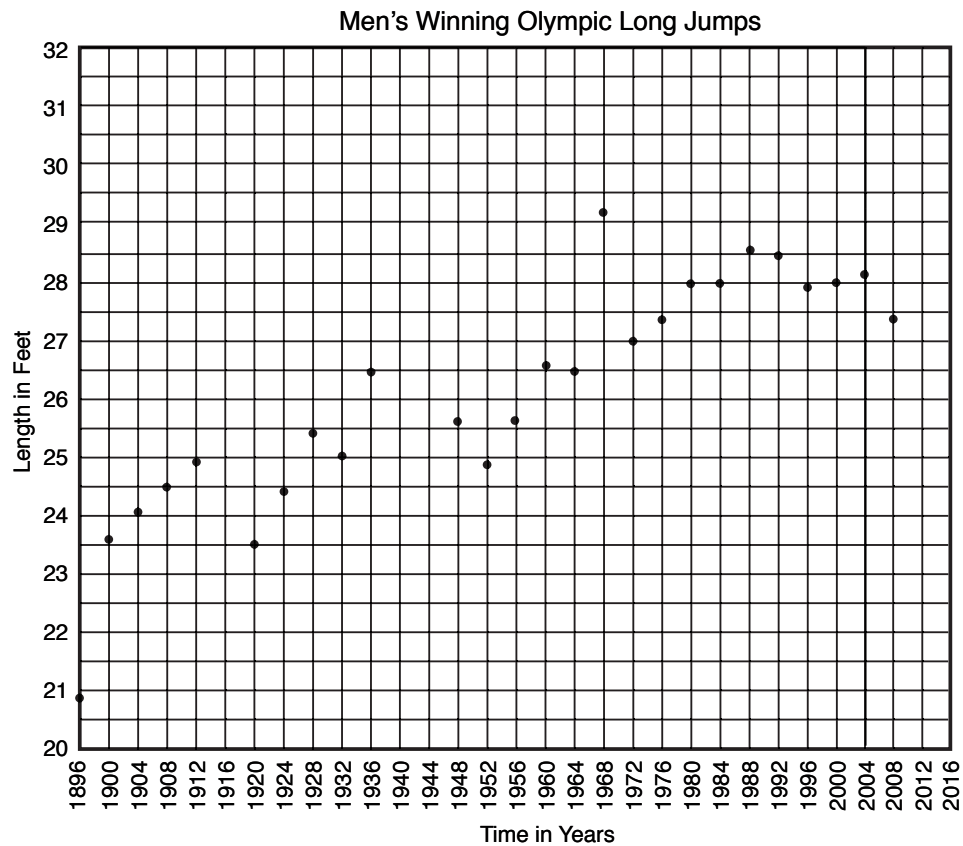


LETTER HOME

Using Data to Predict

Dear Family Member:

In this unit, your child's class will make predictions using graphs and patterns in data. We will also conduct an experiment called *Bouncing Ball*. Patterns in the *Bouncing Ball* data will allow us to make predictions about how high a ball will bounce when dropped from a given height. While making these predictions, students will solve problems and use math in much the same way it is used in science, technology, and the business world. This work will prepare them for algebra and improve their reasoning with multiplication and division.



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You can help your child with using data to make predictions using the following ideas:

Tell the Story in the Graph. Ask your child to tell you the story of the graph shown here. Predict the length of the winning long jump for the next Summer Olympic Games.

What is the Mean? Ask your child to describe the two models they used to find the mean of a set of data. The class measured and found the average head circumference of the students in the class.

Explore Bouncing Ball. Encourage your child to tell you about the Bouncing Ball lab. What data did the group collect? What predictions did the group make?


Play Guess My Rule. One player is the Function Machine and chooses a rule but does not share the rule with the other players. The other players, the Guessers, try to guess the rule by giving an input and the Function Machine player responds with a corresponding output. This is repeated until the Guessers figure out the rule for the Function Machine. Directions are in Lesson 6 in the *Student Guide*.



Roberto
Guesser

If the input is 4...

Input	Output
3	6
4	8
5	10
100	200
n	$n \times 2$



Michael
Function Machine

...the output is 8.

What is the rule? (Multiply the input number by 2.)

Math Facts and Mental Math

This unit continues the systematic review and assessment of the multiplication facts.

Multiplication Facts. Students review the last six facts to maintain and increase fluency and to learn to apply multiplication strategies to larger numbers.

You can help your child review these facts using the flash cards that are sent home or by making a set of flash cards from index cards or scrap paper. Study facts in small groups each night. As your child goes through the flash cards, put the cards in three stacks: Facts I Know Quickly, Facts I Can Figure Out, and Facts I Need to Learn.

For Facts I Need to Learn, work on strategies for figuring them out. Good strategies include:

Doubling. To solve 4×6 , think $2 \times 6 + 2 \times 6 = 12 + 12$, so $4 \times 6 = 24$

Reasoning from known facts. To solve 6×7 , I used 6×6 . $6 \times 6 = 36$ and 6×7 is 6 more. $36 + 6 = 42$, and $6 \times 7 = 42$.

For Facts I Can Figure Out, use the flash cards to practice the facts for fluency.

For Facts I Know Quickly, help your child use mental math strategies to multiply 10s and 100s:
 $40 \times 8 = 3200$, $700 \times 8 = 5600$, $6 \times 7000 = 42,000$.

Thank you for taking the time to talk with your child about what he or she is doing in math.

Sincerely,

Unit 5: Home Practice

Part 1 Triangle Flash Cards: Last Six Facts

Study for the quiz on the multiplication facts for the last six facts. Take home your Triangle Flash Cards: Last Six Facts and your list of facts you need to study.

Ask a family member to choose one flash card at a time. Your helper should cover the corner containing the highest number. This number will be the answer to a multiplication fact. Multiply the two uncovered numbers.

Your teacher will tell you when the quiz on the last six facts will be.

Part 2 Arithmetic Review

Solve the following problems using paper and pencil or mental math. Estimate to see if your answers are reasonable.

A. $49 \times 7 =$

B. $8326 - 5997 =$

C. $2008 + 1992 =$

D. $2398 - 1569 =$

E. $65 \times 9 =$

F. $436 + 248 =$

G. Choose a problem and show how to solve it using mental math.

H. Show or tell your estimation strategy for Question E.

Part 3 Factor Trees and Exponents

Write each of the following numbers as a product of prime numbers. If you need more room to show your work, use a separate sheet of paper.

