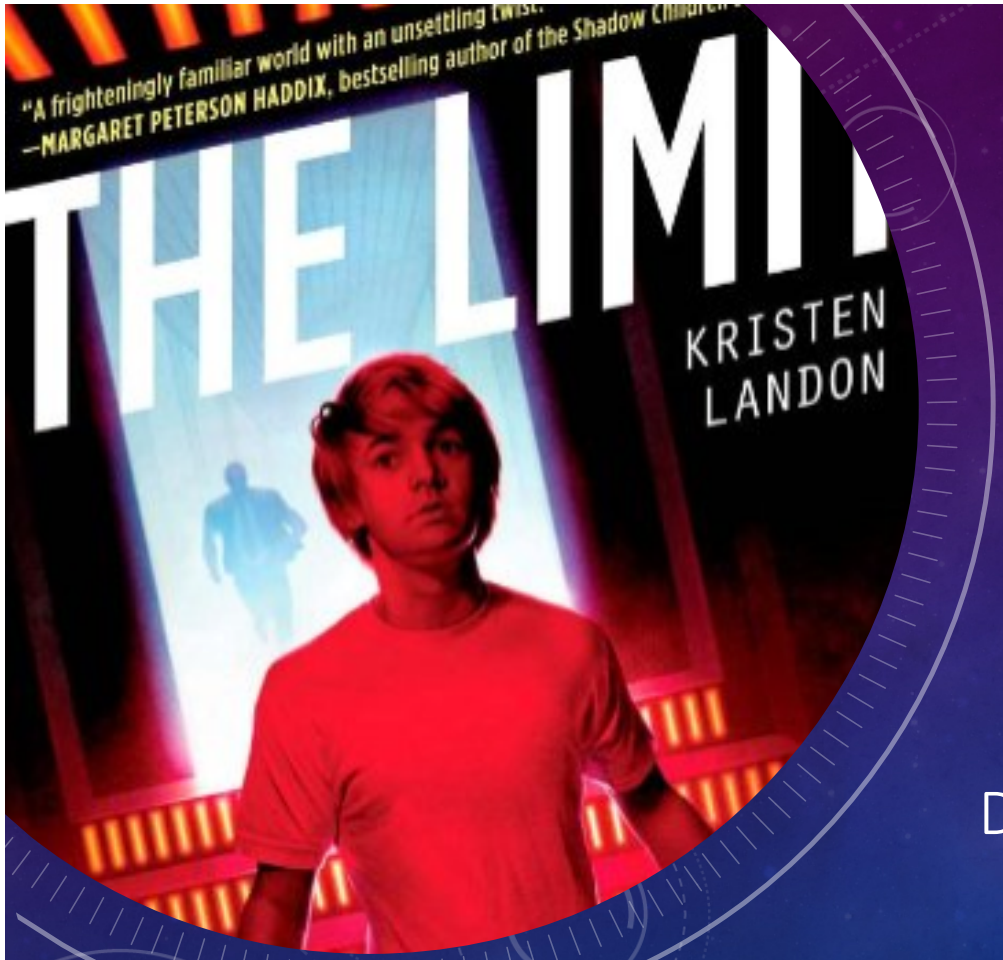

Take It to The Limit: Developing Mathematical Literacy

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The Limit
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An eighth-grade girl was taken today . . . With this first sentence, readers are immediately thrust into a fast-paced thriller that doesn't let up for a moment. In a world not too far removed from our own, kids are being taken away to special workhouses if their families exceed the monthly debt limit imposed by the government. Thirteen-year-old Matt briefly wonders if he might be next, but quickly dismisses the thought. After all, his parents are financially responsible, unlike the parents of those other kids. As long as his parents remain within their limit, the government will be satisfied and leave them alone. But all it takes is one fatal visit to the store to push Matt’s family over their limit—and to change his reality forever.

What Is YA Literature?

Young adult literature is defined as literature written specifically for adolescents in grades 6–12.

(Hazlett, Johnson, & Hayn, 2009).

Why Read Young Adult Literature (YAL) to Develop Math Literacy?

YA in general…

- When content is presented in adolescent worlds it becomes more relevant and meaningful, which generates stronger content appeal for secondary students (Schallert & Roser, 2004).
- When adolescent books are read as a complement to content area textbooks, students learn to synthesize concepts across a range of texts (Bean, 2003), while providing focus and coherence to content area instruction (Austin, Thompson, & Beckman, 2005).

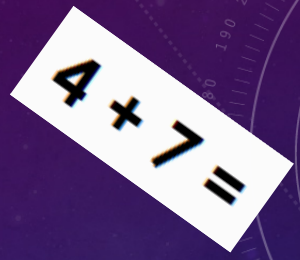
Why Read Young Adult Literature (YAL) to Develop Math Literacy?

