

Numeracy

GRADE 7

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Numeracy in Grade 7

By Grade 7, students are expected to complete a variety of numeracy tasks based on their own research, as well as simulated tasks provided by their teachers. The following briefly describes typical Grade 7 numeracy tasks. For quick reference, these have been grouped according to purpose. In practice, a single numeracy task or problem may often address more than one purpose.

MONEY TASKS

- ◆ Given a set amount of money, estimate whether it is enough to buy certain quantities of fruits and vegetables. Check estimates.

CHANCE TASKS

- ◆ Find out how many people in their town have the same birthday month as they do.
- ◆ If a breakfast cereal company randomly places one of four prizes in each cereal box it manufactures, determine how many cereal boxes would need to be purchased in order to get one of each prize.

DATA ANALYSIS

- ◆ Collect data on their own water consumption and then create a data chart and graph. Present the data orally, using concrete representations, and provide a written analysis of the findings.
- ◆ Choose a topic and survey the class. The data must be useful in some real way. Graph the information and write an explanation of the findings and how they are useful.
- ◆ Collect data on the population of the school over the last 10 years. Graph the information. Predict the school's population in five years and in 10 years. Try to identify and explain trends.

MEASUREMENT AND OTHER APPLICATIONS OF SHAPE AND SPACE

- ◆ Create, analyze, and describe patterns for geometric floor tiles for three different rooms using rotations, reflections, and translations.

Quick Scale: Grade 7 Numeracy

This Quick Scale is a summary of the criteria described in detail in the Rating Scale that follows. These criteria may apply at any time of the year, depending on when specific skills or concepts are introduced.

Aspect	Not Yet Within Expectations	Meets Expectations (Minimal Level)	Fully Meets Expectations	Exceeds Expectations
SNAPSHOT <i>Note: the snapshot can be used alone as a holistic scale for marking some assignments.</i>	<i>The work is insufficient. The student is unable to meet basic requirements of the task without close, ongoing assistance. No relevant extension.</i>	<i>The work satisfies most basic requirements but is flawed or incomplete. The student may provide an extension that varies slightly from the original task.</i>	<i>The work satisfies basic requirements of the task. If asked, the student can produce a relevant extension or illustration.</i>	<i>The work is complete, accurate, insightful, and efficient. The student may volunteer an extension, application, or further illustration of the same mathematical idea.</i>
CONCEPTS AND APPLICATIONS* <ul style="list-style-type: none"> recognizing mathematics grade-specific concepts, skills patterns, relationships 	<ul style="list-style-type: none"> unable to identify concepts or procedures needed does not apply relevant concepts, skills, and strategies appropriately; major errors or omissions unable to recognize patterns and relationships 	<ul style="list-style-type: none"> identifies most concepts and procedures needed; may oversimplify applies most relevant concepts, skills, and strategies appropriately; some key flaws with support, can recognize and use some patterns and relationships 	<ul style="list-style-type: none"> identifies concepts and procedures needed applies relevant concepts, skills, and strategies appropriately; may be somewhat inefficient recognizes and uses basic patterns and relationships 	<ul style="list-style-type: none"> identifies concepts and procedures needed; may offer alternative methods applies relevant concepts, skills, and strategies accurately and efficiently; thorough recognizes and uses patterns and relationships; generalizes
STRATEGIES AND APPROACHES <ul style="list-style-type: none"> analyze problems procedures estimate to verify solutions 	<ul style="list-style-type: none"> unable to analyze problems unsystematic and inefficient; unable to follow appropriate strategies answers or solutions are often improbable (weak estimation skills) 	<ul style="list-style-type: none"> analyzes problems to develop a plan follows instructions without adjusting procedures; inefficient may need reminding to verify results or solutions; estimates are generally logical 	<ul style="list-style-type: none"> analyzes problems to develop a plan structures the task into logical steps or stages; may be inefficient makes logical estimations to verify results or solutions 	<ul style="list-style-type: none"> analyzes problems to develop an efficient plan; insightful structures the task efficiently; may find alternative methods makes relatively accurate estimations to verify results or solutions
ACCURACY <ul style="list-style-type: none"> recording calculations charts, diagrams, graphs 	<ul style="list-style-type: none"> recording is frequently inaccurate major calculation errors major errors in charts, diagrams, and graphs 	<ul style="list-style-type: none"> some recording errors some calculation errors, often involving decimals some errors in charts, diagrams, and graphs 	<ul style="list-style-type: none"> minor recording errors minor errors in calculations minor errors in charts, diagrams, and graphs 	<ul style="list-style-type: none"> accurate and precise records accurate calculations; may use mental math charts, diagrams, and graphs are accurate and precise
REPRESENTATION AND COMMUNICATION <ul style="list-style-type: none"> presenting work constructing tables, charts, diagrams, displays demonstrating procedures, explaining results 	<ul style="list-style-type: none"> work is often confusing, with key omissions often omits required charts, diagrams, and graphs or makes inappropriate choices explanations are incomplete or illogical; little or no mathematical language 	<ul style="list-style-type: none"> most work is clear; may omit some information creates required charts, diagrams, and graphs; some features may be incomplete or inappropriate explanations are incomplete; little mathematical language 	<ul style="list-style-type: none"> work is generally clear and easy to follow creates required charts, diagrams, and graphs appropriately; minor omissions explanations and demonstrations are complete, in own words, and include some mathematical language 	<ul style="list-style-type: none"> work is clear, detailed, and well-organized creates effective charts, diagrams, and graphs explanations and demonstrations are clear, in own words, and include mathematical language; may be innovative or insightful

* You may want to list key curriculum concepts or skills for a particular task.

Rating Scale: Grade 7 Numeracy

These criteria may apply at any time of the year, depending on when specific skills or concepts are introduced.*

Aspect	Not Yet Within Expectations	Meets Expectations (Minimal Level)
SNAPSHOT <i>Note: the snapshot can be used alone as a holistic scale for marking some assignments.</i>	<i>The student is unable to meet basic requirements of the task without close, ongoing assistance. Unable to provide a relevant extension.</i>	<i>The work satisfies most basic requirements but is flawed or incomplete. The student may produce an extension by making a minor alteration to the original task. Often needs some help.</i>
CONCEPTS AND APPLICATIONS** <ul style="list-style-type: none"> recognizing mathematics grade-specific concepts, skills patterns, relationships 	<ul style="list-style-type: none"> unable to identify mathematical concepts or procedures needed to solve a problem or complete a task does not apply relevant concepts, skills and strategies appropriately; major errors or omissions unable to recognize patterns and relationships (e.g., predict nth value of a number pattern) 	<ul style="list-style-type: none"> identifies most mathematical concepts and procedures needed to solve a problem; may oversimplify or miss some aspects of the task applies most relevant concepts, skills, and strategies appropriately; makes some key errors or omissions with support, can recognize and use some patterns and relationships (e.g., predict nth value of a number pattern)
STRATEGIES AND APPROACHES <ul style="list-style-type: none"> analyze problems procedures estimate to verify solutions 	<ul style="list-style-type: none"> unable to analyze problems to develop a plan appears unsystematic and inefficient; unable to follow appropriate strategies answers or solutions are often improbable, indicating weak estimation skills 	<ul style="list-style-type: none"> analyzes problems to develop a plan if they resemble those recently experienced generally follows instructions without adjusting or checking procedures; inefficient may need reminding to use estimation to verify results or solutions; estimates are generally logical
ACCURACY <ul style="list-style-type: none"> recording calculations charts, diagrams, graphs 	<ul style="list-style-type: none"> recording is frequently inaccurate includes major calculation errors makes major errors in charts, diagrams, and graphs 	<ul style="list-style-type: none"> includes some recording errors includes some calculation errors, often involving decimals; generally, answer or solution is "close" some inaccuracies in charts, diagrams, and graphs
REPRESENTATION AND COMMUNICATION <ul style="list-style-type: none"> presenting work constructing tables, charts, diagrams, displays demonstrating procedures, explaining results 	<ul style="list-style-type: none"> work is often confusing, with key information omitted often omits required charts, diagrams, and graphs or makes inappropriate choices explanation of procedures or results is incomplete or illogical; includes little or no mathematical language 	<ul style="list-style-type: none"> most work is clear, although some necessary information may be omitted creates required charts, diagrams, and graphs, but some features may be incomplete or inappropriate (e.g., inappropriate intervals) explanations of procedures and results may be incomplete; includes little mathematical language

