Spring Seeds

Mrs. McKegney is trying to be organized and plan for planting activities next spring. A big part of the planning revolves around the seeds she purchases for students to plant. Using the chart showing what seeds students chose to plant this year, decide which seeds should be purchased for next year's planting.

In a letter to Mrs. McKegney, state your recommendation and explain your reasoning mathematically.

Be sure to support your ideas with a mathematical representation, accurate math language and an organized presentation. Please comment on any additional observations you have.

Grade Levels 3 - 5

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Context

Before beginning this task, students in this fourth - fifth grade class had just completed planting seeds as part of their science unit. Students chose from 14 varieties of seeds to plant. Previously, students had participated in multiple experiences with data analysis including surveys and the *Exemplars* task "Ms. Amico's Birthday Bash".

What This Task Accomplishes

This task assesses students' ability to read a chart, analyze data and draw conclusions based on principles of probability.

What the Student Will Do

Most students will determine the "most popular" seed varieties from both classes, create a graph of the seed varieties planted and make recommendations based on the most common seeds planted.

Time Required for Task

Students worked on this task over several days.

Interdisciplinary Links

Science -

This activity lends itself well to a study of seed germination in addition to a study of plant structure and function.

Art -

Students could design a garden featuring their plants or other plants that would be visually pleasing.

Math -

Students could measure the height of plants at regular intervals or investigate the probability of a seed germinating based on the ratio of seeds planted to the ratio of plants growing. This problem could also be made more complex by incorporating germination time.

Teaching Tips

Planting seeds definitely added motivation to the task. The "real-life" connection was important to the students. A seed planting activity would be an excellent precursor to this problem. Experiences with data analysis is very helpful. The task can be easily adapted by looking at a limited number of results (one class vs. two or even 10 children from one class). The actual problem analysis took approximately one hour.

Suggested Materials

- Calculators
- Graph paper
- Worksheets (see pages 5-6)

Possible Solutions

Solutions will vary depending on the parameters set by the student - how many seed varieties, reasons for eliminating seeds. Based on the data presented here, students selected between five and nine varieties of seeds, which included Cosmos, Calendulas, Bachelor's Buttons and Dahlias.

Benchmark Descriptors

Novice
A solution that shows an incomplete understanding or ability to solve the problem. A solution that does not address the most popular seeds or eliminates some seeds from the list of possibilities. Reasoning is not apparent in the student's solution.

Apprentice
A solution that attempts to summarize seed popularity, but is incomplete or incorrect in its conclusions. A solution which demonstrates some understanding of the problem, perhaps by totaling numbers of seeds planted or eliminating possible seed choices, but has a random or weak explanation of reasoning.

Practitioner
A Practitioner solution considers all the data (both classes) and draws conclusions based on popularity of seeds. It explains the criteria for seed variety selection. The student is able to apply fundamentals of statistical analysis and probability to predict future seed choices.

Expert
A solution that addresses multiple factors in seed selection and goes beyond analysis of general data to isolate more specialized information within the class selections (boy/girl preferences for example). Solution clearly describes criteria for seed selection.

Name	# of varieties														
Name	# of varieties														

Name	# of varieties	P	C	M	4P	4Y	B	L	D	LB	CA	CH	A	?	DI
Leigh	1									X					
Eugene	3		X										X		X
Emma	6				X	X				X	X		X		X
Gloria	3										X		X		X
Sarah	5		X		X	X				X			X		
Mindy	1				X										
Jessica	4			X	X		X				X				
Dustin	3						X				X				X
Cassi	2						X				X				
Jeremy	1									X					
Helen	2		X								X				
Lynn	5		X	X	X	X				X					
Dustin S	1				X										
BJ	1						X								
Sam	1									X					
Amanda	4		X								X			X	X
Thomas	1									X					
Name	#2 of varieties	P	C	M	4P	4Y	B	L	D	LB	CA	CH	A	?	DI

Petunia	Cosmos	Marigold	4:00 purple	4:00 yellow	Bachelor's Buttons	Lavendar	Dahlia	Lemon Balm	Calendula	Chives	Achillea	Mystery	Dianthus
P	C	M	4P	4Y	B	L	D	LB	CA	CH	A	?	DI

Novice

Student appears to total the number of students planting each type.

