

Lesson Plan - Whales: Measuring Whales and Graphing Results

Summary

This lesson introduces students to a number of whales in the order Cetacea. Students can learn basic facts about the biology and behavior of whales and perform a hands on activity to learn about the various sizes of different species of whales.

Content Area

Marine Biology, Zoology

Grade Level

1-4

Key Concept(s)

- All whales are part of the order Cetacea which is the group of animals that includes whales, dolphins, and porpoises.
- Whales exhibit a variety of body sizes, and features.

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Objectives

- Students will understand that all whales, dolphins, and porpoises belong to the order Cetacea.
- Students will learn that whales in the order cetacea vary in size, where they live, and food they eat.
- Students will measure out true sizes of whales to compare and graph results.

Resources

Cetaceans (whales, dolphins, porpoises)

<http://marinelife.about.com/od/cetaceans/p/Order-Cetacea.htm>

Bottlenose dolphin information and conservation

http://sero.nmfs.noaa.gov/protected_resources/bottlenose_dolphins/index.html

Northern right whale information and conservation

http://sero.nmfs.noaa.gov/protected_resources/brydes_whale/index.html

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National Science Education Standard or Ocean Literacy Essential Principle	Learning Goals
Unifying Concepts and Processes 1. Systems, order, and organization	Types of organization provide useful ways of thinking about the world.
Unifying Concepts and Processes 5. Form and Function	Form and function are complementary aspects of organisms in the natural world. Function frequently relies on form.
Science as Inquiry A.1: Abilities necessary to do scientific inquiry	Ask a question about objects, organisms, and events in the environment.
Science as Inquiry A.2: Understandings about scientific inquiry	Simple instruments, such as magnifiers, thermometers, and rulers, provide more information than scientists obtain using only their senses.

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National Science Education Standard or Ocean Literacy Essential Principle	Learning Goals
<p>Life Science C.1: Characteristics of organisms</p>	<p>Each plant or animal has different structures that serve different functions in growth, survival, and reproduction.</p>
<p>Principle 5 (3-5:B., B.1., B.3.) The ocean supports a great diversity of life and ecosystems.</p>	<p>B.: The ocean provides most of Earth's living space and supports a great diversity of life from the surface to the sea floor.</p> <p>B.1.: The great diversity of ecosystems in the ocean provides opportunities for organisms to develop a great diversity of adaptations, many of which are unique to organisms living in the ocean.</p> <p>B.3.: Adaptations that help some organisms survive in the ocean include: blubber to retain heat, fins for swimming, collapsible lungs for deepdiving and acute hearing under water.</p>

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National Science Education Standard or Ocean Literacy Essential Principle

Principle 5 (3-5:B.7.)
The ocean supports a great diversity of life and ecosystems.

Learning Goals

The ocean supports a tremendous variety of sizes of organisms, from extremely small to the largest animal ever to live on earth.

Baleen Whales
(Mysticetes)

WHALES of the WORLD

The Order of Cetacea

Toothed Whales
(Odontocetes)



Harbor Porpoise



Phocoena phocoena

Bottlenose Dolphin



Tursiops truncatus

Cuvier's Beaked Whale



Ziphius cavirostris

Orca or Killer Whale



Orcinus orca

Gray Whale



Eschrichtius robustus

Humpback Whale



Megaptera novaeangliae

Sperm Whale



Physeter macrocephalus

Northern Right Whale



Eubalaena glacialis

Blue Whale



Balaenoptera musculus

We are going to measure the lengths of cetaceans.

- We will record (write down) data on our data sheets.

Write the length in **FEET**
in this column.

Write the length in **METERS**
in this column.



How Big Are Whales?	Scientific Name	How long?	How Long?	Average	
Order Cetacea	<i>Genus</i>	<i>species</i>	Length in Feet	Length in Meters	Weight, tons
Common Name					
Harbor Porpose	<i>Phocoena</i>	<i>phocoena</i>			0.05
Bottlenose Dolphin	<i>Tursiops</i>	<i>truncatus</i>			0.5
Cuvier's Beaked Whale	<i>Ziphius</i>	<i>cavirostris</i>			5
Orca or Killer Whale	<i>Orcinus</i>	<i>orca</i>			8
Gray Whale	<i>Eschrichtius</i>	<i>robustus</i>			33
Humpback Whale	<i>Megaptera</i>	<i>novaeangliae</i>			35
Sperm Whale	<i>Physeter</i>	<i>macrocephalus</i>			40
Norther Right Whale	<i>Eubalaena</i>	<i>glacialis</i>			60
Blue Whale	<i>Balaenoptera</i>	<i>musculus</i>			100

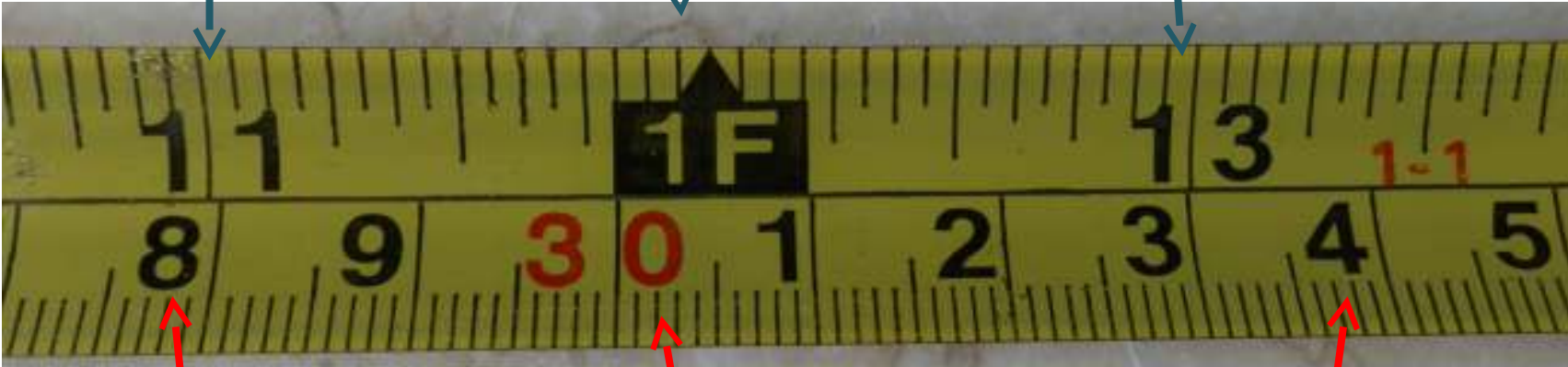
Outside (weather permitting)

