Puttshack Angles & Trajectories Lab
On-site Lesson: The Banker (Grade 3 Student Lab Guide)

Name: _____

Team: _____

Date: _____

Hole #: _____

Puttshack Tech Tool: Trackaball™ (the ball) tracks each hit while the ball is in play. The game screen at each hole shows results that help us check outcomes and improve.

1) Mission

- Fair testing tip: If testing different variables, have Student A complete all trials for Variable A first, then Student B repeat the trials for Variable B.
- We will test a *BANK* shot (hit the wall first) and compare it to a *STRAIGHT* shot. We will collect data and use the screen feedback to confirm what happened.

2) Key Rule of Reflection

- Angle in = Angle out.

3) Quick Prediction

- I think banking will work best when the angle is (circle): Acute Right Obtuse
- Because: _____

_____

4) Bank Shot Plan

- Aim spot on wall (circle): Left Middle Right
- Force (circle): Soft Medium Hard

5) PART A - BANK SHOT TRIALS (Must hit wall first)

Measure first-putt distance with string/tape. Record inches.

Trial	Aim (L/M/R)	Angle (A/R/O)	Force (S/M/H)	Distance (in.)	Wall first? (Y/N)	Bank worked? (Y/N)	Trackaball™ feedback (screen confirm?)

Bank shot worked means: it bounced toward the hole OR set up an easier next shot.

6) PART B - STRAIGHT SHOT TRIALS (No wall)

Trial	Force (S/M/H)	Distance (in.)	Toward hole? (Y/N)	Worked? (Y/N)	Trackaball™ feedback note

7) Results Summary

- Bank worked: _____ / 3
- Straight worked: _____ / 3
- Better strategy today (circle): BANK STRAIGHT
- Evidence sentence: Bank worked _____times and straight worked_____times.

8) Observations

Surface note: The holes use the same turf. If you compare surfaces, use the flooring around the game as the alternative surface.

[ ] Aiming more left on the wall made the ball bounce more right

[ ] Aiming more right on the wall made the ball bounce more left

[ ] More force usually made the ball travel farther

[ ] Angle mattered more than force for direction

[ ] The screen feedback helped us check our results (Trackaball™)

One more observation: _____

_____

9) Model Sketch (Draw your best BANK shot)

Include: start dot, wall corner, bounce dot, arrow in, arrow out. Label: Angle in = Angle out.

Exit Reflection (1 sentence): Next time, we will change _____ because

_____.

Puttshack STEM Field Trip

On-site Lesson Plan

Time	Setting	Led by	Materials
45-60 minutes	Puttshack venue	Teacher (Puttshack associates support the visit)	Clipboards, pencils, measuring tape or pre-marked string, student data sheet, optional protractors; Puttshack provides gameplay, a putter, and a Trackaball™ ball

(Grades 3–4) — 45–60 Minutes

Tech Thread Throughout: Trackaball™ (the ball) tracks each hit while in play, and the game screen at each hole shows hit count and points to validate our data.

Standards Alignment (Built In)

- CCSS Math (4.G.A.1): Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines.
  Students sketch shot paths, mark bounce points, and label angles as acute/right/obtuse.
- CCSS Math (3.MD.B.4): Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.
  Students measure first-putt distance with a pre-marked string/tape and record data.
- Students break the bank shot into components (aim point, angle in/out, force, distance), create a model sketch, and use Puttshack game screen feedback to refine.

Materials

Supply note: Puttshack provides gameplay, a putter, and a Trackaball™ ball. <u>All other supplies should be brought with your group.</u>

Clipboards, pencils, measuring tape or pre-marked string, student data sheet (below), optional protractors (nice-to-have, not required), small “angle card” visuals (acute/right/obtuse).

Lesson

0:00–0:03 | Welcome + Safety

Teacher says:
“Welcome to Puttshack! Today you’re not just playing—you’re engineers and mathematicians in an angles lab.”

Teacher says:
"Safety: putters stay below waist height, we walk, we take turns, and we keep our eyes on the ball."