Student does not indicate solution clearly or demonstrate full understanding of task - since no seeds are eliminated and no conclusions are made regarding seeds.

Apprentice

Name	# of varieties	P	C	M	4P	4Y	B	L	D	LB	CA	CH	A	?	DI
Justin	2				X				X						
Andy															
Carin	6		X				X	X	X				X	X	
Tommy	4			X	X	X			X						
Alexa	6		X	X					X		X		X		X
Lindsey	1		X												
Bethany	6		X	X			X	X					X		X
Chad	1			X											
Thomas	2	X						X							
Bill	5		X			X	X		X			X			
Chanda	6		X				X		X	X				X	X
Kevin	3				X					X		X			
Melvin	2										X		X		
Carolyn	6			X	X		X		X		X		X		
Steph	1		X												
Katie	6		X				X		X		X		X	X	
Name	#2 of varieties	P	C	M	4P	4Y	B	L	D	LB	CA	CH	A	?	DI
			9	5	4	4	6	3	8	2	4	2	6	3	3

Key

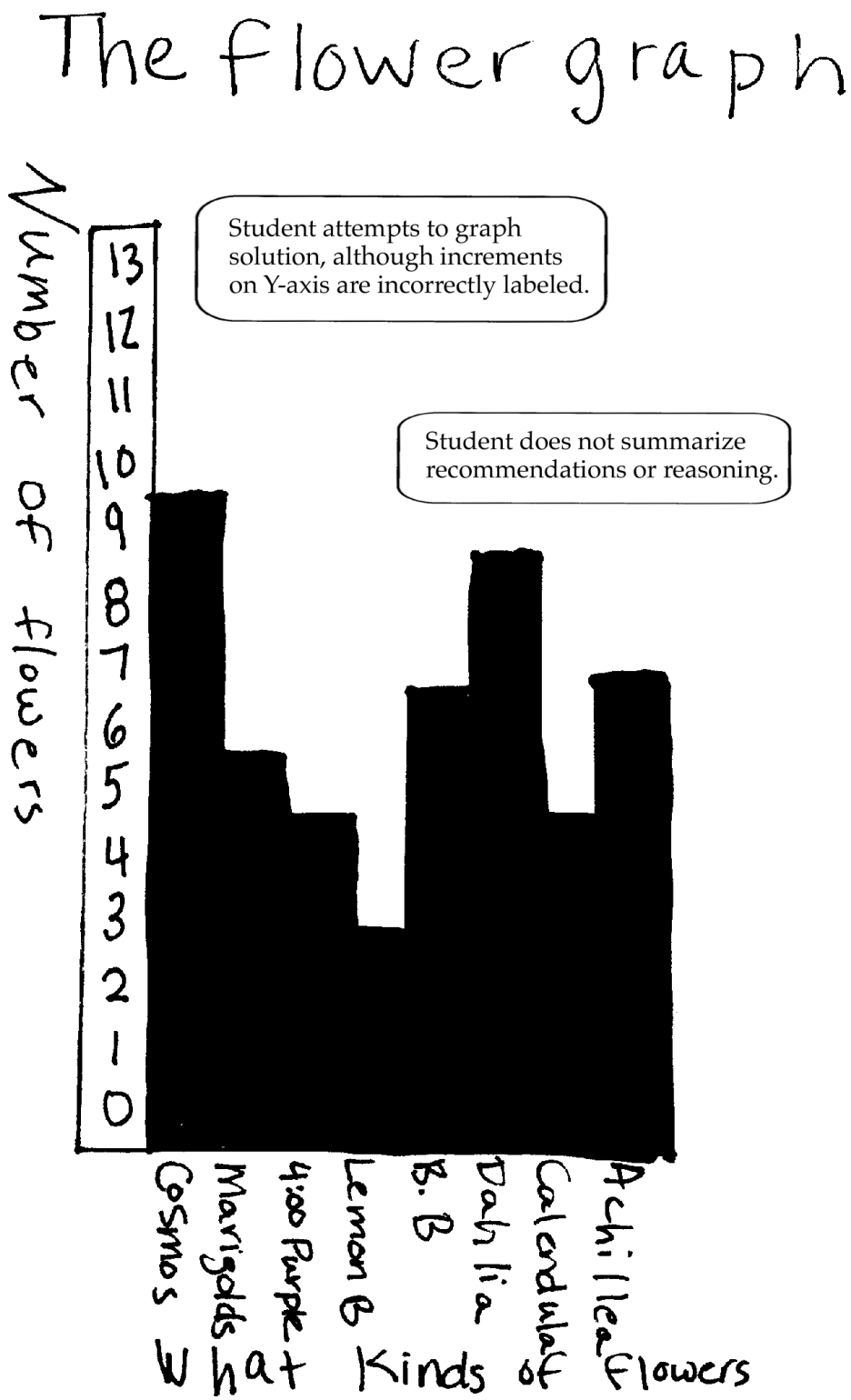
P	Petunia
C	Cosmos
M	Marigold
4P	4:00 purple
4Y	4:00 yellow
B	Bachelor's Buttons
L	Lavendar
D	Dahlia
LB	Lemon Balm
CA	Calendula
CH	Chives
A	Achillea
?	Mystery
DI	Dianthus