- Each person will have their OWN data sheet.
- Each team of two will receive a card with the name of a marine mammal. On the back is a problem to solve. The answer will be the length of your marine mammal in units of feet.
- Enter this number in the correct place on your data sheet.
- Once outside, begin measuring at the 'start line' (zero feet) and pull the tape measure to mark the length you calculated. The tape measures are only 14 feet long. What should you do for animals longer than 14 feet? Stick the marker in the ground when you get to the correct length.
- Switch places with your partner. This time, the person walking away from the start line holding the tape measure will measure in units of meters. Once you know the length in feet, you can either figure out meters using the tape measure or multiply length in feet by 3.3. Write the length in meters in the correct row and column of your data sheet.

Inches

Feet

1 ft 1 inch
or 13 inches



Centimeters

30 Centimeters

34 Centimeters

On the top part of the tape measure, there are 16 lines between each inch so each space is equal to one sixteenth or $1/16$ of an inch.

3 Feet
or $12 \times 3 = 36$ inches



If the tape measure goes to about 15 feet, and there are about 3 feet in one meter, approximately how many meters can we measure with the tape measure fully extended?

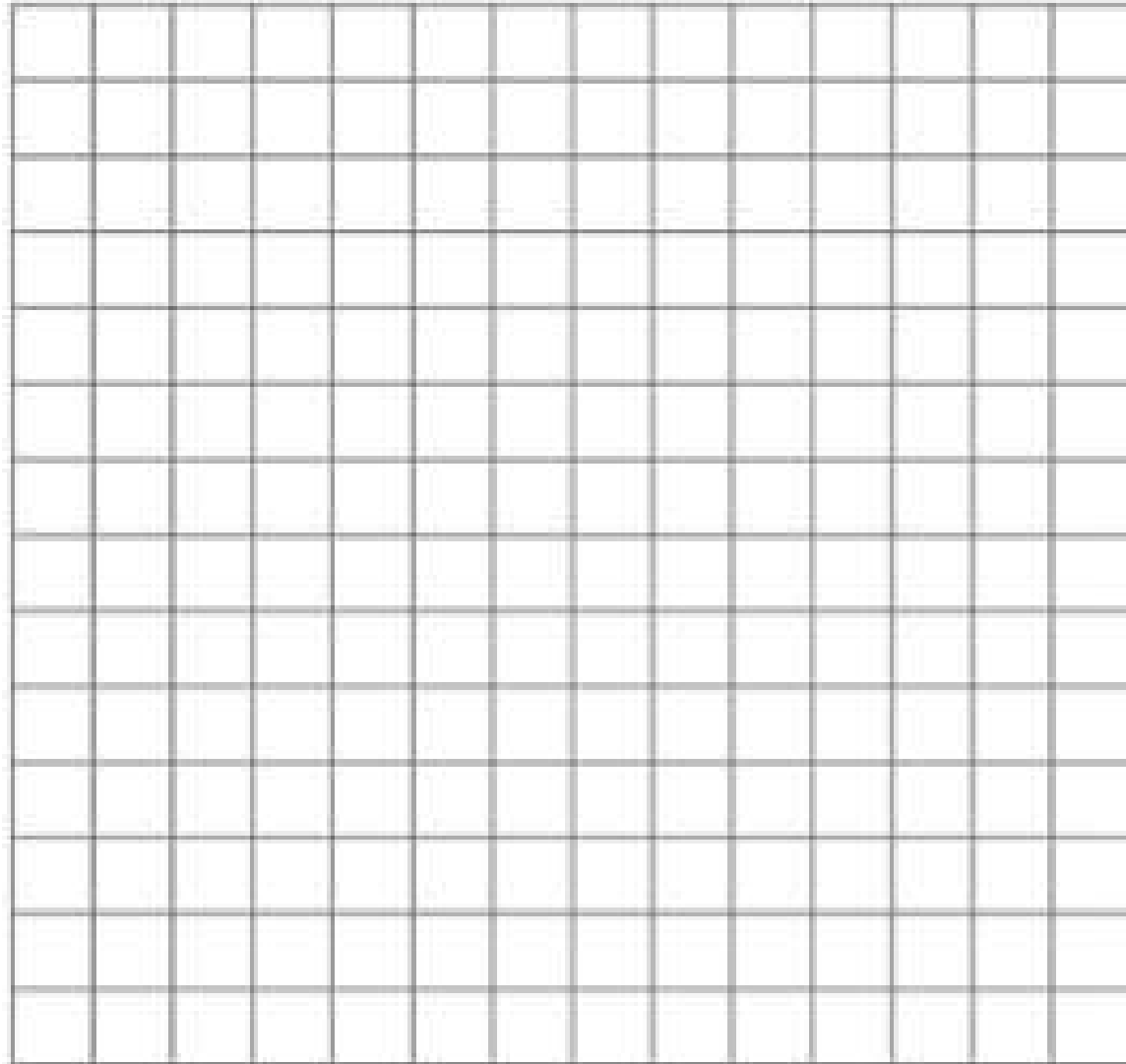
100 centimeters
3.3 Feet or
1 meter

Back in the classroom...

- Fill in the rest of your data table with information from the other 8 teams.
- You will need this information to make your graph.

How Big Are Whales?					
	Scientific Name		How long?	How Long?	Average
Order Cetacea	<i>Genus</i>	<i>species</i>	Length in Feet	Length in Meters	Weight, tons
Common Name					
Harbor Porpose	<i>Phocoena</i>	<i>phocoena</i>	5	1.5	0.05
Bottlenose Dolphin	<i>Tursiops</i>	<i>truncatus</i>	12	3.9	0.5
Cuvier's Beaked Whale	<i>Ziphius</i>	<i>cavirostris</i>	21	6.6	5
Orca or Killer Whale	<i>Orcinus</i>	<i>orca</i>	26	8	8
Gray Whale	<i>Eschrichtius</i>	<i>robustus</i>	46	14	33
Humpback Whale	<i>Megaptera</i>	<i>novaeangliae</i>	49	15	35
Sperm Whale	<i>Physeter</i>	<i>macrocephalus</i>	50	15.25	40
Norther Right Whale	<i>Eubalaena</i>	<i>glacialis</i>	56	17	60
Blue Whale	<i>Balaenoptera</i>	<i>musculus</i>	85	26	100

Let's Graph!