1. 52

2. 85

3. 224

4. Write each of the following using exponents. Then, find each product.

A. $4 \times 4 \times 2$

B. $5 \times 2 \times 5$

C. $2 \times 3 \times 2 \times 2$

Part 4 What's Missing?

The letter n stands for a missing number. What number must n be in each number sentence to make the sentence true?

A. $750 + 150 = n$

B. $839 + 102 = n$

C. $1034 - 40 = n$

D. $2 + n = 100$

E. $16 - n = 8$

F. $n + 21 = 42$

G. $n - 25 = 50$

H. $11 + n = 24$

I. $93 - n = 23$

J. $70 - n = 40$

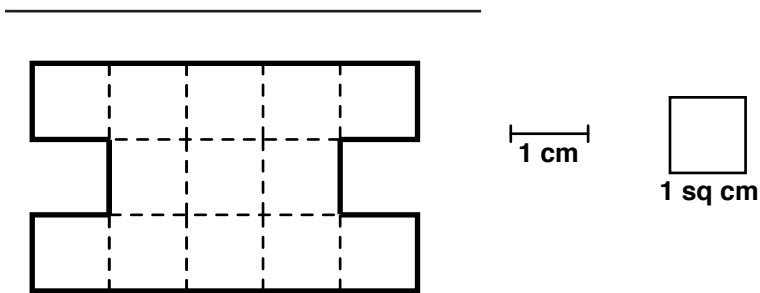
K. $71 - n = 40$

L. $15 - n = 9$

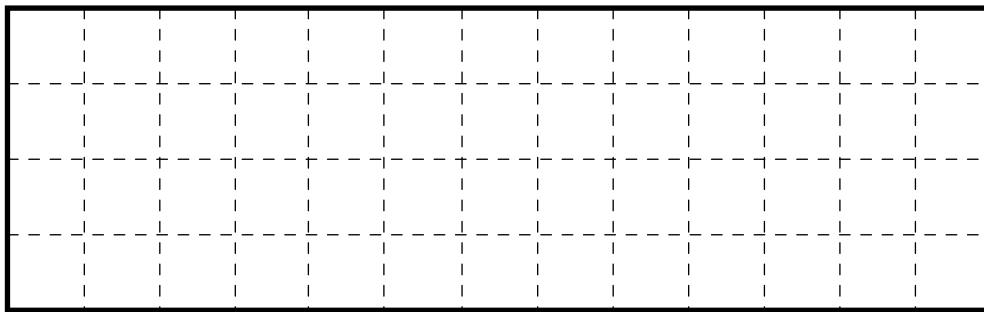
M. Show or tell your strategy for solving Question G.

Part 5 Area and Perimeter

1. **A.** Find the area of the shape below in square centimeters.

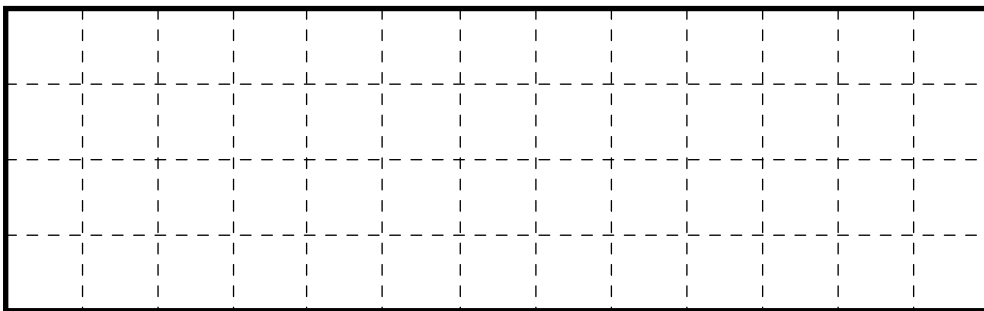


B. Find the perimeter of the shape. _____



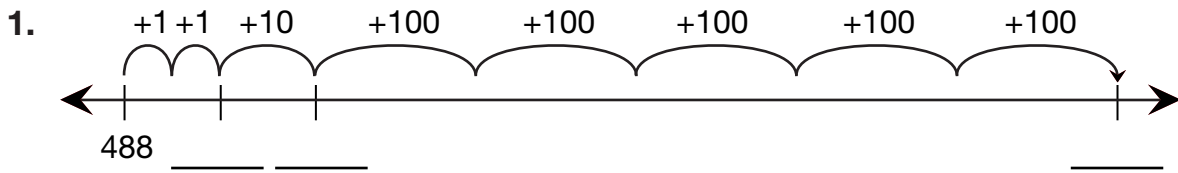
2. **A.** Draw a shape that has the same area but a smaller perimeter.

B. Write the perimeter of your shape in Question 2A. _____

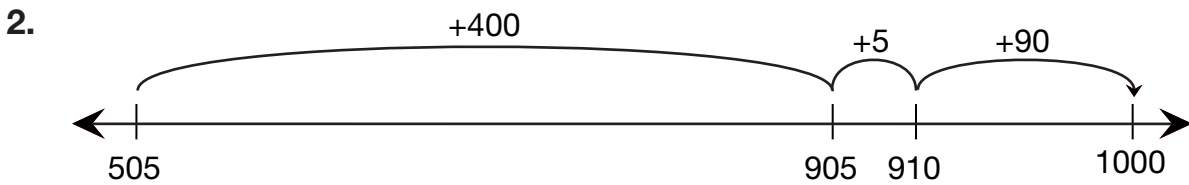


D. Write the perimeter of your shape in Question 2C. _____

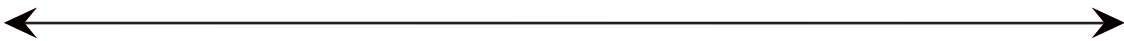
Part 6 Big Base-Ten Hoppers



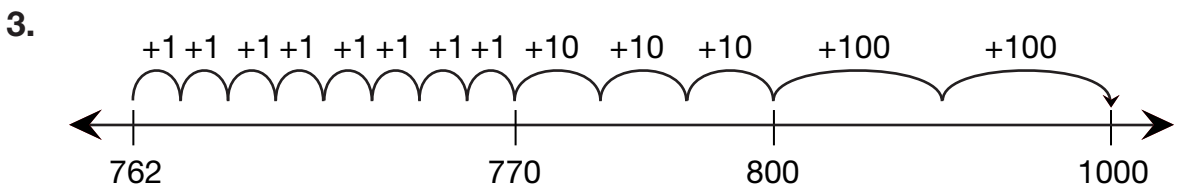
- A. Fill in the blanks to show where the hopper lands.
- B. How far is it from 488 to 1000? _____
- C. Show another way for a hopper to start at 488 and stop at 1000.



