

Numeracy Performance Standards Revision

Instructions for Field-Testing

Context

Over the past year, the Ministry has been working with math educators to update the BC Numeracy Performance Standards to ensure that they are aligned with the current curriculum, while continuing to build on the extensive work that many BC districts, schools, teachers, and inquiry groups have already done.

The revised standards will feature:

- One scale for each of grades 1-3; 4-6; 7-9; 10-12, with space to indicate the specific **strands** and **key concepts** that are being assessed in specific cases.
- Tasks/sample sets at each grade (we anticipate having a minimum of two tasks/student sample sets – and at least one of these will feature **number**)

Field-testing Procedures

Some tasks and samples have been developed as prototypes for field-testing. The prototypes start to show what the final product will look like. These tasks and student samples may or may not be selected for the final version of the standards. It is critical that these prototypes be field-tested by students and teachers.

We currently have prototypes available for Grades 1 to 9. Prototypes for Grades 10 to 12 will be forthcoming.

Each prototype includes:

- (1) Quick Scale
 - (2) Designation of the key concepts involved
 - (3) Task description
 - (4) One sample at each of the four levels of performance
 - (5) The teacher's observations for each sample
 - (6) The small 'logo' form of the scale showing which level(s) each aspect was rated as.
- We need teachers and students to try the prototype tasks. For example, using one of the tasks with a class; then using the scale and samples to try to assess the results gives the best

Numeracy Performance Standards, Grade 4 Prototype

possible insight into how they are working. Another example is that a group of teachers get together to work through the prototype at their grade level as a form of Pro-D.

- Provide specific, concrete feedback. For example, if you don't agree with the placement of a sample, please be as specific as possible about why and where you think it should be rated. Use the attached *Prototype Feedback Questions* to provide focused feedback.
- Send your comments and any additional student exemplars from your field testing to the Ministry. We'd like to hear from you by **September 30, 2011**.
- These prototypes are being circulated as widely as possible, so please feel free to share them with others.

What's Next?

- We will be working on similar prototypes for grades 10, 11 and 12 and would welcome any contributions.
- We need to keep adding to the task/sample sets for Grades 1 to 9. We aim to have two sets per grade for the published materials eventually. We would welcome task/sample sets, especially in patterns and relations, shape and space, statistics and uncertainty.
- If you have something suitable, please either post it on the Moodle site at <http://www.learnnowbc.ca/educators/default.aspx>, or contact Jiemei Li at Jiemei.Li@gov.bc.ca or Nancy Walt at Nancy.Walt@gov.bc.ca

Numeracy Performance Standards, Grade 4 Prototype

Numeracy Performance Standards Revision

Prototype Feedback Questions

1. What suggestions do you have about the use of the numeracy performance standards? Are these materials easy for teachers to use?
2. Are the rating scales easy to apply to samples of student work? What improvements are needed?
3. Is the task grade/age-appropriate? Provide your opinion and comments.
4. What suggestions do you have for improving the student samples in the prototype? Do you agree with the rating? If not, what is the rating and rationale for the rating?
5. Would you suggest other samples that better exemplify the performance levels?
6. Are these materials helpful to discuss with students and parents? In what ways?
7. Would you like to contribute new tasks/samples?

Please send your comments and materials by **September 30, 2011** to Jiemei Li

- by email at Jiemei.Li@gov.bc.ca
- by mail at: Student Assessment Branch, PO Box 9143 Stn Prov Govt
Victoria, BC V8W 9H1

or post them on the Moodle at <http://www.learnnowbc.ca/educators/default.aspx>

Thank you!

