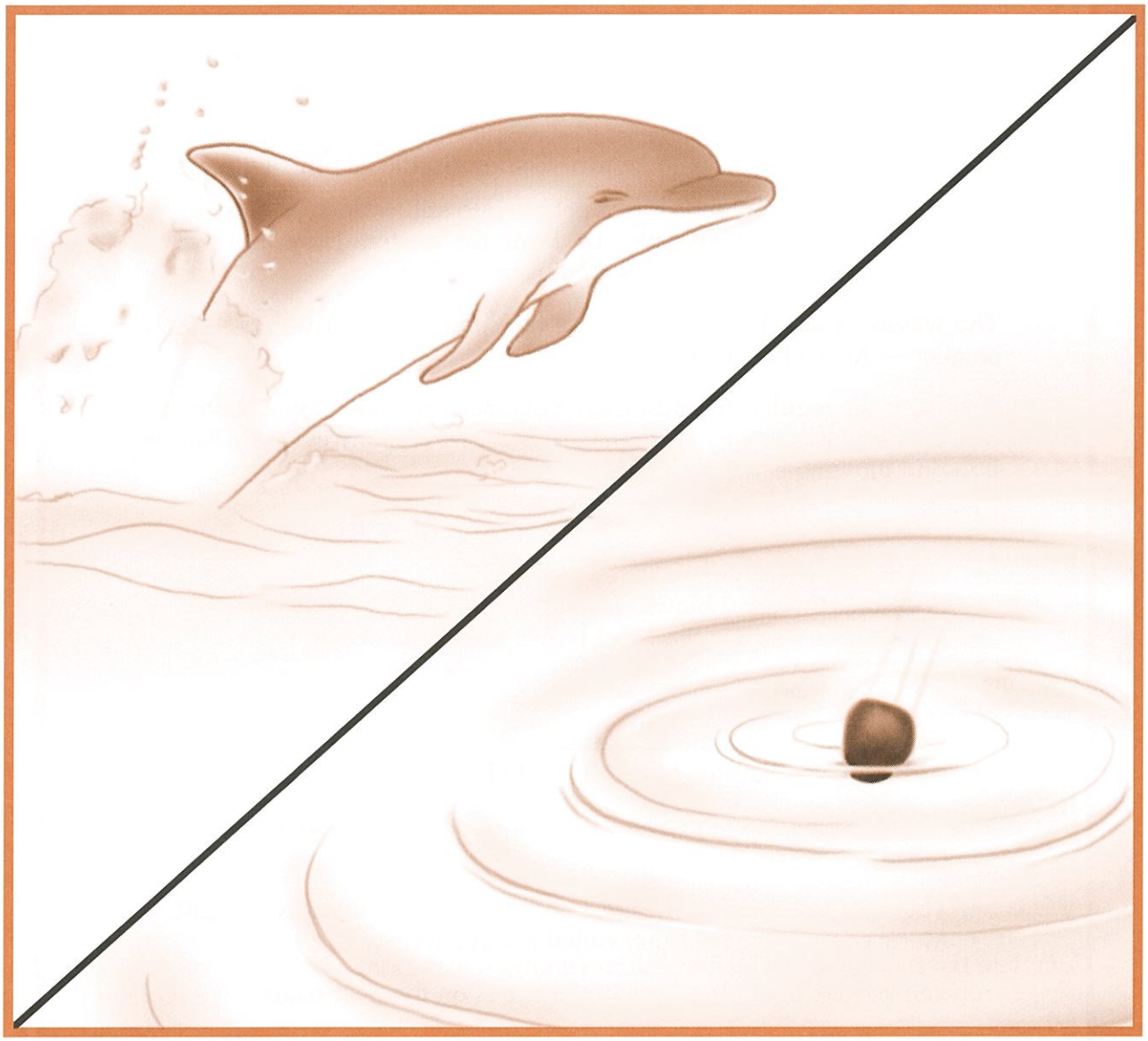
What are ocean waves?



KEY TERMS

crest: highest point of a wave
trough: lowest point of a wave
wave: regular up-and-down movement of water
wavelength: distance from one crest to the next crest

LESSON 4 | What are ocean waves?

What happens when you throw a pebble into still water? You see larger and larger rings moving outward from the center. They are **waves**. Waves transfer energy from one point to another.

The waves caused by the pebble are the same as ocean waves — only smaller — MUCH smaller.

