Bridging for Math Strength Resources

Standards of Learning Curriculum Framework

Standard of Learning (SOL) 5.11 Solve practical problems related to elapsed time in hours and minutes within a 24-hour period.

Student Strengths	Bridging Concepts	Standard of Learning
Students can read an analog clock and tell the time to the nearest minute. Students can solve practical problems related to elapsed time within one hour increments.	Students can solve practical problems related to elapsed time in *hours* and *minutes*, within *any 12-hour period.* (SOL 4.9)	Students can solve practical problems related to elapsed time in *hours and minutes* within a *24-hour period*.

Understanding the Learning Trajectory

Big Ideas:

- An elapsed time problem always consists of a start time, end time, or elapsed time; two of these items are given and one is unknown.
- A variety of tools can be used to solve elapsed time word problems such as an open number line, a t-chart, a demonstration clock, or even regrouping.
- In 3rd grade, students learn how to tell time, match a digital clock to an analog clock, name how minutes in a day and how many hours in a day. They also begin to investigate elapsed time in one-hour increments within a 12 hour period (within a.m. or p.m.) 4th graders extend this learning by solving practical problems related to elapsed time in *hours* and *minutes*, within *any* 12-hour period while 5th graders complete elapsed time in hours and minutes within 24 hours.
- "Basic facts and algorithms for operations with rational numbers use notions of equivalence to transform calculations into simpler ones. …Times in minutes and seconds can be added and subtracted where 1 minute is regrouped as 60 seconds." (Charles, p. 16-17).

Formative Assessment:

- VDOE Just in time Quick Check SOL 5.11 PDF / Desmos

Important Assessment Look Fors:

- The student reads the time on an analog clock.
- The student reads and diagnoses a word problem to determine what information is given and what information must be solved for (start time, elapsed time, or end time).
- The student solves for the unknown (start time, elapsed time, or end time) by using an appropriate strategy such as an open number line, subtracting/adding time, or a t-chart.

Purposeful Questions:

- How did you figure out what piece of information you were trying to solve for?
- Why did you choose this tool (open number line, subtracting/adding time, t-chart) to solve this problem? How did it help you?
- When are some tools more useful than others (open number line, subtracting/adding time, t-chart)?
- What happens to the hour hand as the minute approaches the hour?

Bridging Activity to Support Standard	Instructional Tips
Routine: Would you Rather?	Students answer *Would You Rather* questions meant to bring about their strategies for solving as well as elements of elapsed time problems.
Rich Tasks: Two Clocks Nrichmath Traveling to New York City adapted from Henrico County Public Schools	In the Two Clocks task, students read clocks that have only an hour hand or minute hand and use their position to predict which clock shows various events from that day: getting up, going to school, midday, etc. This task is a great way to show that there is a relationship between the minute hands positioning and the hours hand positioning and vice-versa. It will help address the confusion that occurs in Just in Time Quick Check Number 4. In the Traveling to NYC task, students determine whether they would rather drive, take a plane, or travel by train to get to New York City. They must determine elapsed time based on digital time as well as reading a clock.
Games: Race to the Finish	Students pick 2 cards representing the start and end times for a trip, and determine the elapsed time. Based on your students' needs you can utilize the analog clock deck, the digital clock deck, or both. Students decide if they want a long trip or a short trip. The person who travels to the destination in the shortest/longest amount of time is the winner.

Other Resources:

- VDOE Mathematics Instructional Plans (MIPS)
  - 5.11 - What Time Is It? (Word) / PDF Version
- VDOE Co-Teaching Mathematics Instruction Plans (MIPS)
  - 5.11 - Elapsed Time (Word) / PDF Version
- VDOE Algebra Readiness Remediation Plans
  - Time Part 1 (Word) / PDF
  - Time Part 2 (Word) / PDF
- VDOE Rich Mathematical Tasks: Bus A or Bus B Task
  - 5.11 Bus A or Bus B Task Template (Word) / PDF Version
  - 5.11 Bus A or Bus B Student Version of Task (Word) / PDF Version
  - 5.11 Bus A or Bus B Anchor Papers (Word) / PDF Version
  - 5.11 Bus A or Bus B Anchor Papers Scoring Rationales (Word) / PDF Version

- Simple match-up game: Review time equivalencies
- Review telling time on an analog clock with this "Put the clocks in order by time" activity
- Watch this video visual that shows how the hour hand and minute hand have a relationship by Berkeley Everett. Also available on his website.

Learning Trajectory Resources:

Charles, R. (2005). Big ideas and understandings as the foundation for elementary and middle school mathematics. *Journal of Mathematics Education Leadership*, *7*(3), NCSM.

Clements, D. H., & Sarama, J. (2019). Learning and teaching with learning trajectories [LT]2. Marsico Institute, Morgridge College of Education, University of Denver. https://www.learningtrajectories.org/

Common Core Standards Writing Team. (2019). Progressions for the Common Core State Standards for Mathematics. Tucson, AZ: Institute for Mathematics and Education, University of Arizona.

Richardson, K. (2012). How Children Learn Number Concepts: A Guide to Critical Learning Phases. Bellingham: Math Perspectives Teacher Development Center.

Van De Walle, J., Karp, K. S., & Bay-Williams, J. M. (2018). *Elementary and Middle School Mathematics: Teaching Developmentally.* (10th edition) New York: Pearson (2019:9780134802084)

VDOE Curriculum Framework for All Grades - Standard of Learning Curriculum Framework (SOL)