

Cetacean Computation

OBJECTIVES

Given information about whale behavior, the student will be able to solve various math problems.

The student will be able to graph coordinates and interpret the data.

MATERIALS

- *Cetacean Computation* worksheet on pages 15-16.
- pencils
- calculator
- graph paper

ACTION

Distribute the *Cetacean Computation* worksheets to your students. Explain any new vocabulary words before students begin. Correct answers are given on page 14.

DEEPER DEPTHS

Have students write their own story problems using animal behavior.



Ethologists study animal behavior. This young "ethologist" is watching for gray whales off the coast of San Diego, California

Cetacean Computation

ANSWERS

1. $10,460 \text{ km (6,51111 miles)} \div 56 \text{ days} = 187 \text{ km per day (116 miles per day)}$
 $187 \text{ km (116 miles)} \div 24 \text{ hours} = 7.8 \text{ or } \mathbf{8 \text{ km per hour (4.8 or 5 miles per hour)}}$
2. $187 \text{ km (116 miles)} \times 7 \text{ days} = \mathbf{1,309 \text{ km (812 miles)}}$
3. $1 \text{ minute at the surface} + 4 \text{ minutes diving} = 5 \text{ minutes}$
 $1 \text{ minute} \div 5 \text{ minutes} = 0.2 = \mathbf{20\%}$
4. $(10 \text{ sec.} \times \text{total breaches}) + (10 \text{ sec.} \times \text{total bows}) = ? \text{ sec.}$
 $(10 \times 10) + (10 \times 22) = ? \text{ sec.}$
 $100 + 220 = \mathbf{320 \text{ sec.}}$
5. total time: $2 \text{ hr.} \times 60 \text{ min.} \times 60 \text{ sec.} = 7200 \text{ sec.}$
 lobtail time: $24 \text{ lobtails} \times 3 \text{ sec.} = 72 \text{ sec.}$
 $72 \text{ sec.} \div 7200 \text{ sec.} = ?$
 $72 \text{ sec.} \div 7200 \text{ sec.} = 0.01$
 $0.01 = \mathbf{1\%}$
6. add times: $(\text{breaches} + \text{bows}) + \text{lobtails} + \text{contacts} = ?$
 (from numbers 4 and 5 above) $320 + 72 + \text{time on contacts} = ?$
 $57 \text{ contacts with other dolphins} \times 3 \text{ sec.} = 171 \text{ sec.}$
 $320 + 72 + 171 = ?$
 $320 + 72 + 171 = \mathbf{563 \text{ sec.}}$
7. **8**
8. **4**
9. **2**

for questions 7-9:

n = number of bottlenose dolphin breaches

$1/2n$ = number of killer whale breaches

$2n$ = number of Pacific white-sided dolphin breaches

$$n + 1/2n + 2n = 14$$

$$3 \times 1/2n = 14$$

$$7/2n = 14$$

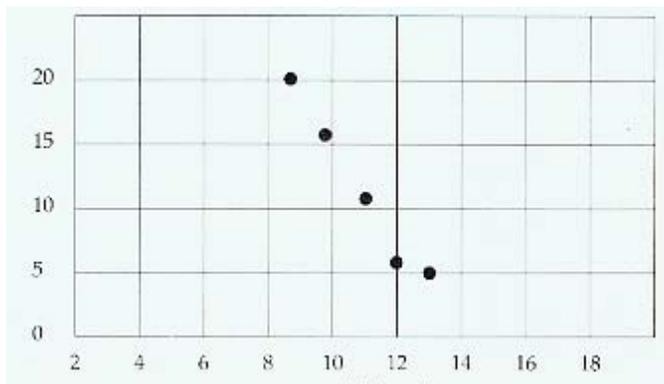
$$n = 14 \times 2 / 7$$

$$n = 28 / 7$$

$$\mathbf{n = 4}$$

10.

number of breaches



whale length

Cetacean Computation

A. WATCH THE WHALES

Gray whales migrate each year from Alaska to Baja California and back: about 10,460 km (6,500 miles) each way. They leave Alaska waters in November and arrive off Baja California, Mexico in January. This journey takes about 56 days. When traveling, they often breathe at the surface four times in about one minute, and then take a deep dive for four minutes.

Answer the following questions. Round your answers off to the nearest whole number.

1. What is a gray whale's average speed (in km or miles per hour)?
2. On the average, how far does a whale travel in one week?
3. What percentage of time does a whale spend at the surface?

B. TIME TALLY

You are an ethologist studying bottlenose dolphins. Last Tuesday you watched one dolphin for two hours and recorded these behaviors: 10 breaches, 24 lobtails, 22 bows, and 57 contacts with other dolphins. The dolphin spent the rest of the time swimming by itself.

Answer the following questions:

4. Breaches and bows last about 10 seconds each. During your observation period, how much time did the dolphin spend on these behaviors?
5. Lobtails last about 3 seconds each. What percentage of the total time did the dolphin spend lobtailing?
6. Contacts with the other dolphins each lasted 3 seconds. How much total time did the dolphin spend doing breaches, bows, lobtails, and contacts?

C. TIME TALLY TWO

At an oceanarium, in one pool, you observed 14 breaches in one hour. The Pacific white-sided dolphin breached twice as many times as the bottlenose dolphin. The killer whale breached one-half as many times as the bottlenose dolphin.

Answer the following questions:

7. How many breaches did you observe for the Pacific white-sided dolphin?

8. How many breaches did you observe for the bottlenose dolphin?

9. How many breaches did you observe for the killer whale?

D. BREACHES OF THE HUMPBACK

You are an ethologist studying the breaching of humpback whales in the western North Atlantic Ocean. You observed many whales and recorded the following data for those that breached. You estimated the length of each whale and the total number of breaches in the breaching sequence.

<i>whale</i>	<i>length</i>	<i>number of breaches</i>
1	12 in (39 ft.)	6
2	8.5 m (28 ft.)	20
3	11 m (36 ft.)	11
4	9.8 m (32 ft.)	16
5	13 m (43 ft.)	5

10. Using this data, graph number of breaches vs. length for these five whales. Given a whale 9 in (29.5 ft.) in length, estimate how many times it might breach in sequence.