* Student performance that falls within the wide range of expectations for Grade 7 generally matches the Level 3/4 descriptions in the reference set Evaluating Mathematical Development Across Curriculum.

**Some of the curriculum concepts and skills students are expected to apply in completing numeracy tasks are specific to the type of task. The shaded charts below the Rating Scale show some of the concepts and skills most likely to apply in Grade 7.

MONEY TASKS

- read and write numerals to any number of decimal places
- add, subtract, multiply, and divide decimal numbers
- use ratios, rates, percentages, and decimal numbers in solving problems

CHANCE TASKS

- identify all possible outcomes of two independent events, using a variety of graphic organizers
- create and solve problems using the numerical definition of "probably" as favourable outcomes divided by possible outcomes
- use simulations to solve probability problems

	Fully Meets Expectations	Exceeds Expectations
	<i>The work satisfies the basic requirements of the task. If asked, the student can produce a relevant extension or illustration.</i>	<i>The work is complete, accurate, and efficient. The student may volunteer an extension, application, or further illustration of the same mathematical idea.</i>
	<ul style="list-style-type: none"> identifies the mathematical concepts and procedures, including relevant algorithms, needed to solve a problem or complete a task applies relevant concepts, skills, and strategies appropriately; may be somewhat inefficient or make minor errors or omissions recognizes and uses basic patterns and relationships (e.g., predict nth value of a number pattern or apply an algorithm in a different context) 	<ul style="list-style-type: none"> identifies the mathematical concepts and procedures needed to solve a problem or complete a task; may offer alternative methods applies relevant concepts, skills, and strategies accurately and efficiently; thorough recognizes and uses patterns and relationships; generalizes to other problems (e.g., recognize nth value of a number pattern or apply an algorithm in a different context)
	<ul style="list-style-type: none"> analyzes problems to develop a plan structures the task into logical steps or stages; may be inefficient makes logical estimations to verify results or solutions 	<ul style="list-style-type: none"> analyzes problems to develop an efficient plan; insightful structures the task efficiently; may find a shortcut for the procedure modelled or offer alternative ways to address the task makes logical and relatively accurate estimations to verify results or solutions
	<ul style="list-style-type: none"> minor recording errors calculations are generally accurate, including decimals; minor errors charts, diagrams, and graphs have minor errors 	<ul style="list-style-type: none"> recording is accurate and precise calculations are accurate; may use mental math charts, diagrams, and graphs are accurate and precise
	<ul style="list-style-type: none"> work is generally clear and easy to follow creates required charts, diagrams, and graphs appropriately; these may have minor omissions (e.g., a missing unit, title, or axis label) explains and demonstrates procedures and results logically, in own words, using some mathematical language 	<ul style="list-style-type: none"> work is clear, detailed, and logically organized creates required charts, diagrams, and graphs completely and effectively explains and demonstrates procedures and results clearly and logically, in own words, using mathematical language; may include innovative or insightful representation or explanation

DATA ANALYSIS

- formulate questions
- select, defend, and use data-collection methods (questionnaires, interviews, experiments, research)
- display data (including circle graphs)
- interpret and analyze graphs
- determine central tendency (mode, median, mean)
- determine distribution (range, extreme, gaps, clusters, quartiles)
- interpolate to make predictions

MEASUREMENT

- diameter, radius, circumference of circles
- area and perimeter of rectangles
- measurement of angles

OTHER APPLICATIONS OF SHAPE AND SPACE

- create, analyze, and describe designs (rotations, reflections, translations)

Sample 1: Water Use (Data Analysis)

CONTEXT

This class previously collected, graphed, and analyzed data from class surveys.

MATHEMATICAL CONCEPTS

- ◆ display data by hand or computer in a variety of ways, including circle graphs
- ◆ estimate and calculate percentages
- ◆ interpret and analyze a variety of graphs

PROCESS

There had recently been a water shortage in the town. The teacher gave the class a real-life task that was relevant to their community.

- ◆ The teacher provided data on average domestic water usage for everyday household activities, such as taking a shower or bath, flushing a toilet, running a washing machine or dishwasher, or brushing teeth with running water.
- ◆ She asked each student to record the amount of water they used on two separate days. Students were allowed to take home measurement devices to make accurate measurements. They were asked to record their information on a chart developed in class.
- ◆ Each student was asked to calculate their total water consumption for each day and their average water consumption over the two days.
- ◆ Students presented a written report that included a data chart indicating daily consumption amounts and a circle or bar graph illustrating the percentage of water use in a minimum of five areas.
- ◆ They also made an oral presentation for which they were required to prepare a concrete example to represent their individual water use. Students used a digital camera to photograph their concrete representations. The teacher made anecdotal notes during the presentation.

