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Claw Game Maker: Is This Machine Fair?

Grades 6-8 · 45 minutes

Physical science · Engineering



Slides, rubric and answer key **Print and go** **No student accounts**

Chromebook friendly

What's included

- A one-page overview: objectives, essential question, vocabulary, standards and assessment
- A 45-minute lesson sequence: warm-up, direct instruction, guided practice, independent practice, closure
- Slides for the board: a PowerPoint file that also opens in Google Slides
- A student worksheet with a QR code and a robot runs table
- A 3-question exit ticket, two to a page, with an answer key
- A rubric: 3 criteria, 4 levels, scored out of 12
- Differentiation for English learners, students with IEPs or 504 plans, and students who need more support or more challenge
- Cross-curricular extensions, and notes for teaching it in grades 4 and 5 and in high school physics
- Standards: Common Core Math

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Is the claw machine rigged, or is it luck? Students predict how many of twenty careful robot players will win the starter machine, then run them and watch the wins come in. Twenty more plays give a different number, and the sheet asks why. They turn the carry grip down the way a real operator can and run again. By the end they can state a win rate from repeated trials, say what a prediction is worth, and read an operator's settings.

At a glance

ESSENTIAL QUESTION

How can you tell what a player's chances are on a claw machine, and what does the operator control?

OBJECTIVES

Students will be able to:

- predict the number of wins in twenty plays and compare it with the observed count
- explain why two runs of twenty plays give different counts, and what more plays would do
- read the win rate as a property of the machine and the pile, not of the player's luck
- change the carry grip the way an operator can and measure what it does to the rate

VOCABULARY

Trial, Win rate, Prediction, Sample, Carry grip

STANDARDS

7.SP.C.6, 7.SP.C.7

TIME AND MATERIALS

45 minutes, grades 6-8.

- One computer or Chromebook per student
- A projector
- The worksheet and exit ticket, one copy each per student
- The rubric, one copy per student if you grade the work

PREP

Make copies of the worksheet and exit ticket. Before class, open mytekdev.com/try/clawmaker?lesson=is-this-machine-fair&ref=tpt-clawmaker-3 once on a student computer: open Test, type a guess, press Run the robots and watch twenty plays come in, then run twenty more. About five minutes.

ASSESSMENT

- Formative: the questions under What to look for, asked while students work, and the exit ticket (answer key included).
- Summative: the worksheet, scored with the rubric.

TECHNOLOGY AND PRIVACY

Runs in any browser with WebGL, Chromebooks included, with nothing to install. Students need no account and no email: the link works signed out, and nothing they do is stored on our server unless they choose to save.

Lesson sequence

MINUTES	STAGE	WHAT YOU DO	WHAT STUDENTS DO
0 to 5	**Warm-up** Hook	Show the title, essential question and Today I can slides (about 1 minute). Then the warm-up: how many of twenty win? Record every number.	Write a number and a reason on the worksheet.
5 to 12	**Direct instruction (I do)** Model it	Project the app and open Test. Show Robot players: type a guess, press Run the robots, and watch the count grow play by play. Then The operator menu: open Build, Claw and point at the three grips. > **It's working when:** Flip a coin ten times on the document camera and count heads. Nobody expects exactly five.	Fill in the vocabulary.
12 to 22	**Guided practice (We do)** Twenty plays together	Students open the link. The guide takes them to Test, asks for a guess, runs twenty plays, then twenty more. Walk the room and collect the pairs of counts on the board. > **Watch for:** Students who change their guess after the first run to match it. The guess is for the next run, and the point is that it will not match exactly.	Follow the guide and record both counts.
22 to 38	**Independent practice (You do)** The runs table	Students run the starter three times and record the counts and the rate. Then they set the carry grip to 0.5 N in Build, Claw and run three more. The table has the spread of each three and the rate of all sixty. > **If they ask:** "Your three runs gave 7, 10 and 6. Which number is the best guess of the true rate, and why?" Sixty plays	Fill in the runs table and answer the two questions.
38 to 45	**Closure** Showcase and exit ticket	Show the Showcase slide. Go back to the warm-up numbers and compare them with the board. Hand out the exit ticket.	Answer the exit ticket.

