

GRADE 6 TEACHER GUIDE · RATIOS AND RATES

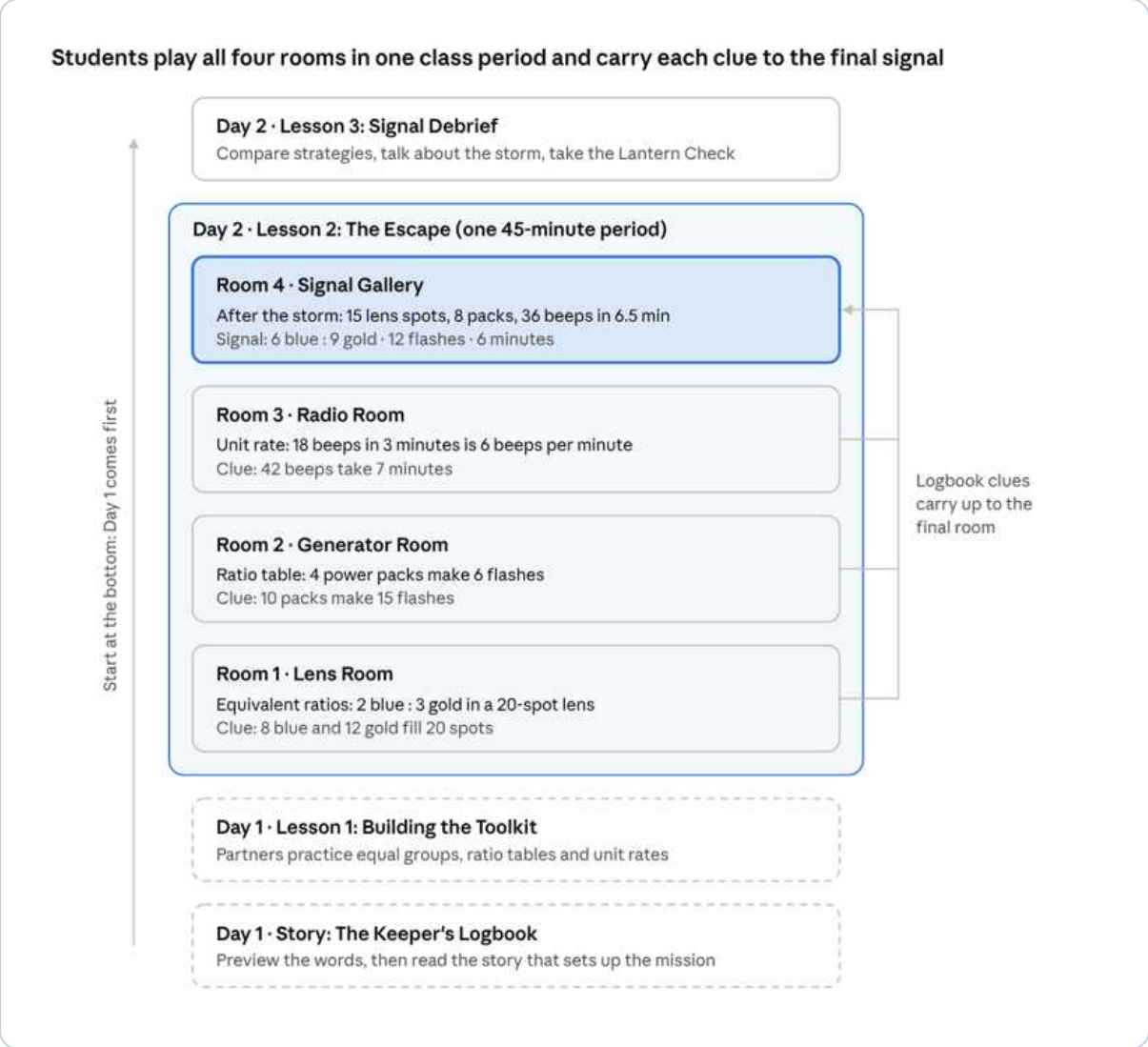
# Light the Beacon

## Ratios and Rates to the Rescue

A Grade 6 teacher guide for Light the Beacon, a virtual escape room. Over two days, students use ratios, ratio tables and unit rates to fix a storm-damaged lighthouse and guide a rescue ship to safety.

2 days · 4 lessons | 6.RP.A.1 – 6.RP.A.3b | Story · Toolkit · Escape · Debrief

# Mission Map




On Day 1, the story and Lesson 1 get students ready. On Day 2, they climb all four rooms in one class period, carrying each clue up to the final signal, and then debrief.

# Unit Introduction

| | |
|---|---|
| **Designed for** | Grade 6 math (adapt for Grade 5 enrichment or Grade 7 review) |
| **Math content** | Ratios, equivalent ratios, ratio tables, tape diagrams, double number lines, unit rates |
| **Standards** | CCSS 6.RP.A.1, 6.RP.A.2, 6.RP.A.3a, 6.RP.A.3b |
| **Mathematical practices** | MP1 Persevere in solving problems, MP3 Explain your reasoning, MP4 Model with mathematics |
| **Format** | An illustrated story in the slide deck, unplugged partner practice, a self-paced browser escape room played in pairs, and a whole-class debrief |
| **Total time** | 2 days: Day 1 is the Story and Lesson 1 (about 75 minutes, unplugged); Day 2 is Lesson 2, the full escape room, and Lesson 3, the debrief (about 90 minutes). On 45-minute periods, plan four periods. |

# Where This Fits

Light the Beacon works best **early in a Grade 6 ratio unit**: after students have met ratio language and ratio tables, and before percents. In most Grade 6 pacing calendars, that falls in the fall. It gives students two days of practice with skills they're already learning. It doesn't replace the unit.