Call-and-response:
Teacher: *"Putters low!"* → Students: "Putters low!"
Teacher: "*Walk*!" → Students: "Walk!"
Teacher: "*Take turns!"* → Students: "Take turns!"

0:03–0:08 | Puttshack Tech + Lab Mission

Scoring note: Puttshack scoring is points-based - players try to earn as many points as possible. Learn more: https://www.puttshack.com/blog/happenings/9-hole-scoring/

Teacher says:
"At Puttshack, Trackaball™ technology helps track what happens during play, and the game screen at each hole show live updates. Today we'll use that technology like a science tool—feedback that helps us learn."

Teacher asks:
"What do we do with feedback?"
Students say:
"Use it to improve!"

Teacher says:
"Exactly. We'll test a bank shot, look at our results, and adjust."

0:08–0:15 | Mini-Lesson: Reflection = Banking

Teacher says:
"Banking is when the ball hits a wall and bounces to a new direction—just like light reflecting off a mirror."

Teacher says (key rule):
"Here's the big idea: Angle in equals angle out. If the ball hits the wall at a certain angle, it bounces out at the same angle."

Teacher does a quick demo (no protractor needed):
"Imagine the wall is a mirror. If I roll toward the wall like this (gesture), it will bounce off like this (gesture)."

Quick vocabulary check (4.G.A.1):
Teacher says:
"Point to an acute angle (small), a right angle (L-shape), and an obtuse angle (wide)."
(Students show with arms.)

Teacher says:
"Today your job is to create the best bank shot by choosing the right angle and aim point."

0:15–0:18 | Explain the Challenge: "The Banker"

Gameplay flow reminder: Each player plays the hole start-to-finish until the ball goes in. Then the next player goes until everyone completes the hole.

Teacher says:
"We're going to an investigation hole with a clear corner. Your rule: your first putt must hit the wall first before it can go toward the hole."

Teacher says:
"You'll do two strategies across trials:

1. *Bank shot (must hit wall first)*
2. *Straight shot (no wall)*
   We'll collect data and compare."

Teacher says:
"And because we're at Puttshack, we'll use the game screen updates as part of our data check."

0:18–0:22 | Set Teams + Roles (Computational Thinking)

Teacher says:
"*Teams of 3–4. Choose roles. We rotate each round."*

Roles (posted):

- Shooter (takes putt)
- Measurer (measures first-putt distance)
- Data Recorder (records trials + outcomes)
- Students break the bank shot into components (aim point, angle in/out, force, distance), create a model sketch, and use Puttshack game screen feedback to refine.

Teacher says:
"Computational thinkers break the problem into parts. Our parts are: angle, aim point, force, distance, result."

Main Activity: Investigation Hole + Data Lab

Surface note: The holes use the same turf. If comparing surfaces, use the flooring around the game area as the alternative surface. Holes vary widely with ramps/obstacles (some moving).

0:22–0:35 | Round 1: Bank Shot Trials (Data + Measurement)

Fair testing tip: When testing different variables, keep trials in clean sets - Student A completes the Variable A set, then Student B repeats the same way for Variable B.

Teacher says:
"Round 1 is all bank shots. Your goal is to get a successful bank that helps you reach the hole."

Step-by-step script (repeat each trial):

1. **Teacher says:** "*Plan it. Point to your wall target spot."*
2. **Teacher asks:** "*What kind of angle are you making—acute, right, or obtuse?"*
3. **Teacher says:** "*Measurer: measure the distance from start to the ball stop on the first putt using the string/tape."*
4. **Teacher says:** "*Recorder: mark whether the ball hit the wall first and if it helped."*
5. **Teacher says:** "*Tech Checker: look up—what feedback do we see on the screen? Use it to confirm the attempt."*

Data expectation: Each team completes 3 bank-shot trials.

Quick coach prompts (angles/trajectories):

- *"If you want the bounce to go more to the right, where should you aim on the wall?"*
- *"How can you change the angle without changing the force?"*
- *"What stayed the same? What changed?"*

0:35–0:48 | Round 2: Straight Shot Trials (Comparison Set)

Teacher says:
"*Round 2 is straight shots—no wall. This is our comparison*."