Numeracy Performance Standards, Grade 4 Prototype

Quick Scale: Numeracy Performance Standards (Grades 4-6)

Task: _____

Grade _____

Strand	Key concepts required by this task (see IRP p. 16)

	Not Yet Within Expectations	Meets Minimal Expectations	Fully Meets Expectations	Exceeds Expectations
Snapshot	<i>Does not meet basic requirements of the task(s) without close, ongoing assistance. Usually unable to explain result.</i>	<ul style="list-style-type: none"> Satisfies basic requirements for most parts of the task, but some important aspect is flawed or incomplete. Partial explanation. 	<ul style="list-style-type: none"> Satisfies basic requirements for all parts of the task(s); reaches and explains reasonable solution(s). (may be minor flaws) 	<ul style="list-style-type: none"> Thoroughly satisfies requirements of all parts of the task; solution is well-developed and justified; often insightful or innovative..
Concepts and Connections - recognizes the math; applies appropriate concepts [R] [V] [CN] - explains/demonstrates relevant concepts; makes connections [R]	<ul style="list-style-type: none"> Does not recognize or apply basic concepts needed for the task(s) Shows little understanding of relevant concepts; explanations are incomplete or illogical 	<ul style="list-style-type: none"> Recognizes/applies concepts needed for most parts of the task(s) (may not be best choice) Shows partial understanding of relevant concepts; explanations may be vague; partially incomplete 	<ul style="list-style-type: none"> Recognizes/applies concepts needed for all parts of the task(s) Shows understanding of relevant concepts; explanations are logical and complete 	<ul style="list-style-type: none"> Recognizes/applies a wide range of concepts including those that have not been recently taught; may offer alternatives Shows thorough understanding; explanations are insightful;
Problem-solving and reasoning -selects and uses appropriate strategies to analyze, solve and create problems [PS] [V] [T] - flexible; perseveres - uses estimation strategies [ME] - verifies and justifies that results are reasonable [R]	<ul style="list-style-type: none"> Does not use appropriate strategies; requires extensive support No flexibility; does not persevere to a solution Does not verify or justify Unable to use estimation strategies (answers are often highly improbable) 	<ul style="list-style-type: none"> Uses some appropriate strategies if problem appears familiar; may need some help Limited flexibility and perseverance Needs help to verify or justify; inconsistent Some evidence of estimation; (some answers reasonable) 	<ul style="list-style-type: none"> Uses appropriate strategies Shows some flexibility; in most cases, perseveres to find a solution With prompting, verifies and justifies Uses estimation strategies appropriately; most answers are reasonable 	<ul style="list-style-type: none"> Uses appropriate strategies; often innovative; may add some complexity Shows flexibility; perseverance to find a solution Verifies; justifies Uses effective estimation strategies; answers are reasonable (relatively precise)
Procedures - accurate and precise in recording, substitutions, calculations, units, and symbols [C] - fluent; efficient in applying procedures including mental math [ME]	<ul style="list-style-type: none"> Follows procedures with limited accuracy; major errors or omissions Inefficient; struggles (e.g., false starts; repeats; little evidence of mental math strategies) 	<ul style="list-style-type: none"> Follows procedures with partial accuracy; some errors or omissions Inconsistent; may be fluent with some procedures but inefficient or not demonstrated in others 	<ul style="list-style-type: none"> Follows procedures accurately with some minor errors or omissions Uses most procedures and mental math strategies fluently; may be inefficient 	<ul style="list-style-type: none"> Follows procedures with accuracy and precision; very few if any minor errors/omissions Uses procedures and mental math strategies fluently and efficiently; may find own 'shortcuts'
Representation and Communication -communicates mathematically including mathematical language [C] -includes appropriate graphics; representations (e.g., charts, tables, graphs, diagrams; sketches) [V]	<ul style="list-style-type: none"> Does not explain procedures and results clearly Omits required graphics or representations and/or does not construct them appropriately; many omissions; serious flaws 	<ul style="list-style-type: none"> Partially explains procedures; results; parts are confusing, vague, incomplete Constructs most required graphics; representations; parts are seriously flawed/ incomplete (e.g., scale inappropriate) 	<ul style="list-style-type: none"> Explains results and procedures clearly using some math language Constructs required graphics and/or representations appropriately; may have minor errors or flaws (e.g., missing labels) 	<ul style="list-style-type: none"> Explains procedures and results precisely; uses mathematical language Constructs required graphics and/or representations effectively and accurately

Used for major tasks, projects, or ongoing observations.

