



# *At Home Learning Resources*

## **Grade 8 - Week 5**

**LOWELL PUBLIC SCHOOLS**

### **Grab and Go Meals**

*Available for Lowell Public Schools Students  
on Weekdays While School is Closed*

Butler (12:45 - 1:30pm) 1140 Gorham St.	Murkland (12:45 - 1:15pm) 350 Adams St.
Greenhalge (10:30 - 11:15am) 149 Ennell St.	Pawtucketville (12 - 12:30pm) 425 West Meadow Rd.
Lincoln (1:30 - 2pm) 300 Chelmsford St.	Robinson (11:30 - 11:45am) 110 June St.
Moody (12 - 12:30pm) 158 Rogers St.	STEM Academy (10:30am - 1pm) 43 Highland St. <i>Meal service at South St. entrance</i>
<b>NEW:</b> Morey (12 - 12:30pm) 130 Pine St.	<b>NEW:</b> Stoklosa (11 - 11:30am) 560 Broadway St.
<b>NEW:</b> Westminster Village Apartments (12.45 - 1:15pm) 1307 Pawtucket Blvd.	

When you pick up that day's lunch, you can also pick up breakfast for the next morning.

## Grade 8 ELA Week 5

Read the poems. Use the chart “Ways to Talk or Think about a Poem” to talk or think about the poems. Choose one of the strategies and write a response to each poem.

After reading the poems, try writing your own poetry. What language could you include? What message do you want to leave with your readers? Why is this important to you to write about? If you want, record your poem and share with your friends or teacher.

### Ways to Talk or Think About a Poem

Think about the big ideas

- What issues are in the poem?
- What does the poet want you to think about the issues?
- What is the theme of the poem?

Look closely at an image

- What does it mean?
- How does it reflect an idea, emotion, mood, or tone?

Look at the line breaks and stanza breaks

- How do the stanzas relate to each other?
- How do you connect one part with the next part?
- How do the breaks effect the poem’s meaning?
- What words are at the ends of the lines? Why?

Make inferences

- Who/what is in this poem?
- What are their relationships, ideas, feelings, or thoughts?
- How does the narrator, if there is one, interact with the poem? With the reader?

Relate the title to the poem

- How is it significant?

Clarify a confusing part

- Ask questions
- Look up words
- Talk your ideas through

Examine a metaphor or other literary device

- What things are being compared in the similes or metaphors? Why? How do they effect the meaning of the poem?
- How does the symbolism help you understand the poem?

Make a personal connection

## Stone

Go inside a stone  
That would be my way.  
Let somebody else become a dove  
Or gnash with tiger's tooth.  
I am happy to be a stone.

From the outside the stone is a riddle:  
No one knows how to answer it.  
Yet within, it must be cool and quiet  
Even though a cow steps on it full weight,  
Even though a child throws it in a river;

The stone sinks slow, unperturbed  
To the river bottom  
Where the fishes come to knock on it  
And listen.

I have seen sparks fly out  
When two stones are rubbed,  
So perhaps it is not dark inside after all;  
Perhaps there is moon shining  
From somewhere, as though behind a hill –  
Just enough light to make out  
The strange writings, the star charts  
On the inner walls.

- Charles Simic

## Love Poem for My People

do not let  
artificial lamps  
make strange shadows  
out of you  
do not dream  
if you want your dreams  
to come true  
you knew how to sing  
before you was  
issued a birth certificate  
turn off the stereo  
this country gave you  
it is out of order  
your breath  
is your promiseland  
if you want  
to feel very rich  
look at your hands  
that is where  
the definition of magic  
is located at

- Pedro Pietri

## Other

We notice each other right away.  
We are the only two Asians in the room.  
It does not matter that her hair is long.  
It does not matter that I am fat.  
I look at her like I look in a mirror,  
Recognizing my self in one quick glance.

- Janet S. Wong

## Mannahatta

I was asking for something specific and perfect for my city,  
Whereupon lo! Upsprang the aboriginal name.

Now I see what there is in a name, a word, liquid, sane, unruly, musical,  
self-sufficient,  
I see that the word of my city is that word from of old,  
Because I see that word nested in nests of water-bays, superb,  
Rich, hemm'd thick all around with sailships and steamships, an island  
sixteen miles long, solid-founded,  
Numberless crowded streets, high growths of iron, slender, strong, light,  
splendidly uprising toward clear skies,  
Tides swift and simple, well-loved by me, toward sundown,  
The flowing sea-currents, the little islands, larger adjoining islands, the  
heights, the villas,  
The countless masts, the white shore-steamers, the lighters, the ferry-boats,  
the black sea-steamers well model'd,  
The down-town streets, the jobbers' houses of business, the houses of  
business of the ship-merchants and money-brokers, the river-streets,  
Immigrants arriving, fifteen or twenty thousand in a week,  
The carts hauling goods, the manly face of drivers of horses, the brown-  
faced sailors,  
The summer air, the bright sun shining and the sailing clouds aloft,  
The winter snows, the sleigh-bells, the broken ice in the river, passing along  
up or down with the flood-tide or ebb-tide,  
The mechanics of the city, the masters, well-form'd, beautiful-faced, looking  
you straight in the eyes,  
Trottoirs throng'd, vehicles, Broadway, the women, the shops and the  
shows,  
A million people – manners free and superb – open voices – hospitality – the  
most courageous and friendly of young men,  
City of hurried and sparkling waters! city of spires and masts!  
City nested in bays! my city!