- A. Show a different way the hopper can start at 505 and land on 1000.



- B. Write a number sentence to show how it moved.



- A. How far is it from 762 to 1000? _____
- B. Complete the number sentences.

$762 + \square = 1000$

$1000 - 762 = \square$

Part 7 Bouncing Balls

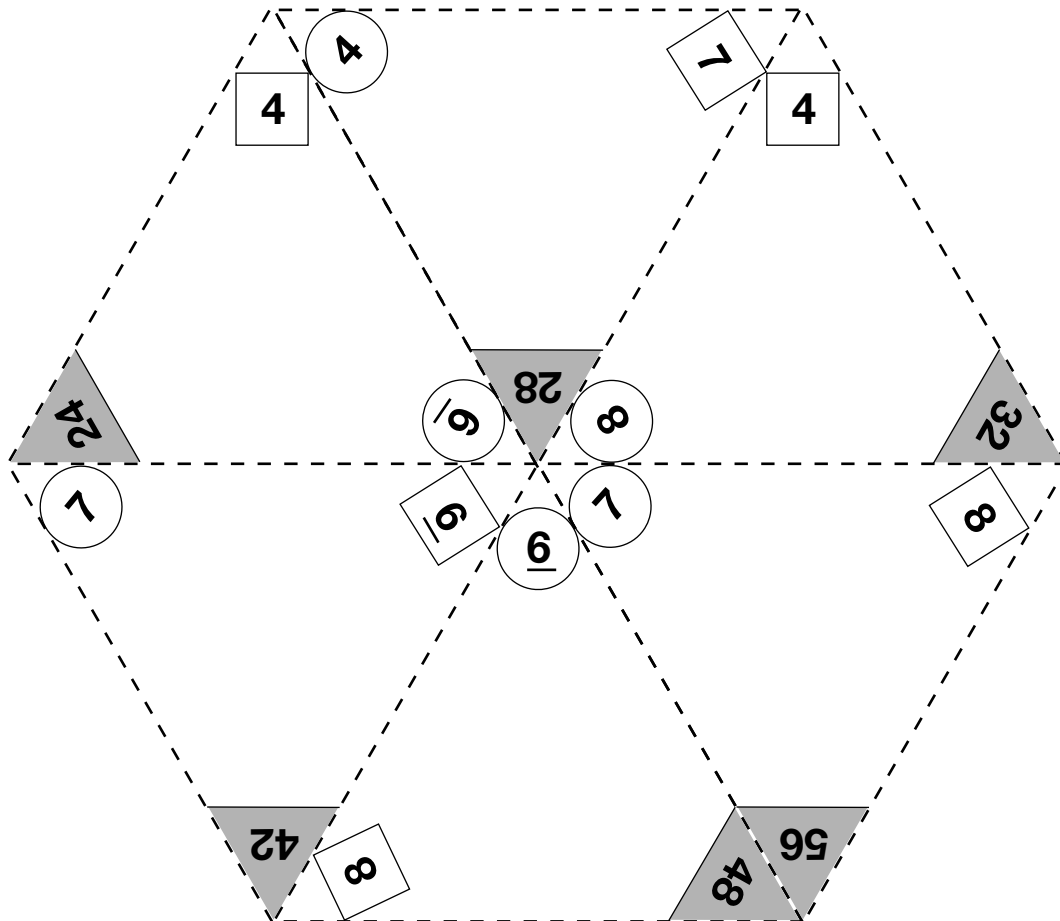
A class experimented with 3 kinds of balls to find out which one bounced highest. They dropped each type of ball from the same height.

<i>T</i> Type of Ball	<i>H</i> Bounce Height (in cm)			
	Trial 1	Trial 2	Trial 3	Median
Basketball	43	41	45	
Kickball	69	65	67	
Tennis Ball	52	51	51	

1. Find the median bounce height for each type of ball. Complete the table
2. What is the manipulated variable? Is it a categorical or numerical variable?
3. What is the responding variable? Is it a categorical or numerical variable?
4. Think about these questions before you graph the median bounce height for each type of ball.
 - What variables will you put on the horizontal axis and vertical axis?
 - How will you scale and label the axes?
 - What type of graph is appropriate? A point graph or a bar graph?