Student appears to total seeds for one class.

Circled numbers may indicate student recommendation.

Student appears to have a strategy and understanding of task as demonstrated through graph and totals on chart.

Apprentice



Practitioner

Student uses a table to show the number of people planting the eight most popular seeds.

Kind of Seed (Flower or Herb)	How many people voted to plant that seed this year	Total amount of people who planted that seed.
Calendula	4 mck. 7 Hock	11
Dahlia	8 mck. 0 Hock	8
Cosmos	9 mck. 5 Hock	14
Lemon Balm	2 mck 7 Hock	9
4:00 Purple	4 mck. 6 Hock	10
Bachelors	6 mck. 4 Hock	10
Dianthis	3 mck 5 Hock	8
Achillea	6 mck. 4 Hock	10

Practitioner

Dear Mrs. Mckegney,

I'm writing to you concerning which seeds to buy for next year. I think you should buy 8 Kinds of seeds; Calendulos, Dahlias Cosmos, Leman Balm, 4'o clock purple, Bachelors buttons, Darthis, and Achillea Let me explain how I came to that conclusion. First I looked at the chart that you made, and added how many people (for example) in Mrs. Hock's class planted Marigolds, and how many people in Mrs. Mckegney's class planted Marigolds. Then I did that with the rest of the seeds. Next I picked all the seeds that 8* or more people chose to plant. There were 8 different types of flowers (or herbs) to choose from. I thought that 8 was a good number of seeds to have because there'd be a variety of seeds to choose from.