- Walt Whitman  
From Leaves of Grass

## Legacies

her grandmother called her from the playground  
    “yes, ma’am” said the little girl  
    “i want chu to learn how to make rolls” said the old  
woman proudly  
but the little girl didn’t want  
to learn how because she knew  
even if she couldn’t say it that  
that would mean when the old one died she would be less  
dependent on her spirit so  
the little girl said  
    “i don’t want to know how to make no rolls”  
with her lips poked out  
and the old woman wiped her hand on  
her apron saying “lord  
    these children”  
and neither of them ever  
said what they meant  
and i guess nobody ever does

- Nikki Giovanni

## In the Hospital Room

I turn my back  
on Grandmother  
as the nurse  
feeds her  
so she does not  
see me  
peeking  
from the corner  
of my eye  
at her mouth  
opening wide,  
too wide,  
the way a baby  
opens his mouth,  
not knowing  
its size.

- Janet S. Wong

Read the poem, "Where I'm From" by George Ella Lyon. Try writing your own, "Where I'm From" poem. Use the original to help you think of ideas. Use the model to help you think of what you can include from your life, your house, your neighborhood. Be creative, it can be where you are from now, or when you were little.

<p>Original Poem:  <b>Where I'm From</b>  <i>By George Ella Lyon</i>  I am from clothespins,  from Clorox and carbon-tetrachloride.  I am from the dirt under the back porch.  (Black, glistening,  it tasted like beets.)  I am from the forsythia bush  the Dutch elm  whose long-gone limbs I remember  as if they were my own.  I'm from fudge and eyeglasses,      from Imogene and Alafair.  I'm from the know-it-alls      and the pass-it-ons,  from Perk up! and Pipe down!  I'm from He restoreth my soul      with a cottonball lamb      and ten verses I can say myself.  I'm from Artemus and Billie's Branch,  fried corn and strong coffee.  From the finger my grandfather lost      to the auger,  the eye my father shut to keep his sight.  Under my bed was a dress box  spilling old pictures,  a sift of lost faces  to drift beneath my dreams.  I am from those moments--  snapped before I budded --  leaf-fall from the family tree.</p>	<p>Model Poem:  <b>Where I'm From</b>  <i>By Ms. Vaca</i>  I am from bookshelves,  from vinegar and green detergent.  I am from the dog hair in every corner  (Yellow, abundant,  the vacuum could never get it all.)  I am from azaleas  the magnolia tree  whose leaves crunched under my feet like  snow  every fall.  I'm from puzzles and sunburns,  from Dorothy Ann and Mary Christine  Catherine  I'm from reading and road trips  From "Please watch your brother" and  "Don't let your brother hit you!"  I'm from Easter sunrises and Iowa  churches at Christmas  I'm from Alexandria and the Rileys,  Sterzing's potato chips and sponge candy.  From my Air Force dad's refusal to go to  Vietnam,  from my mom's leaving home at 17.  On a low shelf in my new house is a stack  of photo albums,  carefully curated by my faraway father,  chronicling my childhood.  I am from these pages,  yellowed but firm,  holding on to me across the country.</p>
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## Find Out More

The number 49 is one of a set of numbers called perfect squares. A perfect square is a number that results from multiplying an integer by itself. The first 15 square numbers are shown.

$1^2 = 1$	$4^2 = 16$	$7^2 = 49$	$10^2 = 100$	$13^2 = 169$
$2^2 = 4$	$5^2 = 25$	$8^2 = 64$	$11^2 = 121$	$14^2 = 196$
$3^2 = 9$	$6^2 = 36$	$9^2 = 81$	$12^2 = 144$	$15^2 = 225$

Look at the equation you wrote on the previous page,  $s^2 = 49$ . How do you solve an equation where a variable squared is equivalent to a perfect square? You have solved equations before by using inverse operations. You solved addition equations by subtracting. You solved division equations by multiplying. What is the inverse operation of squaring a number?

The inverse operation of squaring is finding the **square root**. A square root of a number is any number that you can multiply by itself to get your original number. For example, 3 is a square root of 9, because  $3 \cdot 3 = 9$ . Another square root of 9 is  $-3$ , because  $(-3) \cdot (-3) = 9$ .

The symbol  $\sqrt{\quad}$  means *positive square root*. So,  $\sqrt{9} = 3$ .

$$s^2 = 49$$

The inverse of squaring is finding a square root.

$$\sqrt{s^2} = \sqrt{49}$$

Find the square root of both sides.

$$\sqrt{s^2} = \sqrt{7^2}$$

49 is a perfect square.

$$s = 7$$

The length of one side of the square is 7 inches.



## Reflect

- 1 What is the difference between dividing 16 by 2 and finding the square roots of 16?

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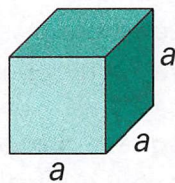


Read the problem below. Then explore how to solve equations with cubes and cube roots.

Each edge of a cube measures  $a$  feet long. The volume of the cube is  $125 \text{ ft}^3$ . What is the measure of each edge of the cube?

**Picture It**

Draw and label the cube.



Volume =  $125 \text{ ft}^3$

The length, width, and height of the cube each measure  $a$  feet.

**Solve It**

You can apply the formula for the volume of a cube.

The volume of the cube is the product of its length, width, and height.

$$a \cdot a \cdot a = V \quad \text{length} = a, \text{ width} = a, \text{ and height} = a$$

$$a^3 = V \quad \text{Substitute the given volume of the cube for } V.$$

$$a^3 = 125$$

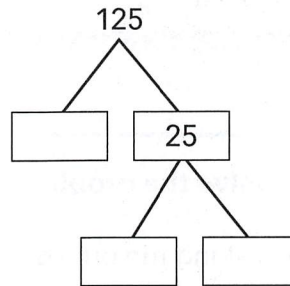
You can use this equation to find the value of  $a$ .



## Connect It

Now you will solve the problem from the previous page.

- 2 Complete the prime factorization of 125.