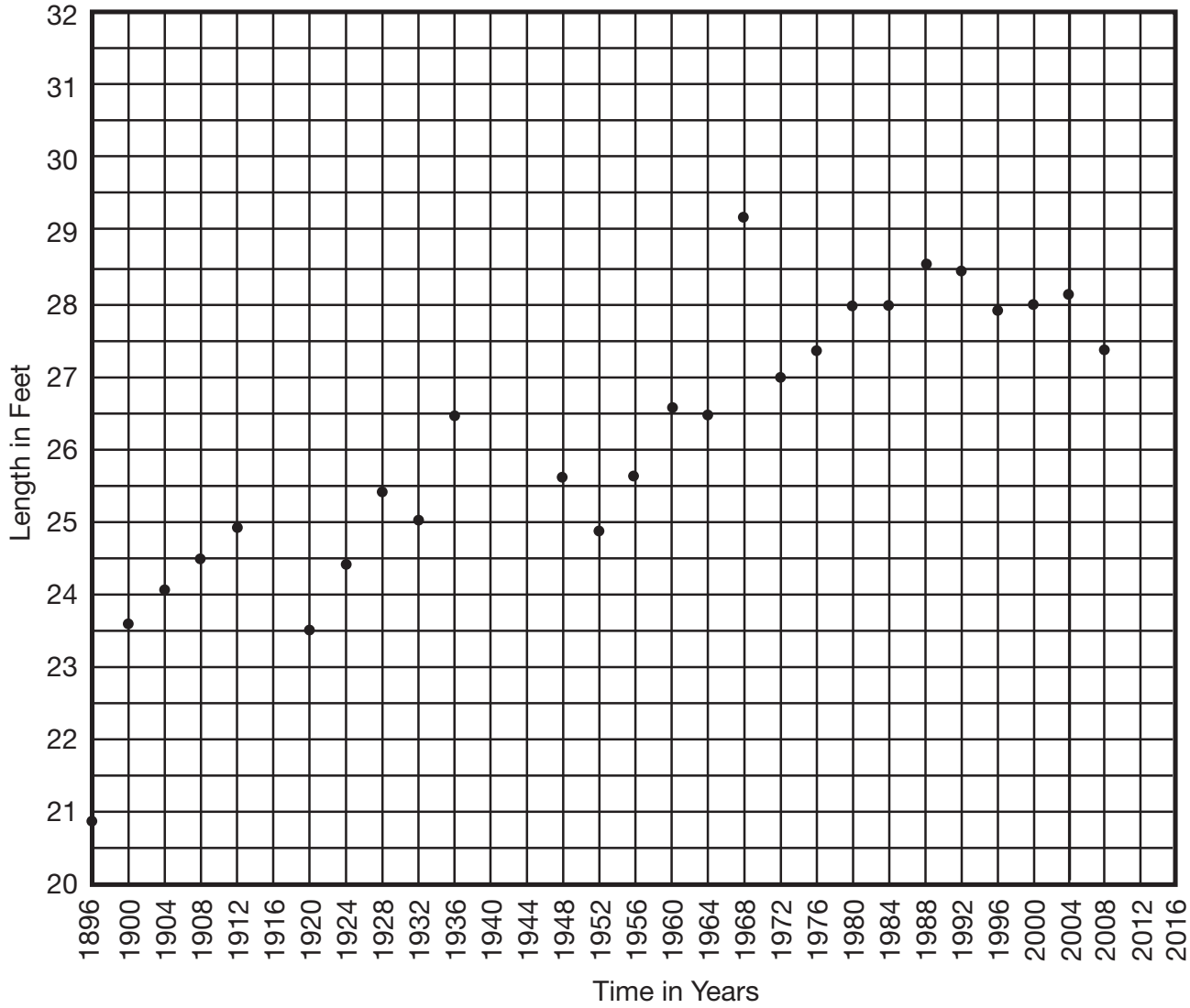
Triangle Flash Cards: Last Six Facts

- Work with a partner. Each partner cuts out the flash cards.
- To quiz you on a multiplication fact, your partner covers the shaded number. Multiply the two uncovered numbers.
- Divide the used cards into three piles: Facts I Know Quickly, Facts I Can Figure Out, and Facts I Need to Learn. Place the first pile in an envelope labeled "Facts I Know."
- Practice the last two piles again. Place these cards in an envelope labeled "Facts to Practice."



