

Sumobot Challenge



Pre-Activity Quiz

- 1. What must you keep in mind when building a robot to fight another robot by trying to push it out of a ring?**
- 2. How can you use gears to your advantage in the competition?**

Pre-Activity Quiz **Answers**

1. **What must you keep in mind when building a robot to fight another robot by trying to push it out of a ring?**

Robot structure, that is, to scoop the other robot, pushing mechanism, etc.

Robot weight

Robot gear ratio: power vs. speed

1. **How can you use gears to your advantage in the competition?**

Use a low gear ratio (small gear turning a big gear) and focus on a powerful attack.

Use a high gear ratio (large gear turning a small gear) and focus on a speedy attack.

Use a medium gear ratio and balance between both power and speed.

Sumobot Challenge

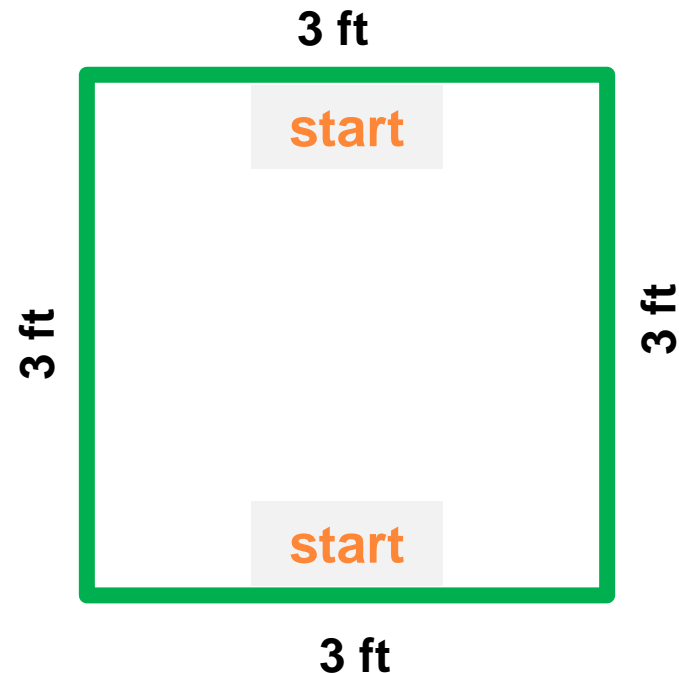
75 minutes

To build and program a robot to battle another robot.

- Two robots are placed on opposite sides of a square ring facing each other. See diagram on next slide →
- The teacher, who will judge the challenge, counts down from 3 and says, “Go!”
- At Go!, students press their NXT brick buttons to activate their programs for the challenge.
- The robot that first has *both* of its tires outside the ring at once is declared the loser; the other robot is the winner of the match and moves on to the next round.

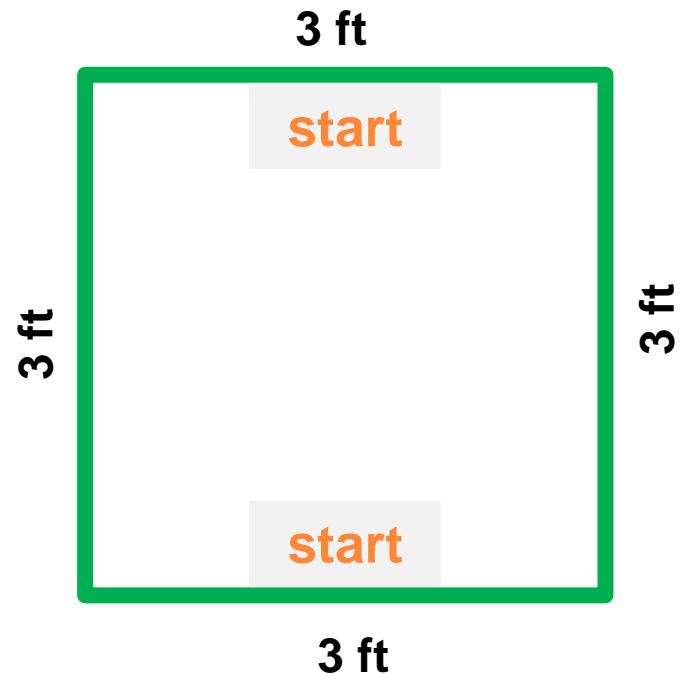
Battleground Setup & Rules

- The “ring” consists of a 3 x 3 foot square area.
- The robots start at opposite sides of the challenge ring.
- After the battle begins, students may **not** touch their robots unless the teacher deems it necessary.