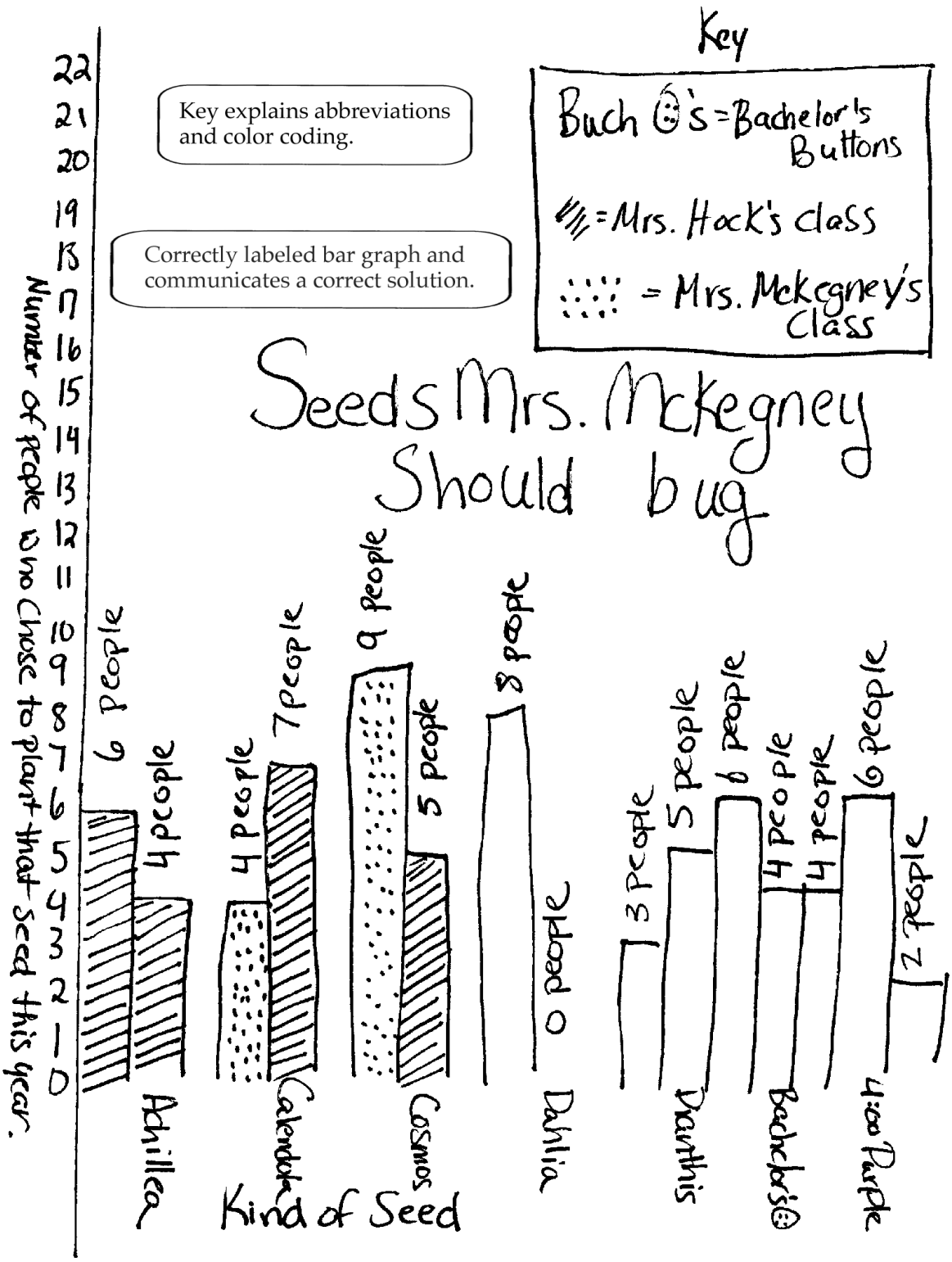
Please consider my idea,

* I picked 8 people or more, because 7-1 would be too small an amount of seeds to bother buying.

Table is explained / described.

Student explains rationale for selecting eight seed types.

Practitioner



Spring Seeds

Practitioner

Name	# of varieties	P	C	M	4P	4Y	B	L	D	LB	CA	CH	A	?	DI
Leigh	1									X					
Eugene	3		X										X		X
Emma	6				X	X				X	X		X		X
Gloria	3										X		X		X
Sarah	5		X		X	X				X			X		
Mindy	1				X										
Jessica	4			X	X		X				X				
Dustin	3						X				X				X
Cassi	2						X				X				
Jeremy	1									X					
Helen	2		X								X				
Lynn	5		X	X	X	X				X					
Dustin S	1				X										
BJ	1						X								
Sam	1									X					
Amanda	4		X								X			X	X
Thomas	1									X					
Name	#2 of varieties	P	C	M	4P	4Y	B	L	D	LB	CA	CH	A	?	DI
		05	2	6	3	4	0	0		7	7	0	4	2	5