Olympic Long Jump

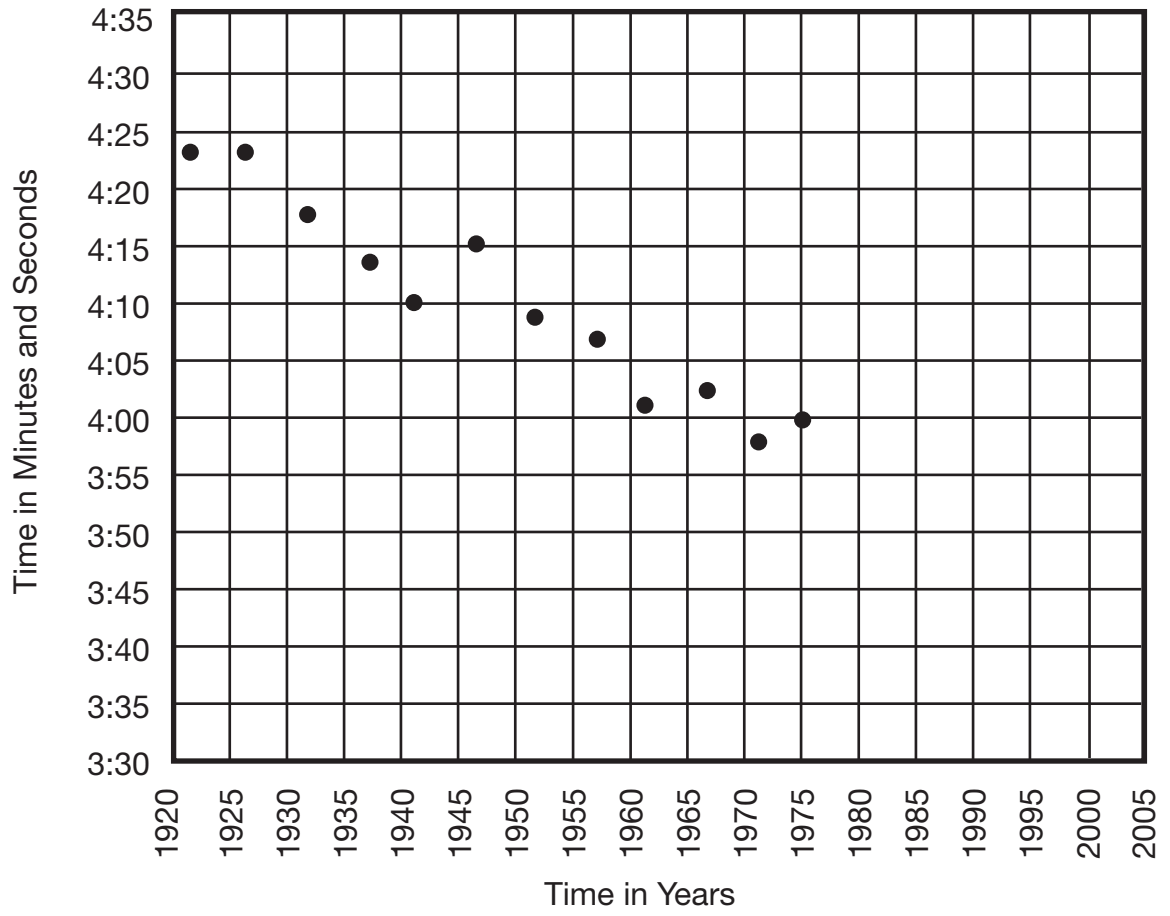
Men's Winning Olympic Long Jumps



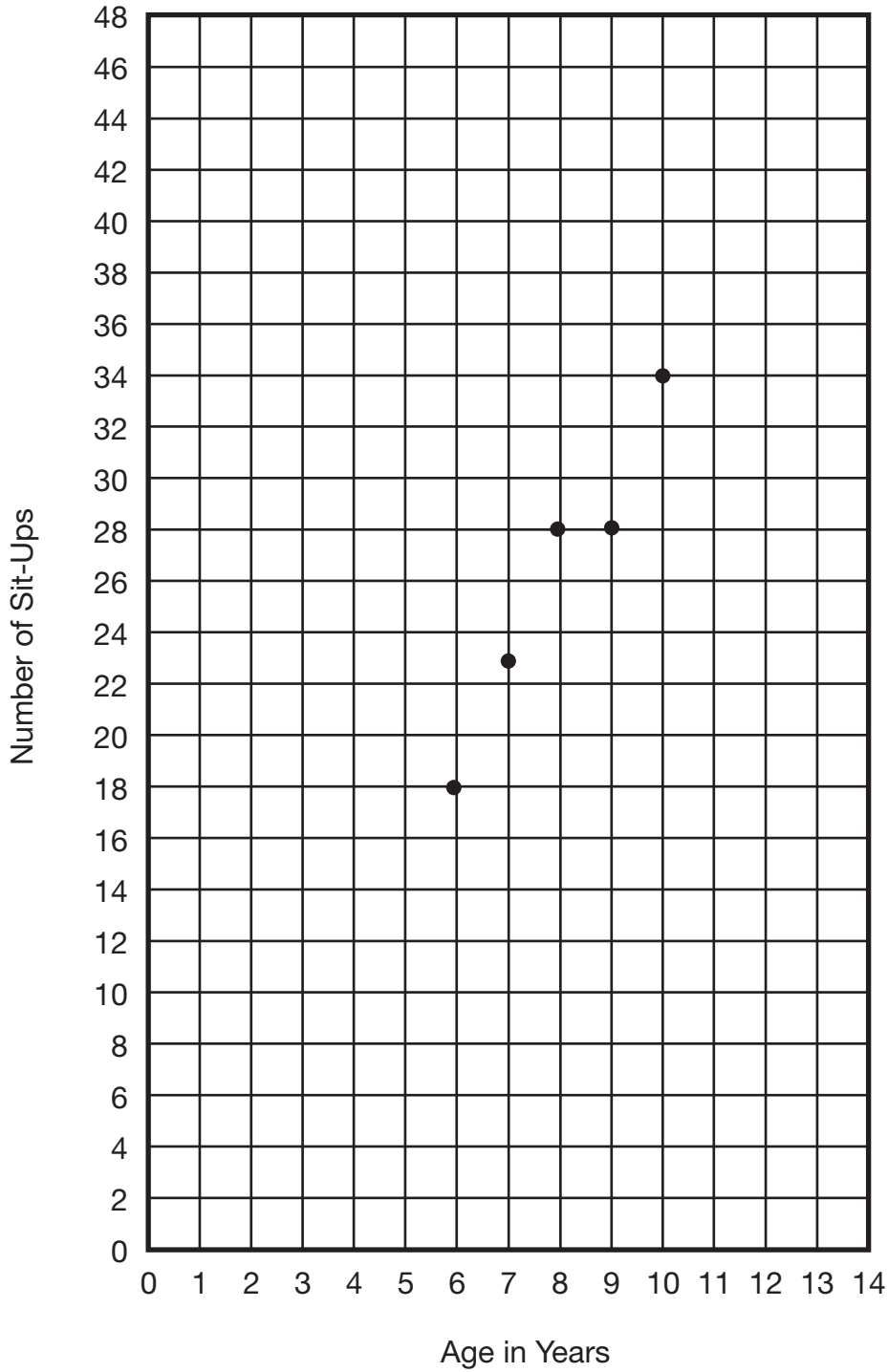
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Mile Run

Some Mile Run Winning Times in Men's College Championships



Nila's Sit-Ups



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Multiplication Facts I Know

- Circle the facts you know well.
- Keep this table and use it to help you multiply.
- As you learn more facts, you may circle them too.

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

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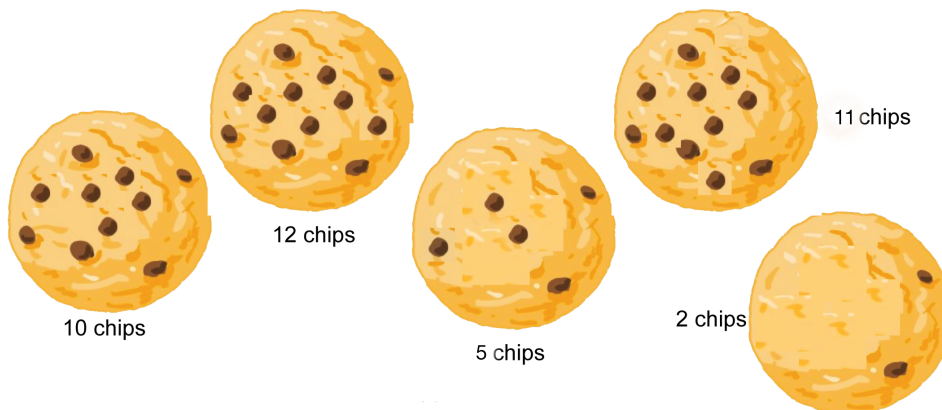
Cookie Factory

1. At the Yum Yum Cookie Factory, a worker finds the mass of 4 cookies. The masses of the cookies are 11 grams, 6 grams, 11 grams, and 9 grams.

A. Find the median mass of the cookies. Show how you found the median.

B. Find the mean using connecting cubes or tiles. Show how you evened out the cubes or tiles in the space below.

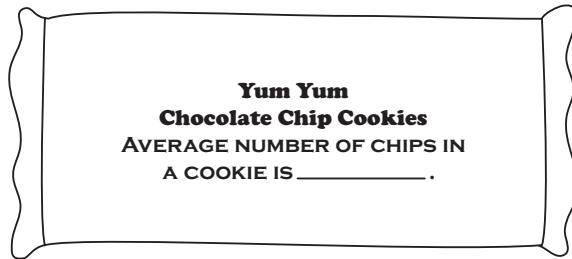
2. A worker at the Yum Yum Cookie Factory inspected 5 chocolate chip cookies and found the number of chips shown below on each cookie.



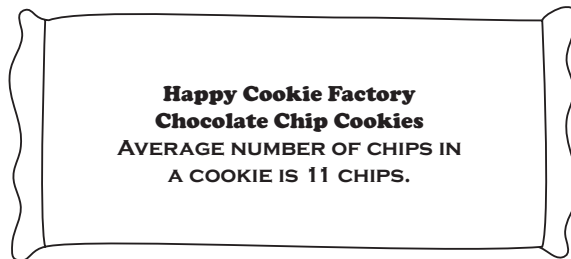
A. Find the median number of chips.