Let's Graph!

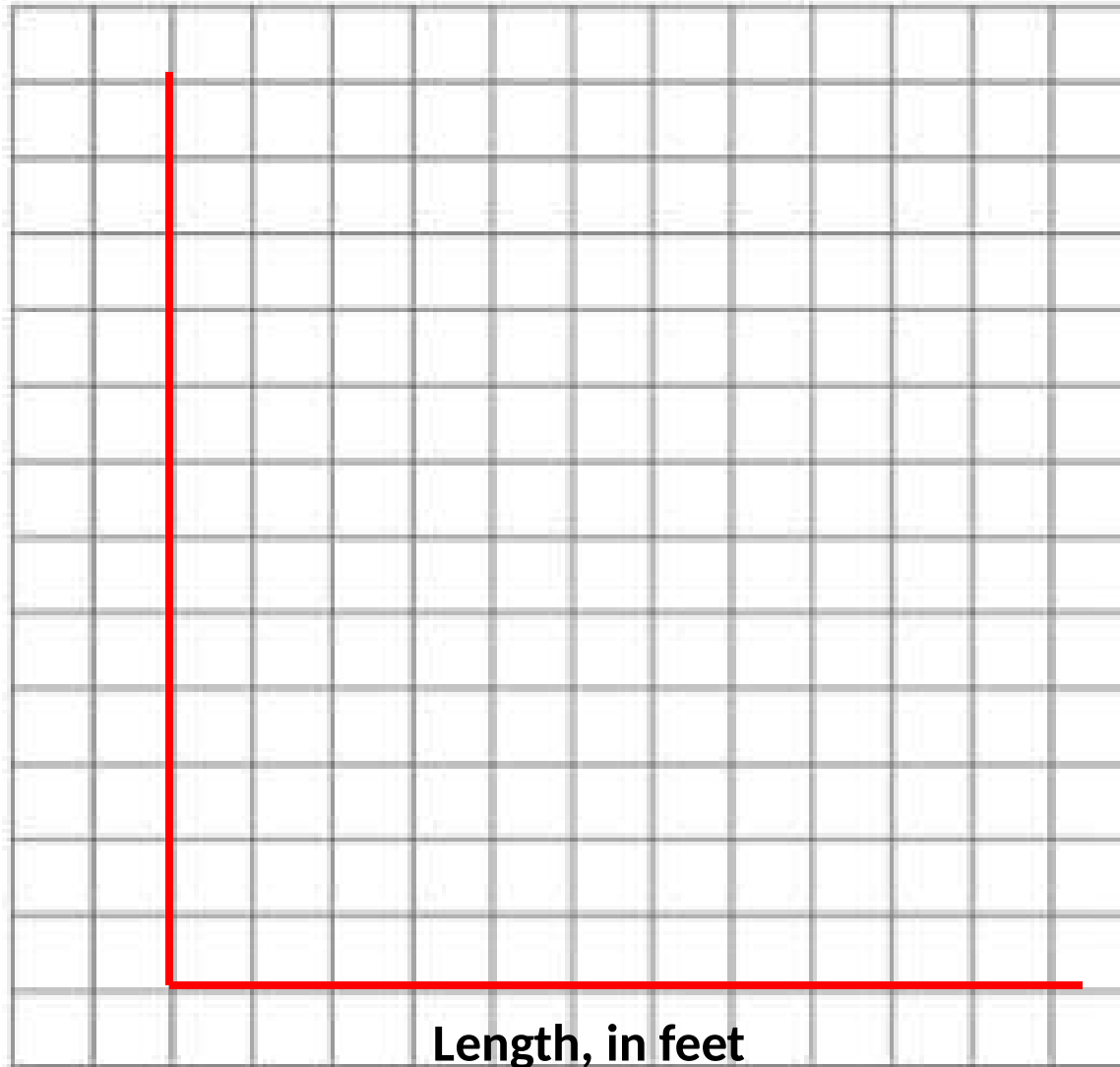
Draw our
Y-axis
and
X-axis



Let's Graph!

