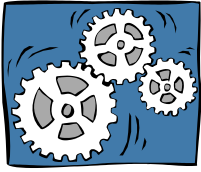


LEGO ROBOTICS DAY CAMP



Curriculum – Day 1

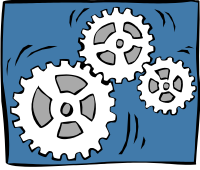
- **Registration & group placement forms.**
- **Circle Time: Camp songs or games.** Have PA's teach one song, then one PA says, "Hey, this is Robotics camp, we need a robot song!" and modify one and teach that. Or Bobby Bop Bop Bop
- **Circle Time: Why are we here?** People want to encourage women to get into engineering, science & technology -- remember women have been making things for a long time, usually in materials that don't take brute strength, so they don't get the historical credit that men do. Have fun.
- **Circle Time: Expectations** – GS promise/law. Kit care. Respect each other. Help each other.
- **Circle Time: Pretest for in-depth evaluation** So the people who gave us the money can decide if we did a good job spending it. Adult corrects tests, collates with placement forms.
- **Snack – by 10:30 – 20 minutes**
- **Circle Time: What is technology? Engineering?** Pass out camper notebooks, talk about documentation.
- **Table Time:** Take campers in groups of 6 (randomly counted off) to decorate camper notebooks with markers, stickers, names. Can use sheet labels, crayons, scissors to make their own stickers. Leave a space for lab number. Pass out GS promise, law.
- **Circle Time: Robot demo** – at least one robot demo'd by a PA. Better at least 2. Works by itself once turned on. Follows instructions/rules programmed into it. Interacts with environment



LEGO ROBOTICS DAY CAMP

Curriculum – Day 1 (continued)

- **The Game** -- small group. (2 pointers, 1 talker, 1 blindfolded mover, chopsticks, rubber bands, candy. = programs, brain, robotic action)
- **Circle Time: Teamwork.** Who is missing team member from The Game? (Mechanical Engineer). Each team member may have more than one role. Pass out TEAM, 5 fingers of Teamwork. Group magic. Volunteers/PA's have specific examples? Sports, band, building a fort?
- **LUNCH – 1 hour, with large motor activity**
- **Group campers by ability/ exposure/ buddy.** Try for some age/grade mix, but not the complete range on one team. Watch for non-optimal alpha/submissive combinations that will need more monitoring.
- **Snack**
- **Group Time: build the pushybot.** Group mentors review what a robot is (autonomous, rule-based, interacts with environment). Explain “prototype” and “tradeoff”. Made the tradeoff NOT to crossbrace so to get speedy construction. Engineering is full of prototypes and tradeoffs – why?
- **Circle Time: Pushybot.** Gear some up, some down – push some cans. Torque vs. speed. Special attachment does robotic action job – push.
- **Circle Time: gearframe.** Reinforce concepts of gear up, gear down. Switch handles on some gearframes, count and compare revolutions. Cross bracing 2+1 rule.
- **Close of day:** Pushybot/gear frame play. Explore kits. Possibly make Friendship bracelets. How is construction of friendship bracelets engineering?



LEGO ROBOTICS DAY CAMP



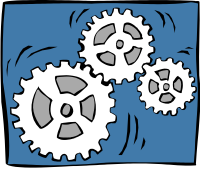
Curriculum – Day 2

- **Opening – PA songs**
- **Circle Time: Teamwork:** -- One part of an engineering team is respecting the schedule, the goal, and the people trying to make that happen. Group Magic (the wonders of synergy, working so well together you make each other smarter.) Take care of each other and yourself. Sticking up for yourself is part of letting your teammates know what you need to help get the job done. Really listening to what your teammates are saying is another part of getting the job done. One way to work a team is to have roles – here at Lego camp, we try to make sure every team member has some time at every job: builder, programmer, QA, documentation (recording, researching), parts. Here, in such small teams, PA's take the role of project managers.
- **PA Teamwork Cheer**
- **Circle Time: Pushybots again.** Select the two pushybots that are the most alike (why?) Gear one up, one down. I would call this robot a prototype – why? What tradeoffs were made? Race these two pushing light, pushing heavy. Torque = pushing force. What is the tradeoff when you increase torque (lose speed.) Why is this not a perfect test? Are the robots exactly alike? Motors equally matched? Cans exactly equal weight? In the best tests one and only one thing is different.

We said that robots do not have remote controls – so what is this about walking behind the pushybot with the RCX? I'd say it's still a robot because as long as we keep the robot within range of its "leash" we could program it to sense its environment and respond according to instructions/rules and move around and know where it is.