| Curriculum | Where to place it | Why there |
|---|---|---|
| Illustrative Mathematics, Grade 6 | End of Unit 2, *Introducing Ratios* (after the tables and diagrams lessons), or early in Unit 3, *Unit Rates and Percentages*, before percentages | Students already use double number lines and ratio tables. Lesson 1 previews the unit rates that Unit 3 develops. |
| Eureka Math, Grade 6 | Module 1, *Ratios and Unit Rates*: after Topic C (Unit Rates), before Topic D (Percent) | Module 1 opens the year, so this falls in the first months of school, while unit rates are still new. |
| Any other curriculum | Once students can describe a ratio and fill in a ratio table | The game assumes those two skills and builds unit rate on top of them. |

**What it practices:** ratio language, equivalent ratios, ratio tables, tape diagrams, double number lines and unit rates (6.RP.A.1, 6.RP.A.2, 6.RP.A.3a, 6.RP.A.3b).

**What it doesn't cover:** percents (6.RP.A.3c), unit conversions (6.RP.A.3d) and unit pricing. Plan those elsewhere in the unit.

**Other good uses:** a review before a ratio unit test, lessons a substitute could run once students know the routines, or a spiral review later in the year.

# The Two-Day Plan

Day 1 introduces the story and practices the skills. Day 2 is the escape room and the debrief.

| | Lesson | What happens | Minutes |
|---|---|---|---|
| **Day 1** | Story: *The Keeper's Logbook* | Preview the words to listen for, then read the story together. It introduces the vocabulary and sets up the mission. | 30 |
| | Lesson 1: Building the Toolkit | Partners practice the three tools the escape room uses, then learn their jobs and get their logbooks. | 45 |
| **Day 2** | Lesson 2: The Escape | Pairs play all four rooms in one class period. | 45 |
| | Lesson 3: Signal Debrief | Compare strategies, connect the models, talk about the storm, and take the Lantern Check. | 45 |

**Block schedule (about 80–90 minutes):** teach each day as written.

**45-minute periods:** run the unit over four periods: Story, Lesson 1, Lesson 2, Lesson 3. Keep the Story and Lesson 1 on back-to-back days, and Lessons 2 and 3 on back-to-back days, so the story and the escape room stay fresh. Lesson 2 must be one full period, because the game doesn't save progress.

> **Teacher Tip:** On Day 2, don't let the escape room spill into debrief time. If some pairs aren't finished when the time is up, start the debrief anyway; those pairs finish during the first 10 minutes of Lesson 3 while others start the strategy tally.

## About This Unit

A storm has knocked out a lighthouse just as a rescue ship heads for the reef. Students climb the tower room by room. Each room holds one ratio puzzle, and each solved puzzle repairs one part of the light.

- **Lens Room:** build a 20-spot lens with 2 blue lights for every 3 gold lights.
- **Generator Room:** extend a ratio table where 4 power packs make 6 flashes.
- **Radio Room:** find a unit rate (18 beeps in 3 minutes) and use it to time a 42-beep message.
- **Signal Gallery:** lightning changes every amount. Students reuse each pattern to set the final signal and explain why it works.

Every room gives a clue for the student logbook. The final room only works if students carry those clues forward, so the math builds on itself.

The unit opens with a short illustrated story, *The Keeper's Logbook*, told in the slide deck. Sixth grader Mira learns how her grandfather's lighthouse runs on ratios just before a storm knocks out the light. The story introduces the vocabulary and ends by making students Mira's crew.

## How the Game Supports Students

- **Practice first:** each room has an optional three-part practice (tap the pencil icon).

- **Free hints:** the lightbulb gives three hints that move from a guiding question to a concrete next step. Hints never cost points.
- **Strategy share:** after each room, students pick the strategy that matches their thinking. Their choices give you a ready-made discussion for Lesson 3.
- **No timer pressure:** the ship moves as students solve rooms, not by the clock.

## Background for Teachers

A **ratio** compares two amounts, such as 2 blue lights for every 3 gold lights (2 : 3). **Equivalent ratios** keep the same "for every" relationship: 4 : 6 and 8 : 12 match 2 : 3 because both numbers are multiplied by the same number. A **rate** compares two different kinds of quantities, such as beeps and minutes. A **unit rate** gives the amount for 1 of something: 6 beeps per minute.

Students meet three visual models in the game. Tape diagrams show equal groups. Ratio tables show columns that scale together. Double number lines show two quantities growing side by side. Encourage students to choose the model that makes sense to them, then compare models during reflection.

> **Teacher Tip:** Plan for students to play the whole escape room in one class period. The final room needs clues from the first three, and the game doesn't save progress if the tab closes. That's why the story sets up the mission on Day 1: it leaves Lesson 2 free for play.

## Adapting for Grades 5 and 7

| Grade | What to change |
|---|---|
| Grade 5 (enrichment) | Pre-teach the story terms the day before, and read the story over two short sessions. In Lesson 1, do Tools 1 and 3 and skip the ×1.5 muffin problem. Pair students with a strong reader as Navigator. Keep Paper Rooms **2-2** on hand in case a pair gets stuck. |
| Grade 7 (review) | Read the story quickly as a hook. In Lesson 1, add a fourth tool that asks students to write each relationship as an equation (flashes = 1.5 × packs). In the debrief, connect each room to proportional relationships (7.RP.A.2) and require a storm twist in Design a Room. |

