Group Activities

- Time Keeper Challenge (Intermediate)
- Nautical Medicine Referral Packet
- Interview with Barkley the Beaver (Eager Beavers)

Time Keeper Challenge (Intermediate)

The Timekeeper Challenge: A 30-Minute Engineering Startup Simulation

Welcome! For the next 30 minutes your team is a **startup company**. Your product is a **mechanical timer** built from plastic cups, string, and tape. Design it, fund it, build it, prove it works, and sell it, all while making more money than the other companies in the room.

This page has everything you need. **Read it before the event** if you can. Teams that arrive with a design sketch and a plan will have a big advantage.

> **Bring:** your worksheet (the one with the QR code that led you here) and a pencil. No electronics may be used to time anything during an official test (see Rules).

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1. The Big Picture

- **The product:** a device that measures **30 seconds (±3 s)** *without electronics*.
- **The customer:** a market that will buy your sensor design if it is accurate, early, and cheap to make.
- **The money:** the government may fund your proposal. You spend money on labor, materials, machining, and official tests. The market buys your sensors if you have a successful demo, with bonuses for being first and most accurate. **The company with the highest final profit wins.**
- **The catch:** the clock is running on your payroll from the moment the simulation starts.

Different strategies can win:

Strategy	Idea
First to market	Get a certified passing device done early and file your report before anyone else.
Lean operator	Build something so cheap and simple that your margin is huge.
Precision specialist	Spend on testing and refinement to be the most accurate.

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2. Timeline

Minute	Event
0	"Go!" Payroll starts. The Store and Machine Shop open. Form your team.
12	**Proposals due** to the Government.
15	**Awards announced.**
27	**Last certified test** may begin.
30	**Final reports due. Hard stop.**

Teams form on their own schedule. There is no deadline, but the payroll is already running (see below).

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3. Forming Your Company

- Teams have **3 to 6 members**.
- Pick a company name and write it on your worksheet.
- Record each member's **class year**. This sets each person's labor rate.
- **No layoffs.** Everyone on the final team is on the payroll.

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4. Labor Costs

Each team member is paid per minute:

Class	Rate
Freshman	$5 / minute
Sophomore	$10 / minute

Class	Rate
Junior	$15 / minute
Senior	$20 / minute
Non-student / faculty / other	You name your own rate (minimum **$5 / minute**)

When does the meter start? At **minute 0**, when the simulation starts. Recruiting, brainstorming, and writing the proposal all count as work. **Every member of your final team is billed from minute 0**, even if they joined later.

When does it stop? The moment you **submit your final report**.

Example: A team of 1 senior, 2 juniors, 1 sophomore, and 1 freshman costs 20 + 15 + 15 + 10 + 5 = **$65 per minute**. If they submit their final report at minute 28, labor is 28 × $65 = **$1,820**.

Upperclassmen are fast and expensive. Underclassmen are cheap. Building a good mix is part of the challenge.

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5. The Store and Machine Shop

The Store is an **unmanned table** that is open from minute 0. It runs on the **honor system**: take what you need, and **record everything you take on your worksheet**. Stock is limited, and when it's gone it's gone.

Item	Price	Stock
Large cup (12 oz party cup)	$40	10
Small cup (5 oz clear plastic)	$20	100
Twine (per length)	$30	**[TBD]** (poor quality and limited, and it may break)
Sharpie	$25	**[TBD]**
Tape (per length)	$40	**[TBD]**
Scissors	$100	**[TBD]**
Fishing line (per length)	$100	**[TBD]** (very limited and expensive)

Free: water (from a sink or drinking fountain), air, gravity, and sand or coins from your own pockets. Also on the table: **one free sticker per team**. It is not a material and does not go on your bill.

> **Only Store items and the free list may be built into your device.** No electronics or outside parts.

Machine Shop

- **$50 per hole**, regardless of hole size.
- Mark the hole location and size on the cup with a Sharpie first.
- **First come, first served.** Waiting in line still costs payroll.
- Record each hole on your worksheet.

You can also cut your own holes if you buy scissors. Is the machine shop worth $50? That's a business decision.