- 3 Write 125 as the product of three factors. \_\_\_\_\_
- 4 Write 125 as a power of base 5. \_\_\_\_\_
- 5 What does 125 have in common with  $a^3$  when 125 is written as a power? \_\_\_\_\_

The product of an integer multiplied together three times is a **perfect cube**. Finding the **cube root** is the inverse of cubing a number. The cube root of a number is the number that is multiplied together three times to produce the original number. The symbol  $\sqrt[3]{\quad}$  means *find the cube root*.

- 6 Look at Solve It on the previous page. The equation shows a variable cubed equal to a perfect cube. Use the cube root to complete the solution.

$$a^3 = 125$$

$$\sqrt[3]{a^3} = \sqrt[3]{\square}$$

$$\sqrt[3]{a^3} = \sqrt[3]{\square}$$

$$\underline{\quad} = \underline{\quad}$$

*Solution:* Each edge of the cube is \_\_\_\_\_ feet long.



## Try It

Use what you just learned to solve these problems. Show your work on a separate sheet of paper.

- 7 Solve:  $y^3 = 8$  \_\_\_\_\_
- 8 Solve:  $x^3 = 27$  \_\_\_\_\_



Read the problem below. Then explore how to use square roots and cube roots to solve word problems.

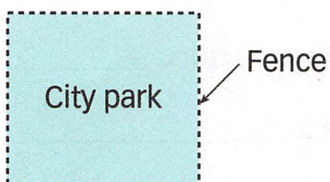
City Park is a square piece of land with an area of 10,000 square yards. What is the length of the fence that encloses the park?

**Picture It**

You can draw a diagram to help solve the problem.

The park is a square. The fence runs along the outside edge of the park.

Area = 10,000 yd<sup>2</sup>



The length of the fence is the perimeter of the square.

**Solve It**

To find the perimeter of the square park, you need to know the length of one side of the square.

Let  $f$  be the length of one side of the square.

$A = 10,000$       Area of the park is 10,000 yd<sup>2</sup>

$f^2 = 10,000$       Area equals the length of one side squared.



## Connect It

Now you will solve the problem from the previous page.

9 What number squared equals 10,000? \_\_\_\_\_

10 Look at Solve It on the previous page. Solve the equation for  $f$ .

$$f^2 = 10,000$$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

11 What is the length of each side of the park? \_\_\_\_\_

12 Write and solve an equation to find the perimeter of the park. \_\_\_\_\_

13 What is the length of the fence that encloses the park? \_\_\_\_\_

14 The park's rectangular garden area is 450 square yards. Its length is twice its width. Find the dimensions of the garden. Begin with the equation  $(2w)(w) = 450$ .

Rewrite the equation using exponents. \_\_\_\_\_

Divide both sides by 2. \_\_\_\_\_

Solve and write the garden's dimensions. \_\_\_\_\_



## Try It

Use what you just learned about square roots and cube roots to solve these problems.

15 The volume of a cube is  $1,000 \text{ cm}^3$ . What is the length of an edge? \_\_\_\_\_

16 A gift box in the shape of a cube has a volume of  $216 \text{ cm}^3$ . What is the area of the base of the box? \_\_\_\_\_

17 A scientist finds the temperature of a sample at the beginning of an experiment is  $t^\circ\text{C}$ . After 1 hour, the temperature is  $t^2^\circ\text{C}$ . If the temperature after 1 hour is  $81^\circ\text{C}$ , what are two possible original temperatures? What is the difference between the possible original temperatures? \_\_\_\_\_



## Find Out More

Scientists often work with very large numbers, such as the distance from Venus to the Sun or the number of cells in a human body. Writing and calculating with very large numbers can be tedious and inconvenient.

When you wrote 60,000,000 as  $6 \times 10^7$ , you used **scientific notation**. Scientific notation uses exponents to make it easier to work with very large or very small numbers. To write a number using scientific notation, write it as a product of two factors:

a number that is greater than  
or equal to 1 but less than 10

$$\rightarrow 6 \times 10^7 \leftarrow$$

a power of 10

To write the number 1,850,000 in scientific notation,

$$1,850,000 = 1\underbrace{850000}_{\text{wavy arrows}}$$

$$= 1.85 \times 10^6$$

Move the decimal point to get a number between 1 and 10.

The power of 10 is equal to the number of place values that the digits increase.

The power doesn't tell you the number of zeros in your answer. Rather, it tells you how many place values the digits increase.

To write the number  $3.54 \times 10^5$  in standard form, we move each digit in 3.54 up 5 place values because we are multiplying by  $10^5$ .

$$3.54 \times 10^5 = 3.\underbrace{54000}_{\text{wavy arrows}} = 354,000$$

To translate between scientific notation and standard notation, change the place values of the digits according to the power of 10.



## Reflect

- Write  $6.85 \times 10^8$  in standard form. Show your work.

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Read the problem below. Then explore how to write very small numbers using scientific notation.

Seven nanoseconds is equivalent to 7 one-billionths of a second, or 0.000000007 second. Write 0.000000007 in scientific notation.



## Picture It

Look at the patterns in the chart below.

100	$10 \cdot 10$	$10^2$
10	10	$10^1$
1	1	$10^0$
0.1	$\frac{1}{10} = \frac{1}{10^1}$	$10^{-1}$
0.01	$\frac{1}{10 \cdot 10} = \frac{1}{10^2}$	$10^{-2}$
0.001	$\frac{1}{10 \cdot 10 \cdot 10} = \frac{1}{10^3}$	$10^{-3}$
0.0001	$\frac{1}{10 \cdot 10 \cdot 10 \cdot 10} = \frac{1}{10^4}$	$10^{-4}$



## Model It

You can write the decimal as a fraction.

$$\begin{aligned} 0.000000007 &= \frac{7}{1,000,000,000} \\ &= 7 \cdot \frac{1}{1,000,000,000} \end{aligned}$$



## Solve It

You can write the number as the product of a number that is greater than or equal to 1 but less than 10. When you multiply by a number by a power of 10, the decimal point moves to the right, or the place value of each digit moves up.

$$0.000000007 \quad \text{Move the decimal point 9 places to the right.}$$



## Connect It

Now look at different ways to solve the problem.

