

Numeracy

GRADE 5

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Numeracy in Grade 5

Grade 5 students are expected to integrate and apply the mathematical concepts and skills they have developed to complete a variety of simulations of real-life tasks proposed by their teachers. Students are also expected to find applications for numeracy and to collaborate in designing realistic problems.

The following briefly describes typical Grade 5 numeracy tasks. For quick reference, these examples have been grouped according to purpose. In practice, a single numeracy task or problem may often address more than one purpose.

MONEY TASKS

- ◆ Use store flyers to complete various shopping tasks.
- ◆ Create problems, given information about prices and numbers of coins.

CHANCE TASKS

- ◆ Calculate the number of handshakes among a group of six students.
- ◆ Play two versions of a game explained by the teacher, then explain whether each was fair or not and why.
- ◆ Conduct a variety of experiments and games involving spinners, dice, and coloured tiles.

DATA ANALYSIS

- ◆ Develop questions, create a plan, collect and display data, and explain the results for a variety of topics (e.g., questions related to the potatoes that are harvested and packaged for sale each fall).
- ◆ Research to find out what brands of potatoes are most commonly sold in grocery stores.
- ◆ Use a variety of methods of recording and displaying data about the potatoes in one 10 kg bag.
- ◆ Conduct a reaction time experiment. Determine the fairest way of determining whose reaction time is best. Create displays and explain results.
- ◆ Choose a question, survey the class, tally results, make circle and bar graphs, and express results in percentages. Explain what conclusions can be drawn from the results.

- ◆ Collect candy wrappers from classmates and graph the results. Explain what conclusions can be drawn from the graph.

MEASUREMENT AND OTHER APPLICATIONS OF SHAPE AND SPACE

- ◆ Choose the best measuring tool and unit to measure the capacity, volume, mass, or surface area of specific objects (e.g., volume of air in classroom, capacity of a pill bottle, mass of a train full of wheat, surface area of a kitchen table).
- ◆ Construct packing crates and boxes to fill them, given a scenario that specifies requirements. Keep a learning log to record thinking and strategies.
- ◆ Design a backyard on graph paper, according to specifications. Calculate area, perimeter, length of fence, and cost of fencing. (This task involves both measurement and money.)
- ◆ Conduct experiments with regular and irregular solids to check predictions about displacement.
- ◆ Graph how they spend their time in a 24-hour period.
- ◆ Create wallpaper or tile designs using flips and slides to specifications provided by the teacher.

Quick Scale: Grade 5 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 may be unable to complete the task without ongoing help; cannot follow procedures independently.</i>	<i>The work satisfies most basic requirements of the task but is flawed or incomplete in some way. The student may need some help.</i>	<i>The work is complete and accurate; may include minor flaws or errors. If asked, the student is able to produce a simple extension of the same mathematical idea.</i>	<i>The work is complete, accurate, insightful, and efficient. The student may independently find an alternative or shortcut or may develop an extension or further application.</i>
CONCEPTS AND APPLICATIONS* <ul style="list-style-type: none"> recognizing mathematics concepts, strategies, skills patterns, relationships 	<ul style="list-style-type: none"> unable to identify concepts or procedures needed to solve problems or complete tasks recently modelled in class does not apply relevant concepts, skills, and strategies appropriately often unable to recognize patterns and relationships 	<ul style="list-style-type: none"> identifies most concepts and procedures needed if problems or tasks have been recently modelled in class applies most relevant mathematical concepts, skills, and strategies identifies simple patterns and relationships; needs help to use them to solve problems 	<ul style="list-style-type: none"> identifies concepts and procedures needed to solve problems or complete tasks recently modelled in class applies relevant concepts, skills, and strategies appropriately; somewhat inefficient identifies and uses simple patterns and relationships 	<ul style="list-style-type: none"> identifies concepts and procedures needed; may propose alternative solutions or shortcuts applies relevant concepts, skills, and strategies effectively and efficiently independently identifies, explains, and uses patterns and relationships
STRATEGIES AND APPROACHES <ul style="list-style-type: none"> analyze problems procedures verify solutions (estimation, mental math, calculator, inverse operations) 	<ul style="list-style-type: none"> unable to analyze problems to develop a plan needs direct support to break tasks into steps unable to verify results or solutions 	<ul style="list-style-type: none"> analyzes problems to develop a plan if problems resemble those recently experienced follows steps without adjusting or checking; inefficient needs help to verify results or solutions 	<ul style="list-style-type: none"> analyzes problems to develop a plan structures the task into logical steps; may be somewhat inefficient if asked, verifies 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 or alternative may independently verify results or solutions
ACCURACY <ul style="list-style-type: none"> recording calculations graphic displays 	<ul style="list-style-type: none"> recording is frequently inaccurate includes major calculation errors graphic displays are inaccurate, with major errors 	<ul style="list-style-type: none"> recording includes some errors may include some calculation errors; generally "close" graphic displays include some errors 	<ul style="list-style-type: none"> recording may include minor errors calculations are generally accurate; may include minor errors graphic displays may have minor errors 	<ul style="list-style-type: none"> recording is accurate and precise calculations are accurate; may use mental math graphic displays 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; key omissions may omit required visuals and graphics; may be inappropriate, incomplete unable to demonstrate procedures or explain results 	<ul style="list-style-type: none"> work is confusing in places; some omissions includes most required visuals and graphics; some are incomplete partially demonstrates procedures and explains results 	<ul style="list-style-type: none"> work is generally clear and easy to follow includes required visuals and graphics; may have minor omissions demonstrates procedures and explains results logically, in own words 	<ul style="list-style-type: none"> work is clear, detailed, and well-organized required visuals and graphics are complete and effective effectively demonstrates procedures; explains results in own words

