Chapter 1: Inequalities

Before:
- Option 1

Graph each inequality on a number line.

   $x \geq 4$ $x \leq 3$ $x > 6$ $x < 0$

Extension: $-4 \leq x \leq 5$ $x \geq 3$ or $x \leq -2$

- Option 2

Solve each inequality and graph the solution on a number line.

$3x + 2 \leq 14$ $-5 + 2x > 15$ * $-2x + 4 \geq 18$

*What happens mathematically in this situation?

- Option 3

Write as many translations for each symbol as possible

   $<, >, \leq, \geq$

During:
- Why does Tess use the inequality symbols to describe her relationship with Richard?
- Why does Tess say that Richard > her?
- In your school, are there people in your life that you feel "not equal to?" Write an inequality showing your relationship with them.

Extension: Do you think it is fair that Richard seems > Tess? In your school does such inequality exist? Why? In society, does inequality exist? For what reasons?

After:
- What caused Tess to believe that R≤T?
- In your life, is there anything that has happened that "makes your symbol switch" with a friend or a classmate?

Extension: Can inequality due to racism, sexism, or other issues ever "switch"? Why or why not?
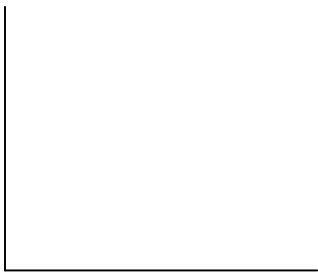
Chapter 2: Graphs

Before:
- Option 1:

Brainstorm as many different types of graphs as you can (circle, bar, pictorial, etc.).
Why would you use a particular type of graph over another?

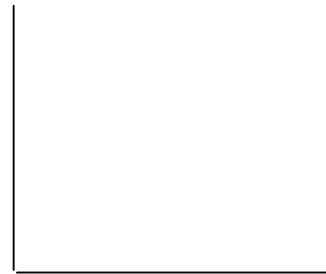- Option 2:

Create a graph that matches each situation.

1. "Yesterday, it was cold in the morning, then really hot around lunch and then warm in the evening."

2. "The population of our town has increased slowly over time."

3. "Sally walked slowly away from the car and then stood still."

- Option 3:

Create a timeline of important events in your "mathematical life." Include learning your multiplication facts, fractions, shapes, long division, solving equations, etc.

Extension: Show different parent graphs and have students identify each with equations, names, etc (linear, quadratic, cubic, absolute value, exponential, etc.)

During:
- What real life graph does Tess study in school?
- What graph does Tess draw and how does it relate to her mom's awful news?
- What graph does Tess actually turn in for her assignment in Algebra class?

Extension: What do you think really happens when someone tries to commit suicide by carbon monoxide poisoning? Why?

After:
Bus Stop

The graph shows the number of people waiting at a bus stop at particular times after school.
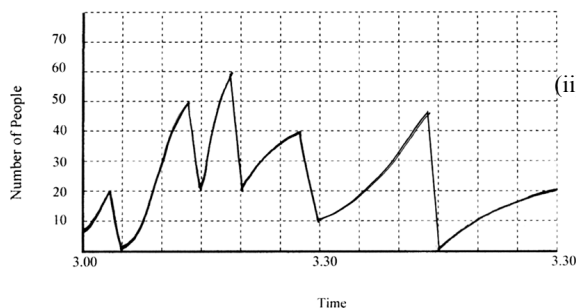
(i) What do you notice about the number of people waiting from 3:00-3:50?

(ii) What is the maximum number of people waiting and when did this happen? Why do you think this was the maximum?

(iii) What time did the buses leave? How do you know?

(iv) Describe how the number of students waiting varies with time.

(v) Was there ever a time when no one was waiting for the bus? Why do you think this happened?

Chapter 3: Tangents

Before:
- Which picture shows a "tangent?"
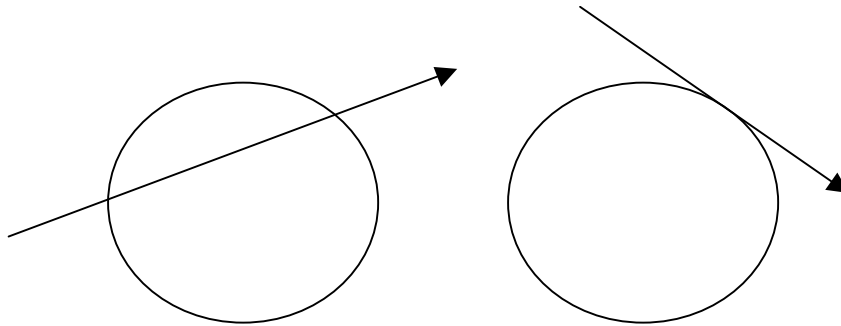
- What does it mean when someone "goes off on a tangent?

