TEACHER WORKSHEET

CYCLE 3 • MATHEMATICS: NUMBERS AND CALCULATIONS

BOBSLEIGH

OVERVIEW

EDUCATIONAL OBJECTIVES:

- Recognize and solve problems in terms of proportions.
- Practice reading and developing new ways to represent data (table and bar graph).
- Give meaning to the concepts of "tenths" and "hundredths" of a second in measuring time.
- Be familiar with bobsleigh, an Olympic Winter Games discipline.

SPECIFIC SKILLS:

- Calculate with integers and decimals.
- Problem-solve in terms of proportions.
- Organize and manage data.

INTERDISCIPLINARY SKILLS:

- History:
  Determine one's place in time.
- PE:
  Understand performance in the context of human performance.
- Mathematics/dimensions and measurements:
  Solve problems involving physical quantities (length and time) using integers and decimals.

SCHEDULE FOR SESSIONS:

- Launch project.
- Read texts aloud as a class.
- Do activities in pairs: Problem-solving.
- Share with class and review.
- Extend activity.

DURATION:

- 2 sessions (2 × 45 minutes).

ORGANIZATION:

- Work in pairs, then share as a class.

OLYMPIC GAMES KEYWORDS:

BOBSLEIGH • RECORD • AVERAGE HOURLY SPEED

CONCEPTS ADDRESSED

THE FIRST OLYMPIC GAMES

Starting in 776 B.C., every four years the Greeks would organize public festivities in the city of Olympia in honor of Zeus. Athletes from all the Greek cities competed in sports events, which thousands of Greeks would watch. The Games, then known as the "Games of Olympia", were held every four years until the Roman Emperor Theodosius outlawed them in 394. There were also Games in the cities of Delphi and Nemea, and on the Isthmus of Corinth.

THE MODERN GAMES

The Frenchman Pierre de Coubertin helped revive the Games in 1896, when the first "modern" Olympic Games were held. The Winter Olympic Games were first introduced in Chamonix, France, in 1924, in response to the development of snow and ice sports. Since 1992, the Winter Games have alternated every two years with the Summer Games. Recently, the Winter Games were held in Pyeongchang, South Korea.

Since 2012, the Youth Olympic Games have also been held every two years, alternating between the Summer and Winter Games.
The Summer Youth Olympic Games were recently held in Buenos Aires, Argentina, in 2018, and the Winter Youth Olympic Games took place in Lausanne, Switzerland, in 2020.

BOBSLEIGH

Bobsleigh (or bobsled) is a winter sport invented by the Swiss in the late 19th century in which "teams make timed runs down narrow, twisting, banked, iced tracks in a gravity-powered sled" (source: https://www.olympic.org/bobsleigh).

It was first introduced as an Olympic discipline exclusively for men, and with four-person sleds, at the 1924 Olympic Games in Chamonix, France. In 1932, in Lake Placid, New York, a new event was introduced: the two-person bobsleigh. And in 2002, at the Olympic Games in Salt Lake City, Utah, a women's event was added.

Until 1952, there was no weight limit (for the crew and sled), which explains why some athletes were overweight.

The start requires power and speed from crew members, who have to push off over 50 meters before getting in. After being launched, the sled then runs down a track that is about 1.5 kilometers long with a dozen bends. The objective is to reach the finish line as fast as possible without tipping over.

The men's event is spread over two days, with two runs down the course (called a "heat") per day. The times of the four heats are added together for the final score. The team with the shortest time wins the event. The women's event follows the same rules, but takes place over one day.

MATH CONCEPTS

- Decimal fractions are fractions whose denominator is 10 or a power of 10. When a unit is divided into 10 equal parts, each part is called a "tenth" (1/10); when a unit is divided into 100 equal parts, it is called a "hundredth" (1/100); etc.
- Decimal numbers can be written as a decimal fraction or with a decimal point: 5/10 and 0.5 are two ways to write the same decimal number.

FUN FACT!

Bobsleigh (or bobsled) is a winter sport invented by the Swiss, but the word is actually of English origin. *Bob* means "short" and *sleigh* was a "vehicle used for transport of heavy goods".

