Unit 5: Time, Graphs and Word Problems



Second Grade ~ Math

Sarah Gerding

STAGE 1 – DESIRED RESULTS

ESTABLISHED GOALS:

- **CC.2.NBT.2:** Count within 1000; skip-count by 5s, 10s, and 100s.
- **CC.2.NBT.4:** Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.
- **CC.2.NBT.5:** Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
- **CC.2.NBT.6:** Add up to four two-digit numbers using strategies based on place value and properties of operations.
- **CC.2.MD.7:** Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.
- **CC.2.MD.10:** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems using information presented in a bar graph.
- **CC.2.OA.1:** Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- **CC.2.OA.2:** Fluently add and subtract within 20 using mental strategies. By end of Grade 2, know from memory all sums of two one-digit numbers. Use place value understanding and properties of operations to add and subtract.
- **CC.2.OA.4:** Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.
- **CC.2.G.3:** Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.

UNDERSTANDINGS:

- Telling time to the nearest five minutes
- Using picture graphs and bar graphs to answer questions

ESSENTIAL QUESTIONS:

- How can you apply "skip counting" skills to read the time on an analog clock?
- How can written or spoken data be represented in a visual way?

STUDENTS WILL KNOW:

- How to use skip counting to tell time on an analog clock (counting by fives).
- How to distinguish between activities that would occur during A.M. or P.M. time periods.
- How to use information presented in a data table to create a picture graph or bar graph.
- How to use a picture graph or bar graph to solve simple put-together, take-apart, and compare problems.

STUDENTS WILL BE ABLE TO:

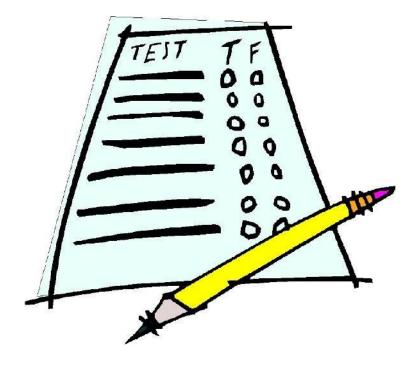
- Tell and write time using analog and digital clocks to the nearest five minutes (using A.M. and P.M.)
- Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories.
- Solve simple put-together, take-apart, and compare problems using data presented in a picture graph or bar graph.

STAGE 2: ASSESSMENT EVIDENCE

Performance Tasks:

- 1. Students will build a clock (using paper plates) and use their model to answer three questions about time.
- 2. End of unit assessment test.

Other Evidence: Quick Quizzes



"Making a Clock" Performance Assessment

Instructions:

Students are given the following materials to construct a clock:

- Paper plate
- Construction Paper
- Markers
- Fastener

Students draw and cut an hour hand (small) and a minute hand (large) out of construction paper. They attach the hands to the middle of the paper plate using the fastener. Finally, students write the appropriate numbers and tick marks on the clock using markers. During this construction, the analog clock in the room is covered up with paper.

Once the clock is constructed, they use their clocks to model and answer the following questions on a piece of paper:

- 1. What does 5 o'clock A.M. look like on an analog clock?
- 2. What does 6:45 P.M. look like on an analog clock?
- 3. Would 6:45 A.M. look any different than 6:45 P.M.?

Students turn in their clock models and their answers and are graded using the rubric located below:

	Needs Improvement (1 point)	Developing (2 points)	Accomplished (3 points)
Clock Construction: Hour and Minute Hands	Hard to tell which hand is the hour hand and which is the minute hand.	Hour and Minute hands are similar lengths, but the hour hand is slightly shorter than the minute hand.	Hour and Minute hands are easily distinguished from each other (hour hand is much shorter than the minute hand).
Clock Construction: Numbers and Tick Marks	Many numbers and / or tick marks are in the incorrect place on the clock face.	Most numbers and tick marks are in the correct place on the clock face.	All numbers and tick marks are in the correct place on the clock face.
Questions: Correct modeling with clock	Did not correctly model either of the two times.	Correctly modeled one time.	Correctly modeled both times.
Questions: Answering question about A.M. vs. P.M.	Did not attempt to give an answer for the question.	Attempted to answer the question, but did not give a correct answer.	Correctly answered the question.