# Unit Summary Chart

| Day | Lesson | Time | Students will… | Assessment |
|---|---|---|---|---|
| **Day 1** | **Story: The Keeper's Logbook** | Prep 5 min · Lesson 30 min | preview the words to listen for; read the story; predict the tools the crew will need | Word Bank S-1; answers to the scene questions |
| | **Lesson 1: Building the Toolkit** | Prep 10 min · Lesson 45 min | practice equal groups, ratio tables (including ×1.5) and unit rates with a partner; learn their jobs for Day 2 | Toolkit Practice 1-1; observation |
| **Day 2** | **Lesson 2: The Escape** | Prep 10 min · Lesson 45 min, all in one class period | play all four rooms; record each clue in their own logbook | Beacon Logbook 2-1; Escape Day Card notes |
| | **Lesson 3: Signal Debrief** | Prep 10 min · Lesson 45 min | compare strategies; connect the models; name the storm's big idea; take the Lantern Check | Debrief Reflection 3-1; Lantern Check 3-3; Lesson Rubric |

## Summarized Objectives

Students will be able to

1. use ratio language to describe a relationship between two quantities, in order, part-to-part or part-to-whole. (Story, Lesson 1) — 6.RP.A.1
2. find equivalent ratios using tape diagrams and ratio tables, including non-whole-number factors. (Lessons 1, 2) — 6.RP.A.3a
3. find a unit rate and use it to solve a problem. (Lessons 1, 2) — 6.RP.A.2, 6.RP.A.3b
4. apply ratio and rate reasoning when quantities change, and explain why a solution meets every constraint. (Lessons 2, 3) — 6.RP.A.3, MP3
5. compare strategies and connect tape diagrams, ratio tables and double number lines. (Lesson 3) — 6.RP.A.3a, MP3

# Unit Assessment

## Lantern Check

Students take the two-question Lantern Check 3-3 near the end of the debrief, on their own. Both questions ask them to scale by 1.5, a step they practice in Lesson 1. After each question, students circle how sure they feel: **Guessing**, **Kind of sure** or **Sure**.

| Question | Answer |
|---|---|
| **Q1 · Ratio table** (6.RP.A.3a): The lamp burns 6 L of oil every 8 hours. How much does it burn in 12 hours? | **9 L** (12 hours is 1.5 × 8 hours, so 6 L × 1.5) |

| Question | Answer |
|---|---|
| **Q2 · Unit rate** (6.RP.A.3b): Lantern A runs 18 hours on 3 L. Lantern B runs 20 hours on 5 L. Which gets more hours per liter? | **Lantern A** (6 hours per liter vs. 4) |

## Reading the Results

Look at each student's answers and confidence together.

| What you see | What it may mean | What to do next |
|---|---|---|
| Both correct, and sure | Ready to move on | Offer the storm-twist challenge in Design a Room |
| Correct, but guessing or unsure | Skill without confidence yet | Have the student explain one answer to a partner and check it together |
| Q1 answer of 10 L | Adds instead of multiplies (6 + 4 = 10) | Revisit the Lesson 1 muffin problem: "Did both amounts change by the same factor?" |
| Q2 wrong | Compares totals, not "per 1" | Revisit Tool 3 from Lesson 1: find the amount for 1 first |

## Lesson Rubric

Use the four-level rubric near the end of this guide for observation during Lessons 1–3. Your notes from strategy shares and partner talk are your best evidence of student thinking.

# Unit Materials List (for 30 students)

| Item | Quantity | Used in |
|---|---|---|
| Projector with the class slide deck (includes the story) | 1 | All lessons |
| Laptop, Chromebook or tablet with a web browser (game bookmarked) | 1 per pair (15), plus 2 spares | Lesson 2 |
| Two-color counters, or blue and yellow cubes/tiles (optional) | 20 per pair (300) | Lesson 1 |
| Chart paper and markers | 1 pad | All lessons |
| **Student copies:** see the Student Handouts table | | All lessons |

**Teacher Tip:** Test the game on your school devices before Day 2. Make sure the page loads through your content filter and fits the screen without scrolling sideways.

# Unit Vocabulary

Every word below comes up twice: first in the story, then in the escape room. Right before reading, show students the "Words to Listen For" slide so they know to listen for them. Lesson 1 practices the math terms, and the Word Bank S-1 gives students a place to write their own examples. A word wall with a picture from the story helps too.

## Math terms

| Term | What it means | In the story | In the escape room | Teaching note |
|---|---|---|---|---|
| **Ratio** | A comparison of two amounts, such as 2 blue for every 3 gold. Written 2 : 3 and read "2 to 3." | Pop describes the lens pattern: 2 blue for every 3 gold. | Lens Room | Encourage "for every" language before the colon notation. |
| **Order matters** | In a ratio, the numbers follow the order of the words. 2 : 3 (blue to gold) is not 3 : 2. | Mira asks what happens if the pattern is mixed up. | Lens Room (the game flags switched colors) | A quick check: "Which number goes with which word?" |
| **Part-to-part** | A ratio that compares two parts of a group: 2 blue to 3 gold. | Pop names it while Mira counts the panels. | Lens Room | Most ratios in the game are part-to-part. |
| **Part-to-whole** | A comparison of one part to the whole group: 2 out of 5 panels are blue. | Mira says "2 out of every 5 panels are blue." | Lens Room strategy: "2 of every 5 spots are blue" | Students often mix this up with part-to-part. Ask: "Compared to what?" |
| **Equivalent ratios** | Ratios that describe the same relationship, made by multiplying both amounts by the same number: 2 : 3, 4 : 6, 6 : 9. | Mira: "Same pattern, bigger numbers." | Lens and Generator Rooms | Pop's rule: multiply, never just add. |
| **Ratio table** | A table of equivalent ratios. Every column keeps the same "for every." | The tables in Pop's logbook. | Generator Room | Students can multiply a column or add two columns they know. |
| **Tape diagram** | A strip divided into equal parts that shows how two amounts relate. | The "long strips divided into boxes" in the logbook. | Practice in the Lens and Generator Rooms | Point out the strips when you read the logbook scene. |
| **Rate** | A ratio that compares two different kinds of quantities, such as beeps and minutes. | Pop: "Beeps per minute. That's a rate." | Radio Room | Units are part of a rate: beeps *per* minute. |

| Term | What it means | In the story | In the escape room | Teaching note |
|---|---|---|---|---|
| **Unit rate** | The amount for 1 of something, such as 6 beeps per minute. | Pop: "the beeps in just one minute." | Radio Room | "Per" means "for every 1." Divide to find it. |
| **Double number line** | Two number lines lined up so that matching marks show equivalent ratios. | Pop sketches one for the radio. | Radio Room practice | Good for students who think visually about time. |