Students break the bank shot into components (aim point, angle in/out, force, distance), create a model sketch, and use Puttshack game screen feedback to refine.

Comparison prompt (ISTE + computational thinking):
Teacher asks:
"*Which strategy is more successful today: bank or straight? What does the data say?*"

0:48–0:55 | Quick Model + Mini Share (Draw It)

Teacher says:
"Now you'll make a model. A model is a drawing that shows the important parts."

Student model directions (4.G.A.1):

- Draw the hole corner like an L-shape wall
- Draw your ball start point (dot)
- Draw the incoming path (ray/line) to the wall
- Mark the bounce point (dot)
- Draw the outgoing path (ray/line)
- Label angle type: acute/right/obtuse

Teacher says:
"Add one sentence: 'Angle in equals angle out because…'"

2–3 team share-out (30 seconds each):

- "We aimed at ___ spot."
- "Our angle was ___."
- "Our data showed bank was successful ___ times."

0:55–1:00 | Wrap-Up + Exit Check (5 minutes)

Teacher says:
"Fast recap. Answer like scientists:"

1. "What is the reflection rule?"
   Students: "Angle in equals angle out."
2. "What did we measure today?"
   Students: "Distance of the first putt."
3. "How did Puttshack technology help us?"
   Students: "The screen gave feedback / helped check our data."

Exit Ticket (pick one):

- “Bank shots worked best when we _____.”
- “If my bounce went the wrong way, I will change _____.”
- “Our data shows _____ was more successful.”

Reference video (Pittsburgh venue): https://www.youtube.com/watch?v=z9KY-mgEeCw

Puttshack Post-Visit Activity (Grades 3–4): Obstacle Course Engineer — Build, Diagram, Compare

20-minute scripted classroom lesson • Completed AFTER students visit Puttshack • Connects to Trackaball™ feedback, banking (reflection), angles, and measurement.

Purpose

- Students reflect on what they observed at Puttshack (bank shots, angles, obstacles) and apply it to a hands-on design challenge.
- Students use measurement + data to support decisions and create a clear diagram/model of their engineered "hole."
- Students connect how Puttshack's Trackaball™ + overhead screens provide feedback that helps teams improve.

Standards Alignment

- CCSS Math (4.G.A.1): Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines.
- CCSS Math (3.MD.B.4): Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.
- ISTE (1.5.c Computational Thinker): Students break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.

Materials

- Per group: 1–2 books (bounce surface), 1 cup (target), 2–4 erasers/blockers (obstacles), masking tape (optional).
- Rulers or measuring tape (inches; halves/fourths encouraged).
- Student worksheet: "Post-Visit Obstacle Course Engineer" (one per student).
- Optional: students' Puttshack notes/data from the onsite bank-shot lesson.

Teacher Setup

- Board prompt: "Bank shot (reflection): Angle in = Angle out."
- Anchor model: START point → BOUNCE point → TARGET point (incoming ray + outgoing ray).
- Assign group space on the floor; optional tape line for "START."

Scripted 20-Minute Lesson (with timestamps)

0:00–0:03 Reconnect to Puttshack
Teacher says: "*You just visited Puttshack. You saw how bank shots can help the ball change direction to reach the hole.*"

Teacher says: "*At Puttshack, the Trackaball™ golf ball and overhead screens give feedback—like a science tool—so players can test ideas and improve."*

Teacher asks: "*What made a bank shot work better at Puttshack—aim point, angle, or force? Share one example."*

0:03–0:06 Goal + Success Criteria
Teacher says: "*Today you are obstacle course engineers. You will build a mini 'hole' that REQUIRES a bank shot—your ball must hit the book first, then reach the cup*."

- Ball hits book first AND reaches the cup (or clearly moves toward it in a controlled path).
- Teams measure distances (start→book and book→cup) and record results.
- Students create a diagram with points, rays/segments, and an angle label.

