

Rocket Races

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You have been hired as a new rocket scientist at NASA. You will join a team of 3-4 and design a rocket. NASA only selects the best designs, so your rocket will compete against others as you race your rocket across the room. Keep in mind that when designing a rocket, **Newton's laws** will have a powerful influence and role in the motion of a rocket. Also, rockets are expensive!

Your group will be given \$20m Newton Bucks to build your rocket.

Prepare & Plan

1. Create a plan for the design of your rocket within your group. Discuss the following:
 - How can we make the most of the available materials?
 - How will Newton's laws will help or hurt your design?
 - Which structure is the most efficient and fastest?
 - What forces will you have to overcome?
2. Officially enter the race by recording your rocket's **name** with the NASA General Director.
3. What materials are you going to use? Use the table below to plan out your expenses. Make sure you have the latest fair market value of each item. Once you've come to a consensus, go to NASA Supply to purchase your items.

NASA General Supply: Available for purchase (in Newton Bucks) Each "buck" equals 1 million

Aluminum Foil (30cm) \$1	Balloon \$4	Sm plastic cup \$2	Straw \$3
Wax Paper (30cm) \$1	Coffee Filter \$1	Paper plate \$1	String (1m) \$1
Sm plastic bag: \$1	Index cards: free	Popsicle Sticks (5) \$1	Styrofoam cup \$3
Lg Binder Clamps \$2	Jumbo clamps \$2	Pipe cleaners \$2	Scotch Tape 15cm \$2
Sm Binder Clamps \$1	Paperclips (3) \$1	Sm Plastic bag \$1	Masking Tape 15 cm \$1
Toothpicks (10) \$1	Coffee stirrers (3) \$1	Styrofoam plate: \$3	Construction paper \$1

Item	Quantity	Cost	Balance

4. Record your initial design. Draw it & describe each material used in the space below.

Testing

1. Test the design of the rocket by doing 3 trial runs. Think of ways to increase the speed or accuracy of the rocket.
2. Record your times below and calculate the average speed.

	Trial #1	Trial #2	Trial #3
Time			
Distance			
Speed			

3. Which trial went the fastest? Why?

Analysis & Conclusion

1. Describe the winning rocket. What gave it an advantage over the other rockets?
2. What parts of your design were successful? Explain.
3. If you were provided with unlimited supplies, how would you change the design of the rocket?
4. How would the motion of your rocket change if it were asked to carry a load (ie, weight was added to it)?
5. In a paragraph, explain how each of Newton's three laws played a role in the motion of your rocket.