YA in Mathematics….

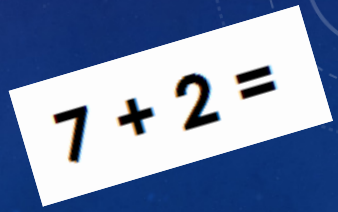
- Reading YAL provides access points for students to practice reading like a content area expert – Mathematicians (Greathouse, Kaywell, Eisenbach, 2017).
- In mathematics classrooms, when reading YAL students can be encouraged to draw on imagination as they solve problems presented in the text as a way to consider the possibilities of mathematics in their world and future. Positioning students as readers in this way helps develop critical literacy, as concepts are explored at deeper levels. (Koellner, Wallace & Swackhamer, 2009)

BEFORE READING

Number Talks



- Short (5–7 minutes) classroom segments
- Challenge students to solve an arithmetic problem using only mental strategies
- Traditional algorithms are discouraged
- No pencils or paper are allowed
- Teacher writes the equations to represent the strategy students describe
- Teachers should facilitate, but not lead the discussion



Introducing Limits and Budgets

Students should be provided opportunities to encounter the specialized mathematical language associated with limits and budgets

Poll students to see how many have created/managed a budget before (or a checking/savings account)

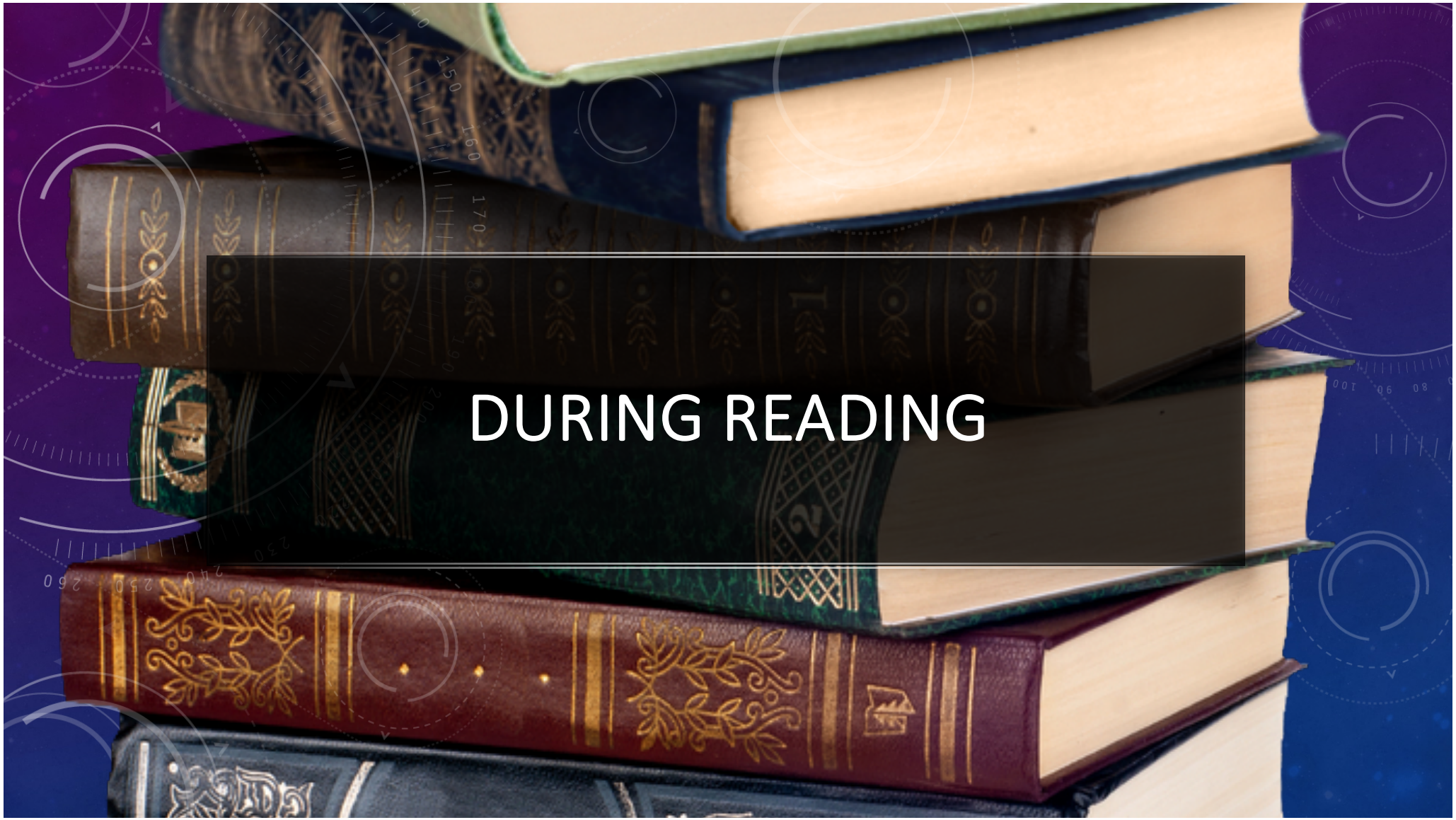
Ask students to share stories of managing a budget