FUN FACT!

After being launched, the sled runs down a track that is about 1.5 kilometers long with 10 to 15 bends. Average speeds can reach 140 km/h!

STUDENT WORKSHEET OVERVIEW

VOCABULARY:

Bobsleigh, record, average hourly speed.

ACTIVITIES:

▶ **ACTIVITY 1: INTRODUCTION TO BOBSLEIGH**

Recognize and solve problems with proportions using the right method. 9–10 yr 10–11 yr 11–12 yr

Materials: Text-based questions + a picture of a women's two-person bobsleigh run

FIND OUT MORE:

From wooden sleds to monobobs.

▶ **ACTIVITY 2: BOBSLEIGH: AN INTERNATIONAL WINTER SPORT**

Read and interpret a table 9–10 yr 10–11 yr 11–12 yr

Take numerical data from a table and represent it in bar graph form 9–10 yr 10–11 yr 11–12 yr

Materials: Text-based questions and tables

FIND OUT MORE:

The history of Olympic medals.

▶ **ACTIVITY 3: GOLD IN HUNDREDTHS OF A SECOND**

Use fractions to understand fractional parts and compare them 9–10 yr 10–11 yr 11–12 yr

Materials: Text-based questions + a picture of a Jamaican monobob

FIND OUT MORE:

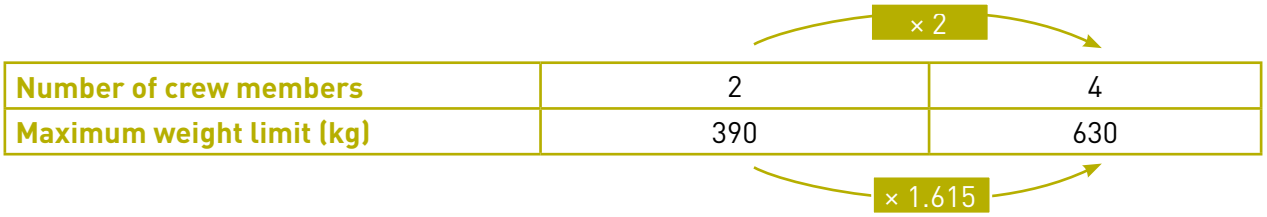
The *Cool Runnings* story.

STUDENT WORKSHEET ANSWER KEY

▶ **ACTIVITY 1: INTRODUCTION TO BOBSLEIGH**

Recognize and solve problems with proportions using the right method 9–10 yr 10–11 yr 11–12 yr

Exercise 1



If the table above showed a proportional relationship, the same number would be used to multiply or (divide) between columns.
In order to go from 2 to 4, multiply by 2.
But 390 multiplied by 2 is 780, not 630. So 2 is not a factor of proportionality.
The table above does not show a proportional relationship because the weight limit is not proportional to the number of crew members in the bobsleigh.

Exercise 2

÷ 2

Number of crew members	2	1
Maximum weight limit (kg)	390	195

If there are half as many crew members, the authorized weight will be half as much. To go from the first column to the next, divide by 2 (2 is the factor of proportionality in this table).

The maximum weight limit for the monobob is therefore 390/2 = 195.

The maximum weight limit for the monobob is 195 kg.

The table above shows a proportional relationship because the weight limit is proportional to the number of crew members in the bobsleigh.

▶ ACTIVITY 2: BOBSLEIGH: AN INTERNATIONAL WINTER SPORT

Read and interpret a table 9–10 yr 10–11 yr 11–12 yr

Take numerical data from a table and represent it in bar graph form 9–10 yr 10–11 yr 11–12 yr

Exercise 1

1) Germany.

2) Switzerland.

3) Russia.

4) Canada and Russia.

