



DISASTER AT SEA

LIVRET DE L'ENSEIGNANT



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SECTION LCE - COLLEGE DE L'EUROPE
BOURG-DE-PEAGE – DROME 26

ESCAPE GAME

GRADE LEVEL : Year 9 – (5 groups of 4 students)

SKILLS : Search, model, reason, calculate, communicate

DURATION : 1 hour (45 minutes of independent work)

CONCEPTS WORKED ON:

- **Puzzle 1:** Calculate with quantities (rate of flow, volume, time, proportionality)
- **Puzzle 2:** Pythagorean theorem
- **Puzzle 3:** Euclidean division

SCENARIO

The cruise liner you are travelling on to England has got a leak. The crew is panicked and needs your help. You have 45 minutes to find the leak. You have to solve 3 puzzles to accomplish this.

MATERIAL

- **Scratch** program to download ([Tools | Scratch Foundation](#))
- **5 padlocks – a white board per student**
- **A computer or iPad**
- **A set of cards** for each group and **calculation sheets**
- **A glass jar** secured with a padlock for each group. Codes:
 - 0313 (GR1)
 - 0953 (GR2)
 - 1673 (GR3)
 - 2274 (GR4)
 - 2954 (GR5)
- Inside each jar is **a piece of paper with a digit written on it** (one digit per group):
 - Group 1: **7**
 - Group 2: **3**
 - Group 3: **9**
 - Group 4: **4**
 - Group 5: **1**



IMPLEMENTATION

Step 1

Introduce the game with [this video](#).

Step 2

Explain the situation:

- 1)** You are passengers on a cruise liner which happens to have a leak, and you are the only ones who can avoid a terrible disaster at sea.
- 2)** You have 45 minutes to rescue the passengers of the ship by solving 3 math puzzles.
- 3)** When finished, you will get a digit (so 4 digits with 4 groups) and these 4 digits will give you a secret code (to type on the computer, finish with the space bar) in order to fix the leak and save the ship.

INSTRUCTIONS POUR L'ENSEIGNANT

DEMARRAGE

- A. Dessiner au tableau 4 traits d'attente pour le code secret (avec « group 1 » au-dessus du premier trait, etc...) + « space bar » pour que chaque groupe puisse écrire son chiffre, avant d'entrer le code dans Scratch. Lancer le chronomètre en allant sur YouTube : **45 Minutes Countdown Timer with Voice & Alarm Sound sur le téléphone.** <https://www.youtube.com/watch?v=7BB0cEV5Ca4>
- B. Lancer le programme Scratch ([Projet Scratch \(1\) \(5\) \(1\) \(3\) CHRONOMETRE.sb3](#)) montrant le bateau de croisière sur l'ordinateur.
- C. Une fois la première énigme trouvée et solutionnée, les élèves obtiennent la réponse suivante : "Puzzle 2 is on page x of the math book" (the page number depends on the group and is linked to the result of Puzzle 1).
- D. A teacher opens the book on the page announced by the students in the group.

PUZZLE PILOTING & ANSWER KEYS

PUZZLE 1

"The water enters the ship at a flow rate of 24.52 / 28.59 / 26.67 / 22.05 / 20.46 m³min. The volume of the boat is 110,000 m³."

Question: How long will it take for the ship to sink? Give the answer in hours (rounded to the nearest hour)."

Group 1 : 110,000 : 2 = 55,000

55,000 : 24.52 ≈ 2,243 min = 2,243:60 h ≈ **37 h** (**Group 1** gives the answer to the teacher, who opens the math book to page 37 → gives the **Puzzle 2**)

Group 2 : 110,000 : 2 = 55,000

55,000 : 28.59 ≈ 1,924 min = 1,924:60 h ≈ **32 h** (**Group 2** gives the answer to the teacher, who opens the math book to page 32 → gives the **Puzzle 2**)

Group 3:

$$110,000 : 2 = 55,000$$

$55,000 : 26.67 \approx 2,062 \text{ min} = 2,062:60 \text{ h} \approx 34 \text{ h}$ (Group 3 gives the answer to the teacher, who opens the math book to page 34 → gives the **Puzzle 2**)

Group 4:

$$110,000 : 2 = 55,000$$

$55,000 : 22.05 \approx 2,444 \text{ min} = 2,444:60 \text{ h} \approx 41 \text{ h}$ (Group 4 gives the answer to the teacher, who opens the math book to page 41 → gives the **Puzzle 2**)

Group 5:

$$110,000 : 2 = 55,000$$

$55,000 : 20.46 \approx 2,688 \text{ min} = 2,688:60 \text{ h} \approx 45 \text{ h}$ (Group 4 gives the answer to the teacher, who opens the maths book to page 41 → gives the **Puzzle 2**)

PUZZLE 2

“A little cat is stuck on the highest part of the ship at point C. You are at point A. To save the kitten before the ship sinks, you need to calculate the length of the cable you have to climb.”