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6. The Government

The Government has a fixed budget for all companies (about **$8,000**). It may fund **zero, one, or several** proposals. If your proposal looks too expensive or unrealistic, **it will not be funded.**

- Your proposal asks for a fixed amount of money.
- If funded, you receive **exactly that amount, counted as income in your final profit**. You keep whatever you don't spend. If you spend more, **the overrun comes out of your profit.**
- If you are not funded (or submit late) you can still compete. You just have no grant income.

The proposal (due at minute 12)

Fill in these two sections on your worksheet and hand it in:

1. **A drawing** of your device, labeled with materials and rough dimensions.
2. **Your requested budget**, built from the cost worksheet (labor + materials + machining + certified tests).

Padding your budget makes you look expensive, and a cheaper competitor may win the money. Underestimating means you eat the overrun. A cheaper, credible plan is more likely to be funded.

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7. Testing

Practice runs (free)

Use the practice timer as often as you want. The app shows a target of **30 seconds** and starts a **hidden clock** when you press the **space bar**. Use your device, and when you think 30 seconds have passed, press the **space bar** again. The app shows how far off you were.

Certified tests ($500 each, paid to the Government)

A certified test is an **official, witnessed run** that goes on the record.

- Each test is **one attempt at 30 seconds**.
- Tests are run at the front of the room by the **Test Operator**, and the app logs every run automatically.
- Tests are **queued** on a whiteboard. If your team is not ready when called, you **forfeit that slot**.
- **No phones, watches, or timing devices** may be used by your team during a certified run.
- **The last certified test may begin at minute 27.** All certified tests must finish by minute 30.
- You can buy as many certified tests as you can afford. You choose which result to claim in your final report.

Passing means the certified time is within **±3 seconds** of 30 seconds.

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8. The Market

The market expects to buy about **500 sensors in total, at $200 each**. It buys only from companies with a **successful demo**, meaning a certified test within **±3 seconds** of 30 seconds.

How the 500 units are split

- Every successful company gets **1 share**.
- The company with the **most accurate** certified result (smallest error) gets **1 bonus share**.
- The company that is **first to market** (earliest final report that includes a certified pass) gets **1 bonus share**.
- **Units per share = 500 ÷ total shares.** Each company sells its shares' worth of units.

Example with 3 successful companies: A is most accurate (2 shares), B is first to market (2 shares), C is neither (1 share). That's 5 shares, so each share is 100 units: **A sells 200, B sells**

200, C sells 100.

If one company wins **both** bonuses, it gets 3 shares. Ties in accuracy go to the earlier final report.

Your payout

Payout = units sold × ($200 − your cost per unit).

- **Cost per unit** is the total of the Store prices of the parts in your finished device. **Tools are not part of the device**(scissors, Sharpies) unless you built them into it.
- **Factory costs are free.** Assembly and drilling cost nothing in mass production, so holes and assembly time do not count toward unit cost.
- Cheaper devices earn more on every unit. A device costing $200 or more per unit earns nothing.

Worked example: A device uses two small cups ($20 each), one length of twine ($30), and one length of tape ($40). Cost per unit = $110, so profit per unit = $90. If this company is company C above (100 units), its payout is **100 × $90 = $9,000**.

If no team passes ±3 seconds

That just means the technology is less mature than the market hoped. Nobody is a "successful company," and the bonuses are not awarded. The market will place a small **pilot order of 100 units** with the closest team **within ±5 seconds**, if there is one. If nobody is within ±5 seconds, there are no sales.

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9. The Final Report (due minute 30)

Your **finish time is the minute you submit the report**. Labor stops then. A team with no report makes no market sales. The report must contain:

1. **Team name** and members with class years.
2. **Certified test result(s)** you are claiming (the Test Operator will confirm against the app log).
3. **Total project cost**: labor, materials, machining, and certified tests.
4. **Bill of materials** for one unit, and the resulting **cost per unit**.
5. **A drawing** of the device as built.
6. **Whether you are claiming a successful demo**, and any bonus (most accurate or first to market).
7. **Your net profit** (see below).

Everything except the certified test log is **self-reported**. Be honest and keep your worksheet neat. The organizers may spot check, and misreporting will disqualify a team.