0:06–0:08 Mini-Lesson: Variables + Reflection
Teacher says: "*Engineers test one change at a time—this is controlling variables."*

Teacher says: "*A bank shot is reflection: the ball comes in, hits the surface, and bounces out."*

Teacher prompt: "*Name the parts of our system." (Expected: start, book/bounce surface, target cup, obstacles, aim/force.)*

0:08–0:15 Build + Test (2 rounds)
Teacher says: "*Build first. Make it so the ball cannot reach the cup without hitting the book first."*

- Round A (3 min): Build + choose START, BOOK, CUP locations.
- Round A (2 min): Test 2 trials. Measure and record.
- Round B (2 min): Improve by changing ONE variable (move book OR start OR cup OR one obstacle).
- Round B (1–2 min): Test 1–2 more trials. Record what changed and what happened.

Teacher coaching prompts: "*What variable did you change?" "Where is your bounce point?" "Acute, right, or obtuse?" "What does your evidence show?"*

0:15–0:18 Diagram + Geometry Talk
Teacher says: *"Capture your design like engineers."*

- Mark START, BOUNCE, TARGET as points.
- Draw incoming and outgoing paths as rays (arrows).
- Label one angle: acute/right/obtuse.
- Add one measurement in inches (halves/fourths encouraged).

0:18–0:20 Share + Reflect (Puttshack connection)
Teacher says: "*Share with a partner team: what you changed, what happened, and how this connects to Puttshack."*

Teacher closure: "*At Puttshack, Trackaball™ + screens give feedback. Here, your measurements/results are feedback. Engineers use feedback to improve.*"

Quick Assessment Checklist

- Measurements recorded for at least 3 trials.
- Diagram includes start/bounce/target points + incoming/outgoing rays.
- Student identifies a variable change and its effect using evidence.
- Student explains one connection to Puttshack (banking + Trackaball™ feedback).

Puttshack Post-Visit Worksheet (Grades 3–4): Obstacle Course Engineer — Build, Diagram, Compare

After your Puttshack visit • Use what you learned about bank shots + Trackaball™ feedback to engineer your own hole.

Name: _____

Date: _____

Team: _____

1) Puttshack Recall (2 minutes)

One thing I learned at Puttshack about bank shots (bouncing off a wall) was:

_____

At Puttshack, the Trackaball™ ball + overhead screens gave feedback by:

_____

2) Build Your Classroom Bank-Shot Hole

- Your ball MUST hit the BOOK first, then reach the CUP target.
- Mark a START point (tape line or a clear spot).
- Add 1–3 obstacles (erasers/books) to shape the path.

3) Trials + Measurements (3.MD.B.4)

Measure in inches. If you can, include halves/quarters (example: 12 1/2 in.).

Trial	Start → Book (in.)	Book → Cup (in.)	Hit book first? (Y/N)	Reached cup? (Y/N)	Notes (aim/angle/what changed)
1					
2					
3					
4					

Circle the ONE variable you changed to improve your design:

Moved book Moved start point Moved cup target

Moved one obstacle Changed aim spot

Describe your change (1 sentence):

_____

4) Diagram Your Design (4.G.A.1)

In the box, draw: START point • BOUNCE point • TARGET point • incoming path ray • outgoing path ray.

Label: one angle type (acute/right/obtuse) and one measurement (in.).

5) Claim–Evidence–Reasoning (CER)

Claim (What helped your bank shot work best?):

_____

Evidence (Use numbers from your table):

_____

Reasoning (Use bounce/reflection language):

_____

6) Puttshack Connection (ISTE 1.5.c)

How is our classroom engineering similar to Puttshack? (check all that apply)

☐ We tested one variable at a time to solve a problem.

☐ We used data (measurements/results) as feedback, like Trackaball™ + screens.

☐ We created a model/diagram to explain our system.

One sentence connection:

_____

Puttshack Pre-visit Activity (Grades 3–4): Obstacle Course Engineer

Time	45–60 minutes
Setting	Classroom (Pre-visit)
Led by	Teacher
Materials	Books, cups, rulers/tape measure, student worksheet, small ball (classroom).