2 Write 1,000,000,000 as a product of 10s. \_\_\_\_\_

3 Write 1,000,000,000 as a power of 10. \_\_\_\_\_

4 Look at the table on the previous page. Write  $\frac{1}{1,000,000,000}$  as 10 to a power to complete the equation:  $7 \cdot \frac{1}{1,000,000,000} = \underline{\hspace{2cm}} \times \underline{\hspace{2cm}}$

5 Look at Solve It. When you have to move the decimal point to the right to express a number in scientific notation, will the power of 10 be positive or negative? \_\_\_\_\_

6 When a number is written in scientific notation, a \_\_\_\_\_ exponent means the number is greater than 1 and a \_\_\_\_\_ exponent means the number is between 0 and 1.

7 Is  $2.14 \times 10^{-5}$  greater than 1 or between 0 and 1? Explain.

\_\_\_\_\_

8 Write  $2.14 \cdot 10^{-5}$  in standard form.

$$2.14 \times 10^{-5} = \frac{214}{100} \times \frac{1}{10^5}$$

$$= \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

9 Explain how to write  $2.14 \cdot 10^{-5}$  in standard form by moving the decimal point.

\_\_\_\_\_



## Try It

Use what you just learned to solve these problems. Show your work.

10 Write 63,120,000 in scientific notation. \_\_\_\_\_

11 Write  $9.054 \times 10^{-6}$  in standard form. \_\_\_\_\_



**Read the problem below. Then explore how to compare numbers written in scientific notation.**

Earth is about  $1.5 \times 10^8$  kilometers from the Sun, while the planet Neptune is almost  $4.5 \times 10^9$  kilometers from the Sun. The distance from Neptune to Earth is about how many times the distance from the Sun to Earth?

**Model It**

**You can write the distances of the planets from the Sun in standard form and compare them.**

$$1.5 \times 10^8 \text{ kilometers} = 150,000,000 \text{ kilometers}$$

$$4.5 \times 10^9 \text{ kilometers} = 4,500,000,000 \text{ kilometers}$$

To find how many times as great 4,500,000,000 is than 150,000,000, divide.

$$4,500,000,000 \div 150,000,000$$

**Model It**

**You can compare the distances of the planets from the Sun using scientific notation.**

To compare  $1.5 \times 10^8$  and  $4.5 \times 10^9$ :

First, compare 1.5 and 4.5.

4.5 is how many times as great as 1.5?

Then, compare  $10^8$  and  $10^9$ .

$10^9$  is how many times as great as  $10^8$ ?





Solve the problems.

**1** Which of the following expressions is equivalent to 5,710,900?

- A**  $5.7109 \times 10^{-6}$
- B**  $57109 \times 10^2$
- C**  $5.7109 \times 10^3$
- D**  $5.7109 \times 10^6$

**2** The average distance from Pluto to the Sun is about  $6 \times 10^9$  kilometers. The average distance from Mars to the Sun is  $2 \times 10^8$  kilometers. The average distance from Pluto to the Sun is about how many times as great as the average distance from Mars to the Sun?

times

**3** Last year a business earned  $4.1 \times 10^6$  dollars in income. This year the business earned  $2.05 \times 10^8$  dollars in income. Which **best** describes how this year's earnings compare to last year's earnings?

- A** This year the business earned about 0.5 times as much as it did last year.
- B** This year the business earned about 2 times as much as it did last year.
- C** This year the business earned about 50 times as much as it did last year.
- D** This year the business earned about 100 times as much as it did last year.



4 Write the following numbers in order from *least* to *greatest*.

$5 \times 10^{-6}$	$-9 \times 10^{-3}$
$-0.0000002$	$0.00007$

Least  $\xrightarrow{\hspace{15em}}$  Greatest

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5 Cara was using her calculator to solve a problem. The answer that displayed was  $1.6E+12$ . She knows that she entered all of the numbers correctly. Why did the calculator give the answer it did? What is the answer to Cara's problem?

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6 The length of a city block running north to south in New York City is about  $5 \times 10^{-2}$  miles. The distance from New York City to Mumbai, India, is about  $7.5 \times 10^3$  miles. The distance from New York City to Mumbai is about how many times the length of a New York City north-south block?

**Show your work.**

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**Answer** \_\_\_\_\_

**Self Check** Go back and see what you can check off on the Self Check on page 1.

# PADDLE POWER

## The Challenge

Build a boat that paddles itself using a rubber band as its power source.

In this challenge, kids (1) follow the design process to make a boat out of cups; (2) design and build working paddles; (3) use rubber bands to store and release energy; and (4) figure out ways to attach their paddles to their boats.

### 1 Introduce the challenge (5 minutes)

Begin by looping a rubber band over your thumb and index finger. Slide a 1 x 2-inch piece of chipboard through the rubber band and wind it up. Let go so the chipboard spins. Begin by telling kids the challenge. Tell them that they'll be using this kind of rubber-band-powered paddle to drive a boat across a container of water. Then get them thinking about storing and releasing energy. Ask:



- Where was the energy stored that made the paddle spin? (*In the rubber band*)
- Tell kids that the term for stored energy is **potential energy**. Ask, "How can you increase a rubber band's potential energy?" (*Wind it up more.*)
- How can you tell when potential energy stored in the rubber band is being used? (*Something moves.*)
- Tell kids the term for motion energy is **kinetic energy**. Ask, "What are some examples of kinetic energy that occur when a paddleboat moves through the water?" (*The rubber band unwinds; the paddle spins; the boat moves; waves spread out*)

### 2 Brainstorm and design (10 minutes)

Show kids the materials and ask, "How can you use these materials to make a boat that paddles itself through the water using a rubber band as its power source?" After discussing their ideas, have them sketch their designs on a piece of paper or in their design notebooks.