Scoring: who wins?

The winner is the company with the highest net profit.

> **Net profit = government grant + market sales − labor − materials − machining − certified test fees**

Everyone starts at $0. Negative is possible.

Illustrative example (your numbers will differ):

	Amount
Grant received	+$2,800
Market sales (100 units × $90)	+$9,000
Labor (28 min × $65)	−$1,820
Materials	−$180
Machine shop (1 hole)	−$50
Certified tests (2)	−$1,000
Net profit	**+$8,750**

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10. Rules

- **Teams of 3 to 6.** No layoffs.
- **Only Store items** and the free list go into the device.
- **Honor system.** Record every item you take, every hole you drill, and every certified test you buy.
- **No phones, watches, or timing devices** during certified runs.
- Machine Shop jobs are first come, first served. Mark the hole with a Sharpie first.
- Clean up water spills, and be kind to the volunteers.
- **Certified tests must finish by minute 30. Final reports are due at minute 30.**
- The organizers' decisions are final.
- Have fun.

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11. Who's Who

Role	What they do
Government	Reviews proposals and awards grants. Also responsible for running certified tests
Machine Shop	Drills holes for $50 each.

12. Tips for Getting Ready

- Sketch two or three designs before the event. Which one uses the fewest materials?
- Think about what actually keeps time: dripping water, a swinging weight, a rolling object.
- Consider whether the machine shop is worth $50, and whether scissors are.
- Plan your team mix. Cheap labor is slow, expensive labor is fast, and *everyone is billed every minute.*
- Estimate your budget honestly. Payroll runs from minute 0, so a 30-minute plan for a team of 5 already costs well over $1,500 before any materials.
- Plan your certified tests. They cost $500 each and the last one must start by minute 27.

Nautical Medicine Referral Packet

Form NM-1: Surgical Deferral & Maritime Referral

COASTAL REGIONAL HEALTH SYSTEM · Department of Nautical Medicine · Office of Elective Buoyancy · *Form NM-1, Rev. 10/2026*

SECTION A: PATIENT INFORMATION

Patient Name: _____ DOB: _____ MRN: _____

Referring Surgeon: _____ NPI: _____

SECTION B: REASON FOR DEFERRAL (check all that apply)

- ☐ BMI exceeds surgical threshold
- ☐ Active tobacco use
- ☐ Patient declines weight loss
- ☐ Patient declines smoking cessation
- ☐ Patient asked "but what if I really want it?"
- ☐ Surgeon would rather be sailing

SECTION C: CLINICAL RECLASSIFICATION

Finding	Surgical Classification	Maritime Classification
Adipose tissue	Risk factor	PFD, USCG Type V (body-integrated)
Chronic cough	Pulmonary risk	Sound-producing device, fog conditions
Cigarette, lit	Contraindication	Visual distress signal (daytime)
Tar deposits	COPD indicator	Period-accurate rigging maintenance

SECTION D: PRESCRIPTION

- ☐ Sloop, 2x weekly
- ☐ Catamaran PRN for stability
- ☐ Regatta participation

- ☐ Trans-Atlantic crossing (refractory cases)

Refills: Unlimited, wind permitting

Contraindication: Patient insufficiently buoyant. Return to surgical pathway. **Note:** Surgery is safer than flying but less safe than driving. Sailing was not studied, which we find very encouraging.

Surgeon Signature / Date: _____ Captain Signature / Date: _____

WHITE: Chart · YELLOW: Patient · PINK: Harbormaster

Brochure: So Your Surgeon Said No

Discovering Your Natural Buoyancy

<svg viewBox="0 0 200 140" width="320">

Being told you're "too high-risk for surgery" can feel discouraging. But what the operating room calls *risk factors*, the open ocean calls **assets**.

You Were Built for This

<svg viewBox="0 0 200 120" width="320">Natural Buoyancy™

Every extra pound you've worked so hard to keep now works hard to keep *you* afloat. Doctors call it BMI. Sailors call it **Bonus Marine Insurance**.

Smokers: You're Already Equipped

<svg viewBox="0 0 200 120" width="320">SOS

Most sailors spend hundreds on flares and foghorns. You carry yours in your shirt pocket. Lost at sea? Light up.