Encourage students to think of scenarios in which sticking to a budget is essential

Ask students to share stories about exceeding their limit and the consequences of doing so

Make a list of any specialized vocabulary words that occur naturally in the conversation

Ask students to list these words in their math journals/notebooks and write their own definitions as inferred from contextual clues


DURING READING


TASK: ANALYZING THE BASKETBALL GAME

Averages, *D=RT,* and Integers, Oh My!

In Chapter 5, Matt "calculat[es] the average number of windows for the buildings [he] pass[es]" (p. 47). Task students with an interesting mathematical exercise:

- Count all of the buildings/homes they pass on the way to school from home each day
- Then count the number of windows on all of those buildings/homes
- Finally, calculate an average number of windows from the buildings they pass each day

Averages, *D* = *RT,* and Integers, Oh My!

In Chapter 6, Matt devises an escape plan through the lobby of the workhouse (p. 56–57). Have students calculate their own "escape" from a location within their school.

- Post-it notes can be posted on the floor of the gym/hallway
- Students must locate their designated post-it note and estimate the distance from their location to the escape door
- They will measure the actual distance and record it on their note
- Students will calculate their running rate (feet per second) by timing each other as they run a known distance
- Using *d* = *rt,* students will calculate how long it would take their team to escape
- Debrief with whole-class discussion

Averages, *D* = *RT,* and Integers, Oh My!

In Chapter 18, Matt ruminates, “the chances of my entire family ever living at home together again were about as good as the product of two positive numbers coming out negative” (p. 184).

Integer Rules Investigation


AFTER READING

Simulating *The Limit*

In Chapter 17, Matt asked, “Why didn’t they send me home as soon as you got the new limit?” to which Mom replied, “They couldn’t. If you came home, we could drop back down to the old limit. *That’s* the one we have to get under in order for you to be able to come home” (pp. 174–175).

You can provide students with the chance to understand the complications of removing debt that is accumulating faster than you can pay it.

- Students should be split into “families” of four and assigned a budget limit that must not be exceeded over the course of the week
- Work with students to create a list of classroom behaviors or practices that yield income (credit) or incur cost (debit) – examples may include students asking the teacher to repeat directions, causing a debt of $20, or students volunteering to answer questions and being called on for an income of $10
- Students track their individual income/debt in a checkbook register over the course of the week
- At the end of the week, families will compile and calculate their family’s balance
- Determine how many families went over the limit and then address ways they can work their way out of debt the next week
- The second week, introduce *Life Happens* cards that mimic circumstances in the book (car breaks down, Dad plays golf, etc.) and have each family draw five (one each day)
- At the end of the second week, families should reconvene to see if they worked their way out of debt
- Follow with a whole-class discussion of the results and discuss the impact of the *Life Happens* cards

Simulating *The Limit*

- Students should submit a Budget Report as a culminating assignment that includes the complied family checkbook register with mathematical calculations
- This should be accompanied by a reflective paper in which students respond to the following prompts:
  - Matt claims, “Managing the account isn’t calculus. Heck, it isn’t even algebra. Basic, simple arithmetic,” to which Mom replies, “Oh, no. It’s much more complicated than that. It’s got all that interest to calculate and the fines and fees to figure out” (p. 173). Reflect on your experience in the simulation to determine whether you agree with Matt or Mom. Use mathematics to support your decision.
  - Matt bemoans, “The dollars in our account disappeared faster than I could think of them” (p. 181). Relate this comment to your family’s experience in the past two weeks. How did Matt’s comment play out (or not) for your family?

Beyond *The Limit*

Financial Literacy: Living Within a Limit

- Ask students to choose a career that interests them and have them locate the average yearly salary for an entry-level position in that career
- Once students have determined their monthly salary, ask them to calculate the taxes that would be deducted from this amount
- Ask them to consider how much insurance would cost and require them to deduct both the tax and insurance amounts from the monthly salary
- Have them put together a monthly grocery list, estimated cost for monthly car payments and gas, housing costs, estimated cost of monthly utilities (electric, water, garbage/sewer, gas, cable, television, internet)
- Ask students to subtract these expenses from their net pay to determine if they could actually live within their set limit
- Have students share their findings either in teams or as a whole class

DEVELOPING MATHEMATICAL LITERACY THROUGH ADOLESCENT LITERATURE

Questions & Book Raffle

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