A wave is the regular up-and-down movement of water. Some waves are caused by tides; some by earthquakes. Most waves, however, are caused by wind blowing across the water.

Wave size depends upon three things:

- wind speed
- how long the wind blows — and
- the fetch or how far the wind blows across the ocean

A water wave has two main parts —

- a high point called the **crest** and
- a low point called the **trough** [TROFF].

The distance between side-by-side crests — or side-by-side troughs is called the **wavelength**.

- The distance between the crest and its trough is the wave height.
- Many connected waves are called a wave train.

You can see the parts of a wave in Figure A on the next page.

PARTS OF A WAVE

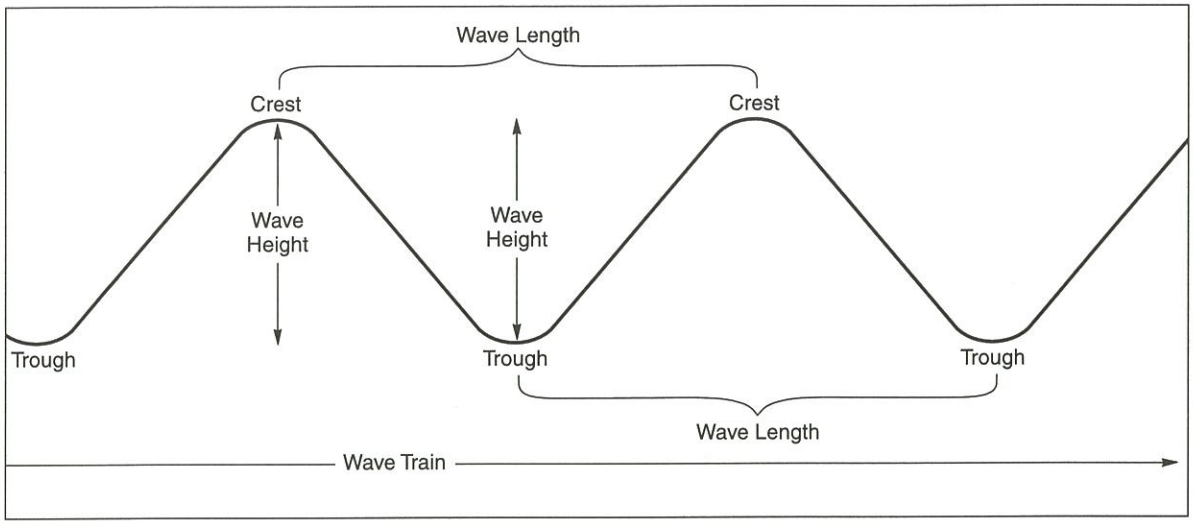


Figure A

1. In Figure B, identify the parts indicated by a letter. Write the correct name next to the letter.

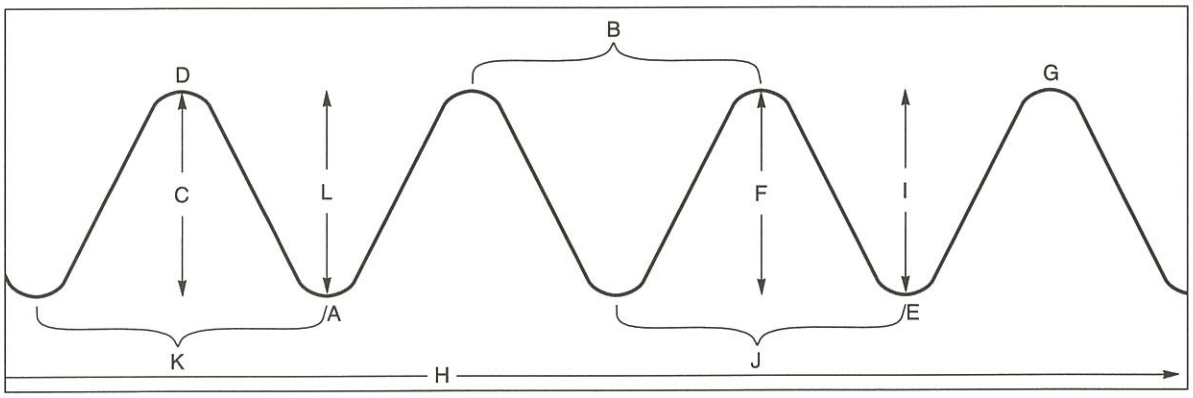


Figure B

a) _____ **b)** _____ **c)** _____ **d)** _____

e) _____ **f)** _____ **g)** _____ **h)** _____

i) _____ **j)** _____ **k)** _____ **l)** _____

2. What is the measurement of each of the following? (Use your metric ruler.)

   a) wave <u>height</u> _____ mm

   b) wave <u>length</u> _____ mm

3. **a)** Are all the waves of this wave train the same size? _____

   b) Take a guess — <u>Must</u> all the waves of a given wave train be the same size?