Label our
Axes

Weight, in tons

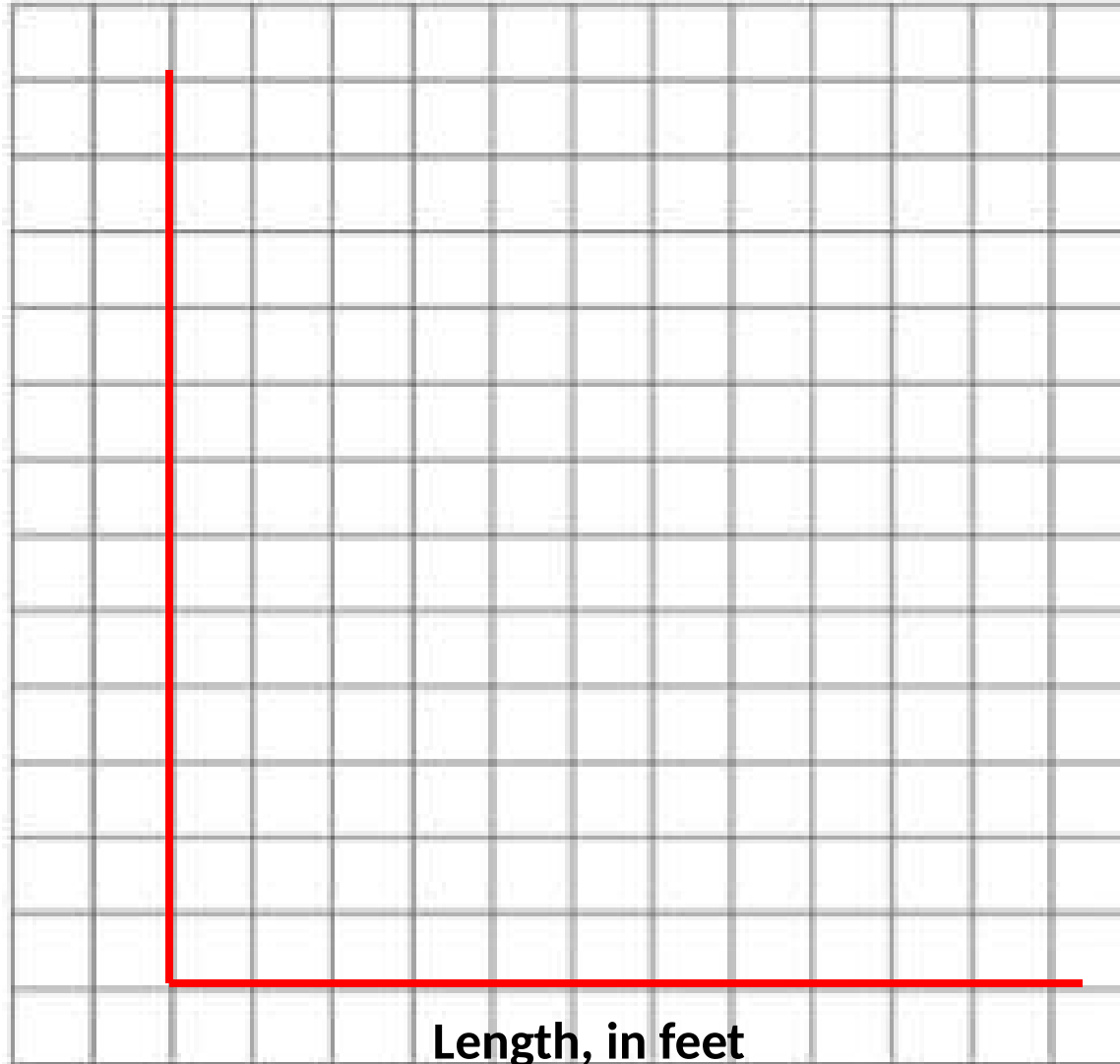


Length, in feet

Let's Graph!

Number our
Length axis

Weight, in tons



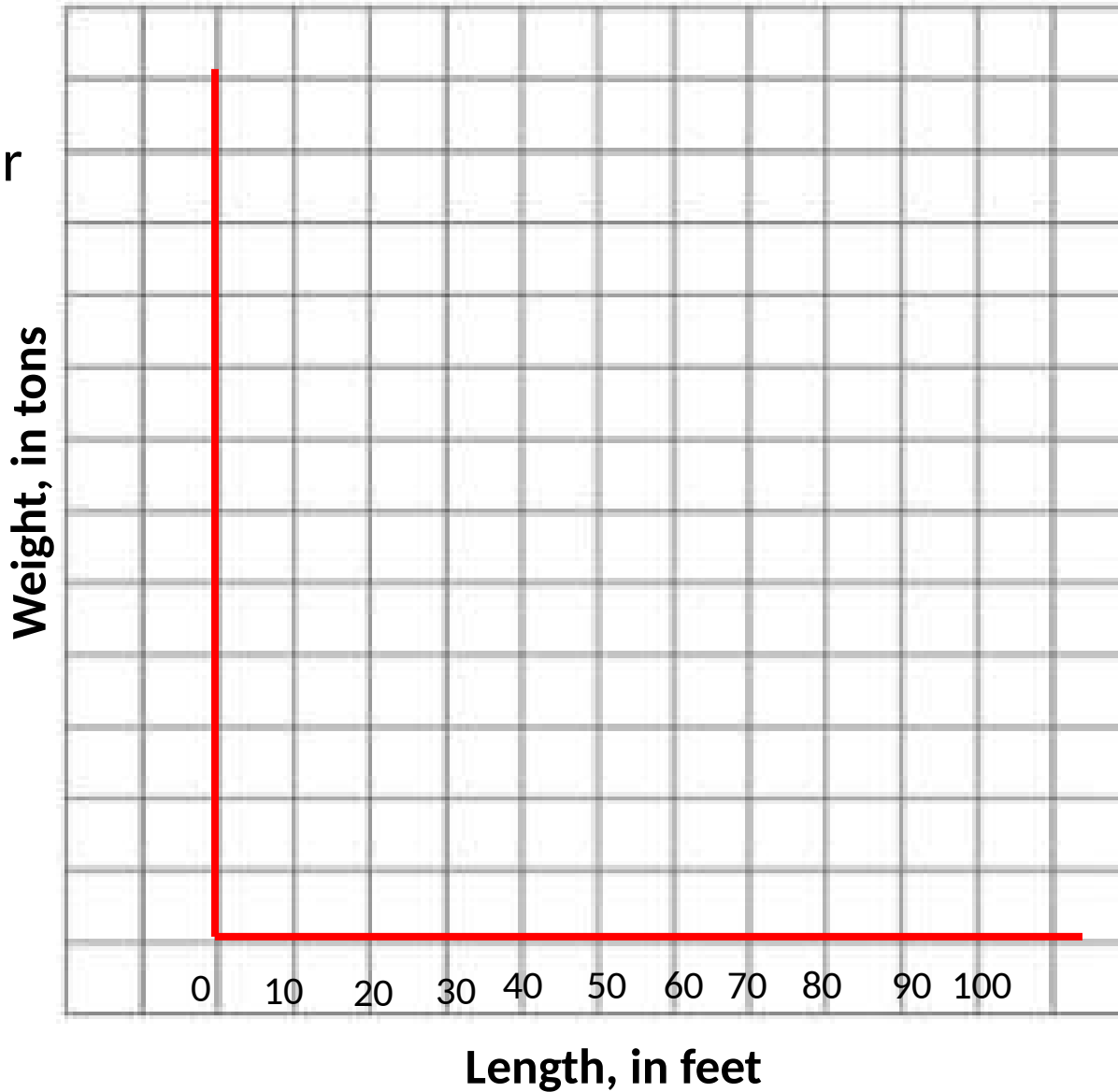
Our lengths
range from
5 ft to 85 ft.

If we let each
box represent
10 ft, we can
label our graph
from 0 to 100 ft.