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

Rating Scale: Grade 5 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 may be unable to complete the task without ongoing help; cannot follow procedures independently.</i>	<i>The work satisfies most basic requirements of the task but is flawed or incomplete in some way. The student may need some help.</i>
CONCEPTS AND APPLICATIONS** <ul style="list-style-type: none"> recognizing mathematics concepts, strategies, skills patterns, relationships 	<ul style="list-style-type: none"> unable to identify mathematical concepts or procedures needed to solve problems or complete tasks that have been modelled in class does not apply relevant concepts, skills, and strategies appropriately; major errors or omissions often unable to recognize patterns and relationships without direct support 	<ul style="list-style-type: none"> identifies most mathematical concepts and procedures needed to solve problems or complete tasks that have been modelled in class applies most relevant mathematical concepts, skills, and strategies appropriately; some errors or omissions identifies simple patterns and relationships; needs help to use them to solve problems
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 needs direct support to break the task into stages, steps, or sections unable to verify results or solutions by using estimation, mental calculation, or inverse operation 	<ul style="list-style-type: none"> analyzes problems to develop a plan if problems resemble those recently experienced follows stages, steps, or sections outlined in the task without adjusting or checking procedures; inefficient needs help to verify results or solutions by using estimation, mental calculation, or inverse operation
ACCURACY <ul style="list-style-type: none"> recording calculations graphic displays 	<ul style="list-style-type: none"> recording is frequently inaccurate includes major calculation errors graphic displays are inaccurate, with major errors 	<ul style="list-style-type: none"> recording includes some errors may include some calculation errors; generally answer or solution is "close" graphic displays include some errors
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 may omit required tables, charts, diagrams, plots, and graphs; those provided may be inappropriate or incomplete may be unable to demonstrate procedures or explain results; uses little mathematical language; often illogical 	<ul style="list-style-type: none"> work may be confusing in places, with some necessary information omitted includes most required tables, charts, diagrams, plots, and graphs; those provided may be incomplete demonstrations of procedures and explanations of results may be incomplete; includes little mathematical language

* Student performance that falls within the wide range of expectations for Grade 5 generally matches the Level 3 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 5.

MONEY TASKS

- add and subtract decimal fractions to hundredths
- multiply and divide decimal fractions to hundredths using single-digit, whole number multipliers and divisors
- estimate, mentally calculate, compute, and verify the product (three-digit by two-digit) and quotient (three-digit ÷ one-digit) of whole numbers

CHANCE TASKS

- conduct experiments and explain results
- use terms such as *best/worst*; *probable/improbable*; *never/less likely/equally likely*; *likely/more likely/always*; *fair/unfair*
- conduct experiments to demonstrate that results are not influenced by factors such as participant's age, experience, or skill (chance is chance)

	Fully Meets Expectations	Exceeds Expectations
	<i>The work is complete and accurate; may include minor flaws or errors. If asked, the student is able to produce a simple extension of the same mathematical idea.</i>	<i>The work is complete, accurate, insightful, and efficient. The student may independently find an alternative or shortcut or may develop an extension or further application of the same mathematical idea.</i>
	<ul style="list-style-type: none"> identifies mathematical concepts and procedures, including relevant algorithms, needed to solve problems or complete tasks modelled in class applies relevant concepts, skills, and strategies appropriately; may be somewhat inefficient or make minor errors or omissions identifies and uses simple patterns and relationships 	<ul style="list-style-type: none"> identifies mathematical concepts and procedures needed to solve a problem or complete a task; may propose alternative solutions or shortcuts applies relevant concepts, skills, and strategies appropriately and efficiently independently identifies, explains, and uses patterns and relationships
	<ul style="list-style-type: none"> analyzes problems to develop a plan structures the task into logical steps or stages; may be somewhat inefficient if asked, verifies results or solutions by using estimation, mental calculation, or inverse operation 	<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 may independently verify results or solutions by using estimation, mental calculation, or inverse operation
	<ul style="list-style-type: none"> recording may include minor errors calculations are generally accurate; may include minor errors graphic displays may have minor errors 	<ul style="list-style-type: none"> recording is accurate and precise calculations are accurate; may use mental math graphic displays are accurate and precise
	<ul style="list-style-type: none"> work is generally clear and easy to follow includes required tables, charts, diagrams, plots, and graphs; these may have minor omissions (e.g., missing units, labels, or titles) demonstrates procedures and explains results logically, in own words, using some mathematical language 	<ul style="list-style-type: none"> work is clear, detailed, and logically organized required tables, charts, diagrams, plots, and graphs are complete and effectively constructed demonstrates procedures and explains results clearly and logically, using appropriate mathematical language; may include visuals

DATA ANALYSIS

- formulate questions; predict results
- select sample or population
- collect, record, and group data
- create and evaluate displays (frequency diagrams, line plots, broken-line graphs, circle graphs)
- discuss reasonableness
- make inferences to generate conclusions

MEASUREMENT

- length, width, height, depth, thickness, perimeter, circumference
- grams, kilograms, tonnes
- choose appropriate units
- estimate and measure area and perimeter of irregular shapes
- relate perimeter and area of rectangles
- cubic centimetres; millilitres
- 24-hour clock

OTHER APPLICATIONS OF SHAPE AND SPACE

- construct, analyze and classify triangles
- build, represent and describe geometric objects and shapes
- use coordinates to describe the position of objects in two dimensions
- describe the results of transformation in terms of slides, flips, or turns

Sample 1: A Variation on Rock, Paper, Scissors (Chance)

CONTEXT

This task was one activity among several games of chance the class used to explore the mathematical concepts of chance and probability. Students had previously played simpler games with one and two dice, recording trials and trying to explain results.

