

Cricket Wicket Knockdown Challenge

Name: _____

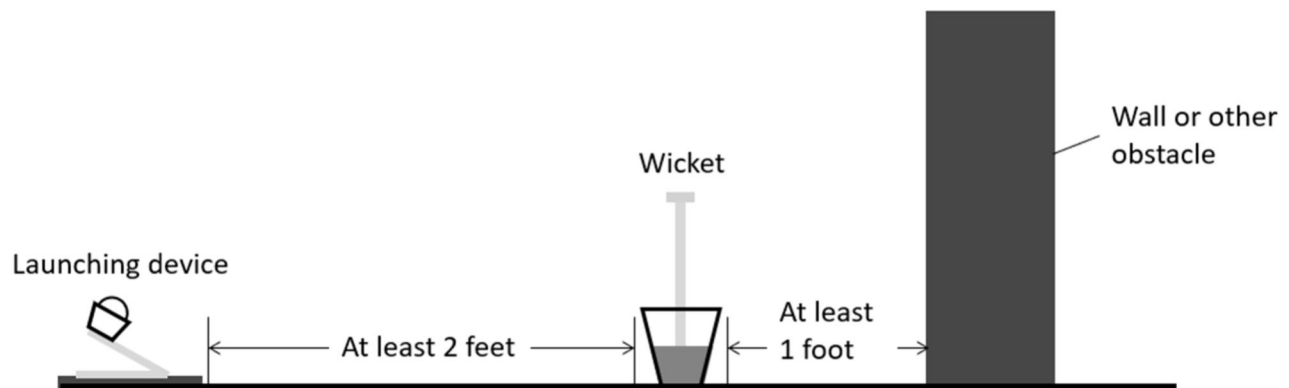
Date: _____

Instructions

Overview: Your goal is to build a machine to launch a ping pong ball and knock down a target. The more times you knock down the target within three minutes, the more points you score. You also score more points for using fewer materials to build your machine. You can watch a video introducing the challenge here:

<https://sbgo.org/fluorchallenge2020>

This diagram shows the setup for the challenge.



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Materials

Use materials from this list to build your machine. Each material has a maximum amount you can use and a point cost. The more materials you use, the more points it costs you.

Item	Max. Quantity	Point cost (each)
Cardboard sheet	1	10
2 oz paper or plastic cup	10	3
Wooden craft stick	10	1
Wooden pencil	10	1
Piece of paper	10	1
Rubber band	10	2
Cardboard tube	2	9
Clear adhesive tape	1	10
Duct tape	1	20

Scoring

Calculate your score using this equation:

$$\text{Total Score} = (100 \times \# \text{ of times eraser is knocked down in 3 minutes}) - (\text{Materials cost})$$

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Rules

1. Device can only be built with items on the official materials list.
2. Device must be free-standing and rest on the ground or a cardboard base. It cannot be taped to the ground or another object like furniture. It cannot be held up in the air or supported by a person (if you let go of it, it shouldn't fall over).
3. The device must launch the ping pong ball (e.g., using a rubber band or a lever). This launching action can be activated by a person, using one or two hands (e.g., stretching a rubber band, pushing on a lever). The device cannot just support the ball while a person throws the ball (e.g., like a golf tee—the device can't just hold the ball in place while you flick it forward with your finger).
4. Wicket must be built according to the diagram shown in Figure 1.

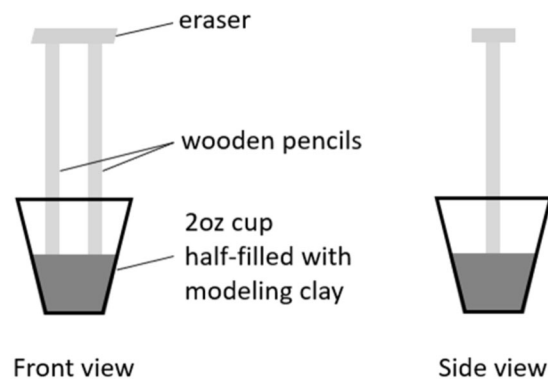


Figure 1.