Total Points: _____ / 9 Points

STAGE 3: THE LEARNING PLAN



Unit Calendar

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday		
March 9	10	11Unit 5 PretestLesson 5.1	12 Snow Day ⓒ	13 • Lesson 5.2 • Quick Quiz 1	14 • Clock Performance Assessment	15		
16	17Lesson 5.3Quick Quiz 2	11 • Lesson 5.4	19 • Lesson 5.5	20 • Lesson 5.6	21 • Review / Catch- up day	22		
23	24 • Lesson 5.7	25 • Lesson 5.8	26 • Lesson 5.9	27Lesson 5.10Quick Quiz 3	28Review for assessment	29		
30	31 • Unit 5 Post Test							

Lesson 5.1 - Hours and A.M. or P.M.

OBJECTIVE: Tell and write time to the hour, including A.M. or P.M.

STEPS:

- 1. Discuss time and clocks: face, minute hand, hour hand, etc. Complete Activity Page 221.
- 2. Times of daily activities: discuss whether certain activities usually occur in the morning (A.M.) or afternoon/evening (P.M.). Complete Activity Page 222.
- 3. Tell time to the hour: discuss how the hour hand moves counterclockwise and how to tell what hour it is by the placement of the hour hand. Complete Activity Page 225.
- 4. Draw clock hands: using time on digital clocks, have students draw the appropriate hands on analog clocks. Complete Activity Page 226.

ASSESSMENT, REFLECTION OR CLOSURE ACTIVITIES:

- After the lesson, student must complete an "exit ticket" before moving on to the next activity. On their exit ticket, they must write a time (using A.M. or P.M.) and list at least one activity that they might do during that time.
- Students also must complete the 5-1 Homework page.

- **Low:** Working in pairs, students use a model clock to make time (to the hour only) and have their partner name the time and name an activity they may be doing at that time.
- **High:** Working in pairs, students use the vocabulary words from the lesson (A.M., P.M., hour hand, minute hand, etc.) to write definitions. Their partner uses the definition to guess the vocabulary word.

Lesson 5.2 - Hours and Minutes

OBJECTIVE: Tell time to 5 minutes.

STEPS:

- 1. Count by fives to tell minutes: Practice counting by fives around a digital clock to find out the time in minutes. Complete Activity Page 227.
- 2. Tell time to five minutes: Have students practice writing time on a digital clock by reading analog clocks to five minutes. Complete Activity Page 228.
- 3. Show time to five minutes: Have students draw clock hands on analog clocks by reading digital clocks. Complete Activity Page 229.
- 4. What's the Error: Students help Puzzled Penguin figure out the correct time. Complete Activity Page 230.

ASSESSMENT, REFLECTION OR CLOSURE ACTIVITIES:

- After the lesson, as a whole class we will count by fives around the analog clock in our room.
- Students complete Quick Quiz 1 as a formal assessment after the lesson.
- Students also must complete the 5-2 Homework page.

- **Low:** Working in pairs, students write times on index cards and use a model clock to make the time.
- **High:** Students practice naming a time by naming how many minutes there are until the next hour or past the current hour (20 minutes to 5, quarter past 3, etc.).

Lesson 5.3 – Discuss Picture Graphs

OBJECTIVE: Draw picture graphs and solve problems using information from the graphs.

STEPS:

- 1. Record information using picture graphs: Students use whiteboards to make a picture graph (teacher models on SmartBoard).
- 2. Students use the picture graphs they created to come up with questions about the data. The questions are shared with the whole class and we solve the problems together.

ASSESSMENT, REFLECTION OR CLOSURE ACTIVITIES:

- After the lesson, students are asked to make comparison statements using the data (pair-share).
- Students also must complete the 5-3 Homework page.

- **Low:** Students record the type of shoes their classmates are wearing (sandals, tennis shoes, etc.) and come up with categories. Then they create a picture graph using their data.
- **High:** Students come up with questions that require more than one step to solve using the graph created during the lesson.