Frequently Asked Questions

Will sailing fix my gallbladder? No. But you'll be too busy trimming the jib to notice.

Is this covered by insurance? Ask your provider to code it as a very large walker.

What if I lose weight while sailing? Congratulations, you're now eligible for surgery. Please return to shore.

> "My surgeon turned me down for a tummy tuck. Now I'm the most stable thing at the regatta." — R.B., Annapolis

> "I didn't quit smoking. I just started smoking at sea. The Coast Guard thanked me." — Anonymous

Ask your surgeon if sailing is right for you.

Not reviewed by any medical board, maritime authority, or reasonable person. Side effects may include sunburn, rope burn, and inner peace.

Interview with Barkley the Beaver (Eager Beavers)

A puppet interview for Eager Beavers (age 5). **Barkley** is a brown paper-bag beaver puppet. One leader is the **Interviewer**; the puppeteer voices Barkley. Runs about 8–10 minutes with the kid activities.

Props: paper-bag beaver puppet, a stick or twig, a cup of water (optional), a small blanket or towel (for the lodge).

Part 1: Say Hello

INTERVIEWER: Good morning, Eager Beavers! Today we have a very special guest. He came all the way from his pond just to meet you. Let's call him out. Ready? One… two… three… "Barkley!"

(Kids call "Barkley!" Puppet pops up.)

BARKLEY: Hi, hi, HI! Wow, look at all these Eager Beavers! I'm an eager beaver too! I'm Barkley. Sorry I'm a little crinkly. I'm made of paper bag today. Real beavers are furry!

INTERVIEWER: Barkley, how big is a real beaver?

BARKLEY: A grown-up beaver is about as heavy as YOU! Some of us are as big as a medium-size dog. We're one of the biggest rodents in the whole world. Rodents are animals like mice and squirrels. We're like a giant squirrel that loves to swim!

Part 2: Where Do Beavers Live?

INTERVIEWER: Where do you live, Barkley?

BARKLEY: I live in a pond! But here's the secret: I MADE the pond myself. Well, me and my family.

INTERVIEWER: How do you make a pond?

BARKLEY: We find a little stream. Then we pile up sticks, rocks, and mud right across it. That's called a **dam**. The water gets stuck behind it and gets deeper and deeper. Then, ta-da! A pond!

INTERVIEWER: And do you live in the dam?

BARKLEY: Nope! We build a house in the pond called a **lodge**. It looks like a big pile of sticks with mud on it. And guess where the front door is?

INTERVIEWER: Where?

BARKLEY: UNDER the water! *(whispers)* So bears and coyotes can't get in. We swim in, then climb up to a dry room inside where we sleep.

Activity: *Kids crouch under a blanket "lodge." The Interviewer counts to three, and they "swim" out the secret underwater door.*

Part 3: What Do Beavers Eat?

INTERVIEWER: Barkley, do you eat fish?

BARKLEY: *(gasps)* Fish? No way! Fish are my swimming buddies. I eat **plants**. My favorite food is... **tree bark!**

INTERVIEWER: Bark? Like from a tree?

BARKLEY: Yep! The soft, juicy layer right under the bark is the yummiest part. I like willow trees, aspen trees, and birch trees. In summer I also munch leaves, grass, and water plants.

INTERVIEWER: How do you get bark off a whole tree?

BARKLEY: With my super teeth! Look, they're **orange**! *(puppet shows "teeth")* They have iron in them that makes them extra strong. And my teeth never stop growing, not ever! So I have to chew, chew, chew to keep them from getting too long.

Activity: *Everyone shows their "beaver teeth" and pretends to chew a tree: "Chomp, chomp, chomp... TIMBER!" Kids fall over gently like a tree.*

Part 4: How Does the Tail Work?

INTERVIEWER: Barkley, everyone wants to know about your tail!