   _____

MAKE YOUR OWN WIND-DRIVEN WAVES (It's easy to do.)

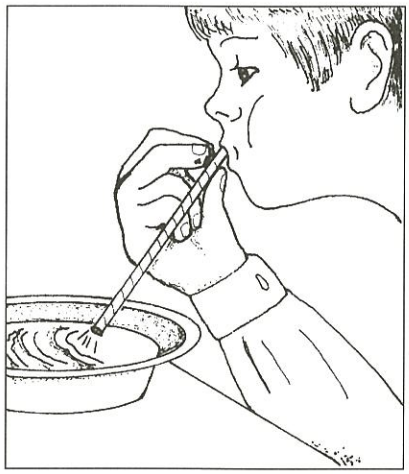


Figure C

1. Fill a saucer with water.
2. **a)** Using a straw, blow gently <u>across</u> the water.

   What do you see? _____

   b) Now blow <u>stronger</u>. What change do you notice? _____

What <u>two</u> conclusions can you reach?

1. _____
2. _____

UNDERSTANDING HOW OCEAN WATER MOVES

When you look at deep-sea waves (not shore waves), it seems that the water moves forward rapidly. But that is not true. Ocean water moves in a series of circular paths. Only the energy moves forward. Energy is passed along from water particle to water particle. The energy transfer is enormous. BUT there is surprisingly little forward movement of the water.

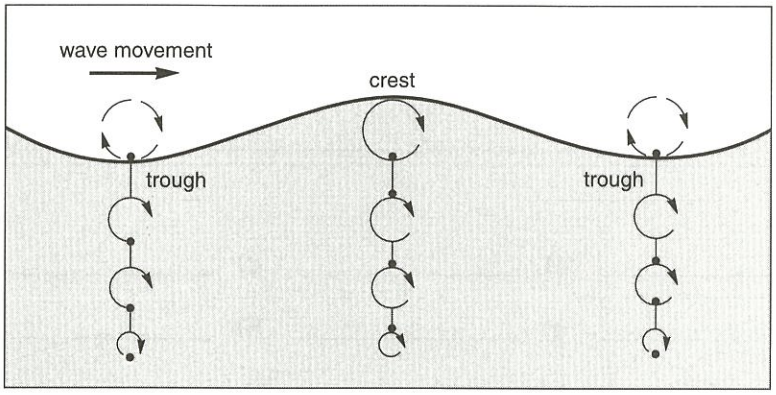
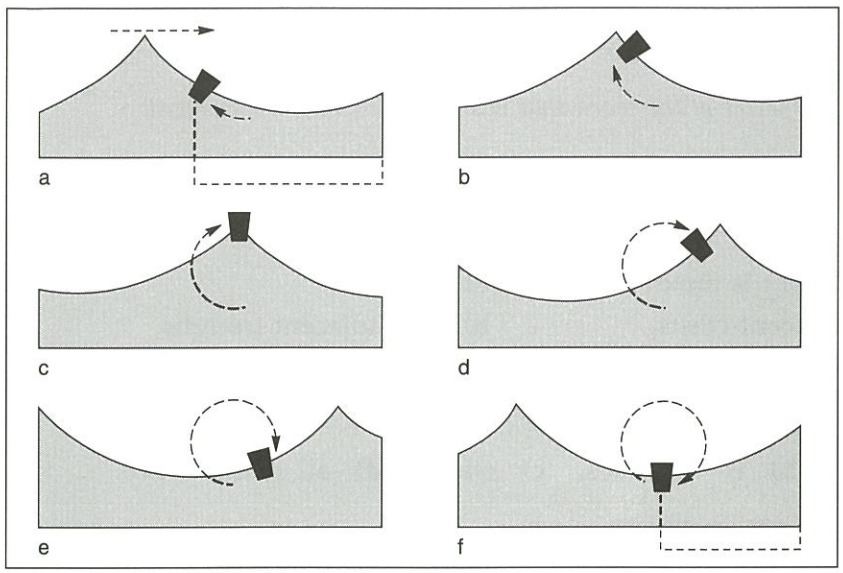


Figure D shows the circular movement of water particles. Notice that the energy transfer is <u>downward</u> as well as forward.