Numeracy Performance Standards, Grade 4 Prototype

The Cards

Context: This task features multiplication and division using mental math strategies. Students are asked to share trading cards with friends. Students can engage with this task in a variety of ways, and at greater or lesser depth. The number of trading cards per package, the number of packages and the kind of cards can all be taken into account to create harder or easier problems.

Grade: 4

PLO's:

A7 demonstrate an understanding of division (1-digit divisor and up to 2-digit dividend) to solve problems by

- using personal strategies for dividing with and without concrete materials
- estimating quotients
- relating division to multiplication [C, CN, ME, PS, R, V]

A5 describe and apply mental mathematics strategies, such as:

- skip counting from a known fact
- using doubling or halving
- using doubling or halving and adding or subtracting one more group
- using patterns in the 9s facts
- using repeated doubling to determine basic multiplication facts to 9x9 & related division facts [C, CN, ME, PS, R]

A6 demonstrate an understanding of multiplication (2- or 3-digit by 1-digit) to solve problems by

- using personal strategies for multiplication with and without concrete materials
- using arrays to represent multiplication
- connecting concrete representations to symbolic representations
- estimating products [C, CN, ME, PS, R, V]

Process:

Before Pose the following problem at the end of a unit involving multiplication and division.

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To situate the learning, ask students if they collect trading cards. Explain that these cards come in packages and are going to be shared in a loot bag – a special gift given to birthday party guests at the end of a party.

During Encourage students to include all their thinking, their pictures and all their calculations. It is important that students record their strategies for solving the problems.

After Have students ensure their work is complete, including numbers, words, pictures and any diagrams or tables that may help to illustrate how they solved the problem(s).

The cards

Your birthday is coming! You have invited 4 friends to the party.

Mom bought you some trading cards to give away to your friends in their loot bags.



She bought:

2 packs of hockey cards

2 packs of monster cards

2 packs of magic cards

2 packs of dragon cards

3 packs of baseball cards

Each pack has 5 cards.

How can you share the cards fairly?

Is there another way?

Show all your thinking.



Update!

Your little brother and your cousin are coming to the party too.

How can you share the cards now?