20-minute scripted classroom activity • Prepares students for the PuttShack bank-shot experience (Trackaball™ + overhead screen feedback).

Standards Alignment

- CCSS Math (4.G.A.1): Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines.
- CCSS Math (3.MD.B.4): Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.
- ISTE (1.5.c Computational Thinker): Break problems into parts, extract key information, and develop descriptive models to understand systems or solve problems.

Lesson Snapshot

- Theme: Angles and trajectories (banking / reflection).
- Big idea: A bank shot changes direction after hitting a surface. Students design an obstacle hole where the ball MUST bounce off a book to reach a target.
- Connection to PuttShack: At PuttShack, the Trackaball™ ball and overhead screens provide feedback as you test strategies. Today we practice engineering thinking before the trip.

Materials

- Classroom: books (1–2 per group), erasers/blockers, cups (target), masking tape (optional), a small ball or rolled-up paper ball.
- Measurement tools: rulers or measuring tape (inches; halves/fourths).
- Student worksheet: “Obstacle Course Engineer” (one per student).

Group Setup

Puttshack field trip notes (for your on-site visit)

- Tech: The Trackaball™ (the ball) tracks every hit while it’s in play. Your results are displayed on the game screen at each hole.
- Screens: The game screen shows hit count as you play, then your points score at the end of the hole. At Hole 9, it shows final score and ranking once all players finish.

- Scoring: You're trying to earn as many points as possible (not the fewest strokes). More info: puttshack.com/blog/happenings/9-hole-scoring/
- Gameplay flow: Each player completes the hole start-to-finish (first stroke until the ball drops). Then the next player goes.
- Support roles: Associates will support the trip, but the teacher will run instruction (no hands-on "Adventure Guide" leading lessons).
- Supplies: Puttshack provides gameplay, a putter, and a ball. Bring any other learning materials/supplies you need.
- Surfaces: Holes use consistent turf, but the flooring around the game can be used as an alternative surface if you compare friction/speed.
- Testing variables: Run clean sets—Student A completes Variable A trials first, then Student B repeats with Variable B.

- Teams of 3–4 students.
- Roles (rotate after each test): Builder, Shooter, Measurer, Diagrammer/Data Recorder.

Vocabulary

- Target, Path, Reflection (bounce), Angle, Trajectory, Variable, Measurement, Evidence

Scripted 20-Minute Lesson (with timestamps)

0:00–0:03 Welcome + Hook
Teacher says: "*Today we're getting ready for our PuttShack field trip by becoming engineers. At PuttShack, the Trackaball™ golf ball and the overhead screens give live feedback. Engineers use feedback to test ideas and improve."*

Teacher says: *"Your challenge today is to build a mini 'hole' on the floor where the ball MUST hit a book first—then bounce to the target."*

0:03–0:06 Mini-Lesson: What is a bank shot?
Teacher says: "*A bank shot is when the ball hits a surface and changes direction. That change is called reflection or bounce."*

Teacher says: "*In mini-golf, you can aim for a wall or bumper so the bounce helps you reach the hole*."

Teacher asks: "*What are three parts of our problem?"*

Expected student answers (prompt as needed): "Start spot, bounce surface (book), target cup."

0:06–0:08 Safety + Rules
- **Teacher says:** "*Roll the ball—no throwing."*
- **Teacher says:** "*Keep hands and feet clear of the putting path."*

- **Teacher says**: "*Only change ONE thing at a time when testing (angle OR distance OR obstacle position). That's how scientists control variables.*"

0:08–0:10 Explain the Engineering Challenge
Teacher says: "*Your hole must have: (1) a START line, (2) a BOOK bumper the ball must touch first, and (3) a TARGET cup.*"

Teacher says: "*If the ball reaches the cup without hitting the book first, the trial does NOT count. Your design must require the bounce.*"

Teacher says: "*After you build, you will diagram your design using points and line segments/rays, and you will measure distances in inches.*"

0:10–0:16 Build + Test (Rounds)
Teacher says: "*Builders: build the course. Measurers: get ready with your ruler. Shooters: you'll test after the build. Diagrammers: start sketching the setup on your worksheet.*"

- Round 1 (2 minutes): Build a first design.
- Round 2 (2 minutes): Test 3 trials. Record: Did it hit the book first? Did it reach the target? Measure the distance traveled (start → book; book → cup).
- Round 3 (2 minutes): Improve the design by changing ONE variable (move book, change start point, or change target position). Test 2 more trials.