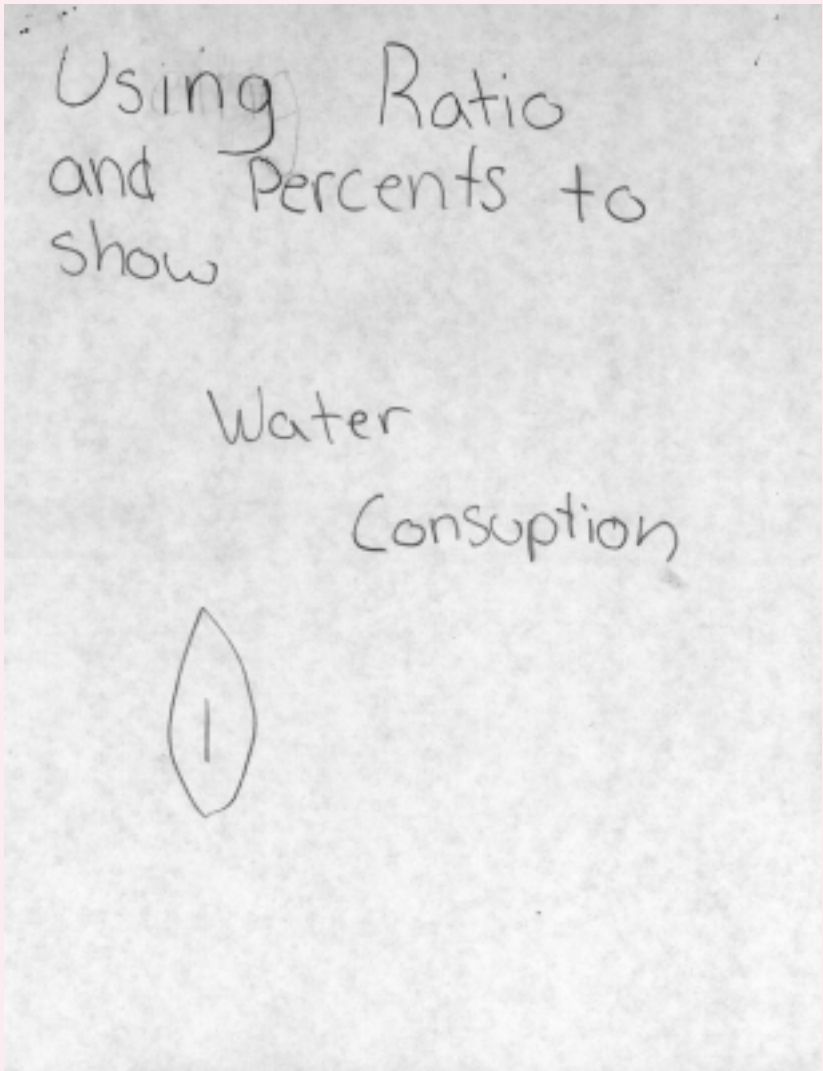
NOT YET WITHIN EXPECTATIONS

Teacher's Observations

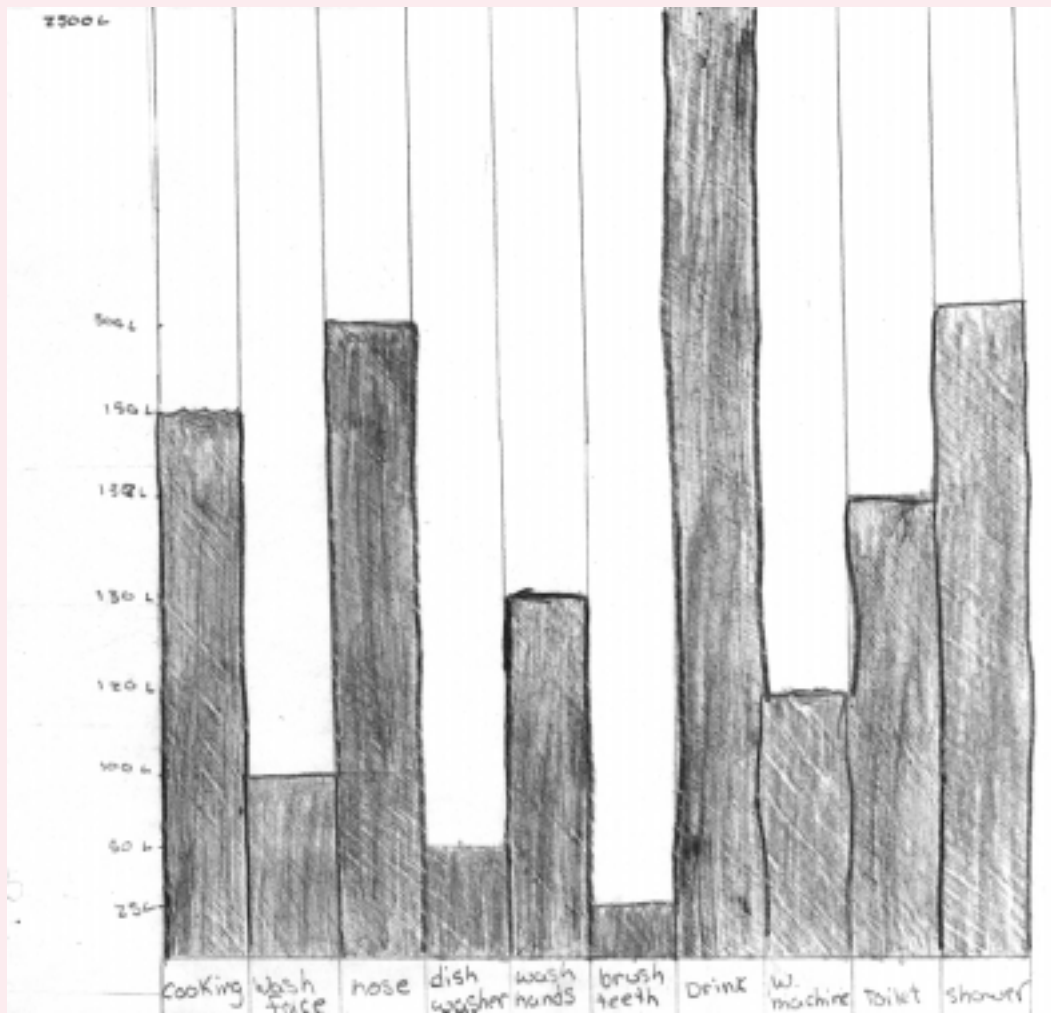
This student omitted key data and calculations. Her oral presentation and demonstration did not indicate a clear understanding of the concepts.