Numeracy Performance Standards, Grade 4 Prototype

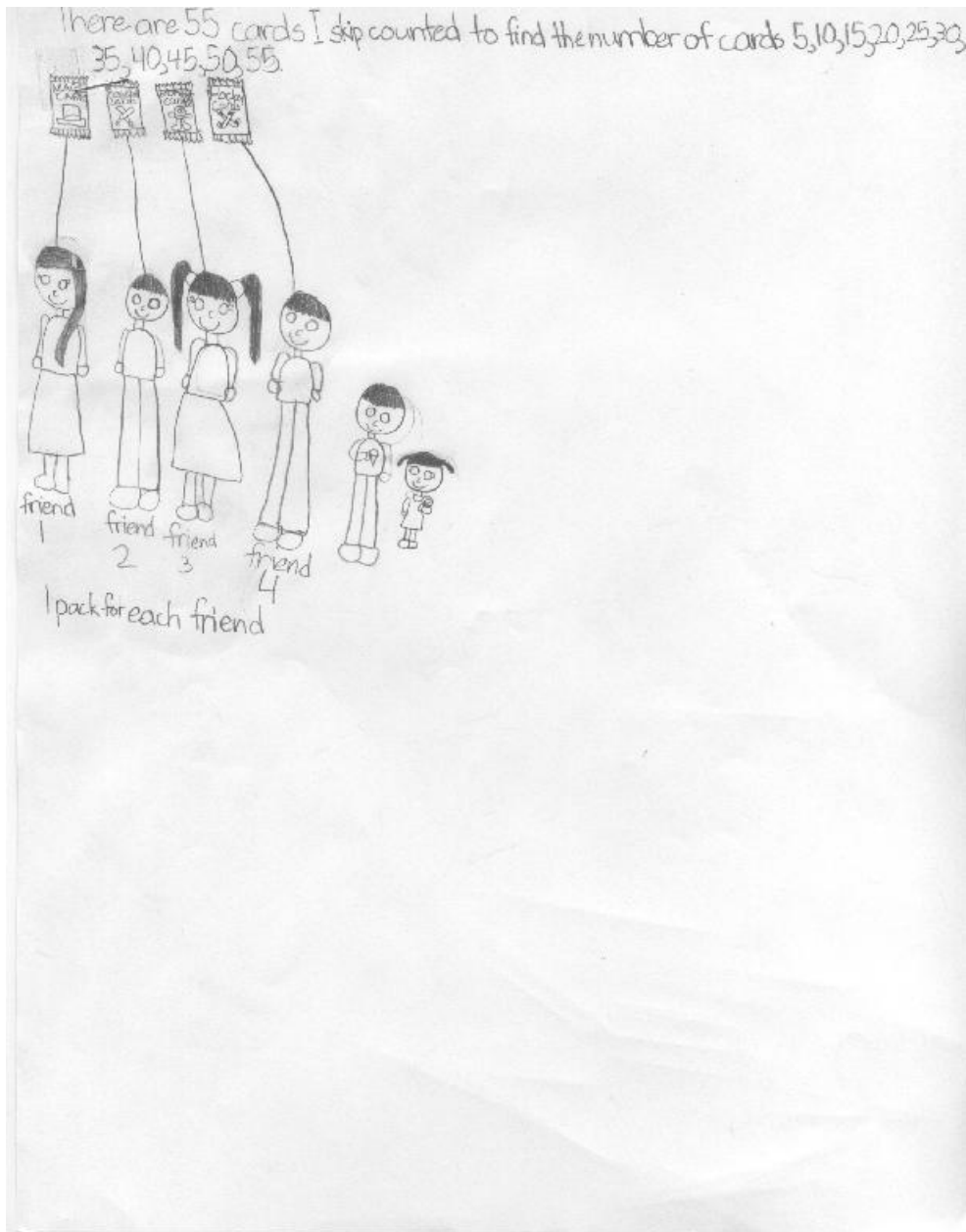
NOT YET WITHIN EXPECTATIONS

Teacher's Observations

	NYM	MM	FM	Ex
OVERALL Snapshot				
Concepts Connections				
Prob-Solving Reasoning				
Procedures				
Represent'n Commun				

- Does not recognize or apply basic concepts needed for the task
- Shows little understanding of relevant concepts
- Does not use appropriate strategies
- Does not explain procedures and results clearly

Numeracy Performance Standards, Grade 4 Prototype



Numeracy Performance Standards, Grade 4 Prototype

MEETS EXPECTATIONS (MINIMAL LEVEL)

Teacher's Observations

	NYM	MM	FM	Ex
OVERALL				
Snapshot				
Concepts Connections				
Prob-Solving Reasoning				
Procedures				
Represent'n Commun				

- Satisfies basic requirements for most parts of the task
- Over-simplifies the task (includes self making 5 to divide by rather than 4)
- Uses limited mathematical reasoning to adjust for additional guests
- Explains results and procedures

Numeracy Performance Standards, Grade 4 Prototype

2 pack h-10	55	each friend gets 11 cards and I did it by taking away 11 from 55 and there was 0 and I take it for my birthday. <u>was how</u> I did it.
2 pack mon-10	-11	
2 pack mag-10	11	
2 pack dra-10	11	
3 pack b-15	0	

update

each friend gets 10
 and my little brother
 gets three and my
 cousin get two and
 I did it the same way.
 My little brother
 gets more because he
 is a little bigger than
 my cousin.