Length, in feet

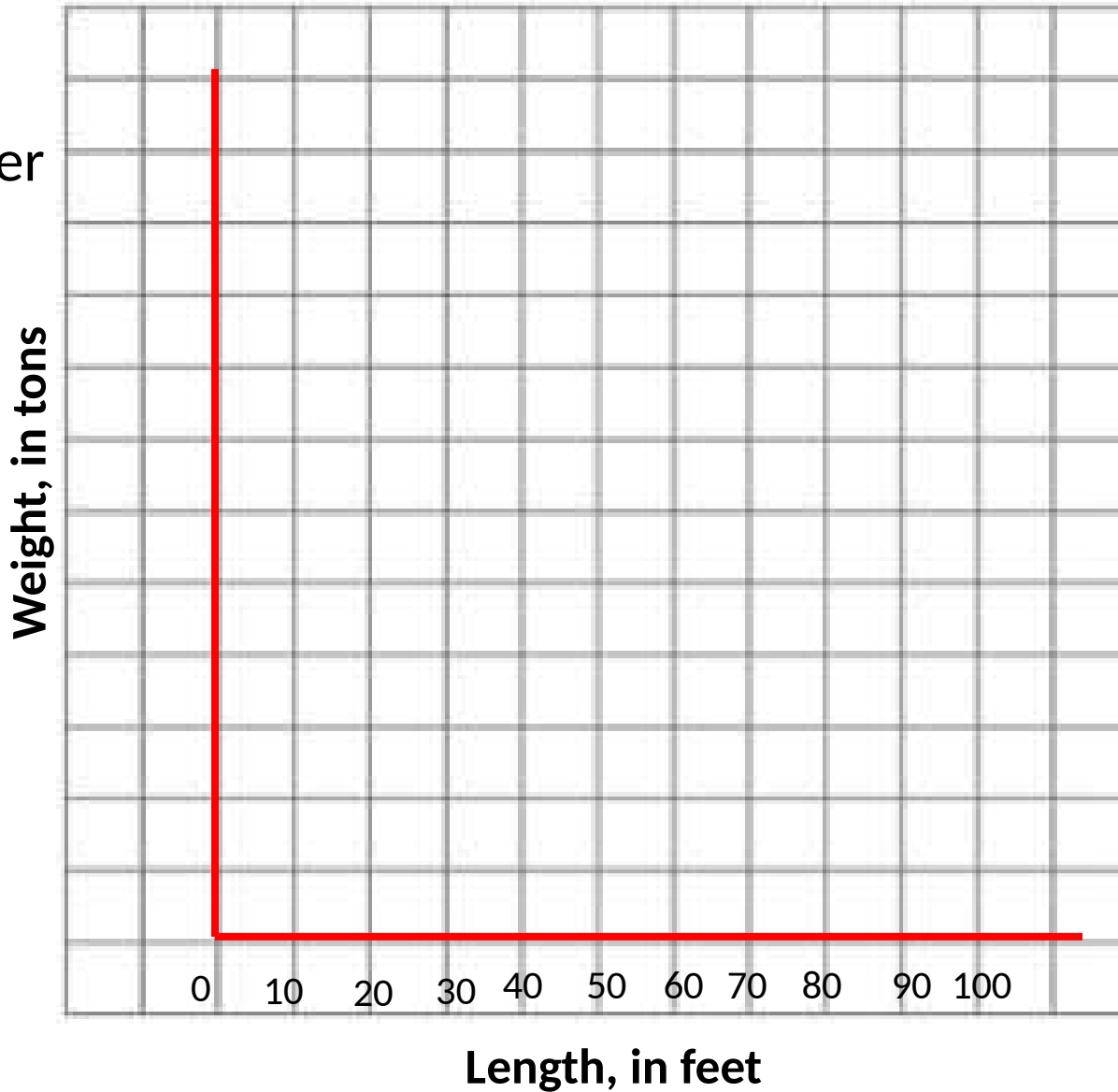
Let's Graph!

Number our
Length axis



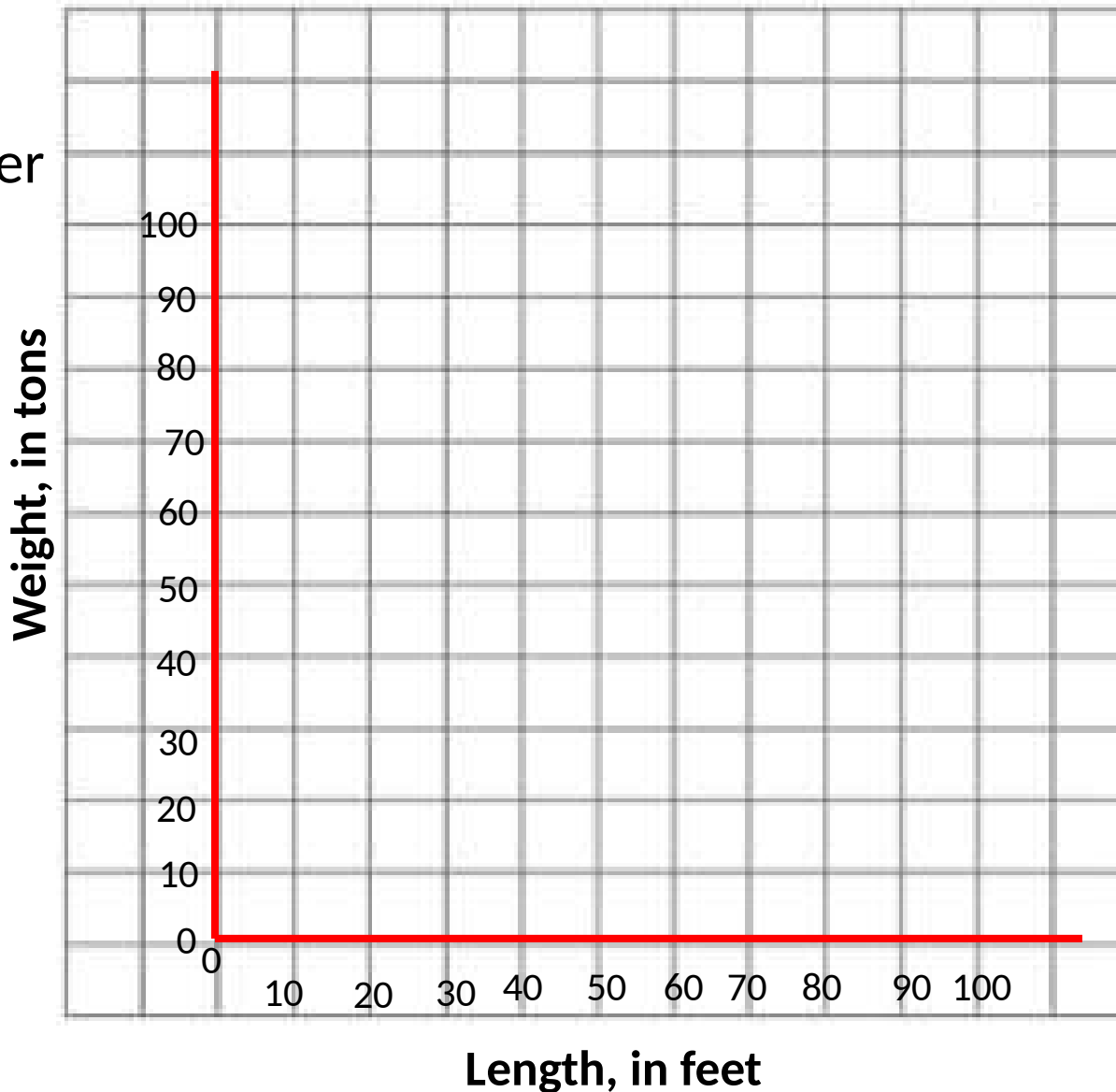
Let's Graph!