BARKLEY: Oh, my tail is AMAZING. It's big and flat like a paddle, and it feels kind of bumpy and scaly, not furry. My tail has lots of jobs:

1. **Steering.** When I swim, my tail helps me turn, like the rudder on a boat. My big webbed back feet do the kicking.
2. **Sitting.** When I chew a tree, I lean back on my tail like a little chair so I don't tip over.
3. **Warning.** If I see danger, I slap my tail on the water: **SPLASH!** That tells my family, "Hide! Dive, dive, dive!"
4. **Saving snacks.** My tail stores extra fat, so I have energy when food is hard to find.

Activity: *Practice the warning slap: everyone slaps their knees as loud as they can when Barkley shouts "Danger!" Then Barkley says "All clear!" and everyone stops.*

Part 5: Swimming Superpowers

INTERVIEWER: Are you a good swimmer?

BARKLEY: The best! I can hold my breath for about **15 minutes**. That's longer than this whole interview! When I go underwater, my ears and nose close up tight. And I have see-through eyelids that work like swimming goggles!

INTERVIEWER: Don't you get cold and wet?

BARKLEY: Nope! My fur is so thick and oily that the water can't get to my skin. I comb it every day with a special split claw on my back foot. It's my built-in comb!

Part 6: What Do Beavers Do in Winter?

INTERVIEWER: Barkley, in winter the pond freezes. What do you do? Do you sleep all winter like a bear?

BARKLEY: Nope! Beavers don't hibernate. We stay awake all winter. But we get ready in the fall, which is right NOW!

INTERVIEWER: How do you get ready?

BARKLEY: First, we put extra mud on our lodge. When it freezes, it gets hard as a rock, so no one can break in. Then we cut lots and lots of branches and stick them in the mud at the bottom of the pond, right next to our door. That's our **underwater pantry**!

INTERVIEWER: Then what happens when the ice comes?

BARKLEY: The ice is like a roof on top of the pond. When I'm hungry, I swim out my underwater door, grab a branch from the pantry, and bring it back inside to eat. Then my whole family

snuggles together in the lodge to stay warm. It's cozy in there!

Part 7: Beaver Families

INTERVIEWER: Who lives in your lodge with you?

BARKLEY: My whole family! A mom beaver, a dad beaver, and the kids. Baby beavers are called **kits**. They're born in the spring, and they can swim right away! The big brothers and sisters help take care of the babies and help fix the dam.

INTERVIEWER: That's like an Adventurer Club! Everyone helping out.

BARKLEY: Exactly! Beavers are the hardest workers in the forest. That's why people call busy helpers "eager beavers." Like YOU!

Part 8: Kids' Turn

INTERVIEWER: Now our Eager Beavers get to ask Barkley a question!

(Let each kid ask one question. Some easy answers for the puppeteer:)

- **Do beavers bite people?** Only if they're scared. Never try to touch a wild beaver. Just watch from far away.
- **Do beavers sleep at night?** No! Beavers mostly work at night and sleep during the day.
- **How do beavers cut down big trees?** One little bite at a time, all the way around, until it falls.
- **Can a beaver live on land?** We walk on land to find trees, but we feel safest in the water.
- **How long do beavers live?** About 10 years in the wild.

Part 9: Quick Beaver Quiz

BARKLEY: Before I go, let's see if you were listening! Shout out the answer:

1. What do beavers build across a stream? *(A dam!)*
2. What is a beaver house called? *(A lodge!)*
3. Where is the lodge door? *(Underwater!)*
4. What color are beaver teeth? *(Orange!)*
5. What does a beaver do with its tail when there's danger? *(SLAP the water!)*

6. Where do beavers keep their winter food? *(At the bottom of the pond!)*

BARKLEY: Wow, you're beaver experts! Okay, I hear my family slapping their tails. I have to go fix the dam. Bye, Eager Beavers!

(Everyone slaps knees goodbye. Barkley dives away.)

Bonus: Leader Notes

- **Memory verse idea:** "*Go to the ant, thou sluggard; consider her ways, and be wise.*" (Proverbs 6:6). Talk about how God made beavers to be hard workers who build and plan ahead.
- **Talk about it:** God gave beavers everything they need: teeth for chewing, a tail for swimming, and warm fur for winter. What did God give *you*?
- **Craft follow-up:** Build a mini dam and lodge from twigs and play dough in a baking pan, then add water.