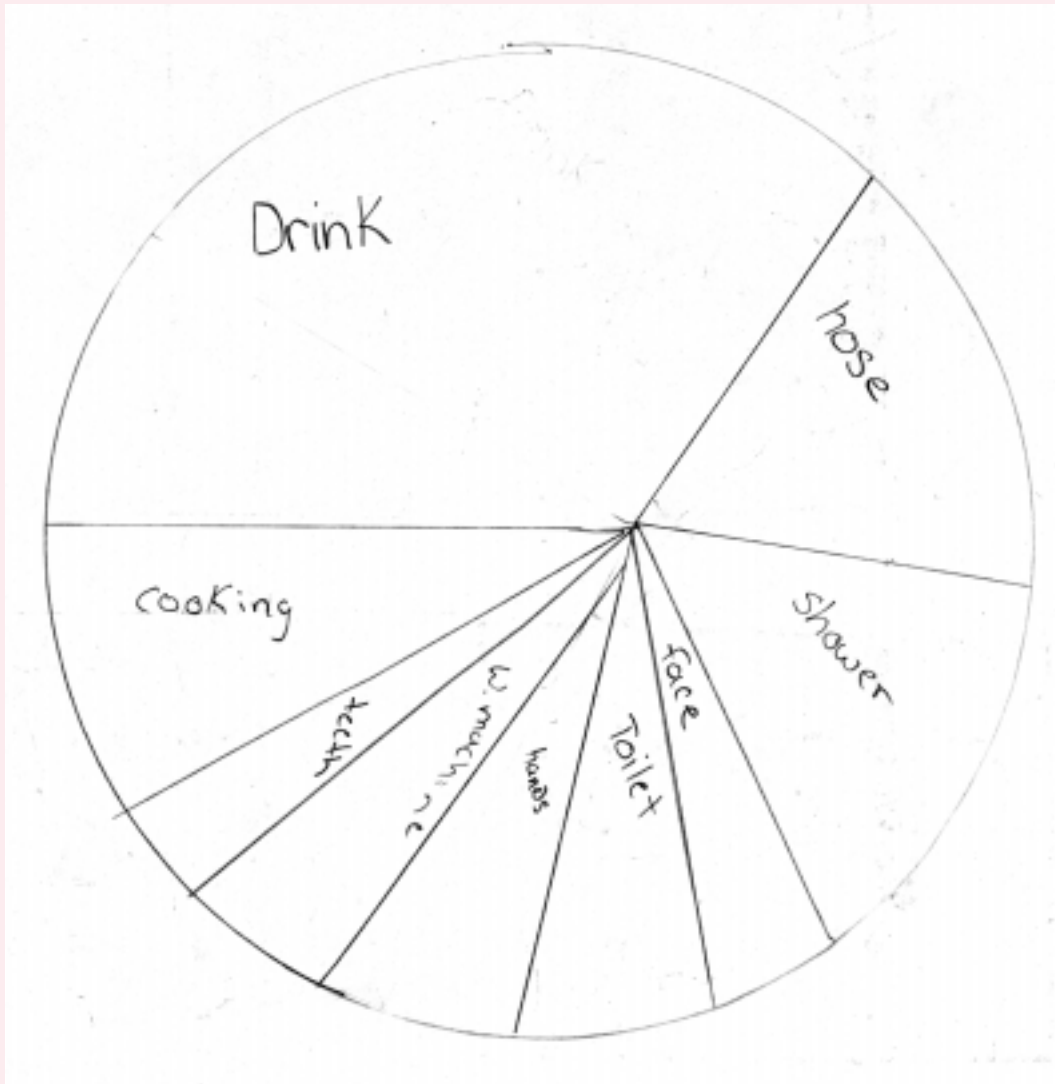
- ◆ does not apply relevant concepts, skills, and strategies appropriately; major errors and omissions
- ◆ appears unsystematic and inefficient; unable to follow appropriate strategies
- ◆ recording is inaccurate
- ◆ explanation of results is incomplete or illogical; includes little or no mathematical language

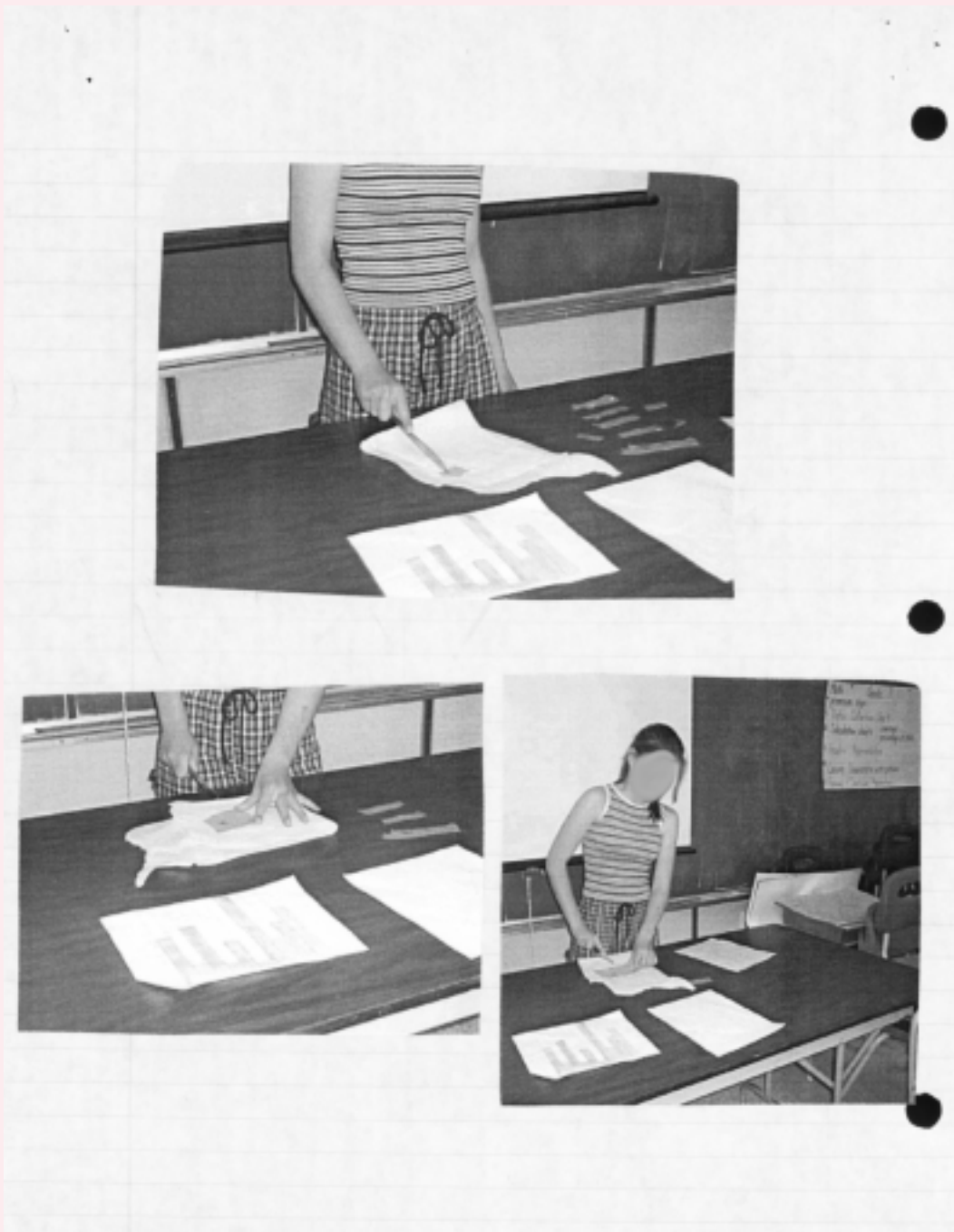
	Not Yet	Meets	Fully	Exceeds
SNAPSHOT				
CONCEPTS				
STRATEGIES				
ACCURACY				
REPRESENTATION				



	Times	Per	Total
shower	Day 1 1 Day 2 0	300 L	300 L
Toilet	Day 1 6 Day 2 5	72 L 60 L	132 L
w. machine	Day 1 3 Day 2 0	120 L	120 L
drink	Day 1 6 Day 2 4	1500 L 1000 L 1000	2500 L
brush teeth	Day 1 3 Day 2 2	15 L 10 L	25 L
wash. hands	Day 1 7 Day 2 6	70 L 60 L	130 L
dish washer	Day 1 2 Day 2 0	50	50 L
hose	Day 1 0 Day 2 1	300 L	300 L
wash face	Day 1 3 Day 2 2	30 L 20 L	100 L
cooking	Day 1 0 Day 2 1	150 L	150 L