MATHEMATICAL CONCEPTS

- ◆ list all possible outcomes of an experiment involving a single event
- ◆ use a variety of methods to record data
- ◆ explain events using the vocabulary of probability (e.g., *fair/unfair*)
- ◆ conduct probability experiments and explain the results using the vocabulary of probability
- ◆ discuss the reasonableness of data and results
- ◆ make inferences to generate conclusions about data

PROCESS

Students were asked to work in groups of three to play a variation of the game “Rock, Paper, Scissors.” Each person had a chance to collect a point, depending on the outcome of each trial.

Player 1 (same) got one point if all three were the same (e.g., rock, rock, rock).

Player 2 (pairs) got one point if two were the same (e.g., rock, rock, scissors).

Player 3 (different) got one point if all were different (e.g., rock, paper, scissors).

Students had an opportunity to practise and learn the game before designing a recording system to keep track of their trials and points. A possible recording system was modelled on the board. Students played and recorded many trials. They were then asked to analyze their findings and speculate about whether or not the game was fair and why.

The data from all groups was combined to produce a larger sample based on results for the whole class. This led to further discussion about whether or not the game was fair and why. Students were asked to write their final conclusions.

NOTE:

The game is not fair. The ratio of outcomes is 3, 18, 6, although experimental results will only approximate these theoretical results.

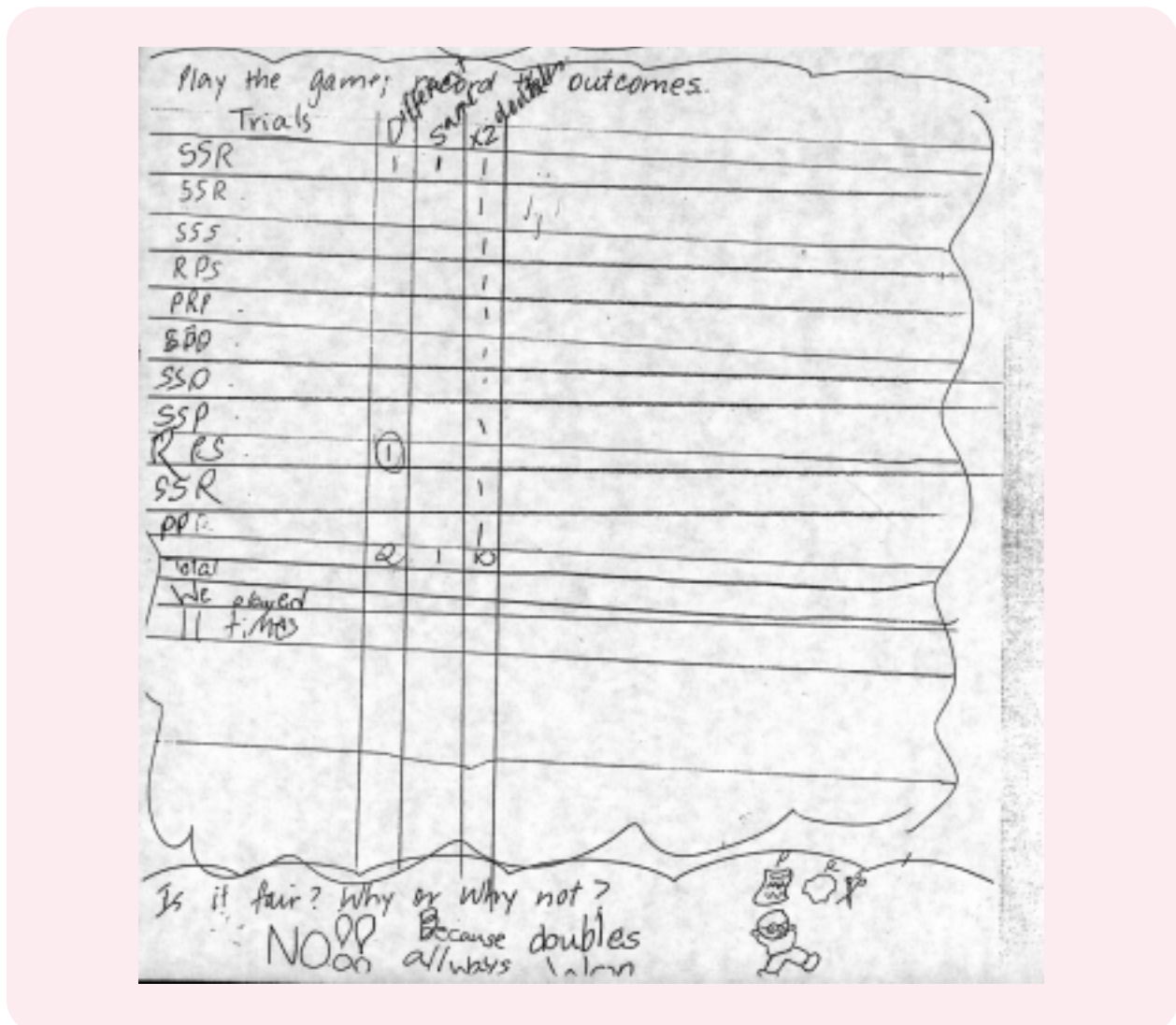
NOT YET WITHIN EXPECTATIONS

Teacher's Observations

With some prompting, this student was able to say that the game was not fair and that Player 2 (pairs) always won. However, he was not able to explain why there was a greater probability of pairs or to suggest how to make the game fair.