### 3 Build, test, evaluate, and redesign (35 minutes)

Distribute the challenge sheet and have kids begin building. If any of the following issues come up, ask kids questions to get them thinking about how they might solve their problems.

- Kids are all doing the exact same design. *Suggest different boat designs, such as: (1) Seal a cup by putting tape over the opening and floating it on its side; (2) Cut a cup in half lengthwise and tape the halves together to form an open boat; (3) Tape several cups together to make a raft; and (4) Use the chipboard for the boat's bottom and sides.*
- Water leaks into the cup. *Seal openings with duct tape.*
- The paddles are hard to attach to the cup. *(1) Tape straws or wooden skewers along the sides of a cup (or poke them through the sides and bottom) so they stick out far enough to loop a rubber band over them. (2) Build a frame out of straws or wooden skewers and mount it between two cups. Attach the rubber band and paddle to this frame.*



SHOW KIDS THE RELATED TV EPISODE



Photo: Parrish Kennington

In Paddle Power, kids figure out how to power a boat through the water. Show them the Aquatic Robotics episode in which *Design Squad* teams attempt to build a radio-controlled underwater robot. Get it online at [pbs.org/designsquad](http://pbs.org/designsquad).



Photo: Lauren Feinberg

A paddleboat moves when the rubber band's stored (**potential**) energy is converted into motion (**kinetic**) energy and spins the paddle.



Photo: Lauren Feinberg

Testing in a large container of water lets the boats paddle a good distance before hitting a side.

- The chipboard paddle warps when it gets wet. *Protect it by wrapping it in duct tape.*
- The paddle hits the frame that holds it. *Reposition the rubber band; widen or lengthen the frame; make the paddle smaller.*
- The frame holding the rubber band bends when the rubber band is wound tight. *Make sure the frame is securely taped to the cup. See if adding a crosspiece can help stiffen the frame. Also, move the rubber band toward the cup. The closer it is to the cup, the harder it will be to bend the frame. Finally, use wooden skewers. They're stronger than straws.*
- The boat tips and does not let the paddle hit the water properly. *Add weight to the boat to control its position. Tape a washer or two to the bottom of the hull. Weight used to keep a boat upright is called **ballast**.*

#### 4 Discuss what happened (10 minutes)

Have kids talk about their designs and how they solved any problems that came up. Emphasize the key themes in this challenge—potential and kinetic energy—by asking questions such as:

- What are some examples of potential and kinetic energy in your paddleboat? *(An example of potential energy is the wound rubber band. Examples of kinetic energy include the things that moved, like the paddle, rubber band, boat, and water.)*
- How can you store a lot of energy in your boat? *(Wind up the rubber band tighter, or use more than one rubber band.)*
- What was the hardest problem to solve when building your boat? *(Answers will vary, but perfecting the paddles and attaching them to the cup is often quite challenging.)*

## FOR EVENTS

- Draw kids into your area by asking, “How quickly can you get a boat to power itself through the water?”
- It's hard to make boats that float well with cups smaller than 8 ounces. If you want to give kids more design options, offer them two different-sized cups, such as 8- and 12-ounce cups.
- Test boats in large containers. Kiddie pools, underbed storage containers, or wallpaper trays offer kids longer, more satisfying travel times for their boats. In addition, even when a boat doesn't go straight, it can still go reasonably far before hitting a side.
- To avoid overcrowding, provide one kiddie pool per 20 participants expected, one underbed storage container per 10 kids expected, or one wallpaper tray per 4 kids expected. Since kids won't all be testing at once, these numbers will provide plenty of open water for testing.
- Large containers filled with water are heavy and awkward. Put the container where you want it on the floor of the testing area. Then use a bucket to fill and empty it.
- Have towels on hand to mop up spills.

To determine how many materials you'll need for different-sized events, for information on obtaining large quantities of materials, and for other general event tips, see page 7.

# PADDLE POWER



## YOUR CHALLENGE

Design and build a boat that paddles itself across a container of water using a rubber band as its power source.

## BRAINSTORM & DESIGN

Look at your materials and think about the questions below. Then sketch your ideas on a piece of paper or in your design notebook.

1. How can you use these materials to make a boat that floats well?
2. How will you attach a rubber band and paddle to your boat?
3. How big a paddle do you need so that it reaches the water and drives the boat?
4. How will you make sure your boat doesn't sink, tip, or roll over?

## BUILD, TEST, EVALUATE & REDESIGN

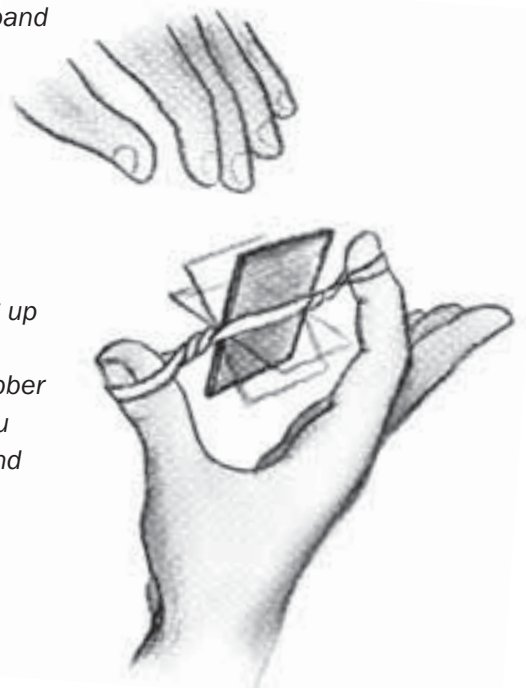
Use the materials to build your paddleboat. Then test it by winding it up, putting it in the container of water, and releasing it. When you test, your design may not work as planned. The saying, "If at first you don't succeed, try, try again," is at the heart of the design process. Testing a design and then revising it based on what you've learned is a key to success. Study the problems and then redesign. For example, if your paddleboat:

- tips—*Add some weight to the bottom of the boat to help keep it upright.*
- has a warped paddle—*Think of some ways to waterproof the paddle.*
- has a paddle that hits the frame holding it—*See if moving the rubber band makes a difference. Also consider changing the size of the frame or the paddle.*
- has parts that bend when the rubber band is wound tight—*Make sure parts are taped on securely. Also, see if moving the rubber band makes a difference. The closer it is to the boat, the harder it will be to bend things. Finally, find ways to add support to any parts that bend.*
- doesn't make it across the container—*Experiment with ways of storing up more energy. Your boat moves by changing stored energy (**potential energy**) into motion energy (**kinetic energy**). The more you wind the rubber band (or the more rubber bands you use), the more potential energy you store. When you let go, this potential energy turns into kinetic energy, and the boat moves.*

as built on TV<sup>TM</sup>  
[pbs.org/designsquad](http://pbs.org/designsquad)

### MATERIALS (per person)

- chipboard (8 ½ x 11 sheet)
- wide container partially filled with water (e.g., kiddie pool, bathtub, underbed storage container, wallpaper tray)
- duct tape
- 2 paper cups (8 ounce or larger)
- 5 rubber bands
- scissors
- towels (paper or cloth)
- 4 straws
- washers (1-inch or larger)
- 4 wooden skewers



# TAKE IT TO THE NEXT LEVEL

- Watch your fingers! Add an on-off switch so you can start and stop the paddle.
- Ready. Set. Go! Experiment with the paddle, the rubber band, or the boat's shape to increase its speed. Then race other paddleboats.
- Tugboat time! Carry or tow a Ping-Pong ball from one side of the container to the other.

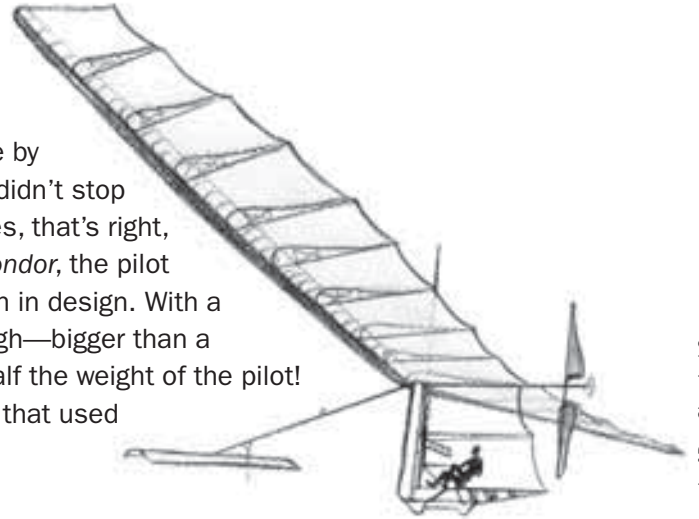
## MAKE IT ONLINE

### Is that a bird or a plane?

Build an airplane that flies by flapping its wings out of wood, wire, tissue paper, rubber bands, and glue. See how on Make Magazine's project page at [makezine.com/designsquad](http://makezine.com/designsquad).

# ENGINEERING IN ACTION

Engineer Paul MacCready was always intrigued by the way birds soared through the air. As an adult, he brought his passion to life by building gliders that won contests and set records. His success didn't stop with gliders—he built the world's first human-powered aircraft. Yes, that's right, *human* powered! In one of MacCready's planes, the *Gossamer Condor*, the pilot pedaled a modified bike to spin a propeller. It was a breakthrough in design. With a wingspan of 96 feet, the *Condor* was 30 feet long and 18 feet high—bigger than a tractor-trailer truck. And it weighed only 70 pounds—less than half the weight of the pilot! MacCready made his planes light and strong with clever designs that used materials in new ways. His motto was “do more with less.”



**Look at the materials below. MacCready used all but one to build the Condor. Guess which one wasn't a part of his incredible flying machine?**

- |  |                           |                                |
|--|---------------------------|--------------------------------|
| <b>A.</b> Mylar® plastic (like in silver balloons) | <b>C.</b> Bicycle parts   | <b>F.</b> Piano wire           |
| <b>B.</b> Aluminum tubes                           | <b>D.</b> Cardboard       | <b>G.</b> Clear household tape |
|  | <b>E.</b> Titanium panels | <b>H.</b> Styrofoam®           |

(Answer: E. Titanium panels. Even though titanium is a lightweight metal, it's still a lot heavier than Mylar®.)



**Watch the DESIGN SQUAD Aquatic Robotics episode on PBS or online at [pbs.org/designsquad](http://pbs.org/designsquad).**

Mylar is a registered trademark of DuPont Teijin Films. Styrofoam is a registered trademark of Dow Chemical Company.



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# The History of Earth Day

By History.com, adapted by Newsela staff on 04.21.17

Word Count **704**

Level **800L**

Read “The History of Earth Day” and “Teen leads battle against climate change, calls for workers to strike”. Compare and contrast the articles using the space at the end of the second article.



Jordyn Blosser (right) and her friend, both second-grade students from Ramstein Elementary School, plant a tree together in honor of Earth Day on April 22, 2015, at Ramstein Air Base, Germany. Photo by: U.S. Air Force photo/Staff Sgt. Sara Keller

Earth Day was founded in 1970 as a day to learn about the environment. Today, Earth Day is celebrated around the world. Sometimes it even extends into Earth Week, a full seven days of events focused on awareness of nature and the planet.

Earth Day was created by Senator Gaylord Nelson. It was originally aimed at getting people to care about the Earth. It was held on April 22 to get as many college students to attend as possible. Nelson hoped to raise public awareness of air and water pollution. He thought this would make people care about the problems the planet faces.