## Story terms

| Term | What it means | In the story | In the escape room |
|---|---|---|---|
| **Beacon** | A strong light used as a signal or warning. | "A beacon is a promise." | The goal: light the beacon |
| **Reef** | A ridge of rock just below the water's surface that can wreck ships. | Waves break over the reef below Gull Point. | The rescue ship heads for it |
| **Lens** | The glass part of a lighthouse that focuses and colors the light. | The "glass beehive" of blue and gold panels. | Lens Room |
| **Generator** | A machine that makes electricity. Here, power packs make flashes. | The green iron generator in the basement. | Generator Room |
| **Logbook** | A record a keeper or crew keeps of what happened and what they found. | Pop's leather logbook full of ratio tables. | Students record a clue from each room |

DAY 1 · STORY

# The Keeper's Logbook



| | |
|---|---|
| **Guiding question** | What tools does a lighthouse keeper use, and why do they all depend on ratios? |
| **Time** | Preparation 5 min · Lesson 30 min |
| **Vocabulary** | beacon, reef, lens, logbook, generator, ratio, order matters, part-to-part, part-to-whole, equivalent ratios, ratio table, tape diagram, rate, unit rate, double number line |
| **Standard focus** | 6.RP.A.1 (ratio language), with a preview of 6.RP.A.2 and 6.RP.A.3 |
| **Grouping** | Whole class, with partner talk |

**Students will** preview the words to listen for, then read a short illustrated story in the slide deck that introduces the vocabulary and sets up the escape room.

**Students learn that** a ratio describes a pattern, that order matters, that part-to-part and part-to-whole comparisons answer different questions, and that a lighthouse depends on ratios and rates to work.

## Overview

In *The Keeper's Logbook*, sixth grader Mira visits her grandfather Pop, the keeper of Gull Point Light. As he shows her the lens, his logbook, the generator and the radio, each idea in the unit comes up as part of the story. Then a storm knocks out the light while Pop is stuck at the harbor, and a rescue boat heads for the reef. The story ends with Mira needing a crew: "That's where you come in."

The story introduces the ideas but never uses the game's numbers, so the puzzles stay fresh for Day 2.

## English Learner Strategies

- Preview the story terms (beacon, reef, lens, generator, logbook) with the pictures before reading.
- Read each scene aloud; let students reread a scene with a partner before answering.
- Sentence frames: "There are ___ for every ___." · "___ out of ___ are ___."

## Materials and Preparation

- Story slides (Day 1 section of the deck)

- Per student: Word Bank S-1
- Chart paper titled "Tools Mira's Crew Will Need"
- Decide how you'll read: you read aloud, students take turns, or partners read the slides on their own devices

## Introduction 8 min

1. Show the "Words to Listen For" slide. Say: *These words come up in today's story, and you'll use them again in tomorrow's escape room. Listen for them.* Read the list aloud together.
2. Before reading, ask:
   - **What is a lighthouse for?** *It warns ships about rocks and guides them to shore.*
   - **How could a ship tell one lighthouse from another at night?** *Different colors, flash patterns or timing.*

## Reading the Story 15 min

Each scene is one slide with a question at the bottom. Pause after each scene for 30 seconds of partner talk, then take one or two answers.

| Scene | What happens | Words introduced | Ask | Expected answer |
|---|---|---|---|---|
| 1 · Gull Point | Mira arrives; Pop explains the beacon. | beacon, reef | Why would a ship need to trust the beacon? | It warns ships away from the reef, especially at night or in a storm. |
| 2 · The Lantern Room | Pop shows the lens: 2 blue for every 3 gold. | lens, ratio, order matters | What would 3 blue for every 2 gold look like? | Mostly blue: a different lighthouse signal. |
| 3 · Parts and the Whole | Pop sets out sea glass like one group of lens panels; Mira sees that 2 out of every 5 are blue. | part-to-part, part-to-whole | How is "2 blue to 3 gold" different from "2 out of 5 are blue"? | One compares blue to gold; the other compares blue to all the panels. |
| 4 · The Keeper's Logbook | Pop shows ratio tables and strips of boxes. | logbook, ratio table, equivalent ratios, tape diagram | Why does Pop say to multiply and never just add? | Multiplying keeps the pattern; adding changes it (2 : 3 becomes 3 : 4). |
| 5 · The Generator Room | Power packs make flashes in a steady ratio. | generator | How could a ratio table help find flashes for any number of packs? | Fill in new columns by multiplying or by adding columns you know. |
| 6 · The Radio Room | Pop explains beeps per minute and sketches a double number line. | rate, unit rate, double number line | Why is the unit rate so useful? | Once you know the amount for 1, you can find any amount. |

| Scene | What happens | Words introduced | Ask | Expected answer |
|---|---|---|---|---|
| 7 · The Storm | Lightning knocks out the light; the rescue boat can't see the reef. | (review) | What three things are broken? | The lens, the generator and the radio. |
| 8 · Mira's Crew | Mira realizes everything runs on ratios and she needs a crew. | (review) | What tools from Pop's logbook will the crew need? | Ratio tables, equal groups, unit rates, double number lines. |

**Teacher Tip:** Don't solve any puzzles during the story. If a student asks how many blue panels a big lens needs, say: *Great question. Hold it for tomorrow.*

## After Reading 7 min

1. Record students' answers to scene 8 on the "Tools Mira's Crew Will Need" chart. You'll return to it in the debrief.
2. Students start the Word Bank S-1: for three terms, they write the meaning in their own words and an example from the story.
3. Say: *Tomorrow, you are Mira's crew. Next, we practice with the tools from Pop's logbook.*

**Extra support:** Pre-teach the five story terms with pictures the day before. **Extra challenge:** Ask students to write the logbook entry Pop might have made about the lens, using two ways to describe the pattern.