During:
1. Why is the story about Toronto a tangent?
2. What story did Rob tell about the slippers? Why is this considered a tangent?
3. Why does Tess find her parent's discussion about organic dairy products to be a tangent?

After:
- Is there more than one way to draw a tangent line to a circle? Draw as many as you can.

- Extension: How are tangent lines used in physics? (Hint: projectile motion, force/motion vectors)

NOTE: At this point in the book, the following lesson "Personal Mathematical Symbol" is appropriate.

PERSONAL MATHEMATICAL SYMBOL

Brainstorm as many mathematical symbols as possible:

Select your personal mathematical symbol: _____

This symbol represents me because…

Think of another person in your life (mom, dad, sibling, friend)… Select their personal mathematical symbol: _____
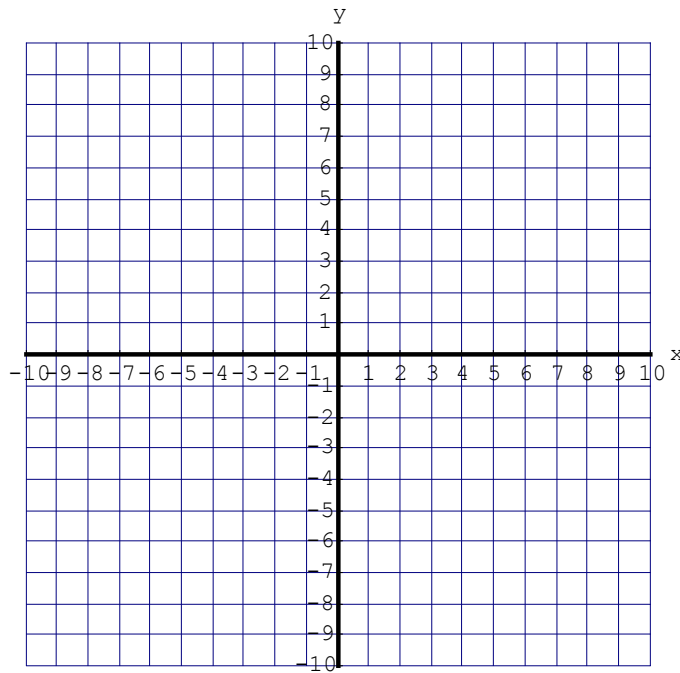
This symbol represents _____ because…

Chapter 4: DNE

Before:

- Solve the system of equations: (hint: you can solve this graphically or algebraically)

$y = 2x + 3$

$y = 2x - 1$

→ Why is there no solution to this system?

During:

- Why is Miranda's symbol |m| ?
- Why is Sammy s^5?
- Why does Ms. Saltzman use DNE for the system shown above?

After:

Make up your own system of linear equations that has no solution. Prove this graphically and algebraically.

Chapter 5: Circular Thinking

Before:

- Draw an angle with a measurement of 90°.

- Draw an angle with a measurement of 180°.

- How many degrees are in a circle?

- What does it mean to "do a 180°?"
  What does it mean to "do a complete 360°?"

During:

What are some of the math mistakes that Mr. Wright makes during History class?

After:

What sports use the phrase "a 180°" or "a 360°?"

In what other mathematical topics is the measurement of 180° or 360° important?

Tony Hawk did a 720° at the X-Games on his skateboard. Why is this impressive?

Chapter 6: Venn Diagrams

Before:

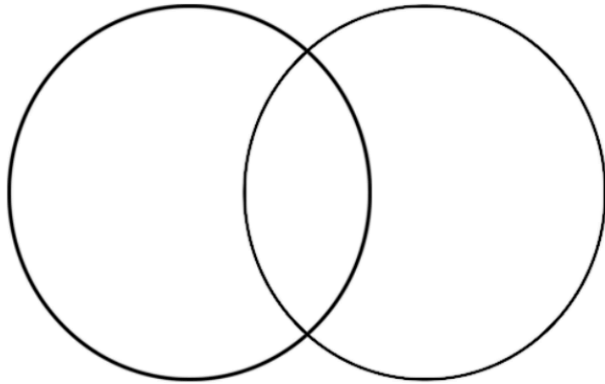What do these Venn Diagrams represent?