Now number
our weight
axis



Let's Graph!

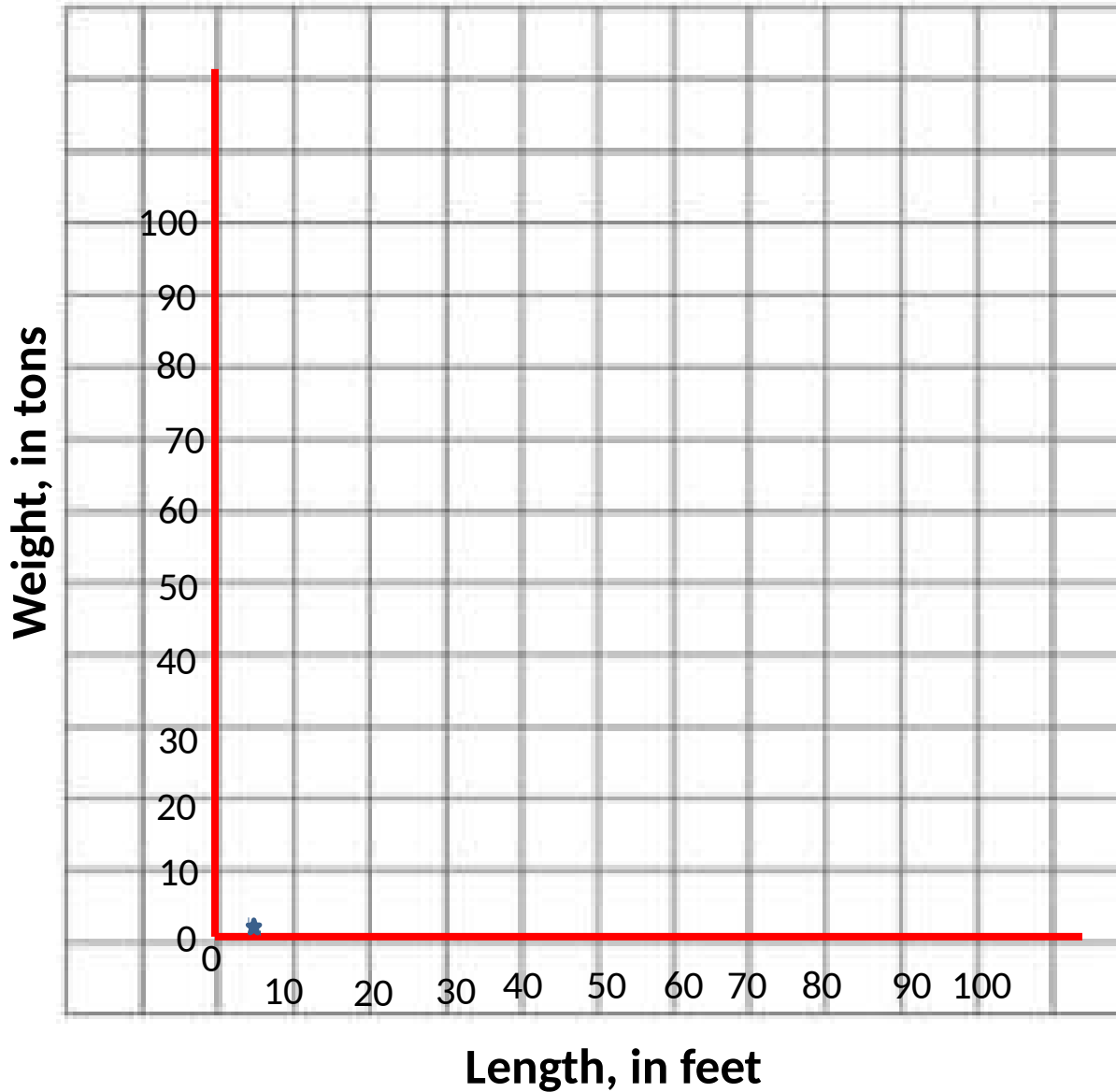
Now number
our weight
axis



Our weights
range from
0.05 to 100
tons.