0:16–0:18 Diagram + Geometry Talk
Teacher says: "*On your diagram, mark: START point, BOUNCE point (where it hits the book), and TARGET point.*"

Teacher says: "*Draw the incoming path (start to book) and outgoing path (book to cup). Label one angle as acute, right, or obtuse.*"

Teacher asks: "*Where do you see perpendicular lines? (Hint: corners of books or taped boundaries.)*"

0:18–0:20 Share + Wrap-Up
Teacher says: "*Share in one sentence: What variable did your team change, and what happened?*"

Teacher says: "*At PuttShack, you'll do this with real obstacles—and Trackaball™ feedback on the overhead screens helps confirm results.*"

Exit prompt (say aloud): *"A bank shot helps because the ball can change direction after it hits a surface."*

Assessment (Quick Check)
- Student diagram includes start, bounce, target points and two path segments/rays.
- Student records measurements (inches; halves/fourths encouraged).
- Student explains one variable change and its effect using evidence from trials.

Puttshack Pre-Visit Worksheet (Grades 3–4): The Geometry of the Bank Shot

Build a bank-shot hole • Diagram it like an engineer • Measure + record data • Prep for Trackaball™ feedback at Puttshack

Name: _____ **Date:** _____ **Team:** _____

Mission

You are an engineer preparing for Puttshack. At Puttshack, the Trackaball™ golf ball and overhead screens provide feedback. Today, you will build a mini-golf "hole" in class where the ball MUST bounce off a book before it can reach the target cup.

Design Rules

- Your ball must hit the BOOK first, then reach the CUP target.
- Roll only (no throwing).
- Change ONE variable at a time when improving your design.

Materials Used (check and add)

☐ Book(s)	☐ Cup target	☐ Erasers/blockers
☐ Tape boundary	☐ Ruler/tape (inches)	☐ Ball (or paper ball)
Other:	Other:	Other:

Step 1: Build + Label Points

On your floor design, identify and label these points:

- START point (where the ball begins)
- BOUNCE point (where the ball hits the book)
- TARGET point (the cup)

Step 2: Measure Distances (inches)

Measure carefully. If you can, include halves or fourths (example: 12 1/2 inches).

Trial	Start → Book (in.)	Book → Cup (in.)	Hit book first? (Y/N) + Reached cup? (Y/N)
1			
2			
3			

Step 3: Diagram Your Hole (Geometry)

In the box, draw your design. Include:

- Walls/obstacles (book, erasers)
- Points: START, BOUNCE, TARGET
- Incoming path (start to book) and outgoing path (book to cup) as arrows (rays)
- Label one angle: acute, right, or obtuse

Step 4: Improve the Design (Variables)
Choose ONE variable to change and explain why:

☐ Move the book

☐ Move the start point

☐ Move the target cup

☐ Add/remove one obstacle

I changed: _____

My reason: _____

Quick Reflection (Puttshack Connection)

1) How did your bank shot change the ball's direction?

_____

2) At Puttshack, the Trackaball™ ball and overhead screens give feedback. What feedback would help you improve your design?

_____

Puttshack Clipboard Reference Cards - Print and Cut Out

THE BANKER: Angle & Bounce Quick Card
Puttshack Tech Tip: Trackaball™ (the ball) tracks each hit while in play. Check the game screen at each hole to confirm what happened and adjust.

Reflection Rule: Angle in = Angle out

Angle Types:
- Acute = small (< 90 degrees)
- Right = 90 degrees (L shape)
- Obtuse = wide (> 90 degrees)

Banking Tips:
- Aim at a spot on the wall (not just "the wall").
- Want the bounce to go more right? Aim more left on the wall.
- Want the bounce to go more left? Aim more right on the wall.
- Keep one thing the same when testing (same start spot or same force).