DAY 1 · LESSON 1

# Building the Toolkit



| | |
|---|---|
| **Guiding question** | What tools can help us find a missing amount when a ratio or rate stays the same? |
| **Time** | Preparation 10 min · Lesson 45 min |
| **Vocabulary** | equivalent ratios, ratio table, tape diagram, double number line, rate, unit rate |
| **Standard focus** | 6.RP.A.2, 6.RP.A.3a, 6.RP.A.3b |
| **Grouping** | Partners at their desks: the same pairs who will play the escape room together on Day 2 |

**Students will** practice the three tools from Pop's logbook that the escape room uses (equal groups, ratio tables and unit rates), then learn their jobs for Day 2.

**Students learn that** keeping a ratio means multiplying both amounts by the same number, never adding. That number can be a non-whole number like 1.5, or students can "go through 1" first. Once you know a unit rate, you can find any other amount.

## Overview

In the story, students saw Pop's tools. Now they use them. Partners sit together at their desks and work through the three tools on the Toolkit Practice sheet 1-1, one tool at a time. After each tool, you bring the class back together for a two-minute check-in, so everyone talks about the same problem at the same time.

Each tool prepares students for one room of the escape room. The problems use new situations (flags, lemonade, muffins, a water pump) so the game's own puzzles stay fresh. Tool 2 includes a ×1.5 problem because both Lantern Check questions need that step, and the game mostly multiplies by whole numbers.

| Tool | Prepares students for | Problems | Answers |
|---|---|---|---|
| 1 · Equal groups | Lens Room | A flag has 3 red stripes for every 2 white. A big flag has 15 stripes. How many are red? Show it with a tape diagram. | 3 groups of 5: **9 red, 6 white** |

| Tool | Prepares students for | Problems | Answers |
|---|---|---|---|
| 2 · Ratio tables | Generator Room | Lemonade: 3 scoops for every 4 cups of water. Scoops 3, 6, ? → cups 4, 8, 20. Muffins: 4 eggs make 6 muffins. How many eggs for 9 muffins? | **15 scoops**; **6 eggs** (9 is 1.5 × 6, or 2 eggs for every 3 muffins) |
| 3 · Unit rates | Radio Room | A pump moves 28 L in 4 minutes. What is the unit rate? How long to move 63 L? Which runner is faster: 20 laps in 5 minutes or 18 laps in 3 minutes? | **7 L per minute**; **9 minutes**; **18 laps in 3 minutes** (6 vs. 4 laps per minute) |

## Student Learning: Look for These Misconceptions

- **Adding instead of multiplying:** "6 muffins → 9 muffins is +3, so 4 + 3 = 7 eggs." This is the mistake Pop warned about in the story, and the one the Lantern Check looks for.
- **Getting stuck on ×1.5:** students can go through a smaller column first: 6 muffins → 3 muffins (2 eggs) → 9 muffins (6 eggs).
- **Mixing up part-to-part and part-to-whole** on the flag: "3 out of 5 stripes are red" is true, but the question asks how many red stripes are in 15.
- **Dividing the wrong way:** 4 ÷ 28 for the pump. Ask: *Are we looking for liters per minute, or minutes per liter?*

## English Learner Strategies

- Explain that "per" means "for every 1."
- Pair the ratio table with a gesture: point down a column and say "for every."
- Sentence frames: "I multiplied both by ___." · "The unit rate is ___ per ___."

## Materials and Preparation

- Per student: Toolkit Practice 1-1
- Per pair: 20 two-color counters (optional, for Tool 1)
- Per student: Beacon Logbook 2-1, handed out at the end of the lesson
- Test the game on a school device. If devices are on a shared cart, bookmark the game so pairs can open it quickly on Day 2.

## Warm-Up: Back to the Lantern Room 5 min

1. Show the lens scene from the story. Ask partners to describe the lens pattern three ways: blue to gold, gold to blue, and blue to all. *2 : 3, 3 : 2, and 2 out of 5.*
2. Ask: **Pop said to multiply, never just add. What would happen to the lens pattern if we added 1 to each number?** *It would become 3 : 4, which is a different pattern.*
3. Post the Guiding Question.

## Activity: Three Tools 25 min

Partners work on one tool at a time, about 6 minutes each, then pause for a quick class check-in.

1. **Tool 1: Equal groups (6 min + 2 min check-in).** Partners color the tape diagram for the big flag. Check-in: **How many groups of 5 fit in 15 stripes?** *3, so 9 red and 6 white.*
2. **Tool 2: Ratio tables (6 min + 2 min check-in).** At the check-in, focus on the muffins. Ask: **Someone said 7 eggs. Why is that tempting? Why doesn't it work?** *It adds 3. But 6 → 9 muffins is ×1.5, so 4 → 6 eggs.*
3. **Tool 3: Unit rates (6 min + 2 min check-in).** Draw a double number line on the board: minutes 0–4 on top, liters 0–28 below. Ask: **Where do you see 7 liters per minute?** Connect it to the line Pop sketched in the radio scene.