Diagram A

Diagram B
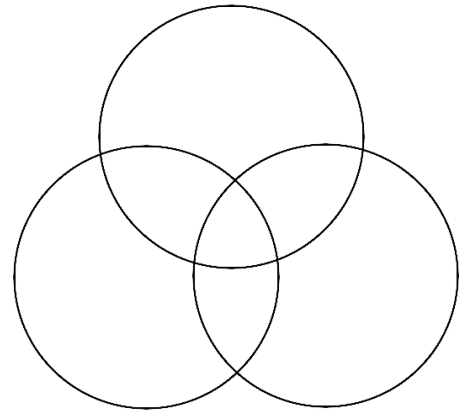
Diagram C
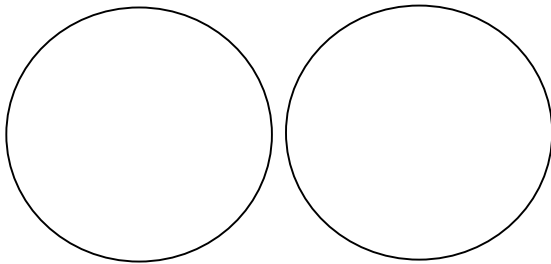
During:
- Describe the diagram showing the intersection between Tess and Miranda and if they've kissed.
- On page 49, there is an empty set shown – why is this called an empty set?
- On page 51 there are three intersecting circles – what does this represent?

After:
- Why does Sammy believe that she and her mother do not intersect?
    - What is your relationship like with your mother?

- Is there anyone in your life that you don't intersect with right now? Why or why not?

Chapter 7: The Difference Between Axioms and Theorems

Before:
- Define Axiom.
- Define Theorem.

- List any theorems or axioms that you know. (Hint: axioms don't need proof, but theorems do!)

During:
- What does Tess think people should do if they know about a crime?
- Why does Tess call a trial a theorem?

After:

Are there any axioms in life or are there only theorems? Explain.

Chapter 8: Zero

Before:

In these three examples, add a zero to the left or the right of the number. Decide if the value changes. Explain.

     5
     .3
     11

What is the definition of x^0?

During:
- Why does Tess say zero is sneaky?
- What does zero do as an exponent?
- What does zero do in the denominator of a fraction?

After:
Go back to the example from "before."
- Add a zero to each number so that the value does NOT change.
- Add a zero so the value becomes 0 or 1.

- Add a zero so the value is undefined or cannot exist.

Chapter 9: Percentages

Before:
Option 1

> What percentage of this math class is girls?
> What percentage wear glasses?
> What percentage are wearing red today?

Option 2

> Define independent variable.
> Define dependent variable.

During:

Why does Tess use y to represent Lynn?
What percent of the time does Tess estimate that Lynn lies?

After:

Since Tess says 16 girls in the class represent 48% of the total, how many girls are in her class?

How does this compare to your class percentage and total?

Chapter 10: Quadratic Equation

Before:

- What is the standard form for quadratic equations?

- Sketch a parabola that opens upward/downward.

- Name several methods you know to "solve" quadratic.

During:
- Why does Ms. Saltzman say that we should care about quadratics?
- Name different real life examples that show motion in the shape of a parabola.
- What formula would Tess like to know? How does gossip travel in your school?

After:

Solve Tess' DO NOW problem using any method you choose. Try to solve it by another method and prove the solutions are the same.

Graph the following:

$y=x^2$

$y=-x^2$

$y=2x^2$

$y=1/2\ x^2$

Describe the similarities and differences you see in the graphs. Try using a graphing calculator and testing out other equations!

Chapter 11: Parallel Lines

Before:

- Draw an example of parallel lines.

- Draw an example of perpendicular lines.

- Draw an example of intersecting lines.

During:
Why does Tess know that Mr. Wright will never end up on the corner of Harrison and Webster?

After:
Name a street parallel to the one you live on. Name one parallel to the street our school is on.

Name a street that is perpendicular to the street you live on/our school is on.

Extension: Make up linear equations that create parallel lines or perpendicular lines.

Chapter 12: A Complete Circle

Before:

Sketch the path of a boomerang.

During:

How does Tess relate what happens in this chapter to the path of a boomerang?

