

METER READERS

Adapted from the Watts on Schools Program

Overview: Students learn how to read electric and natural gas meters, monitor their energy use at home or at school and keep a daily record.

Objective: In learning to read meters, students will realize the energy used daily at home and school.

Time: 30 minute initial lesson, 20 minutes a day for 1 week

Subjects: Mathematics, Science

Suggested Grade Level: Can be modified for grades 5 – 12

Vocabulary: Kilowatts, cubic feet

Materials: Meter-reading practice sheet, Home meter reading record worksheet

PREPARATION & BACKGROUND

Make copies of the worksheets: one of each for each student. Meter reading can be tricky. It helps to remember these rules:

- The dials are like watch faces. BUT every other dial moves counter-clockwise.
- Always read the faces from left to right.
- If the pointer is between two numbers, always record the number it has just passed (this is the smaller number, except when passing from 9 to 0: the 0 represents a 10 in this case).
- If the pointer seems to be pointing directly at the number, refer to the dial on the right. If the hand on the dial to the right has recently passed zero, then you should put down the number that the other hand seems to be pointing at. If the dial on the right is short of zero, put down the next lower number. (Meters needles are not always positioned precisely. They may appear to have reached a number before it is appropriate.)

Use the practice meter reading sheet and look at the examples. These rules actually make sense when you see that each of the dial faces represents a ones, tens, hundreds, thousands and ten-thousands column.

Note: Some meters are marked with “x 10” or “x 20”. These meter readings should be multiplied by 10 and 20, respectively.

PROCEDURE

1. Go over some energy bills from home so students understand how to read them.
2. Teach the class to read meters (review the preparation and background section if necessary).

3. Next assign them to groups of 4 or 5, and practice using the sample worksheet. They can do the examples "round robin" style; one student or group does a problem then the next student or group checks it and does the next example. This continues through the groups.
4. When they seem to be getting the drift of it, distribute the home energy-use sheets. Explain to students how they will be checking their gas and electricity meters at home daily. They will compute a total for both cubic feet of gas and kilowatt-hours. If possible, it would be interesting to have one student do the school meters.
5. Each day in class, you can take a few minutes to see if anyone has had any problems. At the end of the week, everyone can see how much electricity and gas their family has used.

Answers for worksheet:

1. 38192; 2. 62579; 3. 62606; 4. 9486; 5. 2620; 6. 8702

FOR DISCUSSION

1. Do you think your parents or other people in the school realize how much energy they are using each day or in a week?
2. Do you think your parents or other people at school know how to read a meter? What are some other ways to determine your energy use? Why is it important to know how much you are using?
3. How can individual students help save energy at home? At school?

FOLLOW - UP

Have each student report how much energy their home used in a week. Try to determine why some people have higher energy use than others. (Possible explanations: bigger home, more people, energy-intensive equipment such as pools or hot tubs, less efficient heating/cooling system, less insulation, etc.)

EXTENSIONS

1. Have your class track the school's energy use each week by reading the meter. One group of students could be responsible each week. Have the class chart the school's weekly energy use with a bar graph.
2. Why does energy use vary from week to week? Across different seasons?
3. Figure out how much money the homeowners or schools are spending on their energy. (This is a simple calculation of multiplying kilowatt hours per week x the energy price.)
4. Figure out how much CO₂ is being released from this energy use. (US average = 1.34 lbs CO₂/kWh)
5. Have the students report this information to the rest of the school. Display a poster showing your bar graph of data collection and explaining what this means in lay terms.
6. Present these findings to the whole school, school board, principal, or PTA along with suggestions of how to save energy at school.

Meter Reading Practice Sheet

Some meters are digital, they look like the odometer on a car. Other meters have dials. Electric meters with dials are read the same, regardless of how many dials there are. Every dial has a pointer and the numbers 0 to 9. Below is an example of a five-dial electric meter.



Electric Meter

Notice that the pointers on the first, third, and fifth dial move in the same direction as a hand of a clock. The second and fourth pointers move in the opposite direction.



When reading your meter keep these hints in mind:

- Stand directly in front of the meter so that you can clearly see the location of each pointer.
- Read the numbers from RIGHT to LEFT, and write them down in the same order.
- If the pointer is between two numbers, read the number the pointer has just passed, always the lowest number.
- If the pointer is between 9 and 0, always read 9.
- If the pointer appears to be exactly on a number, read the next lowest number unless the pointer to its right has passed zero. Since the first dial (on the far right) has no dial to its right, the number must be read independently.
- If your meter has digital numbers, use those as your reading.

Each meter is numbered make note of your meter number.

What is the reading of the example electric meter shown below?



- A. The pointer on the far right is directly on number 5. read as 5.
- B. The second pointer from the right has just passed 9, and is between 9 and 0, read as 9.
- C. The next dial has passed 8, and is between 8 and 9. Again, read the smaller number which the pointer has just passed, which is 8.
- D. The pointer on the next dial looks like it is right on the 4. But, the dial to its right has not passed zero, so you would read this dial as 3.
- E. The pointer on the far left dial has passed 8 and is between 8 and 9. Read the smaller number which the pointer just passed, which is 8.

Current reading: 83895

Last week's reading: 83770

Subtract last weeks reading from this week's reading:

$$83895 - 83770 = 125$$

The difference of **125 kilowatt** hours have been used since last week's reading.

If your meter has a constant of multiplier it is shown on the nameplate. The reading on the meter may be 1/40 or 1/10 of the energy used. Multiply the subtracted use by the constant to determine actual energy use.

METER READING WORKSHEET

Read the following meters and write your answer in each space below the dial face:

Electric Meter

1. 

2. 

3. 

Gas Meter

4. 

5. 

6. 