Lesson 5.4 – Read Picture Graphs

OBJECTIVE: Solve Compare and Put Together/Take Apart problems using information from picture graphs.

STEPS:

- 1. Use picture graphs to compare amounts: Students work in pairs to view picture graphs and compare amounts shown. Complete Activity Page 233.
- 2. What's the Error: The teacher draws a picture graph on the SmartBoard and the students must figure out what is wrong (the pictures will not line up correctly we then discuss why it is important to line up pictures in a picture graph).
- 3. Students work in pairs to complete Activity Page 234.

ASSESSMENT, REFLECTION OR CLOSURE ACTIVITIES:

- After the lesson, students choose a problem from Activity Page 234 and explain how they solved it to the class (whole group discussion).
- Students complete Quick Quiz 2 as a formal assessment after the lesson.
- Students also must complete the 5-4 Homework page.

- **Low:** Students work in pairs to describe data in picture graphs using sentence-starters (prompts) provided.
- **High:** Students use teacher-provided clues to create a picture graph.

Lesson 5.5 – Introduce Bar Graphs

OBJECTIVE: Draw bar graphs.

STEPS:

- 1. Convert a picture graph into a bar graph: Have students create a picture graph on their whiteboards. Show them how to color in the boxes that contain pictures to make bars.
- 2. Create a Data Table: Poll the class (ask what their favorite type of pizza is) and have students help create a data table for the information. Complete a picture and bar graph on Activity Page 235 using the data table.
- 3. Ask comparison questions: Have students work in pairs to ask (and answer) comparison questions about the new bar graph they have created.

ASSESSMENT, REFLECTION OR CLOSURE ACTIVITIES:

- After the lesson, students share their comparison questions (whole group discussion).
- Students also must complete the 5-5 Homework page.

- **Low:** Students work in pairs to create picture and bar graphs using a given data table. The partners should come up with comparison statements about the graph.
- **High:** Students create data tables, picture graphs and bar graphs then come up with two-step word problems using the data.

Lesson 5.6 – Read Bar Graphs

OBJECTIVE: Read and analyze information in horizontal and vertical bar graphs.

STEPS:

- 1. Compare horizontal and vertical bar graphs: Discuss the similarities and differences between horizontal and vertical bar graphs. Complete Activity Page 238.
- 2. Ask comparison questions: Have students work in pairs to ask (and answer) comparison questions about the new bar graph they have created.

ASSESSMENT, REFLECTION OR CLOSURE ACTIVITIES:

- After the lesson, students share their comparison questions (whole group discussion).
- Students also must complete the 5-6 Homework page.

- **Low:** Students work in pairs: one partner picks categories and numbers, the other partner must create a bar graph using the information.
- **High:** Students create vertical and horizontal bar graphs and have partners create questions using the data.

Lesson 5.7 – Solve Problems Using a Bar Graph

OBJECTIVE: Use information in a bar graph to solve Compare and Put Together / Take Apart problems having one or more steps to solve.

STEPS:

- 1. Solve Put Together / Take Apart and Compare problems: As a whole group, study the bar graph on Activity Page 239 and answer the problems.
- 2. Solve word problems with more than one step: As a whole group, study the bar graph on Activity Page 240 and answer the problems.
- 3. What's the Error: Study the Puzzled Penguin problem on Activity Page 241 and work together as a class to figure out what he did wrong.
- 4. Create a bar graph: On Activity Page 241, students sort shapes and create a data table and vertical bar graph (working with math partners).

ASSESSMENT, REFLECTION OR CLOSURE ACTIVITIES:

- After the lesson, students write and answer a two step problem using their shape graph.
- Students also must complete the 5-7 Homework page.

- **Low:** Using connecting cubes, partners grab a handful from a bowl and sort them to create a bar graph.
- **High:** Students create bar graphs using only two step word problems that are already created for them (i.e., working backwards).

Lesson 5.8 – Collect and Graph Data

OBJECTIVE: Gather, organize and display data.