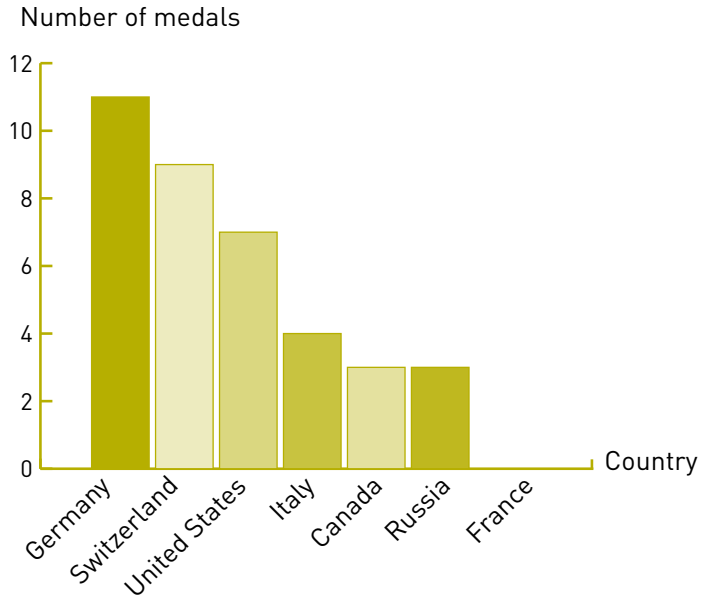
5) France.

Exercise 2

Country	Medal			Total
	Gold	Silver	Bronze	
Germany	11	8	8	27
Canada	3	3	1	7
United States	7	7	10	24
France	0	0	1	1
Italy	4	4	4	12
Russia	3	1	31	35
Switzerland	9	12	11	32

Exercise 3

Number of gold medals in two-person bobsleigh by country



▶ ACTIVITY 3: GOLD IN HUNDREDTHS OF A SECOND

Use fractions to understand fractional parts and compare numbers 9–10 yr | 10–11 yr | 11–12 yr

Exercise 1

The decimal time format 3:50.61 means 3 minutes, 50 seconds, and 61 hundredths of a second.

1 minute = 60 seconds

3 minutes and 50 seconds = 180 + 50 = 230 seconds

61 hundredths of a second = 61/100 = 0.61 seconds

So 3:50.61 equals 230.61 seconds.

Exercise 2

The difference is 10 hundredths of a second, i.e. 10/100 of a second or 1/10 of a second (or 0.1 second).

FIND OUT MORE

EDUCATIONAL FILES

Cycle 3: "Sports stars and heroes"

10–11 yr: "The 1936 Olympic Games in Berlin"

11–12 yr: "The first Olympic Games"

9–10 yr: "Stadium history from ancient times to the present day"

Cycle 3: "Bobsleigh (dimensions and measurements)"

DIGITAL RESOURCES

Learn more about the Olympic Games:
https://www.olympic.org/olympic-games

Learn more about the event in Calgary in 1988 that inspired *Cool Runnings:*
https://www.olympic.org/news/bobsleigh-cool-runnings-in-calgary

Learn more about Nike, the goddess of victory:
https://www.louvre.fr/en/oeuvre-notices/winged-victory-samothrace

Find out more about Olympic medals:
https://www.olympic.org/olympic-medals

Éduscol support document
for mathematics in Cycle 3:
http://eduscol.education.fr/cid101461/ressources-maths-cycle.html

CNOSF science and sports classes:
http://cnosf.franceolympique.com/espritbleu/actus/4804-les-classes-olympiques-sciences-et-sport.html

FILMS FOR TEACHERS

Cool Runnings, directed by Jon Turteltaub
(United States, 1993)

EXHIBITIONS FOR STUDENTS

The Olympic Museum in Lausanne, Switzerland
https://www.olympic.org/museum
(virtual tour available online)

"Fair Play"*:* A touring exhibition on Olympism, available on loan (12 panels,1.60 m × 50 cm)
Contact: academieolympique@cnosf.org

FURTHER READING FOR STUDENTS

http://www.lesclefsdelecole.com/Clefs-des-champs/Listes-de-lecture/Sport-et-olympisme

Les Incroyables Rencontres de Jo,
by Astrid Guyart, Le Cherche Midi (2017)

ACTIVITIES FOR STUDENTS

End of unit: "It's your turn!
Bobsleigh" (and answer key)

Incollables® trivia cards:
http://cnosf.franceolympique.com/cnosf/actus/6106-dcouvrir-lolympisme-avec-les-incollables.html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STUDENT WORKSHEET

CYCLE 3 • MATHEMATICS: NUMBERS AND CALCULATIONS

BOBSLEIGH

VOCABULARY

BOBSLEIGH: An Olympic sport in which teams make timed runs down narrow, twisting, banked, iced tracks in a gravity-powered sled.