	Not Yet	Meets	Fully	Exceeds
SNAPSHOT				
CONCEPTS				
STRATEGIES				
ACCURACY				
REPRESENTATION				

- ♦ unable to identify mathematical concepts or procedures needed to solve problems or complete tasks that have been modelled in class
- ♦ does not apply relevant concepts, skills, and strategies appropriately
- ♦ unable to analyze problems to develop a plan
- ♦ may be unable to explain results; uses little mathematical language; often illogical



MEETS EXPECTATIONS (MINIMAL LEVEL)

Teacher's Observations

This student was able to conclude that the game was not fair but could not explain why. His proposed solution is impractical and does not deal with changing the procedures for the game.

- identifies most mathematical concepts and procedures needed to solve problems or complete tasks that have been modelled in class
- applies most relevant mathematical concepts, skills, and strategies appropriately
- analyzes simple patterns and relationships
- explanation of results may be incomplete; includes little mathematical language

	Not Yet	Meets	Fully	Exceeds
SNAPSHOT				
CONCEPTS				
STRATEGIES				
ACCURACY				
REPRESENTATION				

Play the game; record the outcomes.

Trials	S	D	2x	Trials	S	D	2x
RRS			1	RRS			1
RAP			1	RIS			1
RPS		1		ESR			1
SSR			1	RAS			1
PPS			1	RPP			1
RPS			1	SSS			1
CSP			1	SSR			1
REP			1	SSR			1
SSR			1	SSR			1
RPS	1	1		SSR			1
SSR			1	RPS			1
RAP			1	SSR			1
RPS			1	RPS			1
RPS	1	1		SSR			1
APS			1	RRS			1
RRP	1	1		RRS			1
RPS			1	RRS			1
ESS			1	SSR			1
SSP			1				
SSP			1				

Sam. Different doubles

Is it fair? Why or why not? 5 0 x2 22 point
 Totals Sam: 4 Totals Mike: 28 4 6

On whether or
not this game was
fair & why.

I think is not fair because k is
the same and I was double and k_i only got
4 point and I think that k_i feel bad ✓✓✓

To change this game I would get everyone to get
the same double

On whether or
not this game was
fair & why.

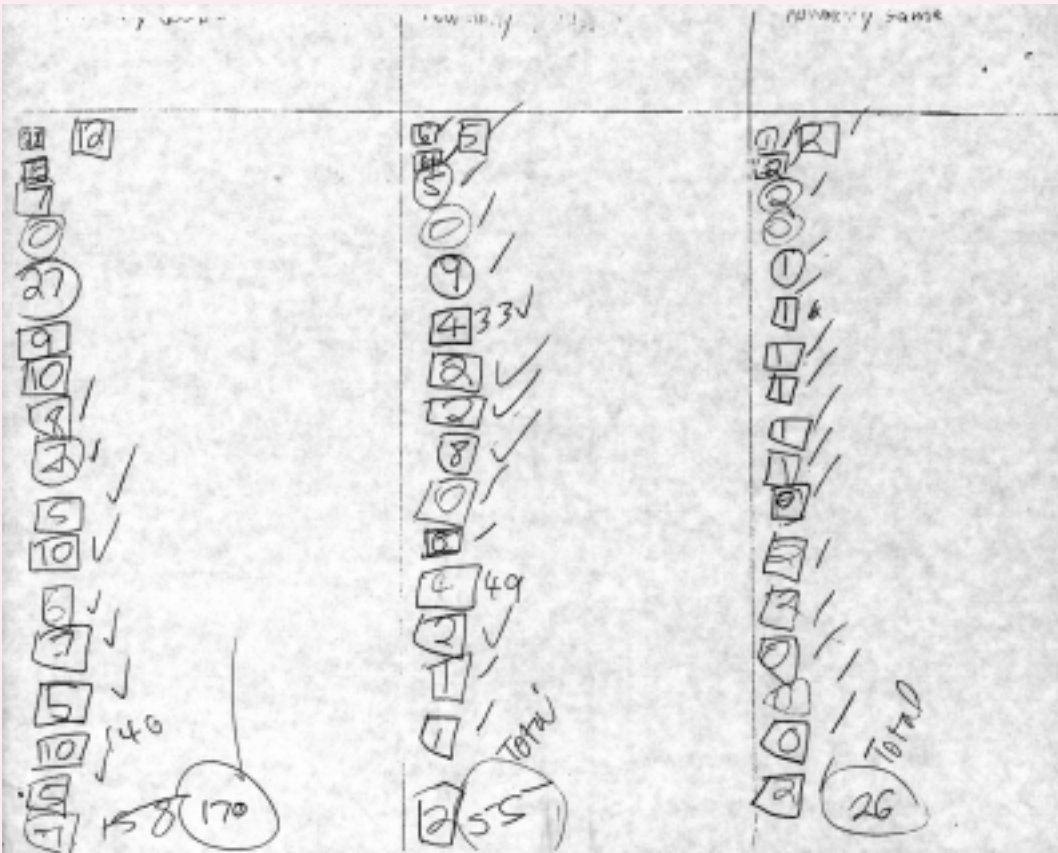
I think is not fair because k is
the same and I was double and k_i only got
4 point and I think that k_i feel bad ✓✓✓

To change this game I would get everyone to get
the same double

On whether or
not this game was
fair & why.