Different dimensions for the 5 groups are provided on the image of Puzzle 2)

We use the Pythagorean Theorem for the right-angled triangle ABC:

$$AC^2 = AB^2 + CB^2 \Rightarrow AC = \sqrt{AB^2 + CB^2}$$

- $AC = \sqrt{9^2 + 40^2} = 41 \text{ m}$ (group 1)
- $AC = \sqrt{7^2 + 24^2} = 25 \text{ m}$ (groups 2 and 5)
- $AC = \sqrt{8^2 + 15^2} = 17 \text{ m}$ (group 3)
- $AC = \sqrt{12^2 + 35^2} = 37 \text{ m}$ (group 4)

PUZZLE 3

When Puzzle 2 has been solved (the result must be checked by a teacher), pupils get **Puzzle 3**, which is hidden in various locations around the classroom:

- 1) In the closet (group 1)
- 2) Under the teacher's desk (group 2)
- 3) In the I-pad box (group 3)
- 4) Behind the computer (group 4)
- 5) Under a chair (group 5)

Problem:

“There are 1,010 passengers and crew on the ferry. There are 19 lifeboats. Are there enough lifeboats to save all the passengers and the crew, given that a lifeboat can hold 65 people and that 4/5/6/7/8 (group 1/2/3/4/5) lifeboats are damaged and unsafe to use? If not, what percentage of passengers and the crew will it not be possible to save?”

Group 1: $19 - 4 = 15$ operational lifeboats

$1,010 = 65 \times 15 + 35$ (16 lifeboats are needed); 35 passengers will not be saved. The percentage of passengers and the crew that will not be saved is:

$$35/1,010 \approx 3.5 \% \text{ rounded to the nearest tenth}$$

Group 2: $19 - 5 = 14$ operational lifeboats

$1,010 = 65 \times 14 + 100$ so 100 passengers will not be saved.

The percentage of passengers and the crew that will not be saved is:
 $100/1,010 \approx 9.9 \% \text{ rounded to the nearest tenth}$

Group 3: $19 - 6 = 13$ operational lifeboats

$1,010 = 65 \times 13 + 165$ so 165 passengers will not be saved.

The percentage of passengers and the crew that will not be saved is:
 $165/1,010 \approx 16.3 \% \text{ rounded to the nearest tenth}$

Group 4: $19 - 7 = 12$ operational lifeboats

$1,010 = 65 \times 12 + 230$ so 230 passengers will not be saved.

The percentage of passengers and the crew that will not be saved is:
 $230/1,010 \approx 22.8 \% \text{ rounded to the nearest tenth}$

Group 5: $19 - 8 = 11$ operational lifeboats

$1,010 = 65 \times 11 + 295$ so 295 passengers will not be saved.

The percentage of passengers and the crew that will not be saved is:

$295/1,010 \approx \mathbf{29.2\%}$ rounded to the nearest tenth

When Puzzle 3 has been solved, pupils can find the secret code, which is a number composed of 4 digits, to unlock the padlock.

- The unit digit of the secret code is the tens digit of the result of Puzzle 1.
- The tens digit is the unit digit of the result of Puzzle 2.
- The hundreds digit is the unit digit of the percentage found in Puzzle 3.
- The thousands digit is the tens digit of the percentage found in Puzzle 3.

MISSION COMPLETION

- The students find the secret code to unlock the padlock.
- Inside the glass jar, they find a piece of paper with a digit (one digit group)

7 (gr1) ; 3 (gr2) ; 9(gr3) ; 4(gr4)

The number formed by these 4 digits is entered into the computer program Scratch. ([Virtual Padlock Group 5.sb3](#)).

An animation then shows the boat has been repaired, the water is draining... »