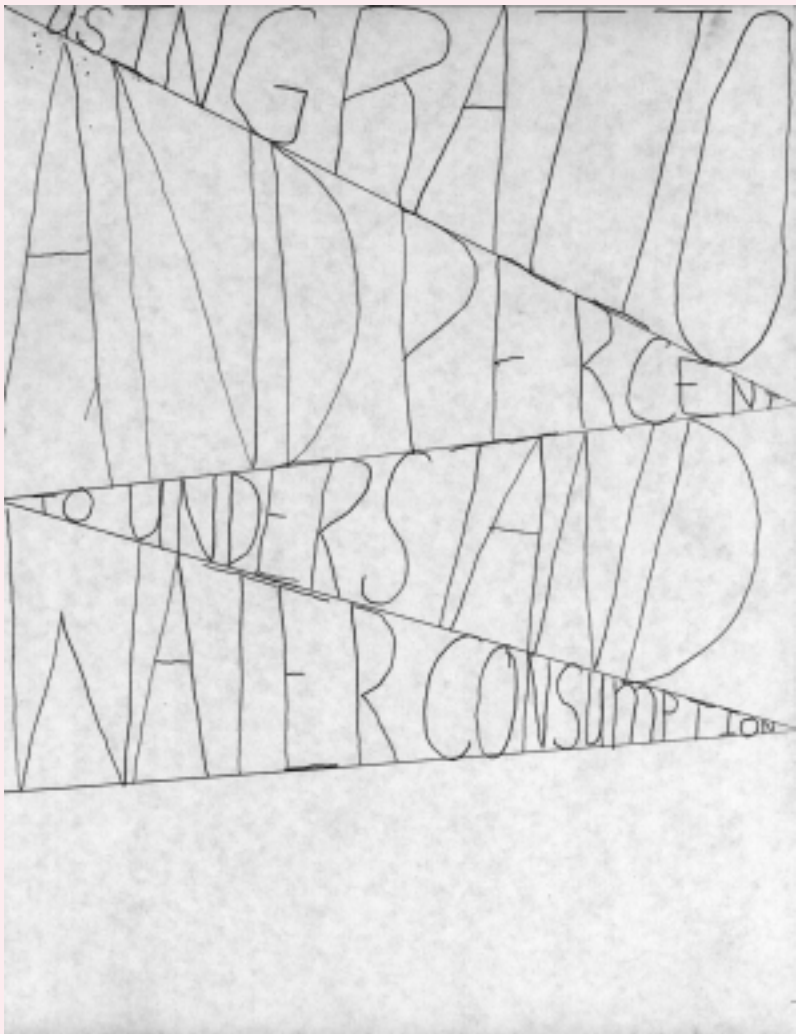
MEETS EXPECTATIONS (MINIMAL LEVEL)

Teacher’s Observations

This student completed most basic requirements of the task but made numerous calculation errors. In her oral presentation, she gave factual information but did not make connections to real-life situations.

	Not Yet	Meets	Fully	Exceeds
SNAPSHOT				
CONCEPTS				
STRATEGIES				
ACCURACY				
REPRESENTATION				

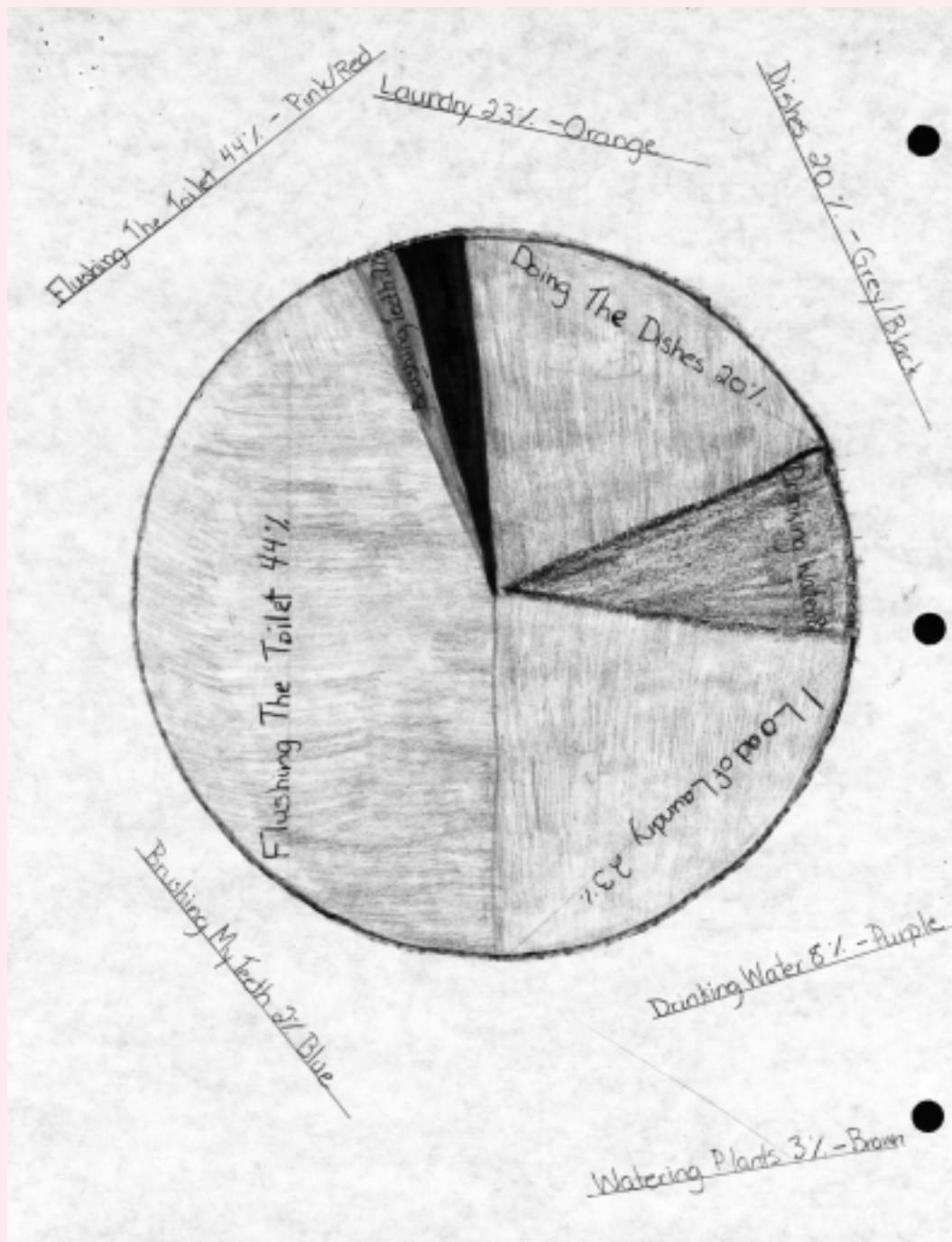
- ◆ applies most relevant concepts, skills, and strategies appropriately; makes some key errors
- ◆ may need reminding to use estimation to verify results or solutions
- ◆ includes major calculation errors
- ◆ work is generally clear and easy to follow
- ◆ explanation of results may be incomplete