After:

Have you ever had to face something that "came back at you" in a complete circle? Describe that situation.

Chapter 13: The Number Line

Before:
- Draw a number line.

- Where do negative numbers go and where do positive numbers go?

- What marks the middle – between negative and positive numbers?

- What about a thermometer – how does this differ from a number line?

During:
- How does Tess relate the number line to the subway/BART line?

- Try to draw the subway line from Tess' description.

After:
- Revisit the Personal Mathematical Symbol. What would your symbol be right now and why?
- What about in another class or after school or on the weekend? Would you perhaps have different symbols for different situations? Explain.

Chapter 14: Prime Numbers

Before:

- What is a prime number?
- Give an example of a number that is not prime and prove why it isn't.

During:

- When Mr. Wright is talking, what do the following numbers represent?
  192:
  77:
  4:
  100:
  12:

- Why does Tess say that Mr. Wright again made a math mistake?

- Translate Tess' notebook entries:
  $S^5 = 100\%$

  $3 > \neq 100\%$

After:
- Circle the Prime Numbers. Cross out all the numbers that are not prime.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

- What is this process of finding the prime numbers called? Who is it named after?

Chapter 15: One More DNE

Before:

Which equation has no solution and why not?

$3x + 6 = 3x + 6$

$3x + 5 = 2x + 6$

$3x + 7 = 3x + 2$

During:
- Why is the number 42 important in this part of the story?

- Why do Tess and Mr. Wright classify the cause of the art teachers' wife's death as DNE?

After:

- Write some important numbers in your life and explain in one sentence why they are important.

- Is there a problem in your life right now that does not have a solution? Explain.

Chapter 16: Imaginary Numbers

Before:

Evaluate each expression.

$\sqrt{4}$

$\sqrt{25}$

$\sqrt{49}$

$\sqrt{-9}$

Is there more than one answer to any of the above? Why or why not?

During:

- Why doesn't $\sqrt{-9}$ exist?
- What symbol do mathematicians use to represent imaginary symbols?
- Why does Tess decide to go back to school during this chapter?

After:

Describe a situation/thing that you cannot see but you can *imagine*.

Chapter 17: The Additive Property of Equality

Before:

Solve each equation. Check your solution.

3x-5=19

3x-7=2x+1

What did you do to each side of the first equation? Why?

What did you do differently in the second equation? Why?

During:
- Why does Tess say that the Additive Property of Equality made her tell?
- Describe the evidence that Tess presents to Ms. Balford against the boys.
- Why do you think that Tess erases the " –" from her ankle?

After:
Describe a time you needed to use the Additive Property of Equality to even things out in your life.

Chapter 18: Extraneous Solutions

Before:

What is an extraneous solution?

During:

Why were the wrist tattoos considered an extraneous solution?

After:

Describe a situation when you misinterpreted information or a situation and believed in an extraneous solution.

Chapter 19: Asymptotes, Non-Euclidean Geometry, and other things I didn't learn yet

Before:

Define asymptote.

Draw an example.

During:

- When Damien returns Tess' eraser, why does she understand how asymptotes might feel?
- When might parallel lines meet?
- Why were letters used to describe quantities such as height, the price of shoes, etc.?

After:

What numbers in your life never change (are constant)? *Hint: Your birthdate…*
Which values in your life need to be represented with a variable? Why?

Chapter 20: Lines and Line Segments

Before:

Draw an example of each of the following:
      Line

      Line Segment

      Ray

During:
Why does Tess' mom think the theorem "Rob killed Nina" cannot be proven?
How does Tess relate lines/line segments to her theory of life?

After:
Give some examples of things in your life that can be represented with a line segment.
(example: Kindergarten – starts 8/92 --------------------- ends 6/93)

      What about a line?

      What about a ray?

Chapter 21: Exponents

Before:

       Define base.
       Define exponent.

       What is Tess' symbol for Sammy and why did she choose that symbol?

During:
How is Sammy's apology an example of her symbol?

After:
Have you ever reacted/acted "exponentially?"

What are the rules of exponents for
       Multiplying powers with like bases
       Dividing powers with like bases
       Raising a power to a power?

Simplify each expression.

$x^5 x^6 g$

x^{10}/x^3

Chapter 22: Infinity

Before:

Define the symbol ∞.

During:

Why does Tess choose ∞ as her "tattoo?"

After:

Now that you have finished the book, what symbols would you assign to your best friends?
What about the members of your family? Your teachers?