## Chapter 1: Pattern

Before:

Find the $7^{th}$ term in each pattern…
Find the $12^{th}$ term in each pattern…
Describe each pattern's rule in words.

- 1, 6, 11…
- A, D, G…
- 2, 7, 22…

During:

- Why does Tess say that people have patterns?
- What does she specifically mean about Marcus' pattern? Richard's?
- Do you have patterns too?

*Extension: Does your school have patterns? Do other aspects of your life have patterns that are predictable? Why do you think some parts of your life are predictable and follow patterns and some parts are hard to predict?*

After:

- Make up your own pattern and write a rule in words explaining it. Be creative – you can use numbers, letters, symbols, etc.

## Chapter 2: Three Thirds

Before:

Draw $\frac{1}{3}$

Draw $\frac{2}{3}$

Draw $\frac{3}{3}$

During:

- What math mistake does Mr. Wright make during this chapter?
- Do you remember other math mistakes he made during Book 1?

Discuss with a partner if you have ever witnessed someone in your life making similar math mistakes (incorrect change at a store, etc.).

After:

Solve the following problems.

$\frac{1}{3} of 27 =$

$\frac{1}{3} of 450 =$

$\frac{2}{3} of 27 =$

$\frac{2}{3} of 450 =$

$\frac{3}{3} of 27 =$

$\frac{3}{3} of 450 =$

## Chapter 3: The Four Fours

Before:
List the number that represents each of the following for you:
Your area code ____
Your age ____
Your shoe size ____
Your ZIP code ____
Your house number/apartment number ____
The number of people in your family _____

During:

- Can you translate any of your "significant numbers" from the Before into the Four Fours?

  Example: If you are 12 years old, your age would be $4+4+\sqrt{4}+\sqrt{4}$

- What symbol does Tess give to Mr. Z? Why?

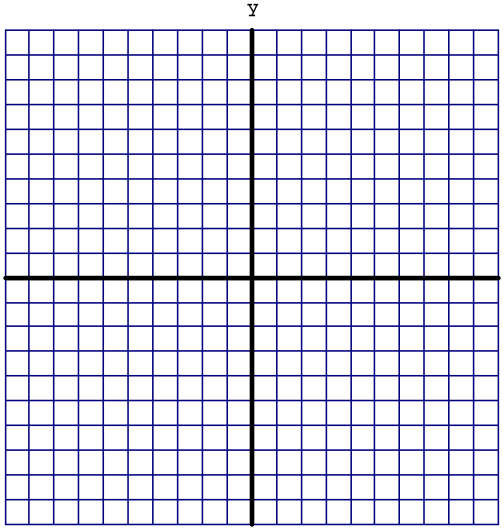
After:

Besides police code, can you think of other "real life" examples where numbers represent different things? Explain.

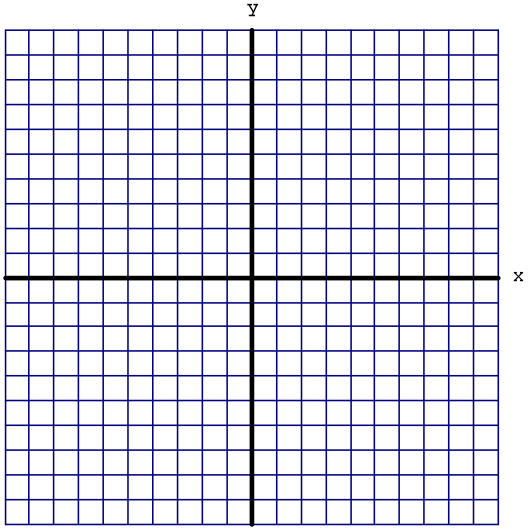
## Chapter 4: Graphs

Before:

Draw a line with positive slope.




Draw a line with negative slope.




During:

Keep track of the positive and negative things you read about Lucia:

| *Positive things about Lucia* | *Negative things about Lucia* |
|---|---|
| | |

After:

- Describe a situation where you experienced someone's positive side AND knew about their negative side.

## Chapter 5: Formulas

Before:
What is a formula in math?

List some common mathematical formulas you already know:

During:
Explain why Tess says that there are no formulas for "real life."