Key

P	C	M	4P	4Y	B	L	D	LB	CA	CH	A	?	DI
Petunia	Cosmos	Marigold	4:00 purple	4:00 yellow	Bachelor's Buttons	Lavendar	Dahlia	Lemon Balm	Calendula	Chives	Achillea	Mystery	Dianthus

Practitioner

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Andy															
Carin	6		X				X	X	X				X	X	
Tommy	4			X	X	X			X						
Alexa	6		X	X					X		X		X		X
Lindsey	1		X												
Bethany	6		X	X			X	X					X		X
Chad	1			X											
Thomas	2	X						X							
Bill	5		X			X	X		X			X			
Chanda	6		X				X		X	X				X	X
Kevin	3				X					X		X			
Melvin	2										X		X		
Carolyn	6			X	X		X		X		X		X		
Steph	1		X												
Katie	6		X				X		X		X		X	X	
Name	#2 of varieties	P	C	M	4P	4Y	B	L	D	LB	CA	CH	A	?	DI
		0	9	5	4	2	6	3	8	2	4	2	6	3	3

Key

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Expert

Name	# of varieties	P	C	M	4P	4Y	B	L	D	LB	CA	CH	A	?	DI
Justin	2				X				X						
Andy															
Carin	6		X				X	X	X				X	X	
Tommy	4			X	X	X			X						
Alexa	6		X	X					X		X		X		X
Lindsey	1		X												
Bethany	6		X	X			X	X					X		X
Chad	1			X											
Thomas	2	X						X							
Bill	5		X			X	X		X			X			
Chanda	6		X				X		X	X				X	X
Kevin	3				X					X		X			
Melvin	2										X		X		
Carolyn	6			X	X		X		X		X		X		
Steph	1		X												
Katie	6		X				X		X		X		X	X	
Name	#2 of varieties	P	C	M	4P	4Y	B	L	D	LB	CA	CH	A	?	DI
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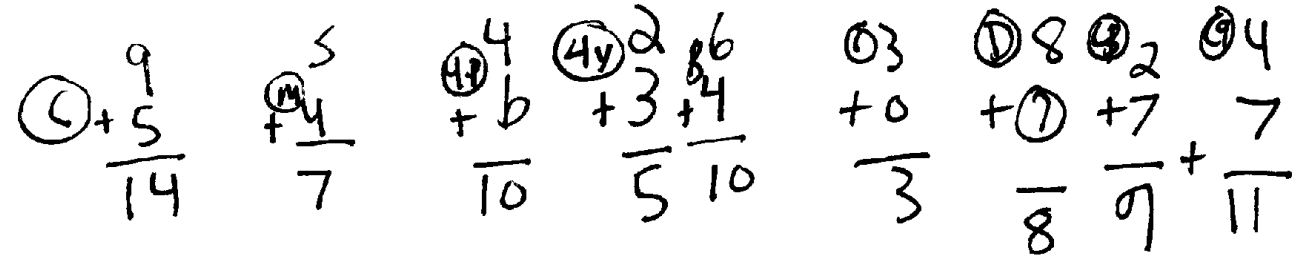
P	C	M	4P	4Y	B	L	D	LB	CA	CH	A	?	DI