Data Reminders:
Scoring reminder: At Puttshack, you want as many points as possible.
- Measure first-putt distance (inches; halves/quarters if possible).
- Record: wall first? success?
- Check the screen feedback to validate what happened.

THE BANKER: Angle & Bounce Quick Card
Puttshack Tech Tip: Trackaball™ (the ball) tracks each hit while in play. Check the game screen at each hole to confirm what happened and adjust.

Reflection Rule: Angle in = Angle out

Angle Types:
- Acute = small (< 90 degrees)
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Banking Tips:
- Aim at a spot on the wall (not just "the wall").
- Want the bounce to go more right? Aim more left on the wall.
- Want the bounce to go more left? Aim more right on the wall.
- Keep one thing the same when testing (same start spot or same force).

Data Reminders:
- Measure first-putt distance (inches; halves/quarters if possible).
- Record: wall first? success?
- Check the screen feedback to validate what happened.

Puttshack Angles & Trajectories Lab
On-site Lesson: The Banker (Grade 4 Student Lab Guide)

Name: _____

Team: _____

Date: _____

Hole #: _____

Tech Tool: Trackaball™ (the ball) tracks each hit while the ball is in play. Results are displayed on the game screen at each hole to validate our trials and refine our model.

1) Mission + Rule

- Fair testing tip: If you are testing different variables, have Student A complete all trials for Variable A first, then Student B repeat the trials for Variable B.
- Test BANK vs STRAIGHT shots using reflection. Use measurement and data to decide which strategy is more successful.
- Reflection Rule: Angle in = Angle out.

2) Break the Problem into Parts (ISTE 1.5.c)

- Aim point on wall (L/M/R): _____
- Angle type (circle): Acute Right Obtuse
- Force level (circle): Soft Medium Hard

Success goal (check one):

[ ] Toward hole

[ ] Easier next shot

[ ] In hole

3) Measurement Setup (3.MD.B.4)

- Tool used (circle): String Tape

- Measure in inches (try halves/quarters): _____ 1/2 _____ 1/4

4) PART A - BANK SHOT TRIALS (Must hit wall first)

Measure first-putt distance each trial and record. Use the screen feedback to confirm outcomes.

Trial	Aim (L/M/R)	Angle (A/R/O)	Force (S/M/H)	Distance (in.)	Wall first? (Y/N)	Success? (Y/N)	Trackaball™ feedback

Average bank distance: (_____ + _____ + _____) ÷ 3 = _____ inches (approx. ok)

5) PART B - STRAIGHT SHOT TRIALS (No wall)

Trial	Force (S/M/H)	Distance (in.)	Toward hole? (Y/N)	Success? (Y/N)	Trackaball™ feedback

Average straight distance: (_____ + _____ + _____) ÷ 3 = _____ inches (approx. ok)

6) Claim - Evidence - Reasoning (CER)

Claim: The better strategy today was _____.

_____

_____

- Evidence (numbers):

  Bank success _____/3; Straight success _____/3.

- Reasoning (use the rule): It worked because angle in equals angle out.

  When we aimed at _____, the ball bounced

  _____.

7) Geometry Check (4.G.A.1)
Circle what your model used:

- Point (start) Line segment (measured path) Ray (path arrow)
- Acute angle Right angle Obtuse angle
- Perpendicular walls (corner) Parallel edges (if noticed)

One geometry sentence: _____

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8) Model Diagram (Required)
Draw: start point, wall corner, bounce point, incoming ray, outgoing ray. Label angle type and one measurement.

9) Tech Reflection (ISTE)

Surface note: The holes use the same turf. If comparing surfaces, use the flooring around the game area as an alternative surface.

How did Trackaball™/screens help your team improve? (check all that apply)

[ ] Confirmed results

[ ] Helped compare strategies

[ ] Helped spot a pattern

One sentence: _____

_____