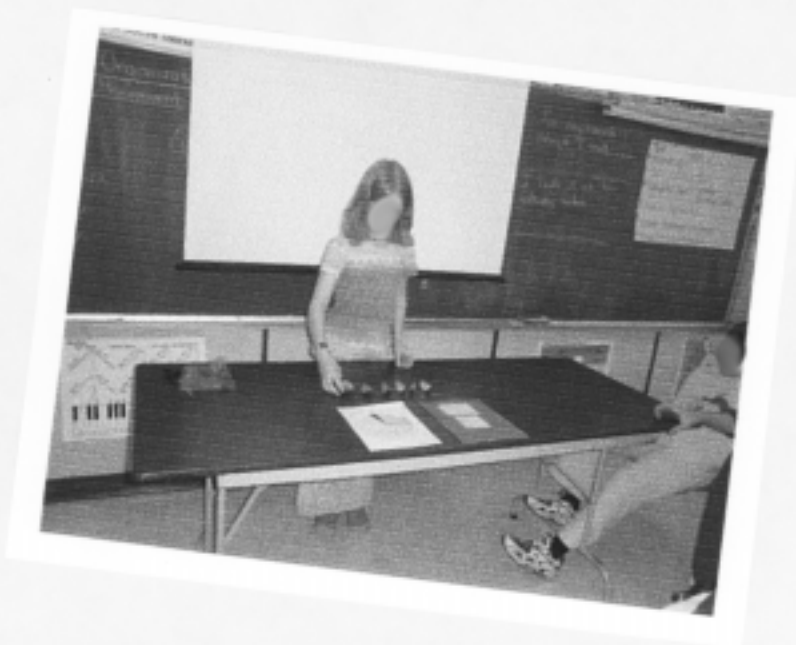
WATER USE GRAPHS

Flushing The Toilet	Day 1 3	Day 2 3	11.1 L Per Flush	68 L
Brushing My Teeth	Day 1 2	Day 2 2	.5 L Per Brush	1 L
1 Load of Laundry	Day 1 1	Day 2 2	8 L per Load	24 L
Drinking Water	Day 1 8	Day 2 9	.5 L per glass	8.5 L
Watering Plants	Day 1 10	Day 2 10	.25 L per Plant	3 L
Doing The Dishes	Day 1 2	Day 2 1	5 L per load	18 L

Flushing The Toilet	46 L	44 %
Brushing My Teeth	1 L	2 %
1 Load of Laundry	24 L	23 %
Drinking Water	8.5 L	8 %
Watering Plants	3 L	3 %
Doing The Dishes	18 L	20 %



For my concrete example I used a measuring tape to measure the percentages on an apple. I used 44% of my water usage by using the toilet. I used 23% of my water usage by doing laundry. I used 20% of my water usage on the dishes. I used 8% of my water usage on drinking water. I used 3% of my water usage on watering plants. I used 2% of my water usage on brushing my teeth.



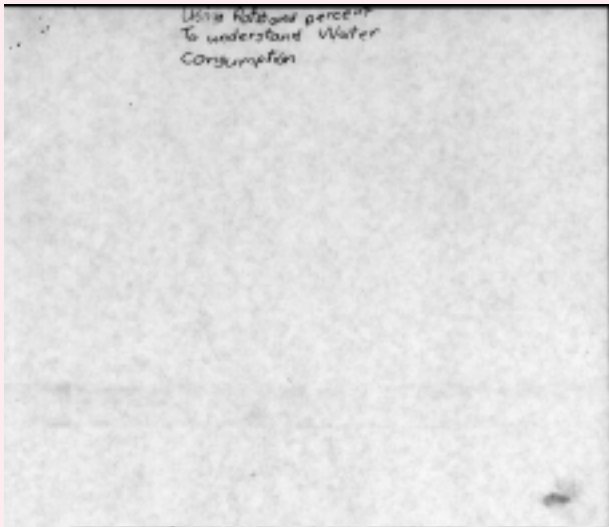
FULLY MEETS EXPECTATIONS

Teacher's Observations

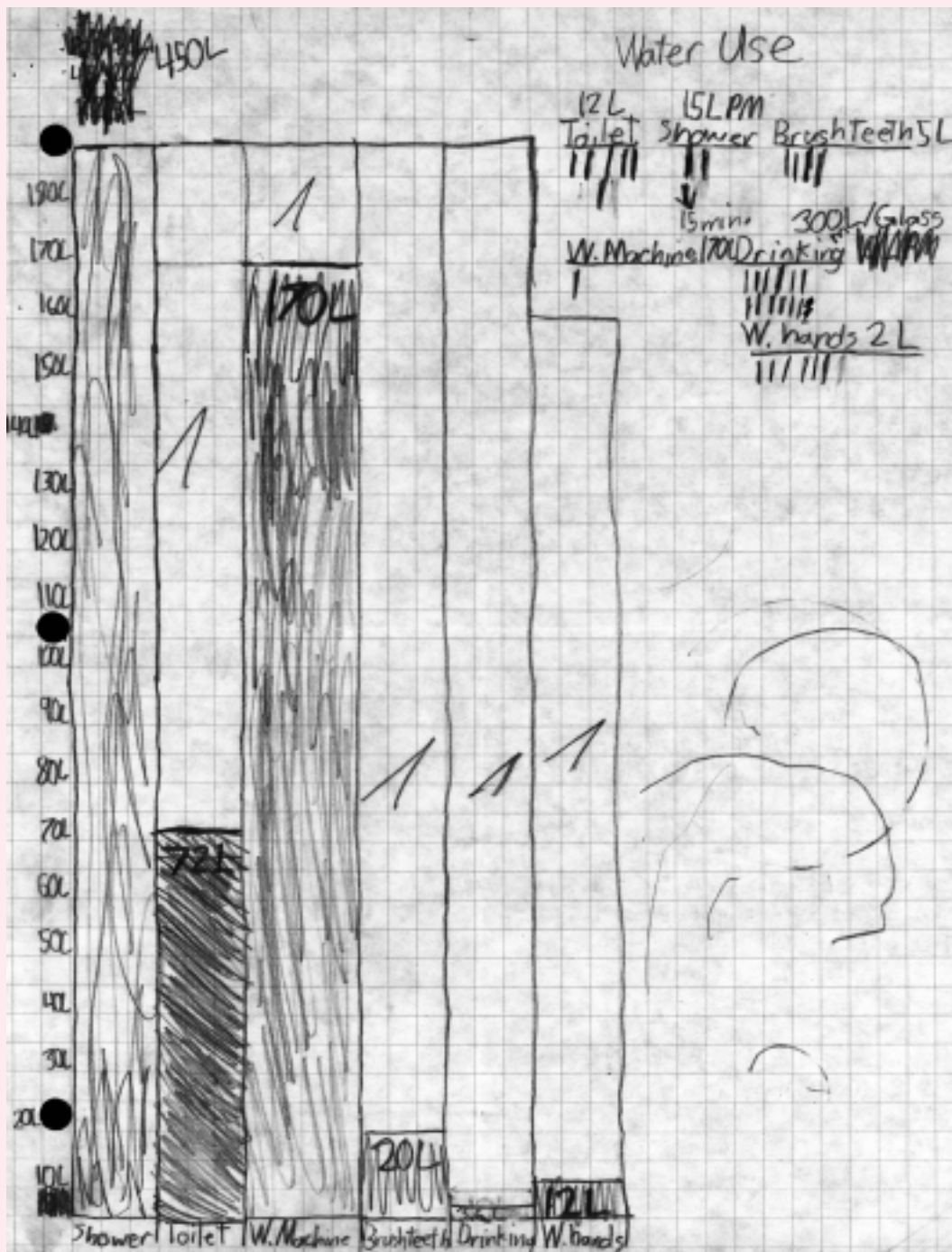
This student completed all the basic requirements of the task, although the work is messy in many places. His oral presentation indicated a good understanding.