- **Group Time: Build a Robot.** Instructions for three types of robots will be found in the team notebook. Mentors help teams choose which one – discuss trade-offs, practice consensus. Run built-in program 1, then add 2 touch sensors on long wires (the poor girl's remote) and run program 2, then add the light sensor and play with program 3.
- **Snack**

- **Back to Robots**

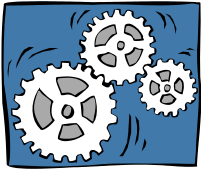


LEGO ROBOTICS DAY CAMP

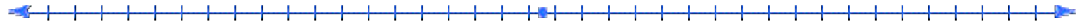


Curriculum – Day 2 (continued)

- **LUNCH – at least 1 hour. Large motor activity. Sidewalk chalk robots?**
- **Circle Time: Programs** -- What's a program – a set of instructions. Programming with Robolab – icons strung like beads. Only certain icons, put together according to rules (it's a language; limited vocabulary, defined syntax). Write the program on the PC, download to RCX. Review RCX ports/buttons. Say Pilot 1 is very limited, so we will skip it because y'all are doing so well.
- **Group Time: Pilot 2** – group mentors go over Robolab programming screen, mouse operation, clicking, downloading. Be alert for kids who have not used a computer before. Context help. Skip Pilot 3.
- **Group Time: Pilot 4** -- write 3 programs.
 - 1) go in a circle until the touch sensor is pushed – could put touch sensor on a long wire. Then build a touch bumper (instructions in team notebook.) Why is a touch bumper good?
 - 2) Go forward and stop on a black line. VIEW button!
 - 3) Drive in a square (If needed for understanding, additional work for faster campers)
- **Snack**
- **PA Teamwork cheer. Turning skit** -- label one PA "A" and one PA "C" and tightly link arms. What happens when one babysteps backwards and one forwards? (Tight turn in place.) When one goes forward and the other stands still? (Somewhat tight skid turn.) When one goes forwards in babysteps and the other in bigger steps? (Wide turn).
- **Group Time: Can Do Challenge** -- starting anywhere in the circle, push all the cans out of the circle in 2 minutes. The camp director gets to place the cans, just to mess with your head. A can is "out" as long as it is not touching the inside of the circle (on the line is considered out.)



LEGO ROBOTICS DAY CAMP

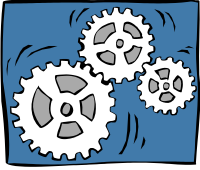


Curriculum – Day 3

- **Circle Time: Documentation.** Any camper who has made notes in their camper notebook about robotics, teamwork, problem solving gets a piece of candy. Any kid who can say what a teammate has contributed gets a piece of candy. What problems are kids having? Can anyone else make a suggestion?
- **Group Time: Can Do Challenge.** When groups are ready, have them bring their robot to the table, camp director sets cans randomly, timed trial. Then go again, different array of cans; then light or heavy or rolling objects. Talk about what worked, why, what could be changed to make the program or robot more general.

Those groups who are moving faster can re-do the Can Do in Inventor 3.

- **Snack**
- **Circle Time: Review problem solving and solution planning** -- Divide and conquer, scientific method. Every Robot tells a story. Locomotion, navigation, robotic action. For Can Do, identify locomotion, navigation, robotic action.
- **Circle Time: Icon Bingo**
- **Announce missions** – simplified tournament challenge missions with modified non-numerical score (lots of stickers). Pick missions and team names.
- **LUNCH** – one hour or longer, large motor activity
- **Work on missions** -- what will robot look like? What will it do? How will program look? Problems, limitations, easy stuff?
- **Snack**
- **Teaser** – Send invitations for Exhibition Day.

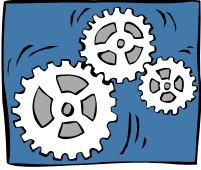


LEGO ROBOTICS DAY CAMP



Curriculum – Day 4

- **Opening – PA songs.**
 - **Work on missions.** If a group completes a mission, they are welcome to try another.
 - **Snack**
 - **Circle Time: Review teamwork, brainstorming, problem solving, mechanical issues.** Brainstorm good things about camp, what did you learn, what did you like, how would you explain that to others, how would you spread excitement about engineering? Someone needs to be the recorder for each group.
 - **Work on missions, signage** (team name, members, robot name, favorite thing about camp/robotics/team)
 - **LUNCH** -- needs large motor probably more than an hour
 - **Work on missions, signage** – camp director review progress with each group.
 - **Snack with short recess**
- Kit pre-inventory and cleanup.**



LEGO ROBOTICS DAY CAMP FOR GIRLS



Curriculum – Day 5

9:05 - checkin complete

**9:10 - posttest and evaluations handed out
work on signs & presentations
PA's help move tournament tables and set up**

**10:00 - snack
work time - missions & presentations
kit cleanup**

11:30 - Lunch - 30 minutes

12:00 - Career talks

Intro: The lineup (% of women working as engineers): have 10 girls line up, whisper to each girl whether she represents a man or woman. Others guess how many represent women engineers (2).
- PA talk about FLL tournament/team experience; science & tech classes

**1:20 Serve refreshments, seat guests, show ORTOP CD
pass out evals**

1:35 Introduce mission scoring, judge

1:40 Lab 8 team

1:50 Lab 7 team

2:00 Lab 6 team

2:10 Lab 5 team

2:20 Lab 4 team

2:40 Lab 3 team

2:50 Lab 2 team

3:00 Lab 1 team

3:10 Awards - at end

3:25 Announce PA names

**3:30 Campers return to team tables w/ parents
for individual show & tell, show programs**

3:45 Robot disassembly & kit inventory