RECORD: An athletic achievement that surpasses what was previously achieved in a given area *(to break a record)*.

AVERAGE HOURLY SPEED: The distance covered in one hour.

ACTIVITIES

▶ ACTIVITY 1: INTRODUCTION TO BOBSLEIGH

Exercise 1

FUN FACT! Bobsleigh (or bobsled) was introduced as an Olympic discipline at the first Winter Olympic Games in 1924 in Chamonix, France. In the beginning, only men's four-person bobsleigh events were held.

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At the 1932 Olympic Games in Lake Placid, New York, a new event was introduced: the two-person bobsleigh. And in 2002, the women's two-person bobsleigh event was finally added at the Olympic Games in Salt Lake City, Utah! A bobsleigh is a multi-seater steel sled with a steering wheel. Crew members have to go down a specially designed icy runway at high speeds in the straightest possible path and without tipping over. The team that reaches the finish line in the least amount of time wins (men's and women's events both involve racing over several heats).

TIPS & TRICKS

The best way to solve a math problem is to **carefully read the instructions**—all the answers are in there! To help you understand them, **imagine that you're the one experiencing the situation described.** You can also tell the problem as a story, **in your own words.**

The start is crucial. Crew members push off over a short distance (50 to 60 meters), trying to give the sled as much momentum as possible, before getting inside and racing down the track (sitting feet first). Speeds can reach over 120 km/h, especially in four-person bobsleigh.

Originally there were no weight limits for the crew and sled, and some athletes were overweight to increase overall weight.

In 1952, new rules set a weight limit—the total weight for a men's two-person team could not exceed 390 kg. For a four-person team, the total weight was limited to 630 kg.

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Look at the table below and say whether or not it involves a proportional relationship.

Justify your answer.

Number of crew members	2	4
Maximum weight limit (kg)	390	630

Exercise 2

FUN FACT! In Lillehammer, Norway, the second Winter Youth Olympic Games took place in February 2016. A new version of the bobsleigh made its debut—the monobob, or solo bobsleigh.

If the event were to be added to the Winter Olympic Games, the Olympic Committee would have to set a weight limit for the men's monobob event.

If the limit was proportional to the two-person bobsleigh, calculate the maximum weight limit for the monobob.

Complete the table below.

Justify your answer.

Number of crew members	2	1
Maximum weight limit (kg)	390	

FIND OUT MORE:

The monobob is a competition that requires all athletes to use the same sled. That takes technology out of the equation. In fact, for the second run in Lillehammer, the fastest athlete in the first run had to swap sleds with the slowest! What matters are steering and athletic skills, rather than equipment.

▶ ACTIVITY 2: BOBSLEIGH: AN INTERNATIONAL WINTER SPORT

FUN FACT! The table below shows the number of medals won per country in the men's two-person bobsleigh between 1932 and 2014.

Country	Medal			Total
	Gold	Silver	Bronze	
Germany	11	8	8	
Canada	3	3	1	
United States	7	7	10	
France	0	0	1	
Italy	4	4	4	
Russia	3	1	31	
Switzerland	9	12	11	

Exercise 1

After you have read the table, answer the following questions:

1) Which country won the most gold medals? .....

2) Which country won the most silver medals? .....

3) Which country won the most bronze medals? .....

4) Which countries are tied in gold medals? .....

5) Which country has never won a gold medal? .....