the total amount of seed people used

Expert



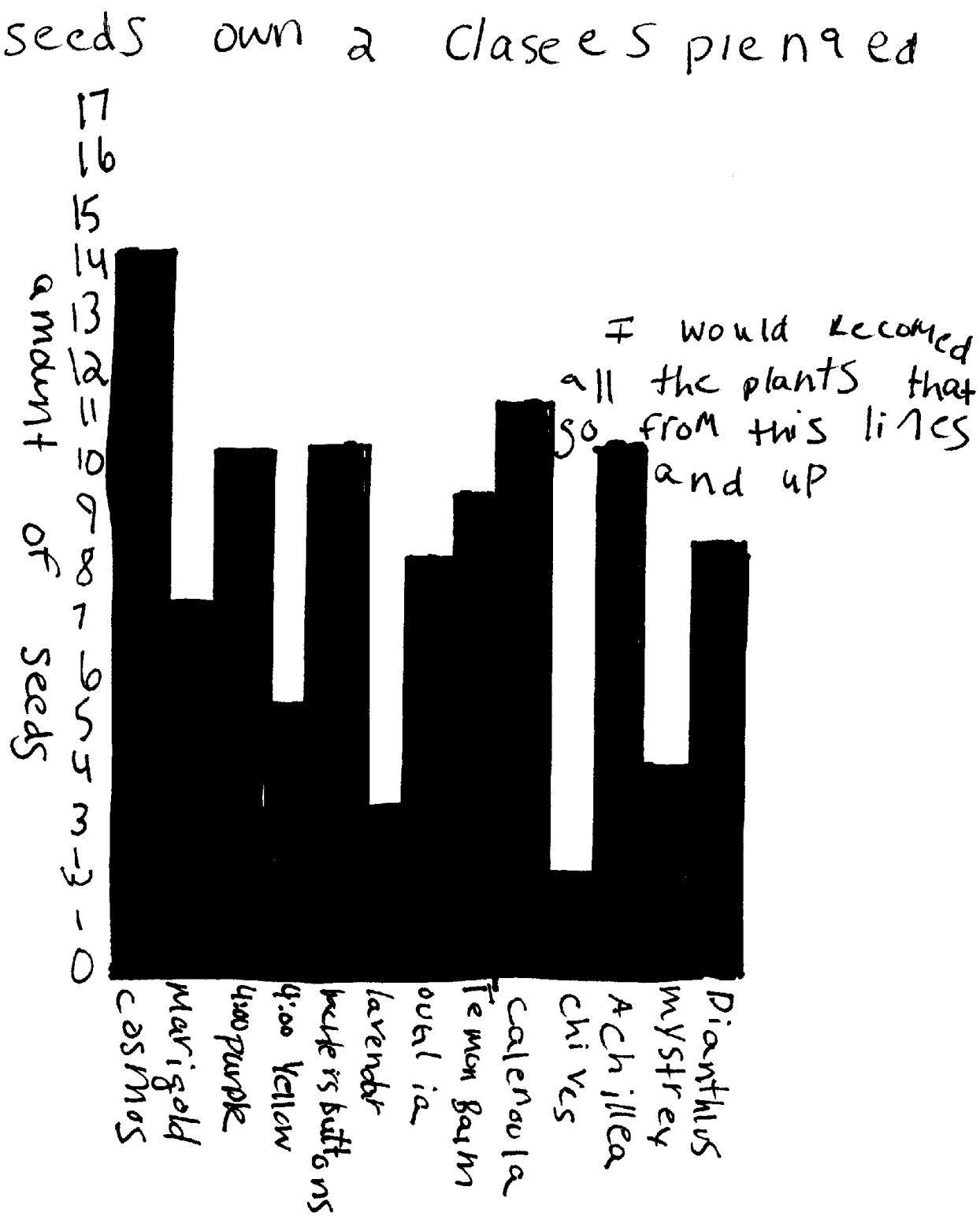
With this I found the amount of seeds total used of both classes

Student totals seeds from both classes using the same abbreviations as done on the sheet.

I would recomend.