STEPS:

- 1. Plan and take a survey: As a class, create a data table containing information about everyone's favorite color.
- 2. Record the collected data: Create a data table, picture graph and bar graph on Activity Page 243 using the collected data.
- 3. What's the Error: Study the Puzzled Penguin problem on Activity Page 244 and work together as a class to figure out what he did wrong.

ASSESSMENT, REFLECTION OR CLOSURE ACTIVITIES:

- After the lesson, ask students to describe how a data table, picture graph and a bar graph are alike and how they are different.
- Students also must complete the 5-8 Homework page.

- **Low:** Students create a bar graph on grid paper using a given data table.
- **High:** Students create bar graphs using only one given sentence with a number included (all other sentences only give information such as "Laura has more ribbons," etc.).

Lesson 5.9 – Make Graphs and Interpret Data

OBJECTIVE: Interpret data in graphs and use the data to solve problems.

STEPS:

- 1. Interpret data: Complete Activity Page 245 and have students make statements about the data.
- 2. More practice with bar graphs: Students work with their math partners to complete Activity Pages 246 and 247.
- 3. Comparison Bars: As a whole class, complete Activity Page 248 focusing on creating comparison bars to solve the word problems.

ASSESSMENT, REFLECTION OR CLOSURE ACTIVITIES:

- After the lesson, ask students to write a compare word problem and solve it using a comparison bar.
- Students also must complete the 5-9 Homework page.

- **Low:** Students answer questions created from a bar graph (Put-Together / Take Apart).
- **High:** Students create two step word problems using a given bar graph and have their partners solve the problems.

Lesson 5.10 – Focus on Mathematical Practices

OBJECTIVE: Use the Common Core Content Standards and Practices in a variety of real world problem solving situations.

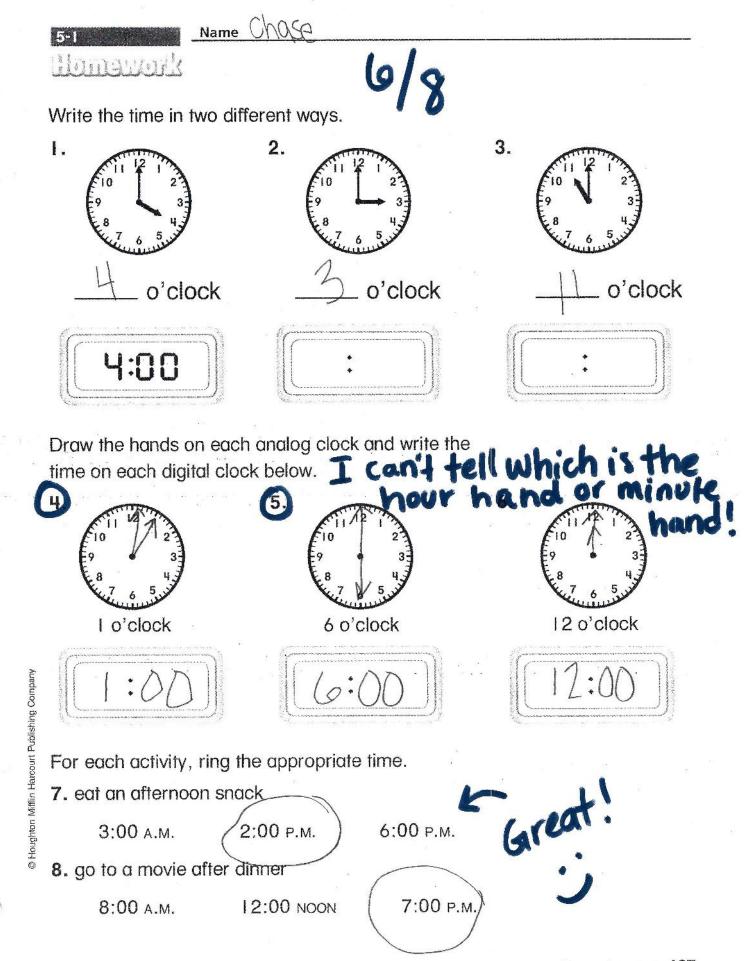
STEPS:

- 1. Create a bar graph: Using the data on Activity Page 249, students create a bar graph. On Activity Page 250, the class votes on the "Cutest Dog" and creates a bar graph to record the data.
- 2. More practice with bar graphs: Students work with their math partners to create and solve two step word problems using the graphs from the previous pages.