I think is not fair because k is
the same and I was double and k_i only got
4 point and I think that k_i feel bad ✓✓✓

To change this game I would get everyone to get
the same double



FULLY MEETS EXPECTATIONS

Teacher's Observations

This student was able to demonstrate why the game is not fair. His solution will not make the game fair but is a step in the right direction.

- ♦ identifies the mathematical concepts and procedures needed to solve problems or complete tasks modelled in class
- ♦ applies relevant concepts, skills, and strategies appropriately; may include minor errors or omissions
- ♦ analyzes problems to develop a plan
- ♦ demonstrates procedures and explains results logically, in own words, using some mathematical language

	Not Yet	Meets	Fully	Exceeds
SNAPSHOT				
CONCEPTS				
STRATEGIES				
ACCURACY				
REPRESENTATION				

Play the game; record the outcomes.

	x2	x3	x1
Trial#1 SSR	1	0	0
Trial#2 PSS	1	0	0
Trial#3 RPS	0	0	1
Trial#4 RSS	1	0	0
Trial#5 SRS	1	0	0
Trial#6 SPS	1	0	0

Is it fair? Why or why not? It is not fair because
 1 way to make dif. or 0. so there are at least
 4 ways to make doubles.

Total # the same 0
Total # different 1
Total # we got doubles 5

Its not fair
because most of
the time people
get doubles because
theres more ways
to make doubles.

See Here

Doubles
RRS

RRP

PPR

PPS

SSR

SSP

To make this
game fair I
would make
only 2 people
play so it could
only be diff. or
same.