Numeracy Performance Standards, Grade 4 Prototype

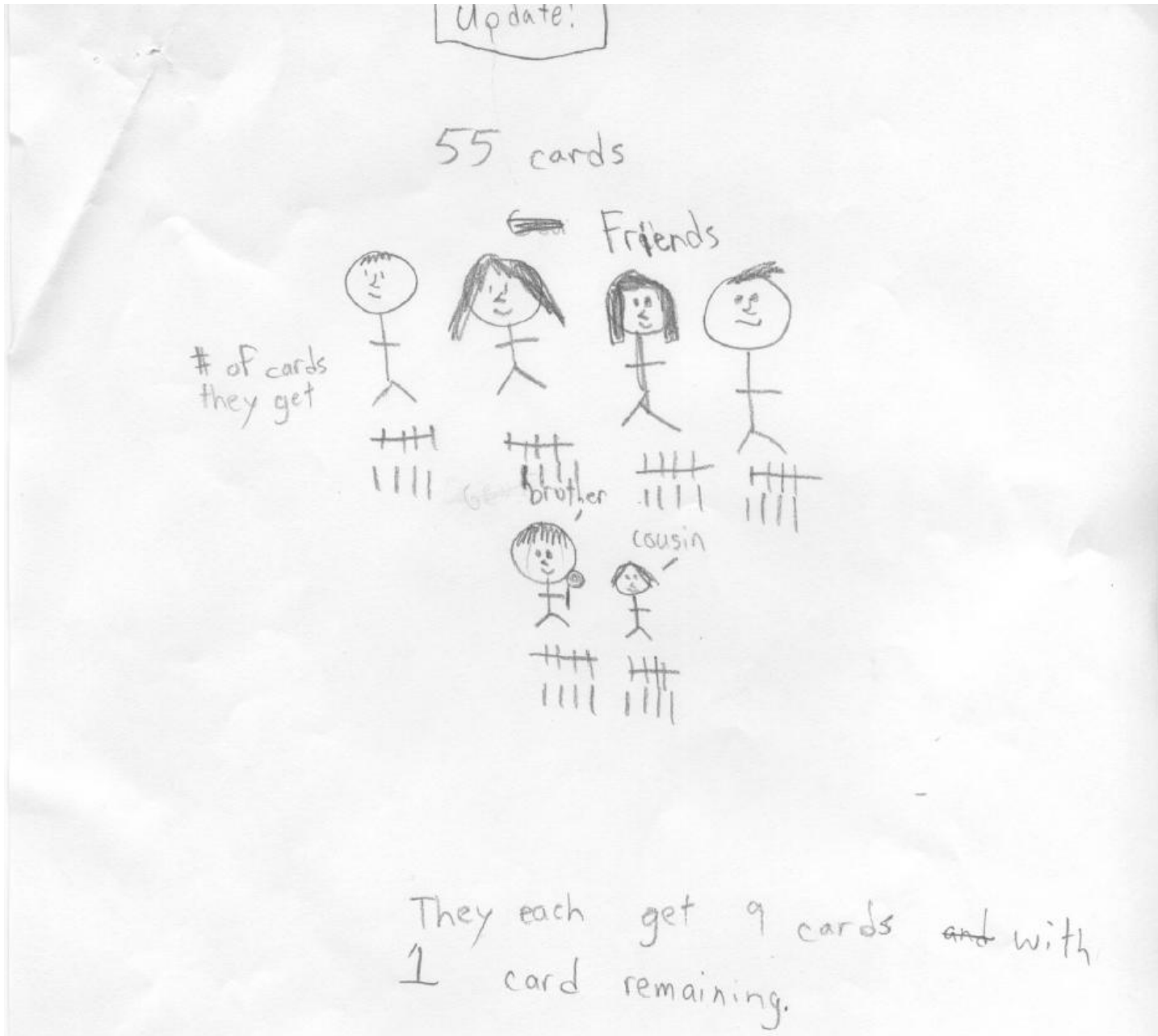
FULLY MEETS EXPECTATIONS (Sample 1)

Teacher's Observations

	NYM	MM	FM	Ex
OVERALL Snapshot			■	
Concepts Connections			■	
Prob-Solving Reasoning			■	
Procedures		■		
Represent'n Commun			■	

- Satisfies requirements of all parts of the task
- Shows understanding of relevant concepts
- Uses appropriate strategies
- Follows procedures with partial accuracy (misinterprets first set of tallies)
- Shows alternate solutions (with and without self)
- Does not recognize that answer for set 1 is improbably is improbable because dividing 4 has resulted in a smaller number per child than dividing by 5

Numeracy Performance Standards, Grade 4 Prototype



Numeracy Performance Standards, Grade 4 Prototype

FULLY MEETS EXPECTATIONS (Sample 2)