5. Wicket must be placed upright, at least 1 foot from the nearest wall or obstacle (Figure 2).

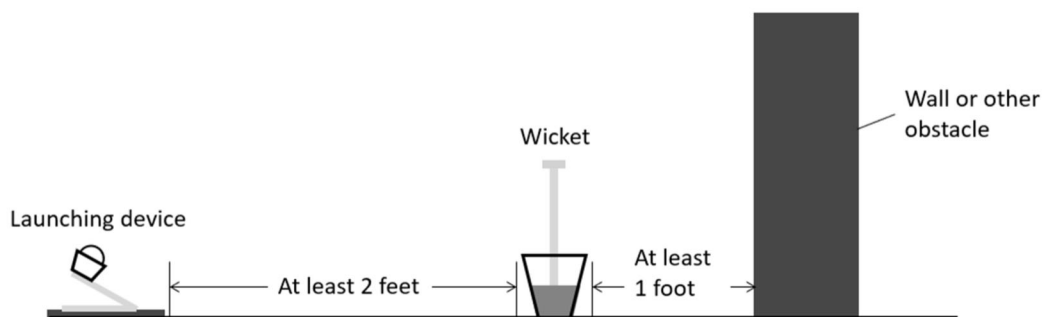


Figure 2.

6. Your launching device must be a minimum of 2 feet away from the wicket (Figure 2).

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7. Testing may be done by a team of up to four students (e.g., one student to launch the ball, one student to retrieve the ball, one student to reset the eraser or wicket, and one student to record the number of times the eraser is knocked over).
8. The ball is allowed to bounce or roll on the ground before hitting the wicket. If a ball bounces off the wall or any object (including a student) and then knocks the eraser over, that does not count (Figure 3). It does not matter if the ball hits anything *after* hitting the wicket.

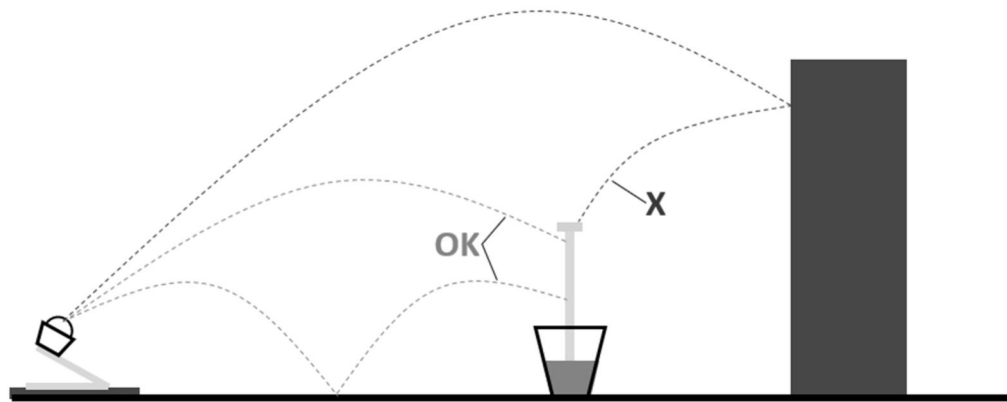


Figure 3.

9. The ball does not need to hit the eraser directly in order to knock it down. It still counts if the ball hits the cup or the pencils and makes the eraser fall.
10. For the official test to calculate your score, there is a time limit of three minutes to see how many times you can knock the eraser off the wicket.
11. You can do as many official tests as you want to try and get a higher score, but you can only submit one high score per team.

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Student worksheet

Name: _____

Date: _____

Directions: Use this worksheet to document your ideas and progress as you work on the Cricket Wicket Knockdown Challenge.

1. **Design.** Use this space to draw design ideas for your machine.

2. **Build.** Compare designs with your teammates and agree on what you will build. You can build one person's design or combine multiple designs into a new design.

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Student worksheet

3. **Test.** Test your ball launcher, following the rules on pages 3 and 4. Does the machine work like you expected? Did anything break? If so, what broke? How many times can you knock the eraser down? Write down your observations (answers to these questions or other things you notice) here.
4. **Iterate.** Your machine probably did not work perfectly on the first try. That is OK! You might need to cycle through steps 1–3 several times. What changes can you make to your design to improve it? What happens when you modify your machine and test it again? Write down three observations and/or changes you made here (draw new sketches if necessary).
5. **Final Design.** What is working well about your final design? What could be improved if you had more time?

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Student worksheet

6. Calculate your score.

- Use the scoring worksheet from your teacher to find your score.
- If you improve your design and test again, use the table below to record your score for each test.

Test Number	Score
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	