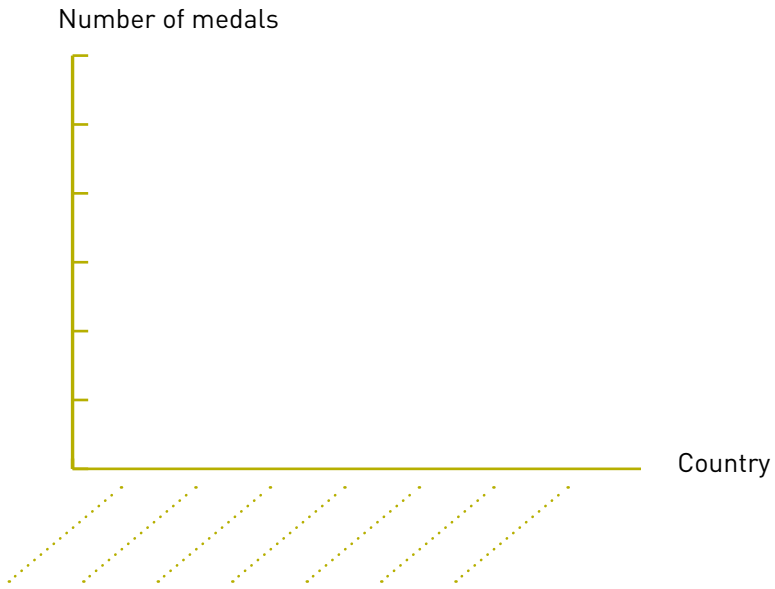
Exercise 2

Calculate the total number of medals won by each country to complete the table above:

Exercise 3

Create a bar graph showing the number of gold medals won by each country.

Rank the countries in descending order based on the number of medals:



FIND OUT MORE:

Olympic medals were first designed to be placed around the winners' necks in Rome in 1960.

▶ ACTIVITY 3: GOLD IN HUNDREDTHS OF A SECOND

FUN FACT! In bobsleigh, a tenth of a second lead taken at the start may be worth several tenths of a second at the finish.
In Sochi, in 2014, Canadian athletes Heather Moyse and Kaillie Humphries won gold in the two-person bobsleigh event, with a time of 3 minutes, 50 seconds, and 61 hundredths. That can be written in the decimal time format as 3:50.61.

Exercise 1

Write the time 3:50.61 in seconds using a decimal point:

.....

Exercise 2

The silver medal went to American athletes Elana Meyers and Lauryn Williams, with a time of 3:50.71.

Write the difference in time between both teams as a decimal fraction and with a decimal point:

.....

.....

FIND OUT MORE:

The Olympic Games in Calgary, Canada, went down in history because it was the first time an island in the West Indies took part in the Olympic Winter Games! The Jamaican team finished in the final rankings with a time of 4 minutes, 3 seconds, and 86 hundredths of a second. Their performance inspired the hit film *Cool Runnings* (1993), and the country continued to send bobsleigh teams to the next five Winter Games.

REVIEW

- Create a graph **using data** from a table.
  - Draw two axes: **a horizontal axis and a vertical axis.**
  - Draw **the bars** that correspond to the data in the table.
  - Don't forget to give the graph **a title**.

- **Read the data** by row and column to **understand the table**.

- When a unit is divided into 10 equal parts, each part is called a **tenth (1/10)**; when a unit is divided into 100 equal parts, it is called a **hundredth (1/100).**

NOW, TAKE ACTION!

- **Work in stages.** Math is just like life! In math, you have to **read the question** and **understand the purpose** of the exercise in order to find the right solution. The same is true in life, when you have to **accept a situation** (like if your parents won't let you sleep at a friend's house), or **make a decision** (like if you want to buy the latest comic book but you would have to spend all the money you've saved). You need to keep all the information in mind to better understand the situation. **Making a table with two columns** with the pros and cons can also help.

- **Use your head.** A lot of math problems can be solved without a formula, **just by using your head**. What matters is to always think in the same way and follow the same logic.