Teacher's Observations

	NYM	MM	FM	Ex
OVERALL Snapshot			■	
Concepts Connections			■	
Prob-Solving Reasoning				■
Procedures			■	
Represent'n Commun			■	

- Satisfies basic requirements
- Reaches a reasonable solution (determines that "fair" will mean the same number of each type of card for each child)
- Uses appropriate strategies (table)
- Perseveres to find a solution
- Follows procedures accurately
- Explains results clearly

Numeracy Performance Standards, Grade 4 Prototype

Rough Work Space: This is a place for you to do your rough work. Do not erase anything. If you are unhappy with something cross it out.

$5 \text{ packs} \times 2 = 10 \text{ cards}$
 $5 \times 3 = 15$

$5 \text{ cards} \times 2 \text{ packs} = 10 \text{ cards}$ $5 \text{ cards} \times 3 \text{ packs} = 15 \text{ cards}$

kid 1 kid 2 kid 3 kid 4 kid 5 kid 6

h d	h d	h d	h d	h d	h d
h d	h d	h d	h d	h d	h d
h d	h d	h d	h d	h d	h d
h d	h d	h d	h d	h d	h d

hockey monster magic dragon base ball

"Good" Work Space: This is a space for you to show your work for your answer. In an organized fashion present and explain your thinking.

The reason I did a table was because it's easier for me to work with. The first way I tried it I used a different way to do it. I switched to a table because the first way I did it I kept on losing track of where I was.

Solution Space: In complete sentences answer the original question. Explain and justify your final choice by giving specific details.

When just my friends were coming they got 12 cards each but when cousin and little brother were coming they got 6 cards each. Every time there's cards left over.

Numeracy Performance Standards, Grade 4 Prototype

EXCEEDS EXPECTATIONS

Teacher's Observations

	NYM	MM	FM	Ex
OVERALL Snapshot				
Concepts Connections				
Prob-Solving Reasoning				
Procedures				
Represent'n Commun				

- Thoroughly satisfies requirements of the all parts of the task
- Solution is well-developed and justified
- Shows thorough understanding
- Uses appropriate strategies
- Uses procedures fluently and efficiently
- Explains procedures and results precisely

Numeracy Performance Standards, Grade 4 Prototype

Name: Jensen

Rough Work Space: This is a place for you to do your rough work. Do not erase anything. If you are unhappy with something cross it out.

10 Hockey cards
10 Monster cards
10 Magic cards
10 Dragon cards
15 Baseball cards
55

4 people
5 people
35 cards total

4 $\overline{) 55}$
13 R3
44
11
12
03

2 m = 2 magic cards

you	F1	F2	F3	F4	total
2h	2h	2h	2h	2h	10 Total
2m	2m	2m	2m	2m	10 Total
2d	2d	2d	2d	2d	10 Total
3b	3b	3b	3b	3b	12 Total

2 cards of h m n d b

10 R3
5 monster
R2
2

* F = friend

"Good" Work Space: This is a space for you to show your work for your answer. IN an organized fashion present and explain your thinking.

1 hockey
2 monster
2 magic
2 dragon
3 baseball

1 hockey
2 monster
2 magic
2 dragon
3 baseball

1 hockey
2 monster
2 magic
2 dragon
3 baseball

1 hockey
2 monster
2 magic
2 dragon
3 baseball

I'm thinking about dividing the numbers. I was confused at first because I thought the cards. I got my answer by adding the card pieces together (55-10) then divided the cards. I then made a table and graph and planned to put my answer in a sentence. I found the cousin and brother one very easy because it almost just an add on.

Four friends
Each friend gets 2 hockey

4 left
3 left

Solution Space: In complete sentences answer the original question. Explain and justify your final choice by giving specific details.

I can share the cards fairly by giving each friend 2 hockey cards, 2 monster cards, 2 magic cards, 2 dragon cards, and 3 baseball cards. You have 11 cards left over.

I can share the cards fairly by giving my little brother, cousin, and friends each 1 hockey card, 1 monster card, 1 magic card, 1 dragon card, and 2 baseball cards. You will have 19 cards left over.