## Pollution on the planet

By the early 1960s, Americans were learning about the effects of pollution on the planet. Rachel Carson's 1962 bestselling book "Silent Spring" created awareness of the dangerous effects of pesticides. Then, a 1969 fire on Cleveland's Cuyahoga River shed light on the problem of chemical pollution in water. Until that time, protecting the planet was not something people cared about very much. Only a small number of people were working on big problems like air pollution.

Factories pumped pollutants into the air, lakes and rivers without getting in trouble. Big, gas-guzzling cars were considered a sign of success. Not many Americans recycled. Most did not even know what recycling was.

Senator Gaylord Nelson was a Democrat from Wisconsin. He wanted to convince the government that the planet was at risk. In 1969, he came up with the idea for Earth Day. He was inspired by protests against the Vietnam War that were taking place at colleges around the United States. He dreamed of a similar large event that would get people to take environmental issues seriously.

Nelson announced the idea for Earth Day in the fall of 1969. He invited the entire country to get involved. Telegrams, letters and telephone calls poured in from all across the country. People finally had a way to express their concerns about what was happening to the planet.

### **Many people wanted to be a part of Earth Day**

Dennis Hayes was a student president at Stanford University. He was selected to help plan the first Earth Day. He worked with an army of student volunteers and staff from Nelson's Senate office. Nelson believed that Earth Day worked because so many people wanted to be a part of it.

"That was the remarkable thing about Earth Day," Nelson said. "It organized itself." They could not have gathered the 20 million people and the thousands of schools and communities that participated on their own.

On April 22, 1970, rallies were held in most American cities. New York City closed off a big street for several hours. The mayor spoke at a rally with famous actors. In Washington, D.C., thousands of people listened to speeches. Singer Pete Seeger and others performed. Congress even took a recess so its members could speak to their voters at Earth Day events.



The first Earth Day was a huge success. It raised awareness about environmental problems and made people care. After Earth Day, people realized that protecting the planet was important. During the 1970s, a number of important laws were passed. In December 1970, the Environmental Protection Agency, or EPA, was created. The EPA protects people and the environment. Additionally, the Clean Air Act was one of many new laws that required companies to change their practices in order to limit air pollution.

### **Earth Day goes global**

Since 1970, Earth Day celebrations have grown. In 1990, Earth Day went global. 200 million people in over 140 nations took part. In 2000, Earth Day focused on clean energy. Hundreds of millions of people in 184 countries and 5,000 environmental groups took part.



The Earth Day Network, or EDN, organizes activities for Earth Day. Today, it works with more than 17,000 partners and groups in 174 countries.



According to EDN, more than 1 billion people are involved in Earth Day activities. It is one of the largest events in the world.

## Quiz

- 1 Which sentence from the article helps you understand that Earth Day is still an important event today?
- (A) It was held on April 22 to get as many college students to attend as possible.
  - (B) People finally had a way to express their concerns about what was happening to the planet.
  - (C) In December 1970, the Environmental Protection Agency, or EPA, was created.
  - (D) According to EDN, more than 1 billion people are involved in Earth Day activities.
- 2 Read the following sentences from paragraph 4 of the section "Many people wanted to be a part of Earth Day."

*During the 1970s, a number of important laws were passed. In December 1970, the Environmental Protection Agency, or EPA, was created.*

Based on the sentences above, which of the following is TRUE?

- (A) The first Earth Day solved the environmental problems.
  - (B) The first Earth Day was successful in raising awareness.
  - (C) There were not enough people celebrating the first Earth Day.
  - (D) Thousands of people went to the first Earth Day.
- 3 According to the article, which of the following MOST inspired Senator Gaylord Nelson to come up with the idea for Earth Day?
- (A) College student protests about environmental problems
  - (B) College student protests against the Vietnam War
  - (C) Rachel Carson's bestselling book "Silent Spring"
  - (D) The 1969 fire on Cleveland's Cuyahoga River
- 4 According to Senator Nelson, what was the MAIN reason the first Earth Day was such a successful event?
- (A) because college students helped organize it
  - (B) because too many companies were polluting
  - (C) because so many people wanted to participate
  - (D) because the Environmental Protection Agency helped organize it

# Teen leads battle against climate change, calls for workers to strike

By The Guardian, adapted by Newsela staff on 04.29.19

Word Count **645**

Level **680L**



Swedish environmental campaigner Greta Thunberg addresses politicians, media and guests with the Houses of Parliament on April 23, 2019, in London, England. Her visit coincides with the ongoing "Extinction Rebellion" protests across London, which have seen days of disruption to roads and transport systems, in a bid to highlight the dangers of climate change. Photo by: Leon Neal/Getty Images

Greta Thunberg is just 16 years old. However, she can draw a crowd. She leads other students in pushing for leaders to fight global warming.

Climate change, or global warming, is the heating up of Earth's climate. Scientists believe it is caused by burning fossil fuels. Oil, coal and natural gas are some examples.

Greta is from Sweden. She said the students need more support from older people to get leaders to keep their promises.

Protests have been going on this month in London, United Kingdom (U.K.) Speaking at an event in London as protests continued there, she was honest about the problem and the effect her efforts have had. "People are slowly becoming more aware, but emissions continue to rise. We can't focus on small things. Basically, nothing has changed," she said.

Emissions are the release of gases, including greenhouse gases. They trap heat and make the Earth warmer. These gases are released when we use fossil fuels.

Greta focused on challenging the companies and governments responsible for most emissions.

She said the protests need to spread. This is not just young people being tired of government leaders, she said. She called it more serious. "It is something that will affect the future" of our world, she said. "We must take action," she said.

### **Time For A General Strike**

Franny Armstrong made a movie about climate change. In a question-and-answer time, she asked if it was time for a general strike. "Yes," said Greta. In a general strike, workers in most companies do not go to work.