Figure D

1. As you go deeper, the energy circles become _____ .
   larger, smaller
2. This means that energy transfer _____ the deeper you go.
   increases, decreases



You can see the movement of water by watching a floating cork. Figure E shows a cork "riding the waves."

You can see that as a wave moves by, the cork moves slightly forward. But then it falls back as the wave passes.

Figure E

3. The cork moves with the water. If the water itself were moving forward rapidly, the cork would _____ .
   stay in the same place, move to the right

4. Compared to the starting position "a," the cork in "f" has moved _____ .
   only slightly forward, to the far right

5. This shows that the water itself _____ moved forward very far.
   has, has not

TIME FOR A BREAK(ER)!

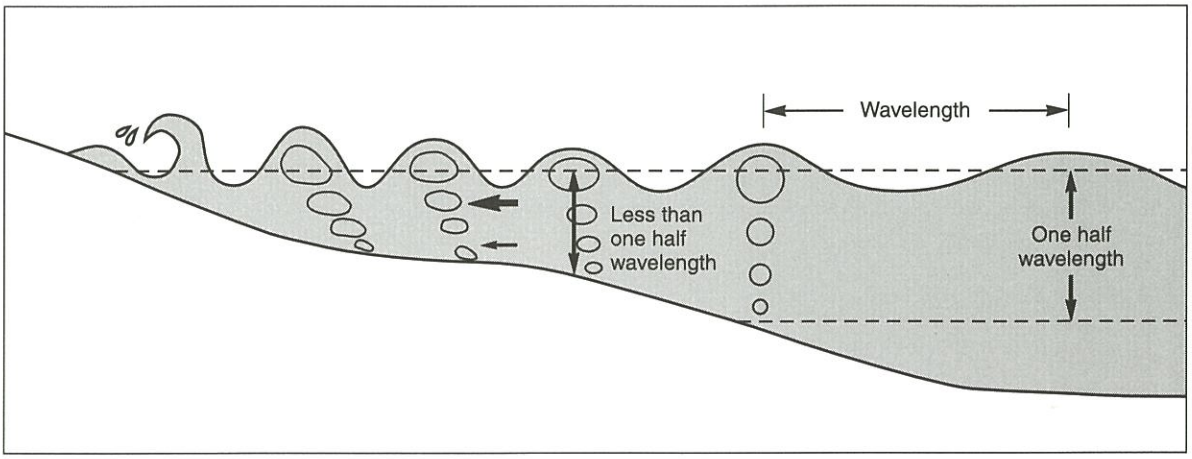


Figure F

As a wave moves toward the shore, the trough of the wave touches the ocean bottom. Friction slows down the wave. The top, or crest, keeps moving at the same speed. It gets farther and farther ahead of the trough. Finally, it falls over and forms a breaker.

MULTIPLE CHOICE

In the space provided, write the letter of the word that best completes each statement.

_____ **1.** A group of connected waves is called a
a) crest **b)** wave length **c)** wave train **d)** wave height

_____ **2.** A wave height is the distance between
a) two adjacent crests. **b)** two adjacent troughs.
c) a crest and a trough. **d)** both a and b.

_____ **3.** Waves are caused by
a) tides. **b)** earthquakes **c)** wind. **d)** all of the above.

_____ **4.** Most waves are caused by
a) tides. **b)** earthquakes. **c)** wind. **d)** volcanoes.

_____ **5.** The distance wind blows over water is called its
a) wavelength. **b)** fetch. **c)** mileage. **d)** swell.

_____ **6.** A wavelength is the distance between
a) two adjacent crests. **b)** two adjacent troughs.
c) a crest and a trough. **d)** both a and b.

_____ **7.** Wave size is affected by
a) wind speed. **b)** fetch. **c)** time wind lasts. **d)** all of the above.

_____ **8.** As a wave becomes a breaker, its wavelength
a) decreases. **b)** increases. **c)** does not change.
d) becomes a whitecap.

_____ **9.** As a wave becomes a breaker, its wave height
a) decreases. **b)** increases. **c)** does not change.
d) becomes a whitecap.