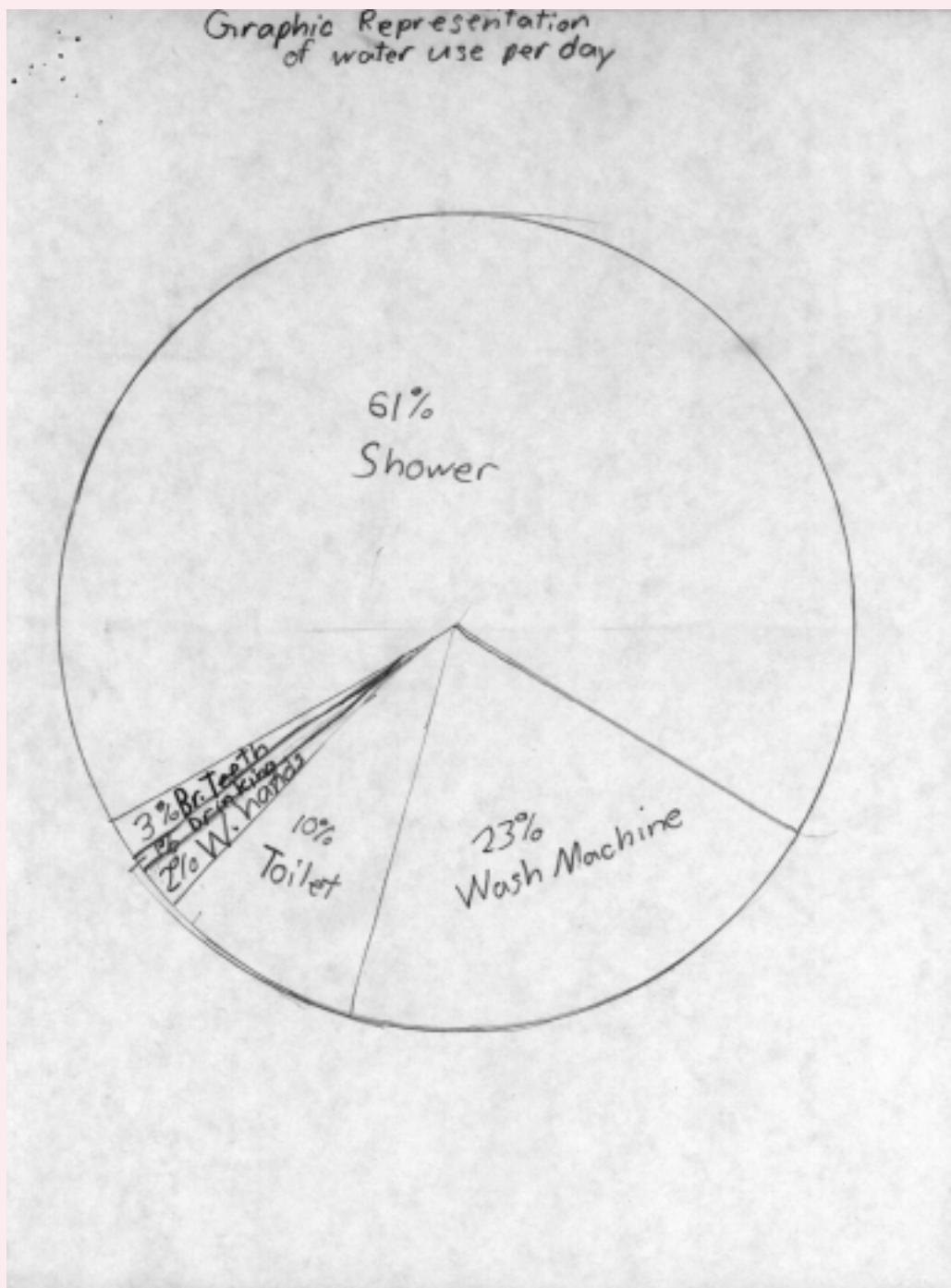
	Not Yet	Meets	Fully	Exceeds
SNAPSHOT				
CONCEPTS				
STRATEGIES				
ACCURACY				
REPRESENTATION				

- ◆ applies relevant concepts, skills, and strategies appropriately
- ◆ makes logical estimations to verify results
- ◆ calculations are generally accurate
- ◆ explains and demonstrates results logically, in own words, using some mathematical language

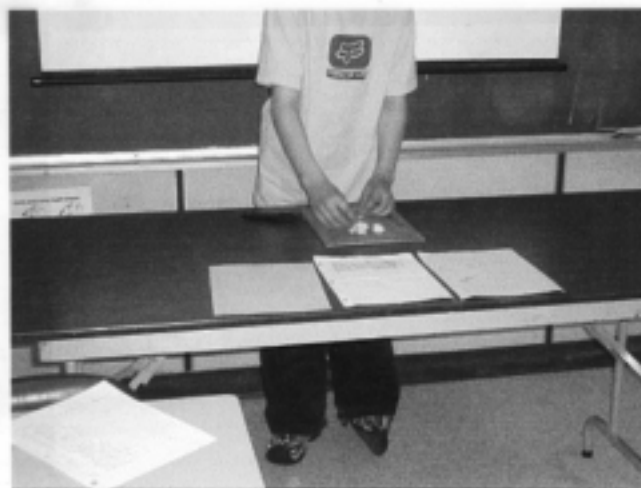


Activity	Day 1	Day 2	Avg	Percent
Toilet	36L	36L	36L	10%
Shower	225L	225L	225L	61%
Wash machine	170L	170L	170L	23%
Br. teeth	10L	10L	10L	3%
Drinking	1.8L	1.8L	1.8L	1%
W. hands	6L	6L	6L	2%
Grand total				109.8L





For my concrete example I used a muffin and I broke it into six pieces that were 61%, 23%, 10%, 3%, 2%, 1%.