B. Find the mean number of chips.

3. Write the median or mean in the blank on the package. Choose the average that gives the customer the best information about how many chips to expect in each cookie.



4. Jessie inspected 5 chocolate chip cookies from a different factory, the Happy Cookie Factory. She found a mean of 11 chips.



Jessie bought one bag of cookies from the Yum Yum Factory and another from the Happy Cookie Factory. If both bags have the same number of cookies, predict which bag will have more total chocolate chips. Explain how you made your prediction.

Cookie Factory Feedback Box

	Expectation	Check In	Comments
Find the median of a data set. [Q# 1A, 2A]	E5		
Find the mean of a data set using manipulatives and numerical procedures. [Q# 1B, 2B]	E6		
Make predictions and generalizations using medians and means. [Q# 3, 4]	E8		

Bouncing Ball Data: What's Wrong Here?

<i>D</i> Drop Height (in cm)	<i>B</i> Bounce Height (in cm)				Ordered Pairs (<i>D</i> , <i>B</i>)
	Trial 1	Trial 2	Trial 3	Average	
40	29	29	29	29	(40, 29)
80	50	50	50	50	(80, 50)
120	70	70	70	70	(120, 70)

<i>D</i> Drop Height (in cm)	<i>B</i> Bounce Height (in cm)				Ordered Pairs (<i>D</i> , <i>B</i>)
	Trial 1	Trial 2	Trial 3	Average	
40	20	22	20	21	(40, 21)
80	41	42	38	40	(80, 40)
120	61	91	67	73	(120, 73)

Bouncing Ball Feedback Box

	Expectation	Check In	Comments
Show the variables and procedures of an investigation in a drawing. <ul style="list-style-type: none"> Identify the variables as Drop Height (D) and Bounce Height (B). [Q# 1–2, Drawing] 	E1		
<ul style="list-style-type: none"> Identify the variables that are fixed. [Q# 3, Drawing] 	E1		
<ul style="list-style-type: none"> Show the procedure: varying drop height, recording bounce height, repeating trials. [Drawing] 	E1		
<ul style="list-style-type: none"> Label the variables. [Drawing] 	E1		
Collect and organize data in a table. [Data Table]	E2		
Measure length in centimeters. [Data Table]	E9		
Find the median or mean of a data set. [Average in Data Table]	E5 E6		
Make a point graph. [Graph]	E3		
Draw a best fit line. [Q# 6, 7]	E4		
Make predictions about a data set using data tables and graphs. [Q# 8–12]	E7		
Identify and extend multiplicative patterns. [Q# 11]	E10		

Name _____ Date _____

**Bouncing Ball
Feedback Box**

Yes ...

Yes, but ...

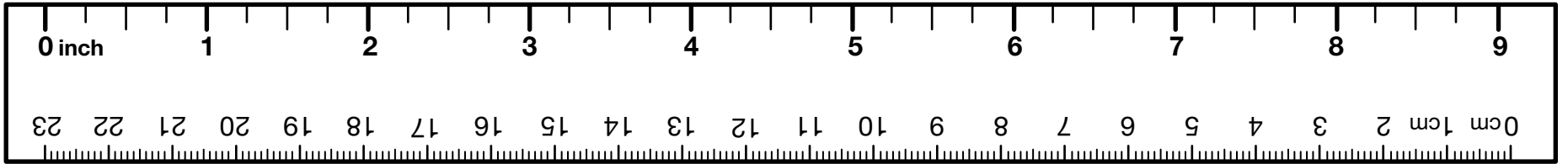
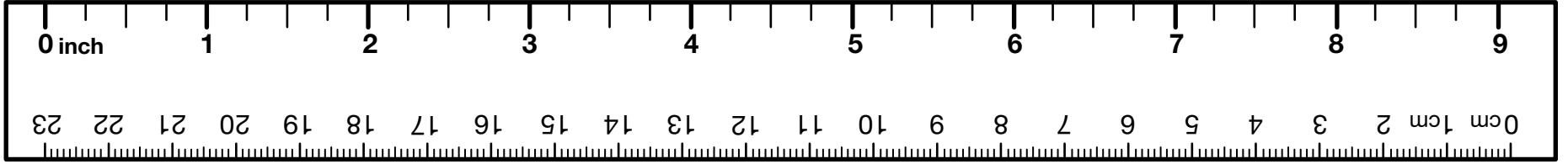
No, but ...

No ...

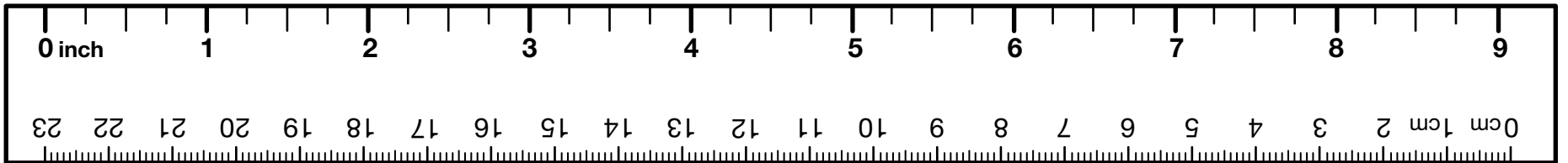
<p>MPE5. Show my work. I show or tell how I arrived at my answer so someone else can understand my thinking. [Q# 13]</p>				
<p>MPE6. Use labels. I use labels to show what numbers mean. [Q# 13]</p>				