cosmoss. ~~4: rarple~~ Bachelor's B4 Lemon Balm, Calendula Achillea

Expert



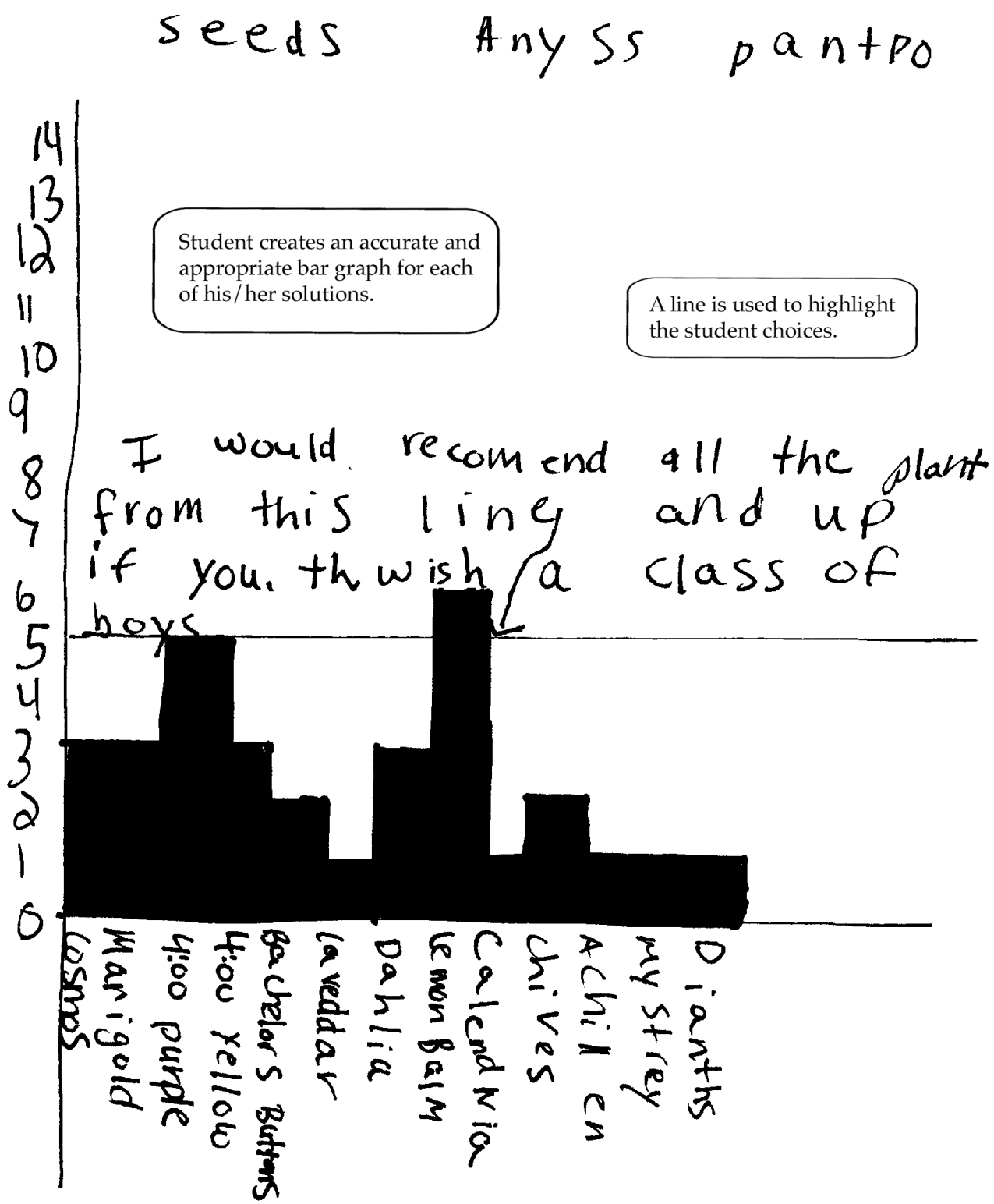
Expert

In this problem I found out that if I were a teacher planning to plant seeds with their class, I would recommend only boys should plant seeds because in the sample I took of boys and girls the boys basically only used 2 kinds of seeds and the girls used 4 kinds. If you were going to do it with the whole class I would recommend 6 kinds of seeds. All are listed below.

Student analyzes the data in 2 ways – boys + girls preferences + whole class.

Boys	Girls	Class
4 o'clocks-purple	Cosmos	Cosmos
Lemon Balm	Bachelor's Buttons	4 o'clocks-purple
	Calendula	Bachelor's Button's
	Achillea	Lemon Balm
		Calendula
		Achillea

Expert



Expert