throw 3		
Throw 4		
Throw 5		
Throw 6		
Throw 7		
Throw 8		
Throw 9		
Throw 10		
Average Flight		

Distance		
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$$(\text{Measurement 1} - \text{Average Flight distance})^2 + (\text{Measurement 2} - \text{Average Flight distance})^2 + (\text{Measurement 3} - \text{Average Flight distance})^2 \dots + (\text{Measurement 10} - \text{Average Flight distance})^2 =$$

Standard Deviation=

Plane 2	Measurement (inches)	(Measurement - Average Flight distance) <sup>2</sup>
Throw 1		
Throw 2		
Throw 3		
Throw 4		
Throw 5		
Throw 6		
Throw 7		
Throw 8		
Throw 9		
Throw 10		
Average Flight Distance		

$$(\text{Measurement 1} - \text{Average Flight distance})^2 + (\text{Measurement 2} - \text{Average Flight distance})^2 + (\text{Measurement 3} - \text{Average Flight distance})^2 \dots + (\text{Measurement 10} - \text{Average Flight distance})^2 =$$

Standard Deviation=

Plane 3	Measurement (inches)	(Measurement - Average Flight distance) <sup>2</sup>
Throw 1		
Throw 2		
Throw 3		
Throw 4		
Throw 5		
Throw 6		
Throw 7		
Throw 8		
Throw 9		
Throw 10		
Average Flight Distance		

$$\begin{aligned} & (\text{Measurement 1} - \text{Average Flight distance})^2 + (\text{Measurement 2} - \text{Average Flight distance})^2 + \\ & (\text{Measurement 3} - \text{Average Flight distance})^2 \dots + (\text{Measurement 10} - \text{Average Flight distance})^2 = \end{aligned}$$

Standard Deviation=

Step 4: Make a double bar graph for all three planes, that compares the average flight time and the standard deviation. ( You may use Desmos, Exel, Sheets, Ex.)

Post project problems:

1. Which airplane flew the farthest?
2. Which airplane had the highest average distance
3. Which standard deviation was the closest to the mean?
4. Which airplane would you get on if you had this data?