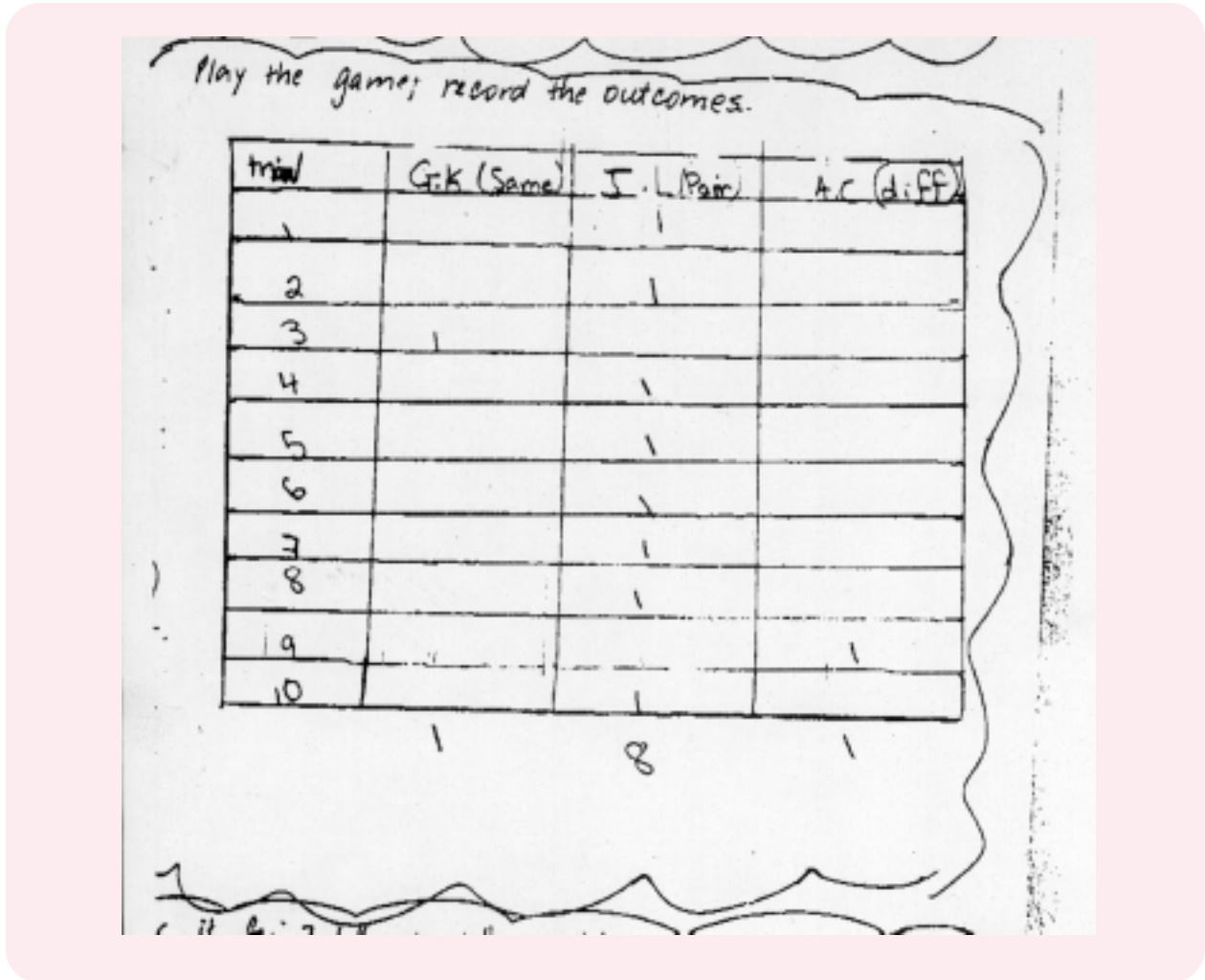
EXCEEDS EXPECTATIONS

Teacher's Observations

The student independently determined that she could solve the problem by creating a chart classifying all possible outcomes under the three conditions (pair, same, different). She correctly concluded that the game is not fair and explained why.

	Not Yet	Meets	Fully	Exceeds
SNAPSHOT				
CONCEPTS				
STRATEGIES				
ACCURACY				
REPRESENTATION				

- ◆ identifies the mathematical concepts and procedures needed to solve a problem or complete a task
- ◆ applies relevant concepts, skills, and strategies appropriately and efficiently
- ◆ analyzes problems to develop an efficient plan
- ◆ work is clear, detailed, and logically organized
- ◆ demonstrates procedures and explains results clearly and logically, using appropriate mathematical language; may include visuals



Possible Combinations		
Same	Pairs	different
RRR PPP SSS	RRR RRS SSR SSP PPS PPR RRR RRR RRR SSR RSS PSS SPP RPR RSR SRS SPS PSP PRP	RPS SPR PSR RSP SAP RRS
3	18	6
The game is not fair because the person that gets pairs has the greatest chance of winning.		

Sample 2: Class Survey (Data Analysis)

CONTEXT

This class had graphed and interpreted data that was given and had participated in a variety of shared data analysis activities.

MATHEMATICAL CONCEPTS

- ◆ formulate questions for investigation, from a real-world context
- ◆ display data by hand in a variety of ways, including circle graphs
- ◆ estimate and calculate percentages

PROCESS

Students were asked to choose a subject for a class survey and conduct the survey, tallying the results on a class list provided by the teacher. The teacher reviewed how to construct bar and circle graphs before they graphed their data both ways. Students were also asked to change their results to percentages. They were then asked to write about their processes and thinking, using mathematical language.

