

# Electrifying Bloomsmath Activities

The following activities are pitched at the Stage 3 level but can be adapted for other levels as required. As always is it expected that students would complete their prerequisite syllabus multiplication and division activities (knowledge) via the myriad of activities available at this basic level of cognition. Once students have completed this they may progress through the following Bloomsmath activities which allow them to apply their multiplication and division skills in new and interesting ways.

In a developed country such as Australia we live our lives surrounded by electrical equipment, yet how many of us actually know how much electricity we are consuming. In this set of activities students will identify and calculate the energy usage of a number of common electrical appliances and will calculate how much fossil fuel is being consumed to produce that energy.

	<b>Knowledge</b>	<b>Comprehension</b>	<b>Application</b>	<b>Analysis</b>	<b>Synthesis</b>	<b>Evaluation</b>
<b>Multiplication and Division</b>	Students select and apply appropriate strategies for multiplication and division.	Students calculate the cost for each meter reading given.	Students calculate the wattage of various home appliances.	Students calculate the fiscal cost of running various home appliances.	Students calculate the environmental cost of running various home appliances.	Students debate the need to reduce electrical consumption both on an environmental and fiscal basis.

**Comprehension:** Every building in Australia has an electricity meter which measures how much electricity passes into a building and is used by that building's occupants. Meters are read on a fairly regular basis by a member of the electricity company so that they are able to charge appropriately for electricity consumed over a given period of time. For most households a meter reading is taken every quarter prior to a bill being issued. For this activity students will need to study their home electricity meter reading and bring to school their current reading. Students can select at least five other classmates and compare their readings against their classmates and calculate how much electricity has been used between the two readings. This can then be multiplied by the current cost per unit of electricity for the local area (this can be found on the school's electricity bill) to calculate how much electricity students would be using of the readings were taken at quarterly intervals.

Reading an electricity meter is not immediately easy and students will need some assistance. Every electricity meter has five dials with the numbers 0-9 on each dial. The dials are not identical though. On the first dial, the numbers increase in a clockwise direction while on the next meter, the numbers increase in the opposite direction, in a counter-clockwise direction. Each dial alternates from clockwise to counter-clockwise. To read a meter, students read the dials from right to left and record the numbers. If the pointer is between two numbers, they should record the smaller number. In addition students can measure in seconds how long it takes for the disk at the base of their dial to complete one revolution – the faster the disk is spinning the more electricity the house is consuming.

**Application:** Every home appliance has a panel attached to it or stamped into it which clearly lists the wattage, or maximum power, which that appliance consumes. The wattage is calculated by multiplying the appliance’s current by its voltage ( $w = \text{current} \times \text{voltage}$ ). Students will need to find the wattage for a number of common household appliances such as a clock radio, coffee machine, clothes washer, clothes dryer, dishwasher, ceiling fan, hair dryer, clothes iron, microwave, refrigerator, computer, television or stereo.

The table below will assist students to complete this activity.

Appliance	Wattage	Hours of Use Per Day	Days Used Per Year	Cost Per Year
Clock radio				
Coffee machine				
Clothes washer				
Clothes dryer				
Dishwasher				
Ceiling fan				
Hair dryer				
Clothes iron				
Microwave				

Refrigerator				
Computer				
Television				
Stereo				

Note: Remember to divide by 1000 for kWh.

**Analysis:** Students will calculate the annual cost of running each appliance for a year. To achieve this the wattage will need to be multiplied by the local utility rate per kilowatt hour (this can be found on the school's electricity bill as in Comprehension).

**Synthesis:** Students can then calculate how much coal will have to burn to power each of these appliances if they estimate that 1 kilogram of coal will produce around two kilowatt hours of electricity.

Appliance	Wattage	Hours of Use Per Day	Days Used Per Year	Coal Burnt Per Year
Clock radio				
Coffee machine				
Clothes washer				
Clothes dryer				
Dishwasher				
Ceiling fan				
Hair dryer				
Clothes iron				
Microwave				

Refrigerator				
Computer				
Television				
Stereo				

**Extra:** As a discussion topic it would be worth considering why some houses have a much higher meter reading than others – age is the general reason for higher readings. Students should also be asked to record the electricity used in the past year or four quarters on their household electricity statements. These can be compared to see which households are most energy efficient and reasons why this may be the case such as the number of occupants, the time most occupants go to bed or the number of computers/televisions in use in the house. Once students have their quarterly readings they can, as a whole class, compare which sections of the year most energy is consumed and suggest why this may be the case – the heights of winter and summer tend to be the most costly due to extreme heating and cooling requirements. Students can also be asked to calculate how far their energy provider would have over or under charged them if they were charged say 20 kWh for the summer quarter and 15 kWh for the spring quarter.