**Teacher Tip:** If you'd rather get students moving, set up the three tools as stations around the room. Split the pairs into three groups, give each group a starting station, and rotate every 8 minutes. Hold the muffin discussion until everyone has finished Tool 2.

## Getting Ready for the Climb 8 min

1. Explain the two jobs. The **Driver** taps and the **Navigator** reads aloud. Both partners write every clue in their own logbook, and they switch jobs after each room.
2. Show the game's three helpers: the **pencil** opens a practice, the **lightbulb** gives a free hint, and the **logbook** keeps the clues.
3. Hand out the Beacon Logbook 2-1. Students write their own name and their partner's.

## Reflection 7 min

- **Which tool from Pop's logbook felt most useful? Which felt hardest?** Add answers to the "Tools Mira's Crew Will Need" chart.
- **Why does adding the same amount to both rows break a ratio?** *The "for every" changes. 4 eggs for 6 muffins is not the same as 7 eggs for 9 muffins.*
- Say: *Tomorrow, the lighthouse goes dark, and you'll have one class period to light it again.*

**Extra support:** Work through Tool 1 together as a class before partners start, and give the 3-muffin column (2 eggs) as a starting point for Tool 2. **Extra challenge:** *How many eggs for 15 muffins? 10.*

DAY 2 · LESSON 2

# The Escape



| | |
|---|---|
| **Guiding question** | Can we use ratios and rates to light the beacon before the ship reaches the reef? |
| **Time** | Preparation 10 min · Lesson 45 min, **in one class period** (the story set up the mission on Day 1, so this is almost all play time) |
| **Vocabulary** | all unit terms |
| **Game rooms** | All four: Lens Room, Generator Room, Radio Room, Signal Gallery |
| **Grouping** | Pairs, one device per pair; Driver and Navigator switch at each room |

**Students will** play Light the Beacon from start to finish, record each room's clue in their own logbook, and use all three clues to set the final signal.

**Students learn that** the ratios and rates they find stay true even when the amounts change, so each room's answer becomes a tool for the next.

## Overview

The escape room is one continuous mission: the last room depends on the first three, and the game does not save progress if the tab closes. Students heard the story and learned their roles on Day 1, so this lesson is almost all play time. Carry the **Escape Day Card** (in the handouts PDF) while you circulate. It puts each room's answer, the common mistakes and questions to ask on one page.

## Pacing for a 45-Minute Period

| Segment | Minutes | What happens |
|---|---|---|
| Settle and open the game | 3 | Pairs sit, open the bookmarked game, logbooks out |
| Lens Room | 10 | Equivalent ratios |
| Generator Room | 8 | Ratio tables |
| Radio Room | 8 | Unit rates |

| Segment | Minutes | What happens |
|---|---|---|
| Signal Gallery | 12 | New amounts after the storm; explain the signal |
| Huddle | 4 | Celebrate; collect logbooks |

With a longer period, add a 5-minute recap of the story at the start and give the Signal Gallery more time. Pairs move at their own pace; use the times to spot pairs who are stuck, not to rush anyone.

## Room-by-Room Facilitation Guide

| Room | The puzzle | Answer | Watch for | Ask |
|---|---|---|---|---|
| **1 · Lens** | Fill a 20-spot lens (4 gold panels stuck) with 2 blue : 3 gold | 8 blue, 12 gold | 12 more gold (ignores stuck panels); colors switched; 10 and 10 | How many groups of 5 fit in 20? Where do the stuck panels fit? |
| **2 · Generator** | Packs 4, 8, 10 → flashes 6, 12, ? | 15 flashes | 14 (adds 2 to both rows); 12 (copies a column) | What could 2 packs make? How can columns you know make 10? |
| **3 · Radio** | 18 beeps in 3 minutes; how long for 42 beeps? | 6 per minute; 7 minutes | 3 ÷ 18; 8 minutes (48 beeps) | How many beeps each minute? How many groups of 6 make 42? |
| **4 · Signal Gallery** | 15 lens spots, 8 packs left, 36-beep message, ship in 6.5 minutes | 6 blue : 9 gold; 12 flashes; 6 minutes | Old amounts (8 : 12, 15 flashes); skipping the deadline check | What stayed the same? What changed? Is 6 minutes soon enough? |

**Logbook clues:** Lens: *8 blue and 12 gold filled 20 spots.* Generator: *10 packs make 15 flashes.* Radio: *6 beeps a minute; 42 beeps take 7 minutes.*

## Student Learning: Look for These Misconceptions

- **Adding instead of multiplying** shows up in every room. The game's feedback catches most of these. Follow up by asking, "Did both amounts change by the same factor?"
- **Reusing old amounts** in the Signal Gallery. Send students to their logbook: the pattern carries over, the numbers don't.
- **Speed over sense-making.** Before the Driver opens the next door, ask the Navigator to explain the last answer.

## Supporting All Learners

- **Reading load:** the game has a lot of text. Navigators read aloud to Drivers. Before class, test whether your devices' built-in read-aloud tool works on the game page.
- **Paper access:** a student who can't use the game (because of a device, vision or attention need) can solve the same four puzzles on Paper Rooms 2-2 with an adult or partner, recording clues in the logbook.

- **IEP and 504 plans:** if a student needs a break, split the session after Room 2. Keep the tab open during the break.
- **English learners:** keep the Lesson 1 toolkit poster and sentence frames on display. Read the "New orders" card in the Signal Gallery aloud for the class.

## Absent on Escape Day?

- **Best option:** the student plays solo during an intervention block, study hall or at lunch, using a logbook. Plan about 40 minutes.
- **At home:** if your school allows it, send the game link. The student brings back a completed logbook.
- **No device time available:** the student completes Paper Rooms 2-2, then joins Lesson 3 with a logbook like everyone else.