Centimeter and Inch Ruler

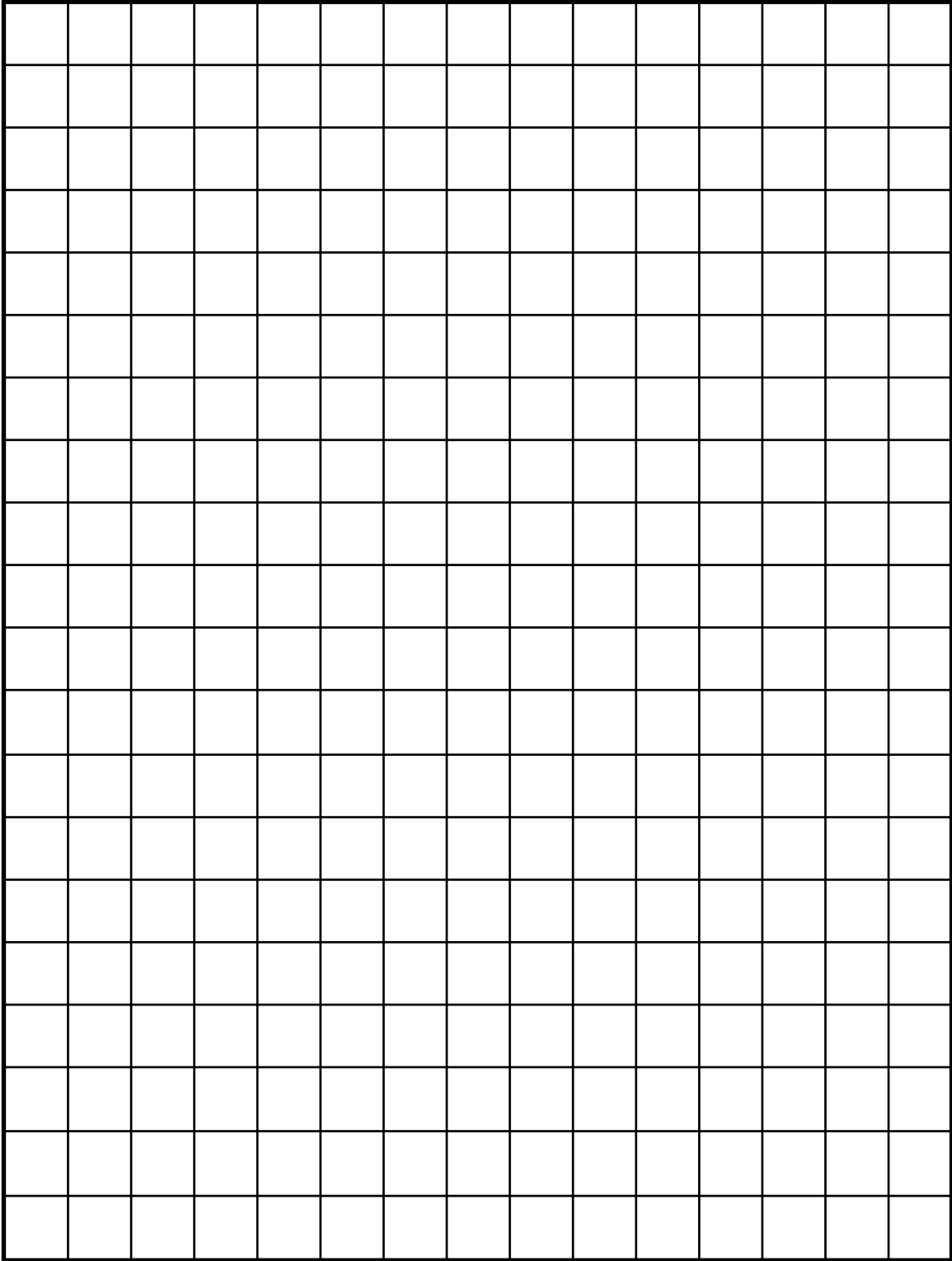
Master



TC • Grade 4 •



Name _____ Date _____



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Math Practices Notes

Solving a problem:

<p>1. Know the problem. I read the problem carefully. I know the questions to answer and what information is important.</p>	<p>2. Find a strategy. I choose good tools and an efficient strategy for solving the problem.</p>
<p>3. Check for reasonableness. I look back at my solution to see if my answer makes sense. If it does not, I try again.</p>	<p>4. Check my calculations. If I make mistakes, I correct them.</p>

Showing or telling how I solve a problem:

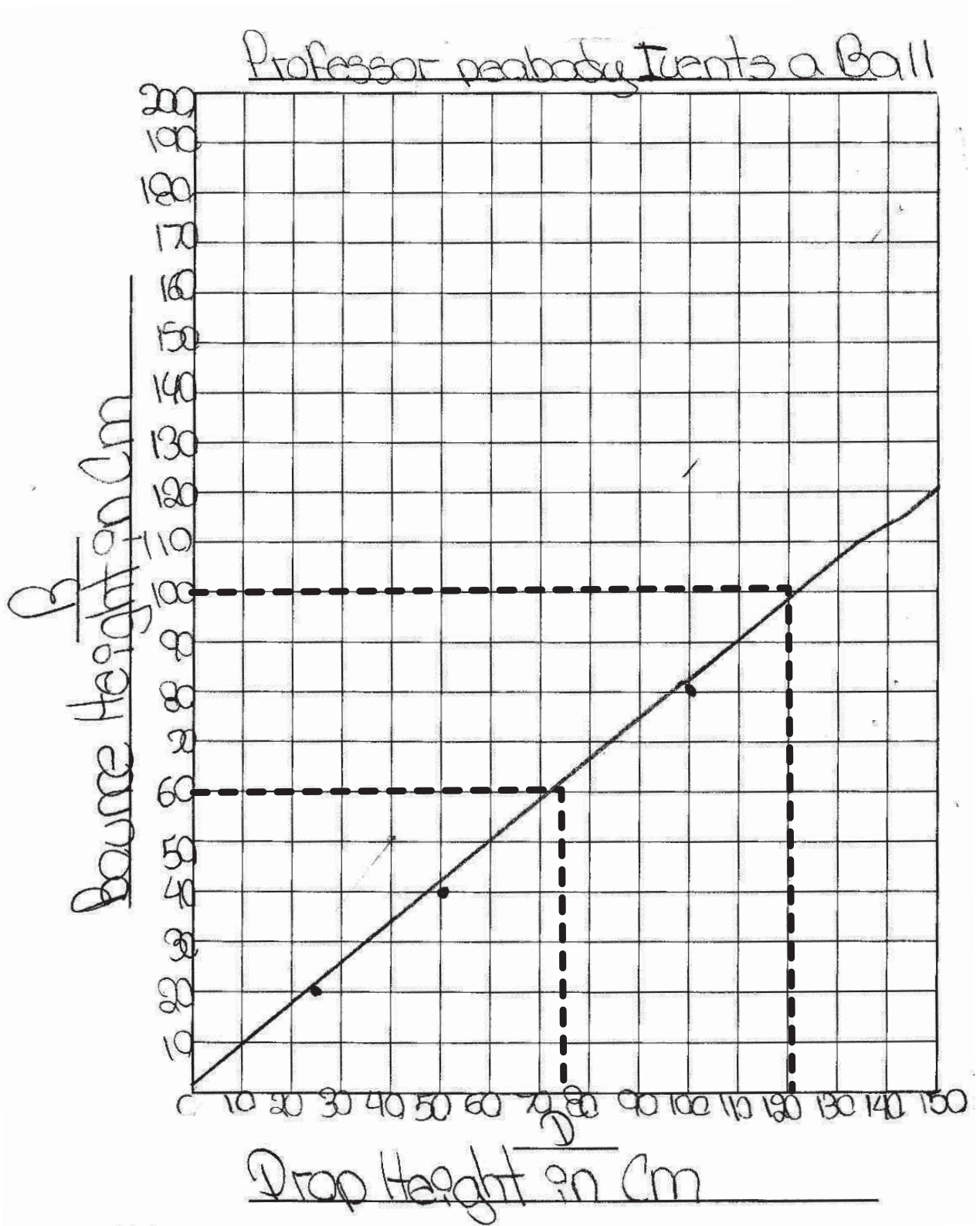
<p>5. Show my work. I show or tell how I arrived at my answer so someone else can understand my thinking.</p>	<p>6. Use labels. I use labels to show what numbers mean.</p>
----------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------