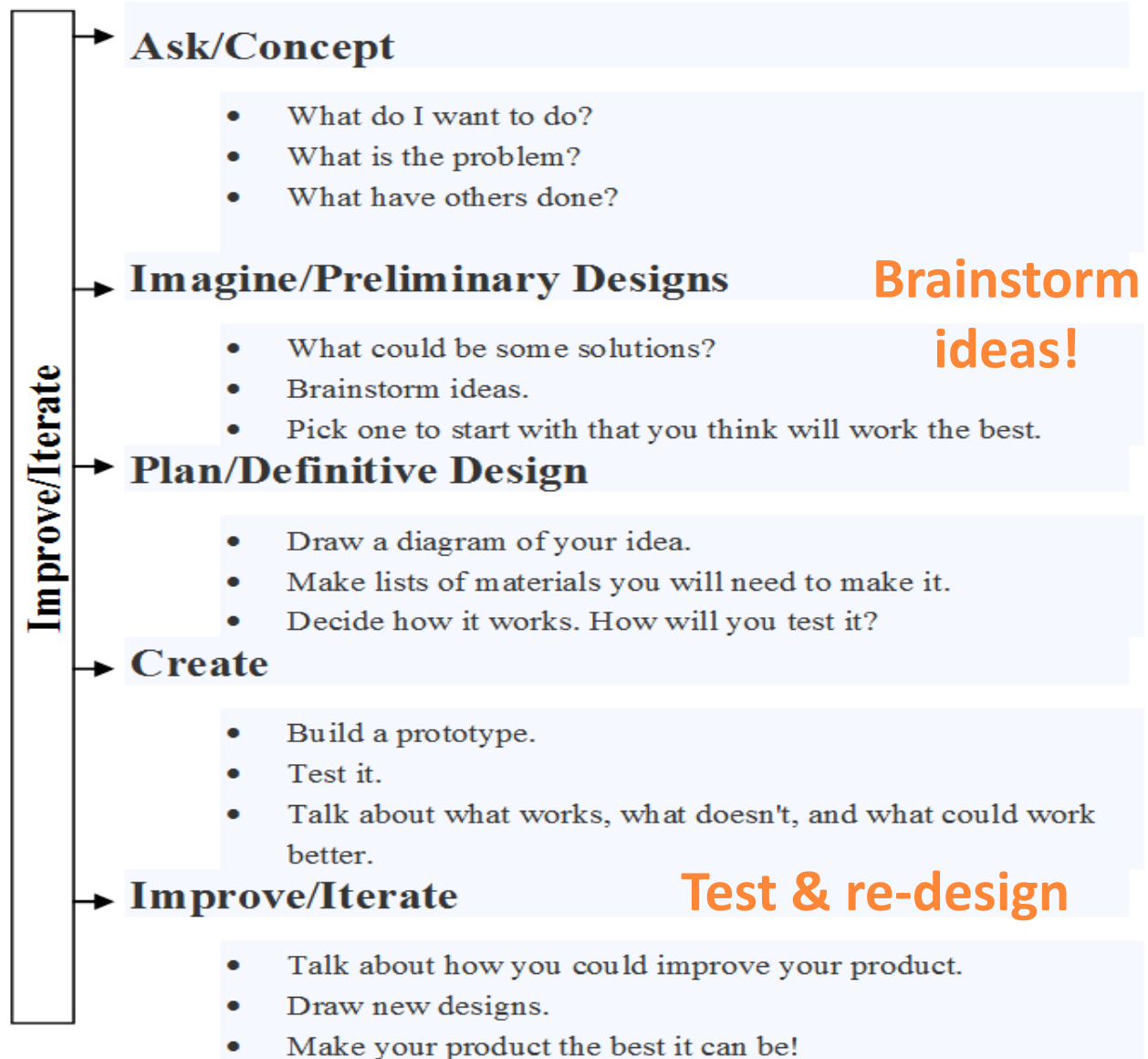
Battleground Materials List

- **Ruler or tape measure**
(to measure out the “ring”)
- **Black electrical tape**
(to mark the square area)
- **Little stickers or signs to signify the robot starting points**



Engineering Design Process

Follow these steps...



Post-Activity Quiz

- 1. What type of gear ratio did you use for your Sumobot? How did that affect the fight?**
- 2. How did you design your robot and/or your program to help you complete the task?**

Post-Activity Quiz **Answers**

1. **What type of gear ratio did you use for your Sumobot ?
How did that affect the fight?**

If a large gear ratio was used (big gear turning small gear), the robot was faster but sacrificed power.

If a small gear ratio was used (small gear turning big gear), the robot had a lot of power while sacrificing speed.

If the gear ratio used was close to 1 (similar-sized gears turning each other), the robot maintained a balance of both power and speed.

2. **How did you design your robot and/or your program to help you complete the task?**

Possible answers:

Changing gear ratio (power vs. speed)

Designing different structures to help fight the other robot

Designing a program so the robot moves directly towards the robot opponent

Vocabulary

design: Loosely stated, the art of creating something that does not exist.

gear: A rotating machine part with cut teeth that mesh with another toothed part in order to transmit torque; in most cases, the teeth on both gears are identical in shape.

torque: The tendency of a force to rotate an object about its axis or pivot.