NOT YET WITHIN EXPECTATIONS

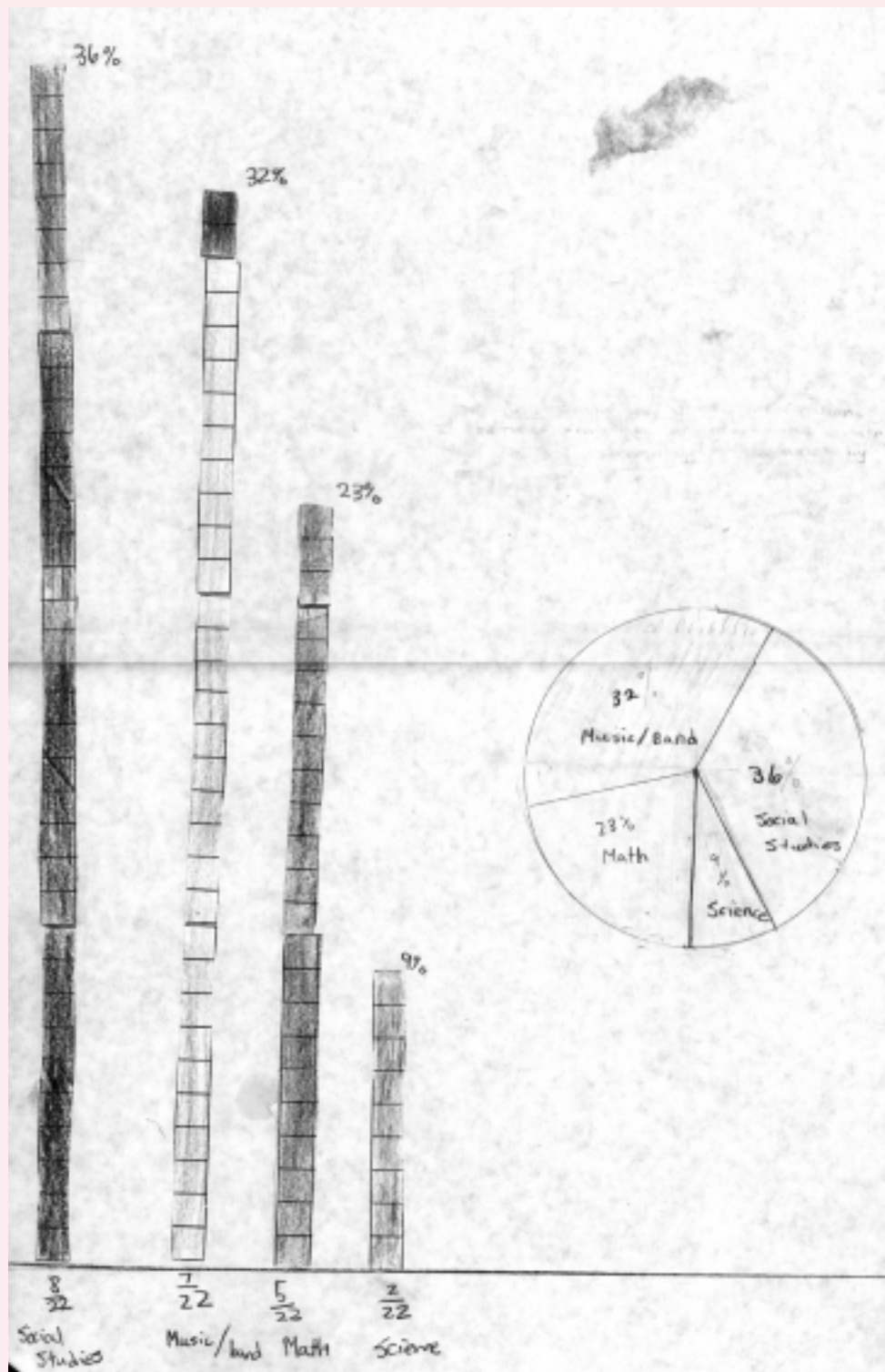
Teacher's Observations

This student chose to survey favourite subjects, the example the teacher had used. She had continuous support from a teaching assistant throughout the task. She was not able to explain her thinking in writing or orally, although she was able to say which subjects were most and least favoured.

	Not Yet	Meets	Fully	Exceeds
<i>SNAPSHOT</i>				
CONCEPTS				
STRATEGIES				
ACCURACY				
REPRESENTATION				

- ◆ unable to identify mathematical concepts or procedures needed to solve problems or complete tasks that have been modelled in class
- ◆ needs direct support to break the task into stages, steps, or sections
- ◆ may be unable to explain results

[illegible]



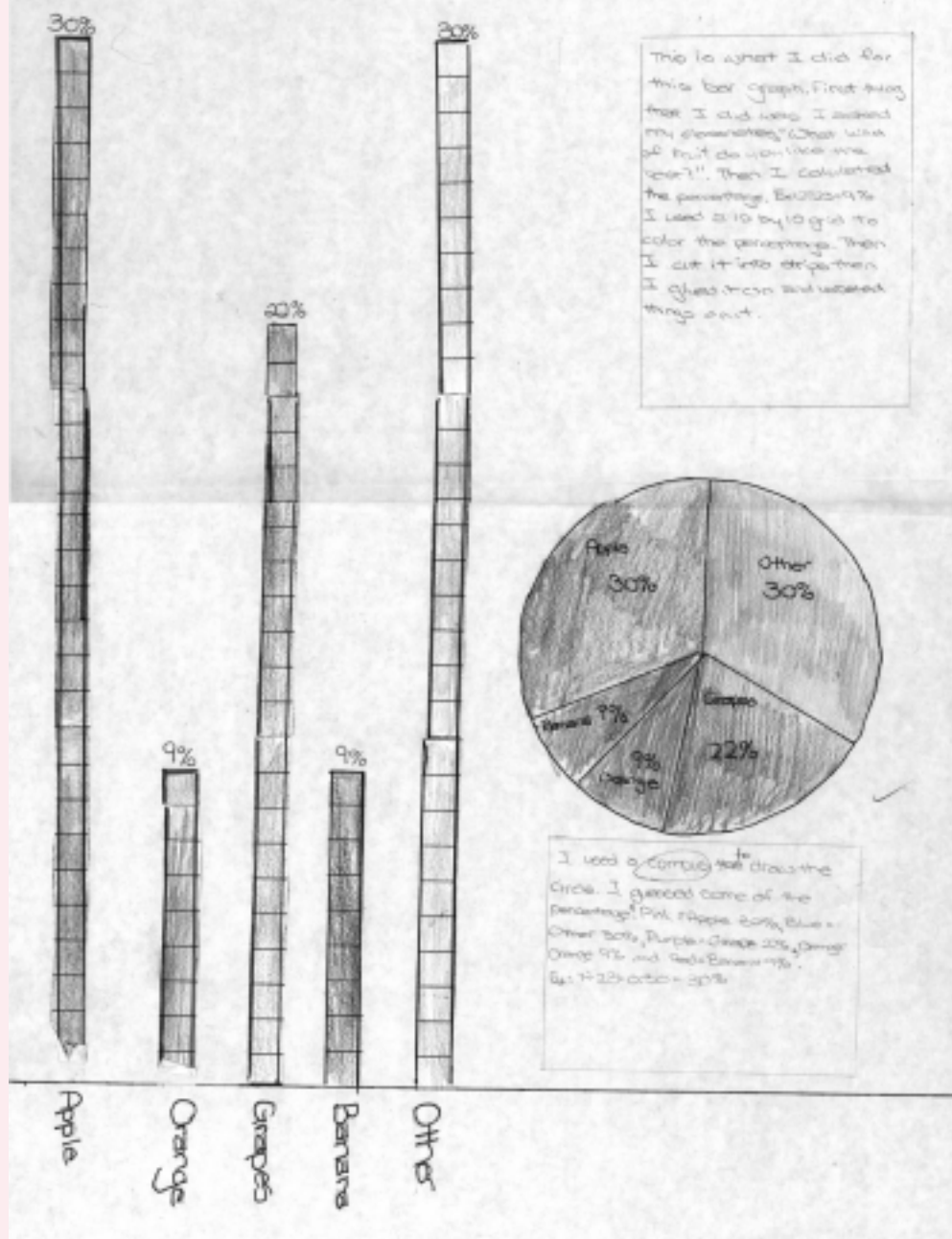
Teacher's Observations

	Not Yet	Meets	Fully	Exceeds
SNAPSHOT				
CONCEPTS				
STRATEGIES				
ACCURACY				
REPRESENTATION				

