Catapult

How does mass and angle affect distance?

Introduction

I wanted to do this experiment to learn more about how a catapult works, to see how the mass of a projectile will affect the distance it travels when launched from a catapult. I also wanted to learn if angling the catapult will change how far the same projectiles travel when launched from the same catapult.

Hypothesis

I believe the foam ball will fly the farthest because it has a low mass and is firm.

Materials

1. Catapult
2. Tape measure
3. Level
4. Projectiles
5. Scale
6. Block
7. Zip-Ties
8. Pen and paper

Procedure

1. Gathered materials needed

2. Set up a controlled test area, we had to remove the wheels from the catapult and zip-tie it to a 2x4 to secure the catapult so it didn't bounce or move with every launch.

3. Weighed the projectiles

4. Launched each projectile from level ground 10 times and record the data

5. Added blocking to the front of the catapult to increase the angle to approximately 10 degrees.

6. Launched each projectile from a 10 degree angle 10 times and record the data

7. Calculated and compared the data, finding the average distance each projectile traveled from the flat launch and the angled launch.

Data

Projectile	Weight (grams)	Distance Traveled Flat (inches)	Distance Traveled Angled (inches)
Cottonball	Less than a gram	100.75	100.62
Foam Ball	1 gram	189	224
Marble	6 grams	167.75	214.25
Tigers Eye Marble	16 grams	80.25	102.5

Cotton Ball	Foam Ball	Marble	Tigers Eye	DIstance in Inches
91	199	167	80	
109	204	166	84	
101	188	168	76	
92	180	172	83	
111	193	167	79	
100	183	169	83	
98	176	175	78	
99	179	161	82	
122	213	165	78	
90	186	168	79	
Cotton Ball	**Foam Ball**	**Marble**	**Tigers Eye**	
91	179	165	78	
92	180	166	78	
98	183	167	79	
99	186	167	79	
101	188	168	80	
105	193	168	82	
109	199	169	83	
111	204	172	83	
Cotton Ball	**Foam Ball**	**Marble**	**Tigers Eye**	**DIstance in Inches**
100.75	**189**	**167.75**	**80.25**	

Conclusion

My hypothesis was correct: the foam ball did travel the farthest both starting flat and at an angle. I learned that increasing the angle will increase the distance the projectiles travel except for the cotton ball which I believe is because of its low mass.

References

1. Britannica editors “Catapult Military Weaponry” N.D. https://www.britannica.com/technology/catapult-military-weaponry
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