After:
Make up a math problem that has the numbers 15, 14, 1, 18 and 19 in it. Show your work, use any combination of operations you want and find the answer.

## Chapter 6: Codes

Before:

Complete the following code:

A = 1 B = 2 C = 3 D = 4

Now, write the word MATHEMATICS using this code:

Write your name in this code:

Write the name of your school in this code:

During:

- What word does Grandpa help Tess work out using the letters she translated on the wall?
- Why does this word relate to the story?

After:

Write a note to a classmate using a code. (You can use the code from *Before* or make up your own code). Be sure to include a key to translating your note if you make up a new code!

**Chapter 7: Collecting Data**

Before:
Complete the table for the equation $y = 5x - 4$

| x | 0 | 1 | | 3 | 4 | | |
|---|---|---|---|---|---|---|---|
| y | -4 | | 6 | | 16 | | |

*Extension: If the above equation were graphed, what type of graph would it make? Describe the graph as completely as you can.*

Simplify the following Four Fours problems:

$4! - \sqrt{4} + \frac{4}{4}$

$\sqrt{4} + \sqrt{4} + \sqrt{4} + \sqrt{4}$

$4 + \sqrt{4} - \frac{4}{4}$

$4! - \sqrt{4} + 4$

$\frac{4}{4} + \sqrt{4} + \sqrt{4}$

During:

- Translate the Four Fours problems into letters:

What does this spell?

Why do you think Tess is writing this?

After:

Do you think you would have drawn on the wall? If so – what would you have drawn?

If not – why not?

**Chapter 8: Knives and Fires**

Before:
Simplify.

$4^4 - 4! - 4!$

Why can't this problem represent a letter?

What do you think this problem means?

During:

- Why is it so significant that the tagger wrote back to Tess using the above problem? What does Tess think it means?

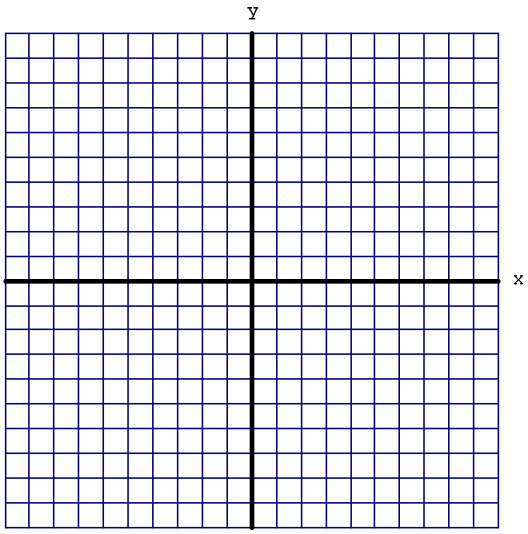
After:

If you could interview anyone at your school about something, who would it be and why?

## Chapter 9: Absolute Value

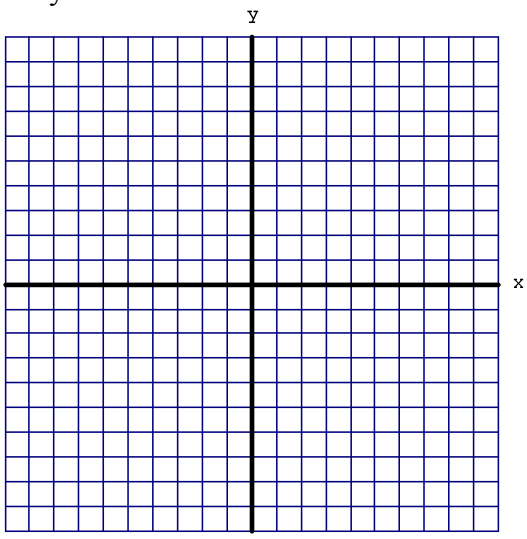
Before:
Define absolute value.

Sketch the graph of $y = |x|$




During:

Place points on the graph showing Tess' descriptions of herself at this point in the story:




After:
Draw a graph of YOUR LINE – include positive points for good things about yourself and, if appropriate, at least one negative point…

**Chapter 10: Rate of Change**

Before:
Name three things that change with time (either increasing or decreasing)

- 
- 
- 

Sketch a graph of what one of your examples would look like if you tracked it for one day:

During:
Describe a time when you felt embarrassed.