## Materials and Preparation

- One device per pair with the game bookmarked, plus 2 spares
- Beacon Logbook 2-1 (one per student, from Lesson 1); a few copies of Paper Rooms 2-2
- Escape Day Card for you; toolkit poster on the wall

> **Teacher Tip:** The game has no teacher dashboard, so you can't see each pair's progress. The logbook is your only record of who finished each room. Glance at logbooks as you circulate and collect them at the end.

## Introduction 3 min

1. Say: *Remember Mira? The lighthouse is dark, the ship is 3 miles out, and you are her crew. Open the game and start climbing.* Remind students: *Hints are free. Strong problem solvers use them.*

## Activity: Play the Escape Room 38 min

1. Pairs play from the title screen to the rescue. Encourage pairs who feel unsure to open each room's practice first.
2. Circulate with the Escape Day Card. Before a pair opens each door, ask the Navigator: **How do you know your answer works?**
3. After each room, both partners record the clue and tick the strategy they chose in the game.
4. In the Signal Gallery, pairs fill in "What stayed the same? What changed?" before touching a dial.
5. **Early finishers** start planning Design a Room 3-2. **Pairs who fall behind:** point them to hints and check in. If time runs out, they finish in the first 10 minutes of Lesson 3; the logbook gets them back quickly.

## Huddle 4 min

- Celebrate the rescue. Ask: **Which clue helped most in the gallery?**
- Collect logbooks for Lesson 3.

DAY 2 · LESSON 3

# Signal Debrief



| | |
|---|---|
| **Guiding question** | Why did the patterns we found still work after the storm changed every amount? |
| **Time** | Preparation 10 min · Lesson 45 min |
| **Vocabulary** | all unit terms |
| **Game rooms** | None (pairs who didn't finish use the first 5 minutes) |
| **Grouping** | Whole class and pairs, then individual Lantern Check |

**Students will** compare strategies room by room, connect three ways of showing the same ratio, explain the big idea behind the storm, learn from common mistakes, and take the Lantern Check.

**Students learn that** a ratio or rate stays the same when the amounts change, that a tape diagram, a ratio table and a double number line can show the same relationship, and that different strategies can reach the same answer.

## Overview

In the debrief, students make sense of what they did in the escape room. They already explained their signal in the game, so this lesson focuses on three questions: Which strategies worked? Why do they give the same answers? What let the crew solve the storm? Students capture their thinking on the Debrief Reflection 3-1 as the lesson goes.

| Part | Minutes | Purpose |
|---|---|---|
| 1 · Back to Gull Point | 5 | Close the story and tally strategies |
| 2 · Strategy share | 12 | Compare strategies room by room |
| 3 · Connecting the models | 8 | See one ratio three ways |
| 4 · The storm's big idea | 7 | Name what stays the same when amounts change |
| 5 · Mistakes worth learning from | 5 | Explain why tempting wrong answers fail |

| Part | Minutes | Purpose |
|---|---|---|
| 6 · Lantern Check | 8 | Check skills and confidence |

## Student Learning: Look for These Misconceptions

- **Guess-and-check is "cheating."** It's a fair start. The goal is noticing when a faster strategy would work better.
- **The gallery's numbers were "new math."** Connect each dial back to its room: same pattern, new amounts.
- **The three models are different math.** Show that the same pair of numbers (2 packs : 3 flashes) appears in all three.

## English Learner Strategies

- Let students rehearse their strategy explanation with a partner before sharing with the class.
- Keep the word wall and sentence frames visible: "I multiplied both by ___ because ___." · "The unit rate is ___ per ___."
- Accept explanations that point to a model on the board along with a few words.

## Materials and Preparation

- Beacon Logbooks 2-1 returned to students
- Per student: Debrief Reflection 3-1, Lantern Check 3-3
- Per pair (for later): Design a Room planner 3-2
- Chart paper: one sheet per room, labeled with the game's strategy choices; the "Tools Mira's Crew Will Need" chart from Day 1
- Before class, choose two or three anonymous wrong answers you saw during play (see Part 5)

## Part 1 · Back to Gull Point 5 min

1. Show the epilogue slide and read it aloud: the *Sea Wren* reaches the harbor safely, and Pop finds the crew's clues in the logbook.
2. Pairs who didn't finish the game finish now. Everyone else adds a tick on the chart paper for each strategy they chose in the game.
3. Post the Guiding Question.

## Part 2 · Strategy Share 12 min

Take one room at a time. Ask one pair per strategy to explain at the board, then ask the discussion question.

| Room | Strategies in the game | Discussion question | Listen for |
|---|---|---|---|
| Lens | groups of 2 blue and 3 gold · 2 of every 5 spots are blue · tried colors and checked | Which would still work for a 100-spot lens? | Groups (20 groups of 5) or part-to-whole (2 of every 5, so 40 blue). Guess-and-check takes too long. |

| Room | Strategies in the game | Discussion question | Listen for |
|---|---|---|---|
| Generator | flashes for 1 pack, then scaled · combined rows · tried numbers | Why is 14 flashes tempting, and why is it wrong? | It adds 2 to both rows. But 2 packs make 3 flashes, not 2. |
| Radio | beeps per minute, then divided · counted up by 6 · tried numbers | Why do counting up and dividing give the same answer? | Division counts how many groups of 6 fit in 42; counting up does the same thing one group at a time. |

Students record one strategy they would use next time on the Debrief Reflection 3-1.