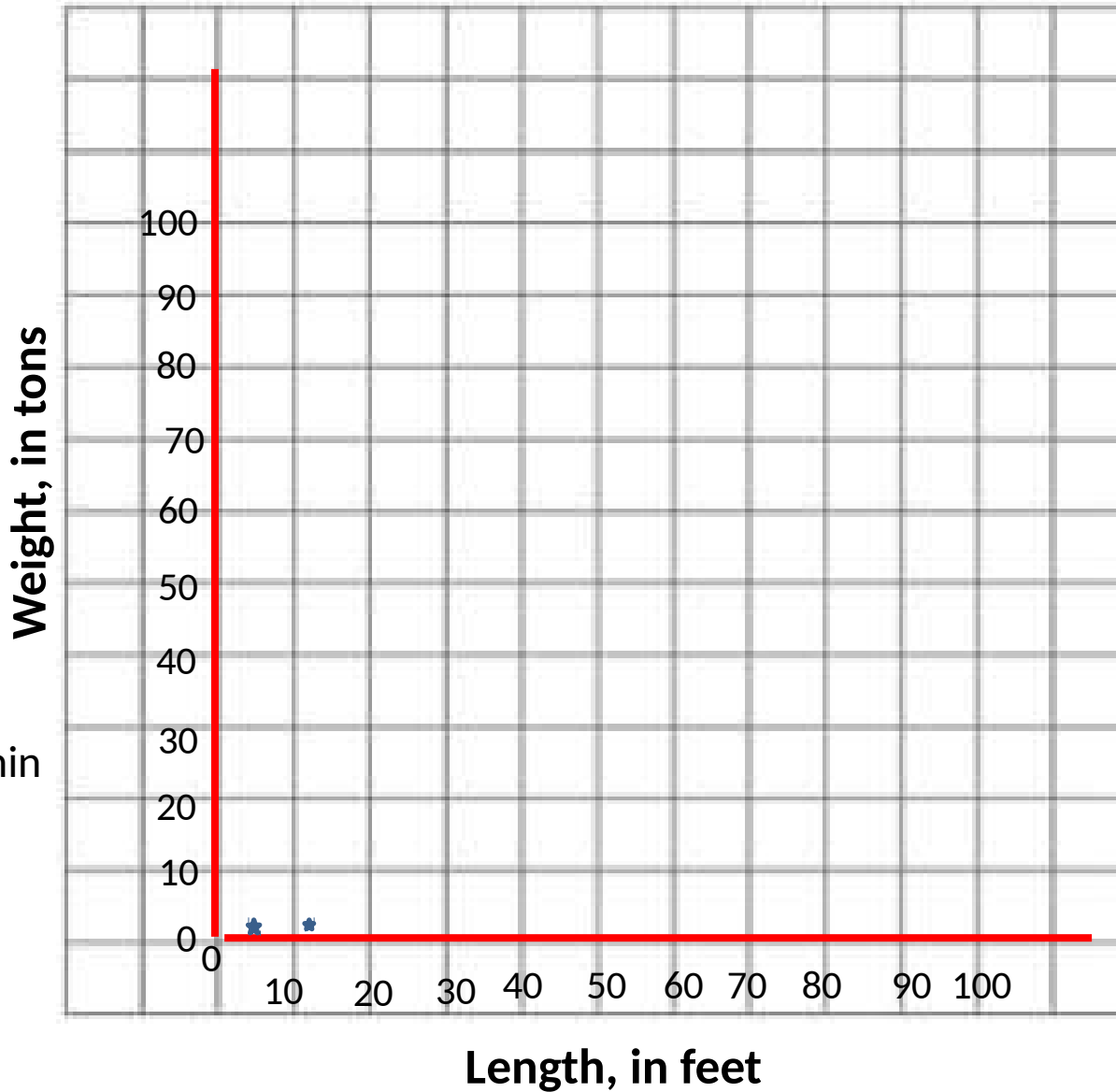
If we let each
box represent
10 tons, we can
label our graph
from 0 to 100
tons.

Let's Graph!



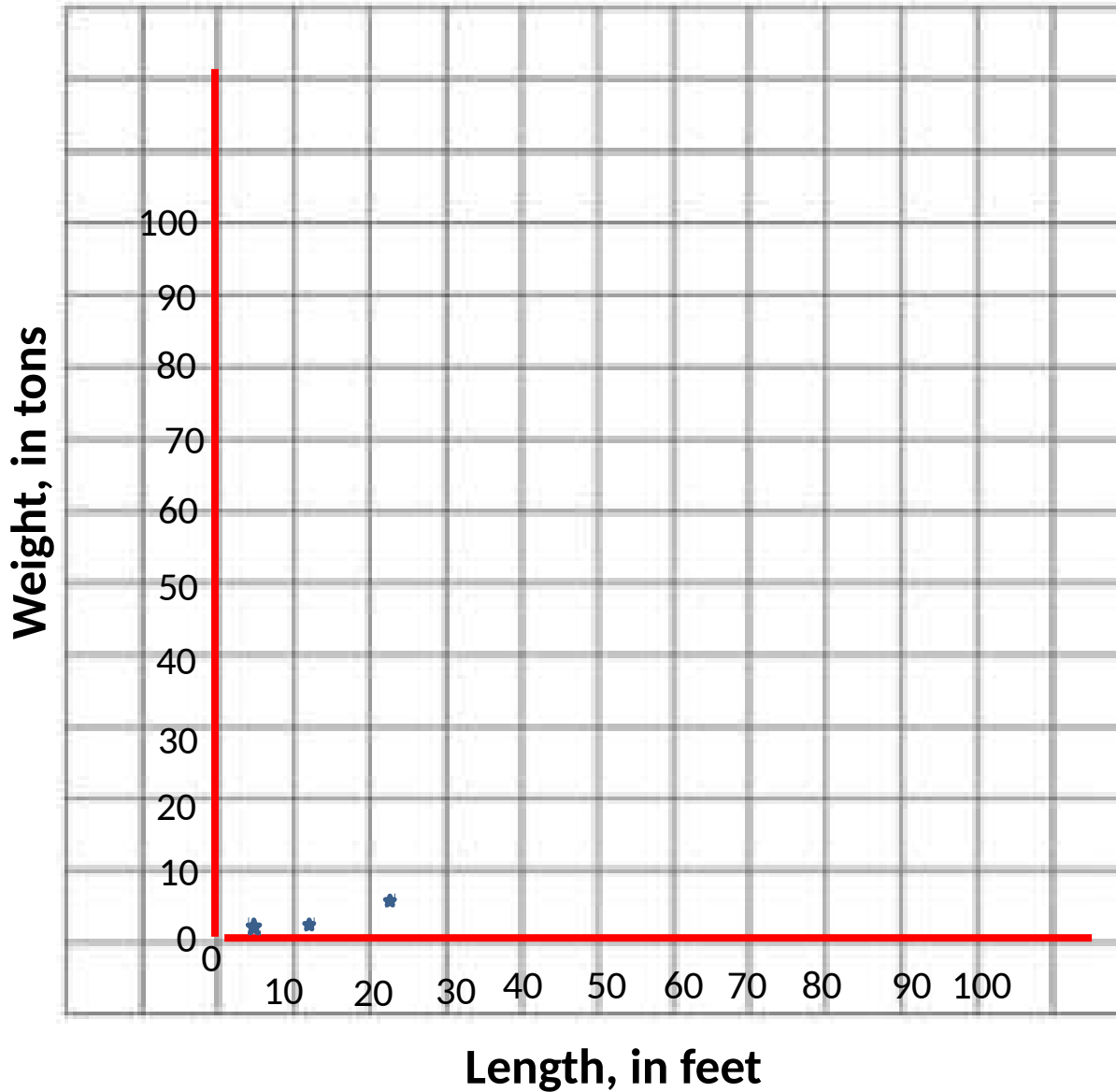
Harbor porpoise
5 ft long
0.05 tons

Let's Graph!