Before you teach: a ten-minute walkthrough

Open mytekdev.com/try/clawmaker?lesson=is-this-machine-fair&ref=tpt-clawmaker-3. A claw machine in a room, seen the way a player sees it: a 70 cm box, three rubber-padded prongs parked closed over the chute, and a pile of bears, ducks and capsule balls.

1. **Guess.** Open `Test`. Under Robot players, type a guess out of twenty in My guess.
2. **Run.** Press `Run the robots`. Twenty plays come in one at a time, each a win or a loss, with the count and your guess beside it. The starter wins about two in five.
3. **Again.** Run twenty more. The count is different. The sheet asks why.

4. **The carry.** Open `Build`, `Claw`, and drag `Carry` down to 0.5 N. Run the robots: most prizes now fall on the way to the chute.
5. **The check.** On `Build`, `Share`, Run the honest machine check: at 0.5 N it fails and names the prize kinds that cannot be lifted.

> The robots aim at a prize near the top of the pile with a set wobble of a few centimeters, so the rate is a property of the machine and the pile. The pile itself is luck: the same machine filled differently can win anywhere from one play in ten to four in five, and the starter's pile sits near two in five.

Background for the teacher

A win rate is wins divided by plays, and it is only a good estimate when there are many plays. Twenty plays at a true rate of 40 percent will give anywhere from about 4 to 12 wins most of the time; sixty plays narrow that. The lesson has students see the spread for themselves before it says so.

A real claw machine's operator menu sets the grips for the grab, the lift and the carry separately, and machines are often set to ease off on the carry so that prizes fall near the chute. That is not a secret; it is why several states require that every prize on show be winnable with the claw as set. The app's honest machine check is modeled on that rule.

The robots are careful players, not perfect ones: they aim at a prize near the top of the pile with a set wobble. A student who aims well can do better than the robots; a student who aims badly will do worse. The rate measures the machine.

What to look for

Ask these while students work. A student who has understood the lesson can answer them without help:

- Your two runs gave different counts. Was one of them wrong?
- What would you expect from the next run?
- How many plays would you want before you said the rate was 40 percent?
- What did the carry grip do to the rate, and where did the prizes fall?
- Could a player at the machine tell the carry grip had been turned down? How?

> The first question is the real test: a student who says neither run is wrong, and both are samples of the same machine, has the idea.

Cross-curricular extensions

- Math: pool everyone's runs on the starter. How does the rate from 400 plays compare with the single runs?
- Civics: read your state's rules on crane games and say what they require of an operator.

- Economics: at a dollar a play and a four dollar prize, what win rate makes the machine break even?
- English: write a short, fair sign for a machine that eases off on the carry.

Vocabulary

Trial	One play, start to finish. The robots play twenty at a time.
Win rate	Wins divided by plays. Eight of twenty is 40 percent.
Prediction	The number you expect before the run. It is compared with what happened.
Sample	The plays you actually ran. A small sample can land some way from the true rate.
Carry grip	The squeeze on the way to the chute. Real machines are often set to ease off here.

Differentiation

ENGLISH LEARNERS

- Keep the vocabulary slide up, and point at the count as it grows while you say trial and win rate.
- Pair each learner with a partner; the table is counts.
- Accept the explanation as a drawing of two runs with different counts.

STUDENTS WITH IEPS OR 504 PLANS

- Pair students, one running and one recording.
- Zoom the browser to 150%.
- Allow two runs instead of three where the IEP allows a modified assignment.

STUDENTS WHO NEED MORE SUPPORT

- A sentence starter: "The two runs were different because ___."
- Do the first run together on the projector.
- Use the Kid level: the grips read weak, medium and strong.