## Part 3 · Connecting the Models 8 min

1. Draw the Generator Room relationship three ways side by side: a tape diagram (groups of 2 packs, each making 3 flashes), a ratio table (2, 4, 8, 10 packs → 3, 6, 12, 15 flashes) and a double number line.
2. Ask: **Where do you see "2 packs make 3 flashes" in each picture?** Have students come up and point.
3. Ask: **Which model would you pick for the Radio Room? Why?** *Many choose the double number line, because time runs along a line.*
4. Say: *These are three pictures of the same idea. Pick the one that helps you think.*

## Part 4 · The Storm's Big Idea 7 min

1. Build a class chart: **What stayed the same after the storm? What changed?** *Same: 2 blue : 3 gold; 2 packs : 3 flashes; 6 beeps per minute. Changed: 15 spots, 8 packs, a 36-beep message, the ship in 6.5 minutes.*
2. Ask: **Why could the crew still solve it?** *The ratios and rates didn't change, only the amounts. The patterns from the logbook still worked.*
3. Ask: **Where else does a ratio stay the same while the amounts change?** *Doubling a recipe, driving at a steady speed, mixing paint, map scales.*
4. Students write the big idea in their own words on the Debrief Reflection 3-1.

## Part 5 · Mistakes Worth Learning From 5 min

Show two or three anonymous wrong answers from play, such as 14 flashes, 16 gold panels in the lens, or 8 minutes for the radio. For each, ask: **Why might someone think this? What would you tell them?** Point out what makes each mistake reasonable before correcting it.

## Part 6 · Lantern Check 8 min

Students complete the Lantern Check 3-3 on their own, including the confidence rating. Use Reading the Results in the Unit Assessment section to plan next steps.

## Closing

Return to the "Tools Mira's Crew Will Need" chart from Day 1. Ask: **Which predictions turned out to be right? What would you add?**

**Extension: Design a Room.** Pairs use the planner 3-2 to invent a fifth room for Gull Point Light (a fog horn, a fuel tank, a supply boat). They write one ratio or rate puzzle, an answer key, and three hints that move from a question to a concrete next step. Pairs finish for homework, then swap rooms and solve them as the next day's warm-up. **Challenge:** add a storm twist, where the amounts change but the ratio stays the same.

**Extra support:** In Part 3, give students a copy of the three models with the numbers already filled in, and ask them to circle the matching parts. **Extra challenge:** Ask students to show the Radio Room with all three models.

# Student Handouts

All seven student handouts and two teacher pages (the Escape Day Card and an answer key) are in one print-ready PDF: *Light the Beacon Student Handouts*.

| Code | Handout | Used in | Print |
|---|---|---|---|
| S-1 | Word Bank | Day 1 · Story (kept all unit) | 1 per student |
| 1-1 | Toolkit Practice | Day 1 · Lesson 1 | 1 per student |
| 2-1 | Beacon Logbook (2 pages) | Handed out in Lesson 1; used on Day 2 | 1 per student, double-sided |
| 2-2 | Paper Rooms (2 pages) | Day 2 · Lesson 2: alternate access and absent students | A few copies |
| 3-1 | Debrief Reflection | Day 2 · Lesson 3 | 1 per student |
| 3-2 | Design a Room planner | Lesson 3 extension | 1 per pair |
| 3-3 | Lantern Check | Day 2 · Lesson 3 | 1 per student |
| Teacher | Escape Day Card | Day 2 · Lesson 2 | 1 for you |
| Teacher | Answer Key | All lessons | 1 for you |

# Discussion Prompts

Use these questions as you circulate. They work in every room of the game.

| When students are… | Ask |
|---|---|
| Getting started | What do you know? What are you trying to find? What does one group look like? |
| Stuck | Which helper could you use: practice, a hint, or your logbook? Can you draw it? |
| Testing an answer | How can you check it without the game? Does the "for every" still hold? |
| Done | Which strategy did you pick, and would it work with bigger numbers? |
| Disagreeing with a partner | Show me both ways. Do they give the same answer? Why? |

**Student sentence frames:** "There are ___ for every ___." · "I multiplied both by ___ because ___." · "The unit rate is ___ per ___." · "I know my answer works because ___."

# Lesson Rubric

| Students can… | 1 Novice | 2 Apprentice | 3 Proficient | 4 Distinguished |
|---|---|---|---|---|
| Describe a ratio (6.RP.A.1) | Does not use ratio language | Uses "for every" with support; may reverse order | Describes ratios accurately and in order | Explains the difference between part-to-part and part-to-whole |
| Find equivalent ratios (6.RP.A.3a) | Adds to both parts | Scales with tiles or hints | Scales with groups or a ratio table independently | Chooses an efficient strategy and explains why it works |
| Find and use a unit rate (6.RP.A.2, 3b) | Cannot find the amount for 1 | Finds the unit rate with a hint | Finds and uses the unit rate | Compares rates and checks reasonableness |
| Explain a solution (MP3) | No explanation | Restates the answer | Gives reasons tied to the numbers | Justifies every constraint, including the deadline |

# Family Letter

Dear Family,

Over the next two days, our class is doing **Light the Beacon**, a virtual escape room about ratios and rates. It begins with a short story about Mira, whose grandfather keeps a lighthouse. Then students work in pairs as Mira's crew to repair the lighthouse during a storm so that a rescue ship can reach the harbor. Each room is a math puzzle: matching a color pattern, completing a table, and finding how fast a radio sends a message.

**Try this at home:**

- Cook together. Ask: *If this recipe uses 2 cups of flour for every 1 cup of sugar, how much flour for 3 cups of sugar?*
- Compare prices at the store. Ask: *Which is the better deal per ounce?*
- Notice rates around you: miles per hour, pages per day, dollars per hour.

Ask your child to tell you how they saved the ship!

Sincerely,

[Your name], Grade 6 Math