Bottlenose dolphin
12 ft long
0.5 tons

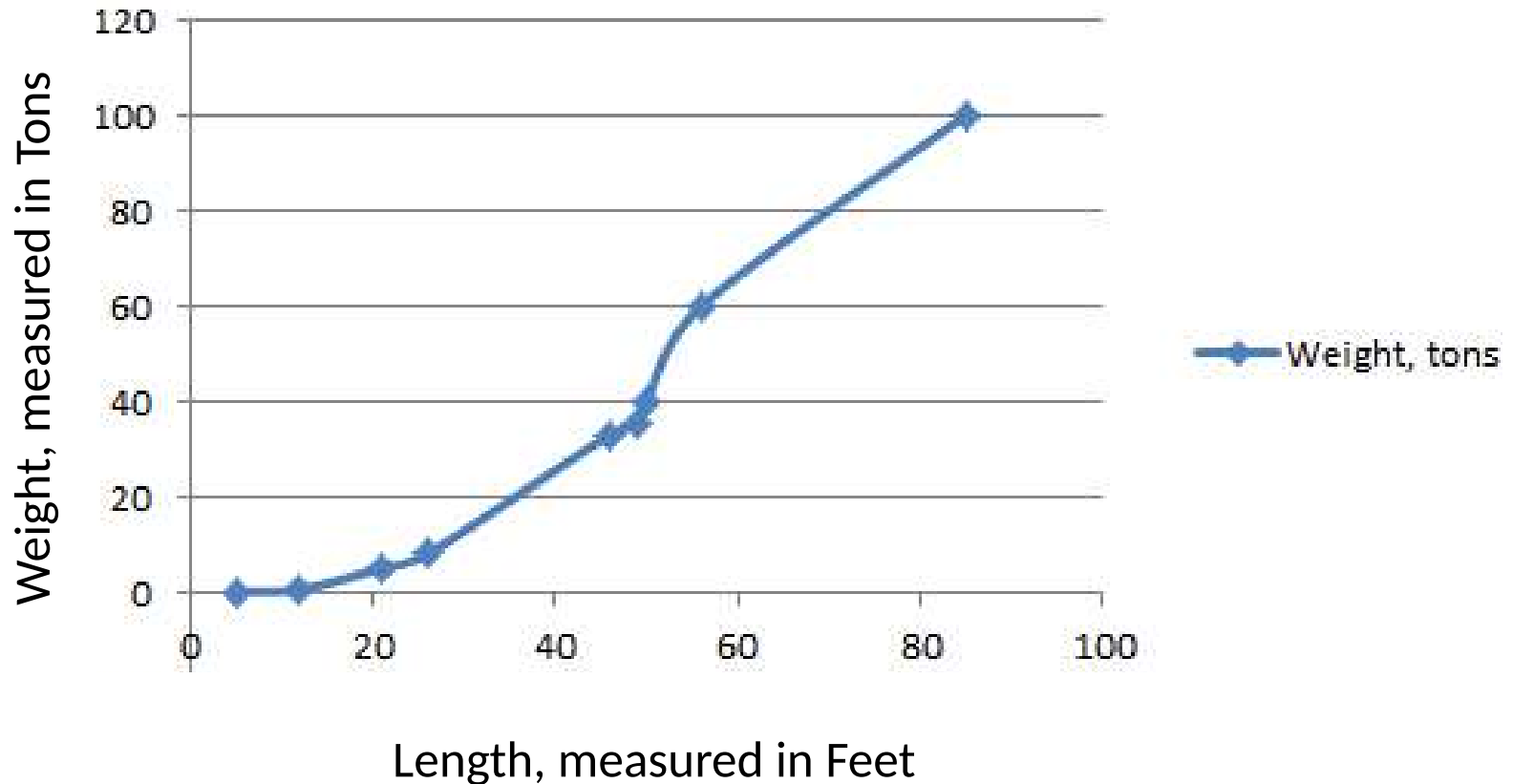
Let's Graph!



Cuviers
beaked whale
21 ft long
5 tons

Graphing Our Results

Weight, tons



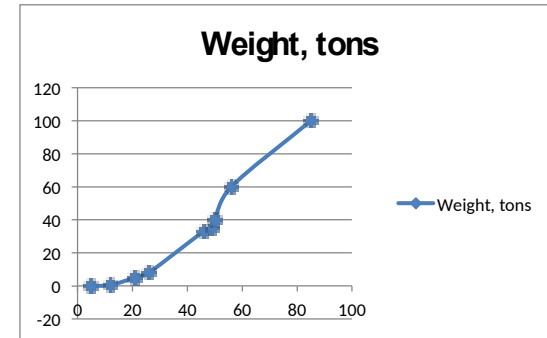
Measuring Whales Data Sheet

How Big Are Whales?

Order Cetacea	Scientific Name		How long?	How Long?	Average
	Genus	species	Length in Feet	Length in Meters	Weight, tons
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Can you solve?

- One ton = 2,000 pounds
- One kilogram (kg) = 2.2 pounds
- How many kilograms are in 1 ton?



Can you solve?

- One ton = 2,000 pounds
- One kilogram (kg) = 2.2 pounds
- How many kilograms are in 1 ton?

$$2,000 \div 2.2 = 909$$

There are 909 kilograms in 1 ton!



Acknowledgements

Lesson developed by Dr. Chris Simoniello for Bay Point Elementary 3rd Grade (adaptable for use with grades 1-4).
Standards-cross-referencing and formatting by Grant Craig.