STUDENTS READY FOR MORE

- Pool the whole class's runs on the starter and find the rate from hundreds of plays.
- Find a carry grip at which the robots win about one play in ten, and say what a player would feel.
- Solve the Fair or not? puzzle under Puzzles.

Adapting for other grades

Younger students: In grades 4 and 5, do the guide and two runs on the starter; drop the third rubric row; total 8, and 6 meets the objectives.

Older students: In high school, pool the class's runs and find the proportion with a margin of error; compare the starter with the carry grip at 0.5 N.

Student worksheet

Name: _____ Date: _____

Open the app: scan the QR code, or go to mytekdev.com/try/clawmaker?lesson=is-this-machine-fair

Essential question: How can you tell what a player's chances are on a claw machine, and what does the operator control?

Warm-up: Twenty people play once each. How many win? Why? _____

1. **Vocabulary.** Trial, win rate, prediction, sample, carry grip: write each in your own words.

2. **The guide.** My guess: ____. First run: ____ of 20. Second run: ____ of 20.

3. **The runs table.** Three runs on the starter, three with the carry grip at 0.5 N: wins of 20, the rate of each, and the rate of each three together.

1. Your runs gave different counts. Which number is the best guess of the true rate, and why?

2. What did the carry grip do, and could a player tell?

Exit ticket

Name: _____

1. A win rate of 40 percent means (A) every fifth play wins (B) about 8 wins in 20 plays, give or take (C) you win after four losses

2. Two runs of twenty gave 7 and 11 wins. (A) One run was wrong (B) both are samples of the same machine (C) the machine changed

3. What does turning the carry grip down do, and what does the honest check say about it?

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Exit ticket

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Answer key: exit ticket

QUESTION	ANSWER	WHY
1	B	A rate is about the long run; any twenty plays land near it, not on it.
2	B	Small samples spread; more plays narrow the estimate.
3	Prizes fall on the way to the chute	The rate drops; the check names prize kinds that cannot be lifted at that grip. A full answer says the operator sets it.

Rubric

Score each row from 1 to 4.

Name: _____

CRITERIA	4 EXCEEDS	3 MEETS	2 APPROACHING	1 BEGINNING
Data	Six runs recorded with the rate of each, the rate of each three together, and the pooled rate.	Six runs with their rates.	Fewer runs, or no rates.	No runs.
Reasoning	Explains why runs differ, why more plays give a better estimate, and uses the pooled rate.	Explains why runs differ and prefers more plays.	Says the runs were different.	No reasoning.
The operator	Measures what the carry grip did to the rate and says what a player would see.	Measures what the carry grip did.	Changes the grip without measuring.	No change made.

Total: ____ / 12. A score of 9 or more meets the objectives.

Standards

The lesson is built for 7.SP.C.6 and 7.SP.C.7: a rate from repeated trials, a prediction, and the reasons they differ.

FRAMEWORK	CODE	GRADES	STANDARD	HOW THE LESSON MEETS IT
Common Core Math	**7.SP.C.6**	7	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.	Students collect data on repeated plays, observe the relative frequency and predict the count in the next run.
Common Core Math	**7.SP.C.7**	7	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.	Students compare a predicted rate with observed frequencies, and explain the spread of small samples and the effect of the carry grip.

Checked November 2026 against: Common Core State Standards for Mathematics, Grade 7, Statistics and Probability, New Jersey Administrative Code 13:3-7.4, crane games: prizes must be obtainable by the claw as set.

Optional: save student work in a free class

The whole lesson runs at the link on the worksheet, with no accounts and no sign-up.

To keep students' work, and see it all in one place, make a free class. It takes about ten minutes, once, and covers every lesson in this series: mytekdev.com/tools/class-setup

Students in a class open mytekdev.com/tools/claw-game-maker/lessons/is-this-machine-fair/start instead of the worksheet link. Each one gets their own copy of the starter, and the same link reopens it next time.

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