How did Lucia help Tess feel less embarrassed?

Describe the experiment with the candles:

After:
Tess says Lucia "saved her slope." Describe a time when you felt like you had a "falling" slope. Have you ever had someone "save your slope?"

**Chapter 11: Graphic Stories**

Before:
Define "intersection" in as many ways as you can.

*Extension:*
Show two ways you can prove that (1, 2) is the solution to the system of

$y = 5x - 3$
$y = x + 1$

During:
Draw your own graph of your ride to school.

Tess draws three lines intersecting to help her find who is writing to her on the wall. Why?

After:
Why does drawing a picture sometimes help you solve math problems? Think back to Ms. Saltzman's drive to school – is there more than one way to "draw" this?

**Chapter 12: The Real Story**

Before:

Look carefully at this Four Fours problem:

$$\left(4! - 4 - \frac{4}{4}\right)2$$

Why doesn't this fit the model of other Four Fours problems?

What does the "2" indicate?

What property does this show?

During:
Why does Tess know that the tagger is writing directly to her?

After:

Mr. Wright made a mistake early in the chapter. What was it?

Can you think of other words that tell a time span?

**Chapter 13: Coincidental Systems**

Before:

Define coincidence:

Find the next two values of this sequence:
0, 1, 1, 2, 3, 5, 8, 13, 21 …

During:
Why are $y = 3x + 5$ and $2y = 6x + 10$ called "coincidental lines?" How does this mathematical fact relate to the definition of coincidence you provided in the *Before*?

What is the Fibonacci spiral?

After:
Explain how the Fibonacci sequence works. Try to represent this in words and in an algebraic sentence if possible.

Where does the Fibonacci sequence occur in real life? Give a few examples. How does the Fibonacci sequence relate to the "golden ratio?" (If you don't know – look this up! ☺)

## Chapter 14: No Formulas

Before:

Brainstorm as many mathematical formulas you can list in under two minutes. Compare with your partner and see how many unique formulas you listed together.

During:
Why do you think this chapter is called "No Formulas?"

How long was Tess suspended for? Do you think it is fair that she has to miss the math competition?

After:
What risks did Tess take by writing on the wall? Describe the sequence of events that led to her suspension. In the space below, draw a flow chart diagram showing how these events led to her missing the math competition.

**Chapter 15: Family Patterns**

Before:
How many hours are in Tess' four day suspension?

How many minutes?

What is the significance of 525,600 minutes?

During:

How does Tess decide to divide up this number to make sense of it?

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Whose name is written on the wall? Who do you think wrote that it was this person?

After:

What do you think Tess will do with the new information?

**Chapter 16: Tessellations**

Before:

Define tessellation:

Can you think of some examples of tessellations in nature?

During:

Why does Tess love the math concept of tessellations?

What does Tess have a picture of on her wall?

Is Tess sympathetic with Marcus? Are you?

After:

Create your own polygon with any number of sides. Cut it out of heavy paper. Trace it to create your own unique tessellation on a blank paper. Color if you have time!

**Chapter 17: Simplifying Expressions**

Before:

What does it mean to simplify an expression?

What is the difference between an expression and an equation?

During:

Translate these numbers into a phrase:
8 9 12 21 3 9 1

Try simplifying the expressions from this chapter:

$(y + 3) – 2(y + 7)$ $5x + 2y – (2y – 3x – 4)$

After:

Make up your own expression for your partner to simplify.

**Chapter 18: Δ Which in Algebra Means Change**

Before:
What is Δ? What language is it written in? What does it mean?

During:
Explain why these two expressions are equivalent:

$$\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

After:

Describe some of the ways Tess says she Δed this year.

Do you think you have Δed at all this year? Explain.

**Chapter 19: Probability**

Define probability:

What is the probability of rolling an even number on a single die?

During:

What does Lucia say is the probability of rolling a seven on the first roll of two dice? How did she figure this out? (If you don't know this one – look it up! ☺)

What does Tess say about her probability of things like getting caught?

Why does Lucia say she "doesn't want to be a line?"

After:

Now that you have finished the book, what do you think could happen next for Tess, Lucia and the others at Westlake Middle School?

What major math concepts do you remember most from reading this book?