CYCLE PROGRESS WORKSHEET

CYCLE 3 • MATHEMATICS: NUMBERS AND CALCULATIONS

BOBSLEIGH

PROGRESS GUIDELINES FOR PROPORTIONS (ACTIVITY 1):

For students 9–10 years old, problems with proportions should only involve integers.
Problems involving constant speeds may be introduced to students over 10.
Activity 1 in the worksheet could therefore be an opportunity for students 10–12 years old to work with proportions to calculate average bobsleigh speeds (in connection with "dimensions and measurements").
At the end of Cycle 3, students should work on calculations using percentages.
Activity 1 in the worksheet can therefore be used to have students 11–12 years old calculate percentages.

ABOUT THE MATH PROBLEMS:

Math problems become more complex in Cycle 3 as the unit progresses:

– Numbers: Higher and higher integers are used, and later decimals (activities should be limited to hundredths for students 9–11 years old, and to ten thousandths for students 11–12 years old).

–Data: For students 9–11 years old, the data used to solve the problem is presented only one way each time (text, table, or graph).
For students 11–12 years old, all three formats can be combined.

The medal table in Activity 2 should not be provided to that age group.
Students should instead read a text with information about the number of medals, and would have to create a table before using the data to make the graph.

IT'S YOUR TURN!

CYCLE 3 • MATHEMATICS: NUMBERS AND CALCULATIONS

BOBSLEIGH

PUT YOUR KNOWLEDGE TO THE TEST

1 WHEN WERE THE FIRST WINTER GAMES HELD?

☐ 1896 ☐ 1968 ☐ 1924

2 WHAT COUNTRY DOES BOBSLEIGH COME FROM? (HINT: IT'S A WINTER SPORT)

☐ Switzerland ☐ Jamaica ☐ The United States

3 WHEN DID THE OLYMPIC GAMES FIRST INCLUDE WOMEN'S BOBSLEIGH EVENTS?

☐ 1932 in Lake Placid, New York, United States ☐ 2002 in Salt Lake City, Utah, United States

☐ 1984 in Sarajevo, Bosnia and Herzegovina

4 WHEN DID THE JAMAICA NATIONAL BOBSLEIGH TEAM FIRST PARTICIPATE IN THE GAMES?

☐ 1924 in Chamonix, France ☐ 1988 in Calgary, Canada

☐ 1992 in Albertville, France

TEST YOUR KNOWLEDGE FURTHER

1 MANY OLYMPIC MEDALS FEATURE THE GODDESS OF VICTORY HOLDING A LAUREL WREATH. HER NAME INSPIRED A FAMOUS SPORTS BRAND. FIND HER NAME IN THE FOLLOWING LIST:

☐ Adidas ☐ Nike ☐ Puma

2 BRITISH ATHLETE JAZMIN SAWYERS WON A SILVER MEDAL IN THE BOBSLEIGH AT THE 2012 WINTER YOUTH OLYMPIC GAMES. SHE ALSO QUALIFIED FOR THE OLYMPIC GAMES IN RIO. WHICH SPORT DID SHE COMPETE IN?

☐ Long jump ☐ Discus throw ☐ Boxing

3 WHY DID THE 1960 WINTER GAMES IN SQUAW VALLEY, CALIFORNIA, IN THE UNITED STATES, NOT INCLUDE BOBSLEIGH EVENTS?

☐ The track was too icy ☐ The track had melted ☐ The track wasn't ready

4 WHAT TEMPERATURE WAS REACHED DURING THE BOBSLEIGH RUNS AT THE 1988 OLYMPIC GAMES IN CALGARY, CANADA?

☐ 14 °C ☐ 25 °C ☐ 0 °C

KICK OFF THE DISCUSSION... GIVE YOUR OPINION!

Mark Twain, the American author of *The Adventures of Tom Sawyer*, said: "They did not know it was impossible so they did it."

WHAT ABOUT YOU? HOW FAR CAN YOU GO WHEN YOU SET YOURSELF A GOAL?

IT'S YOUR TURN! ANSWER KEY

CYCLE 3 • MATHEMATICS: NUMBERS AND CALCULATIONS

BOBSLEIGH

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