- ◆ identifies most mathematical concepts and procedures needed to solve problems or complete tasks that have been modelled in class
- ◆ follows stages, step, or sections outlined in the task without adjusting or checking procedures
- ◆ calculations are generally accurate
- ◆ graphic displays may have minor errors
- ◆ explanations may be incomplete; includes little mathematical language

[illegible]

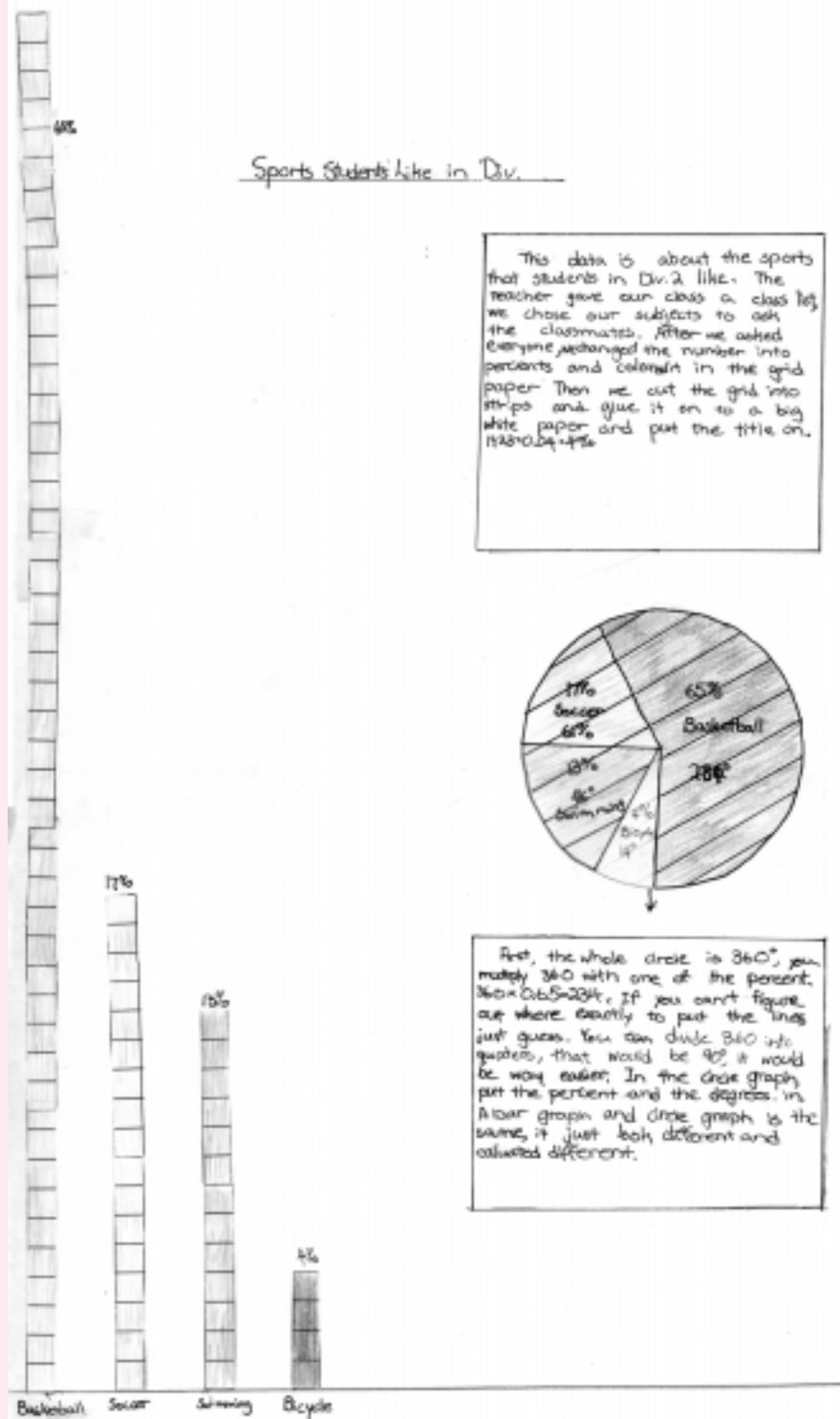
What Kind of Fruit do Students Like?



Teacher's Observations

	Not Yet	Meets	Fully	Exceeds
<i>SNAPSHOT</i>				
CONCEPTS				
STRATEGIES				
ACCURACY				
REPRESENTATION				

- [illegible]



EXCEEDS EXPECTATIONS

Teacher's Observations

This student worked efficiently throughout the task. He was able to calculate precise numbers of degrees for each section on his circle graph. His explanations of his processes and thinking are very detailed and use mathematical language.

	Not Yet	Meets	Fully	Exceeds
SNAPSHOT				
CONCEPTS				
STRATEGIES				
ACCURACY				
REPRESENTATION				

- ◆ applies relevant concepts, skills, and strategies appropriately and efficiently
- ◆ structures the task efficiently
- ◆ graphic displays are accurate and precise
- ◆ demonstrates procedures and explains clearly and logically, using appropriate mathematical language



Movies that Students in Div. 2 Like