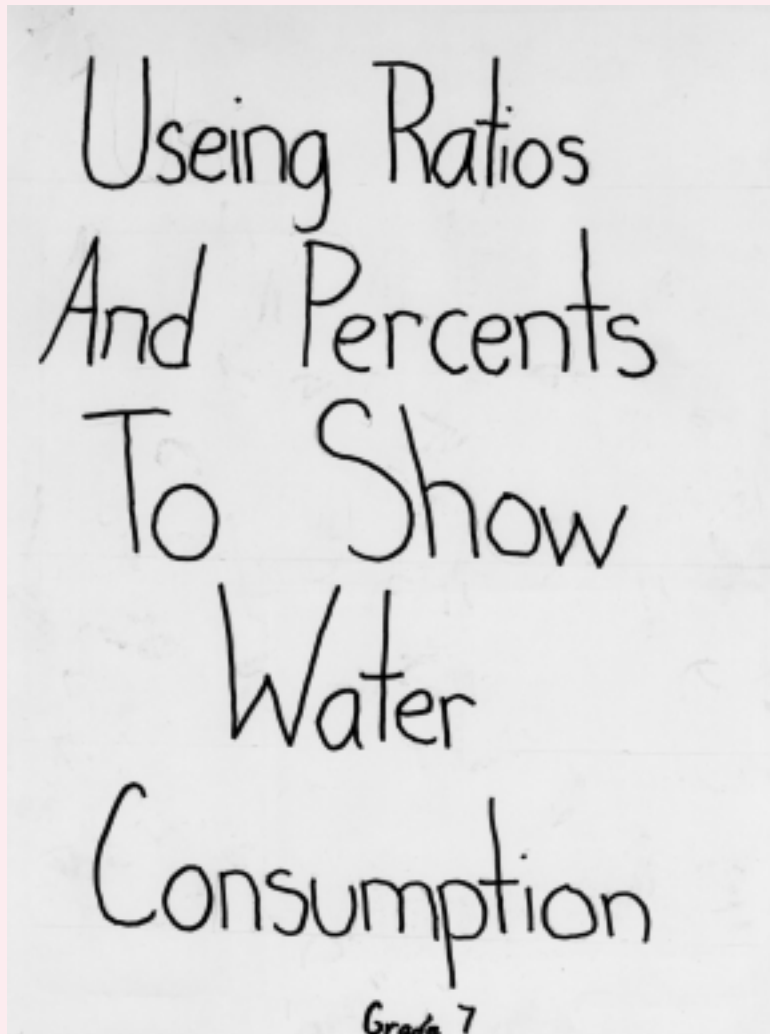
EXCEEDS EXPECTATIONS

Teacher's Observations

This student's work is complete and accurate. She gave a good explanation in her written presentation. In her oral presentation, she made connections to the recent water shortages in the town.

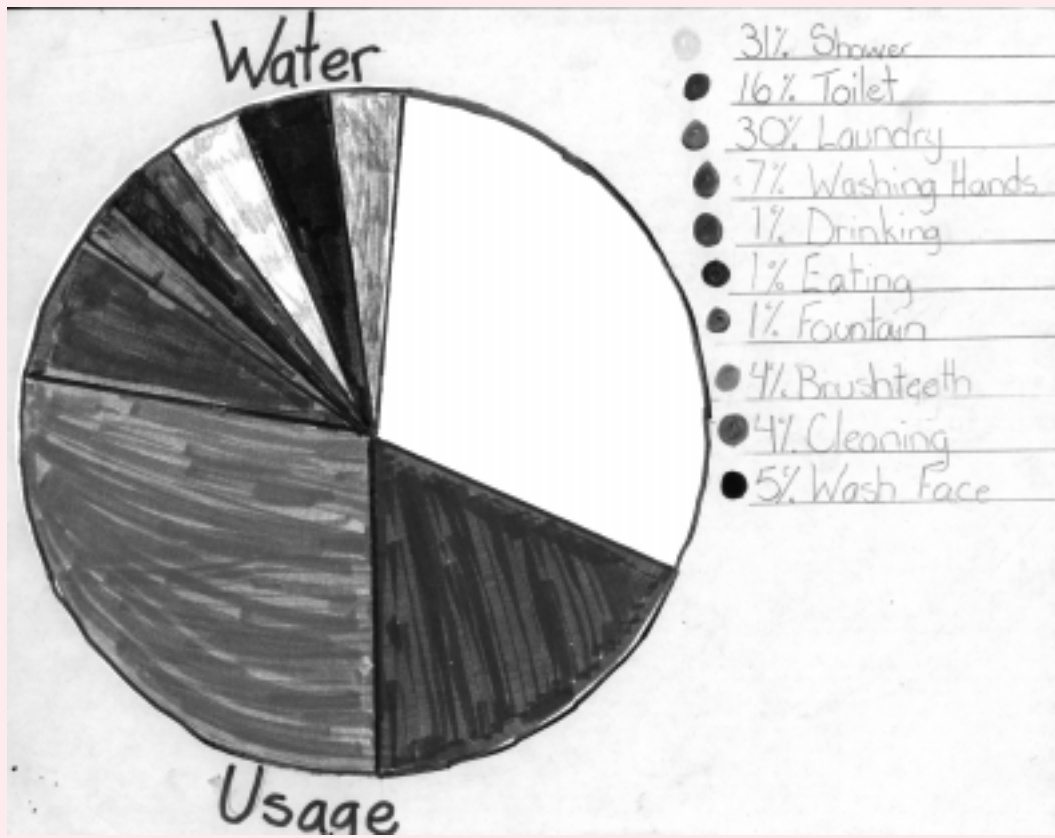
- ◆ applies relevant concepts, skills, and strategies accurately and efficiently
- ◆ structures the task into logical steps or stages
- ◆ charts and graphs are accurate and precise
- ◆ explains results clearly and logically in own words; uses mathematical language; may include insightful explanation

	Not Yet	Meets	Fully	Exceeds
SNAPSHOT				
CONCEPTS				
STRATEGIES				
ACCURACY				
REPRESENTATION				



Total usage: 548 litres				
Use of water	Number of times		Amount per time	Total
CLEANING	Day 1	✓	20 litres	20 litres
	Day 2			
SHOWER	Day 1	✓	90 litres	180 litres
	Day 2	✓		
TOILET	Day 1	✓✓✓✓	12 litres	96 litres
	Day 2	✓✓✓✓		
BRUSHTEETH	Day 1	✓✓	500 ml.	2 litres
	Day 2	✓✓		
FOUNTAIN	Day 1	✓✓	125 ml.	500 ml.
	Day 2	✓✓		
WASH HANDS	Day 1	✓✓✓✓	5 litres.	45 litres
	Day 2	✓✓✓✓✓		
DRINKING	Day 1	✓✓✓	300 ml	1.5 litres
	Day 2	✓✓		
EATING	Day 1	✓	1.5 litres	3 litres
	Day 2	✓		
LAUNDRY	Day 1	✓	170 litres	170 litres
	Day 2			
WASH FACE	Day 1	✓✓	10 litres	30 litres
	Day 2	✓		

Item	Average times per day	Amount per time	Average total per day
Wash Face	2	10 litres	20 litres
Cleaning	1	20 litres	20 litres
Shower	1	90 litres	90 litres
Toilet	4	12 litres	48 litres
Brush teeth	2	500 ml.	1 litre
Fountain	2	125 ml.	250 ml.
Wash Hands	4	5 litres	20 litres
Drinking	3	300 ml.	900 ml.
Eating	1	1.5 litres	1.5 litres
Laundry	1	170 litres	170 litres



Oral and visual presentation!

In my oral presentation I used bubble gum to show the percentage of water usage over a 2 day time period. I used 1 meter of bubble gum and cut it using centimeters to show percents. I cut it into 10 pieces. The first piece was 31% showing my showers. Second was 16% which represents flushing the toilet. 30% was used on laundry. The fourth piece I cut was 7% showing how much I used washing my hands. 1% of water was used on each of these drinking, eating and the fountain. Brushing my teeth and cleaning both used 4%. 5% was washing my face. Altogether I used 548 litres of water.

What I Learned:

While doing this water usage project I learned many things. I learned that I use a lot of water flushing the toilet. Which means the world would use millions and millions of litres more than me.

I also learned to watch the amount of water I'm using and to use it carefully. I noticed that a shower uses almost half as much as a load of laundry.

