



## REDUCED GRAVITY, LOW-FAT

An ESA Mission X – Train Like an Astronaut Educational Guide

Student Name \_\_\_\_\_

### Introduction

As astronauts travel to the moon, Mars, and beyond, the need for nutritionally balanced meals becomes even more important for space missions. The amount of fat inside food packaged for spaceflight is analyzed by researchers before the food is sent into space. Fat content of food is monitored before consumption by dietitians and food scientists at NASA.

### Problem

The fat you see on beef or ham is visible fat. Can you name other kinds of food you expect to contain high quantities of fat? Actually, other kinds of food like French fries or hamburgers also contain fat which is labeled as invisible because you cannot see it.

How can I discover the fat content of a cheeseburger? How can I formulate a balanced meal?

Discuss it with your teacher and classmates.

### Test Procedure

With your group:

#### Day 1

- Read the record data sheet
- With your teacher: place the cheeseburger meal into the blender
- Once blended, put it in the beaker or container
- Add 2 parts of water (1/3 mixed burger meal, 2/3 water)
- With your teacher: put in the microwave for 15 minutes low intensity to make it simmer
  - Or with your teacher: put it in a pan and simmer for 10 minutes
- Put a lid on the beaker or container
  - Or pour the emulsion from the pan back in the beaker and put a lid on it
- Let the **emulsion** cool down
- Put it in the freezer (or refrigerator) for 1 day
- Record data

### Materials per group

- food guide pyramid
- beaker/container
- stirring spoon
- water
- marker
- fast food cheeseburger meal
- nutrition label of a cheeseburger and fresh fries
- pan (if you use a cooker)

## Day 2

- Read the record data sheet
- Remove the cold/frozen emulsion from the refrigerator/freezer
- Mark the layer of fat with a marker
- Record data

### Record data sheet

Proportion of water and burger meal:	
Time in minutes the “burger meal soup” simmered:	
Time in hours of cooling down:	
Thickness of the fat layer:	
Diameter of the beaker:	
Volume of fat (with teacher’s help):	
Volume of burger:	
Proportion (fat volume/fat burger):	

### Study data

After collecting all data, **study data** by answering the following questions as a class.

1. If you eat too much fat, how does your body deal with the extra fat?

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2. List one food item which contains visible fat and one which contains invisible fat.

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3. Why is it necessary to heat the emulsion? And to cool it down?

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## Reduced Gravity, Low-Fat Glossary

<b>Emulsion</b>	A suspension of two liquids within each other that normally would not mix (like oil and water). Picture a cup with vinegar. If you pour oil into the vinegar, the oil will float on top of the vinegar because it is less dense. The liquids start to mix together and tiny droplets of each liquid become suspended within each other. When they are evenly mixed in each other then you have an emulsion.
<b>Balanced Diet</b>	Contains sufficient amounts of fibre and the various nutrients (carbohydrates, fats, proteins, vitamins, and minerals) to ensure good health. Food should also provide the appropriate amount of energy and adequate amounts of water.
<b>Nutrition Facts label</b>	The label required on most pre-packaged foods.