Jackie's Solution and Table

1. The bounce height was 60 cm. I found my answer by going back to my graph and then I put a dotted line to find my answer and compared it to my table.
2. The drop height is 120 cm. I found my answer by going back to the graph. I used the best-fit line to find the answer.
3. 250 cm. I found my answer by going back to the start and adding to my data table. Look at my data table.

125	100
150	120
175	140
200	160
225	180
250	200
275	220
300	240

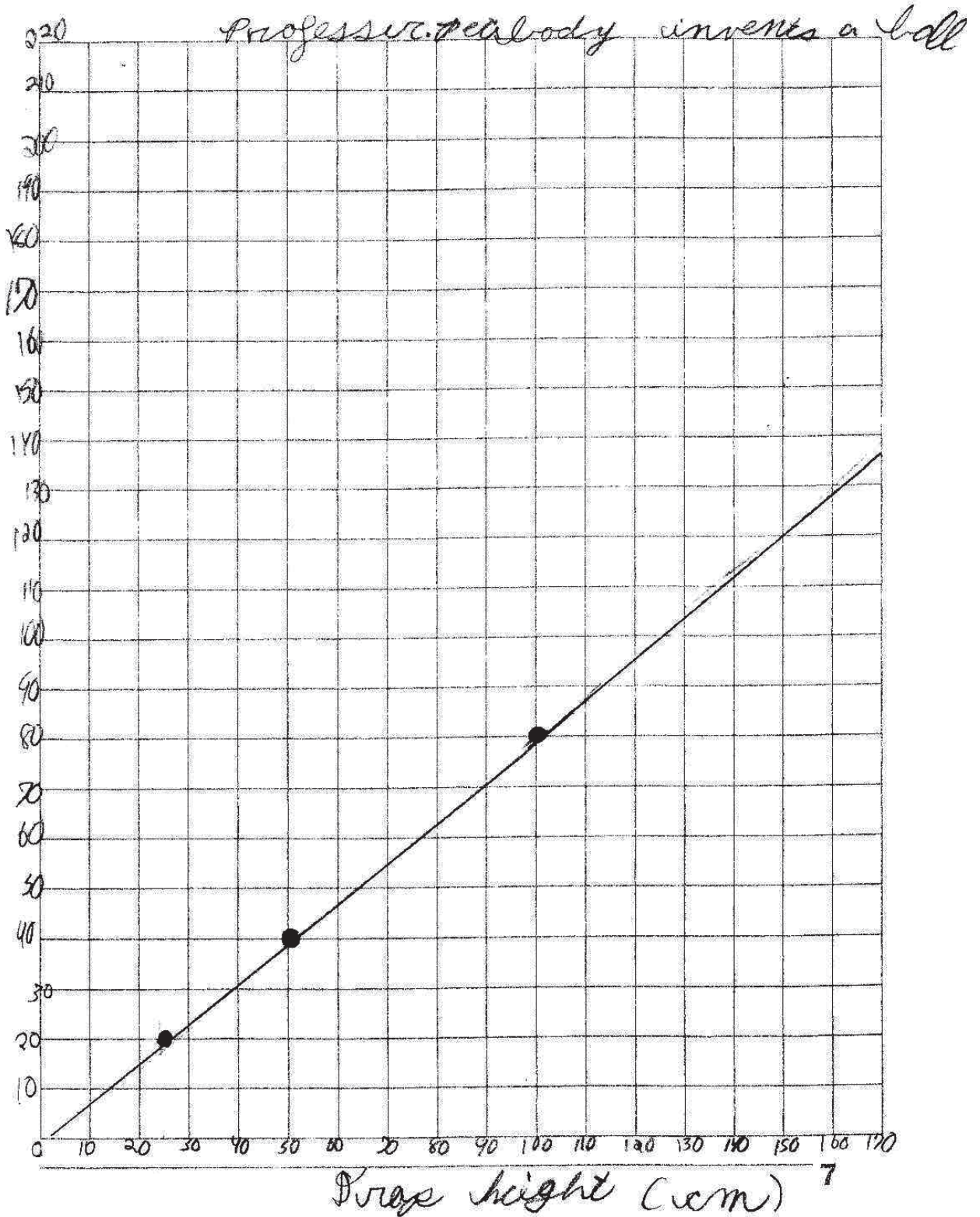
Jackie's Graph



Daniel's Solution

1. 70 cm because the new ball is maybe liked freshed-out. Also, because maybe the old one is weak. I found my answer by imagining it and then like if it came to real life.
2. 125 because that was my answer.
3. 160 because the drop height has to be lower. I found my answer by looking in the graph and finding how many cm the number was going to be.

Daniel's Graph



Maria's Solution

1. It should bounce 60 cm. I found the answer by looking at the pattern in the chart.
2. The drop height was 125 cm. I found the answer by adding 25 to 100 like the other numbers were.
3. The drop height would be 250 cm. I found the answer by adding 20 cm to get a bounce height of 100 cm. Then I added 25 cm to the drop height until I got to the last line of the chart I did.