Workers' groups have so far been slow to join the strikes. Some fear it will hurt their jobs.

The talk took place on Earth Day, April 22. It followed a week of protests, which made the climate top news.

Police arrested more than 1,000 protesters. However, hundreds remained in a part of London where Greta spoke on April 21.

What the protesters are doing is good, Greta said. "We need to do everything we can to put pressure on the people in power," she told the crowd on Earth Day, getting cheers.

Interest in the event was strong. A long line of people stood waiting for the doors to open.

When Greta appeared on stage, people cheered and clapped.

Armstrong said she had been to talks over the years, but had never seen anything like it. She called Greta a star.

Greta told the crowd she was surprised at the quick spread of a movement that began less than a year ago. It began when she went on strike alone outside a Swedish government building.

"It is hard to understand what is happening during the last months. It has all happened so fast. I don't have time to think it through," she said.

Her trip has included meeting with leaders in Europe.

### **Pushing Leaders To Give Attention To Climate Change**

Some say she has pushed U.K. leaders to give more attention to climate change.

Some lawmakers in the United Kingdom said they hope groups will work together on the climate.

Caroline Lucas is one of these lawmakers. She said the protests and school strikes gave her hope. "It feels like a turning point in the history of how we defend our planet," she said.

### **Calling Out A Broken System**

"Young people are calling out against a system that is sadly broken," she said.

How to deal with people in power was a subject of questions to Greta.

Someone asked Greta how she deals with people who deny that climate change is happening. "I don't," she replied.

Anna Taylor is with the U.K. Student Climate Network. She shared Greta's views. Young people are not going to accept leaders "saying 'we support you' and then walking away," she said.

Posting online is not enough, she said. That is why they have to keep striking, she explained.

**Short Answer Response:**

How is the movement from the original Earth Day 50 years ago similar to today's teen climate change movement? Give three examples.

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How is the movement from the original Earth Day 50 years ago different from today's teen climate change movement? Give three examples.

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## Quiz

- 1 How does the information in the section "Time For A General Strike" support the main idea of the article?
- (A) It shows how government leaders reacted to Greta's speech.
  - (B) It highlights how protests can get people in trouble with the law.
  - (C) It describes what Greta has done to fight climate change.
  - (D) It explains what leaders can do to stop climate change.
- 2 Select the sentence that BEST summarizes the article.
- (A) Greta Thunberg is leading students in pushing companies and governments to stop global warming.
  - (B) Greta Thunberg is a 16-year-old student from Sweden who traveled to London to give a speech.
  - (C) Greta Thunberg uses strategies such as posting online and going on strike to protest global warming.
  - (D) Greta Thunberg hopes to convince climate change deniers that climate change is really happening.
- 3 Complete the sentence.
- Greta's speeches and protests have caused \_\_\_\_.
- (A) companies to reduce harmful emissions
  - (B) police to arrest 1,000 protesters in Sweden
  - (C) U.K. leaders to give more attention to climate change
  - (D) Franny Armstrong to make a movie about climate change
- 4 What does Greta feel about her movement's success over the past year?
- (A) She feels excited about traveling to other countries.
  - (B) She feels overwhelmed by all the speeches she is asked to make.
  - (C) She feels disappointed that it has not stopped climate change yet.
  - (D) She feels surprised about how quickly it grew.

# ESL at Home Gr. 6-8 Weeks 5-6

Use notebook paper to complete these activities. Do one each day!

Monday	Tuesday	Wednesday	Thursday	Friday
<p>Who is your favorite book or movie character? Write or draw what would happen if you met them in real life.</p>	<p>Look at the food in your home. Create a pretend menu for lunch. <b>Example:</b> Pretzel and jelly sandwich with a side of tuna fish: \$4.67 Chocolate chip scrambled eggs with salsa ice cream: \$5.99</p>	<p>Unscramble these animal names, then draw the animal. caro rwmo cnaotu rumle</p>	<p>Make a t-chart of healthy and unhealthy foods in your home.</p> 	<p>Create your own superhero. Draw and label a costume and superpowers. Write about a time the superhero saved someone.</p>
Monday	Tuesday	Wednesday	Thursday	Friday
<p>Use boxes or books to create a ramp. Find five things to roll down the ramp. What rolls the farthest? What rolls the shortest?</p>	<p>Design a plan for your dream neighborhood. Draw and label a map of the homes, streets, and businesses you would have.</p>	<p>Create a commercial for your new neighborhood. Tell what makes it special and why people should move there.</p>	<p>Listen to any song. Write down any similes you hear. Ex: "I came in LIKE a wrecking ball."</p> 	<p>Choose two animals, like a horse and an alligator. Imagine what they would look like if they were put together. Draw it, and write about its ecosystem.</p>

## Earth Day



**Celebrating 50<sup>th</sup> Year Anniversary of Earth Day on April 22, 2020**

### Earth Day Challenge

Earth Day is an annual event celebrated around the world on April 22 to demonstrate support for environment protection. Earth Day was founded in the United States by United State Senator Gaylord Nelson as a “national teach-in on the environment” that was first held on April 22, 1970. On Earth Day, people do things to help the environment. They clean beaches, recycle cans, bottles, and newspapers, donate money to environmental groups, sign petitions, and teach others about the importance of protecting the environment.

What Can You Reduce?


What Can You Reuse?


What Can You Recycle?




## Earth Day Pledge



Celebrating 50<sup>th</sup> Year Anniversary of Earth Day on April 22, 2020

My name is: \_\_\_\_\_

I promise that I will try to

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Some ideas to consider:

- use less water.
- use less electricity.
- spend more time in nature.
- use both sides of paper.
- only buy things that I truly need.
- eat more vegetables.
- use rechargeable batteries.
- grow vegetables in my garden.
- plant a tree.
- recycle and reuse items.