ASSESSMENT, REFLECTION OR CLOSURE ACTIVITIES:

- Students complete Quick Quiz 3 as a formal assessment after the lesson.
- Students also must complete the 5-10 Homework page and the Unit 5 review packet.

- **Low:** Students describe how you can count items on a picture graph or how you can tell information just by looking at a picture graph without counting.
- **High:** Students create their own survey, collect data, and create picture and bar graphs to show their final data.

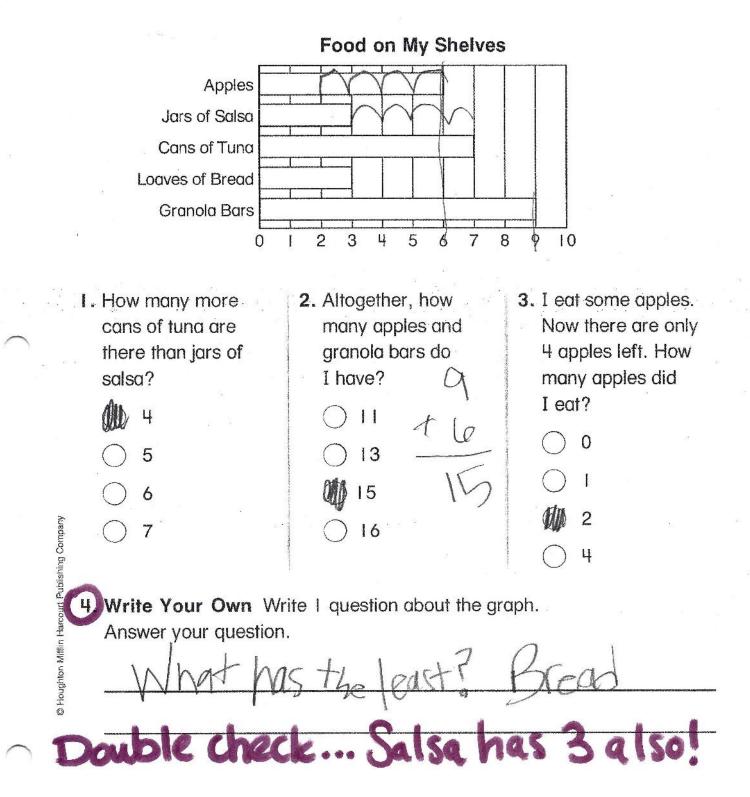


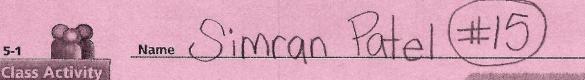
Hours and A.M. OT P.M 137

Use the bar graph to answer the questions below. Fill in the circle next to the correct answer.

Name

Monaunk





Times of Daily Activities

5-1

We use A.M. for the hours after 12:00 midnight and before 12:00 noon. 9:00 A.M. is 9 o'clock in the morning.

We use p.m. for the hours after 12:00 noon and before 12:00 midnight. 9:00 P.M. is 9 o'clock in the evening.

II. Complete the chart. For each time listed, write whether it is dark or light outside; whether it is morning, afternoon, or evening; and an activity you might be doing at that time.



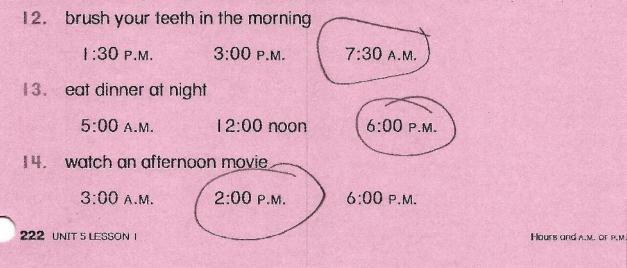
VOCABULARY

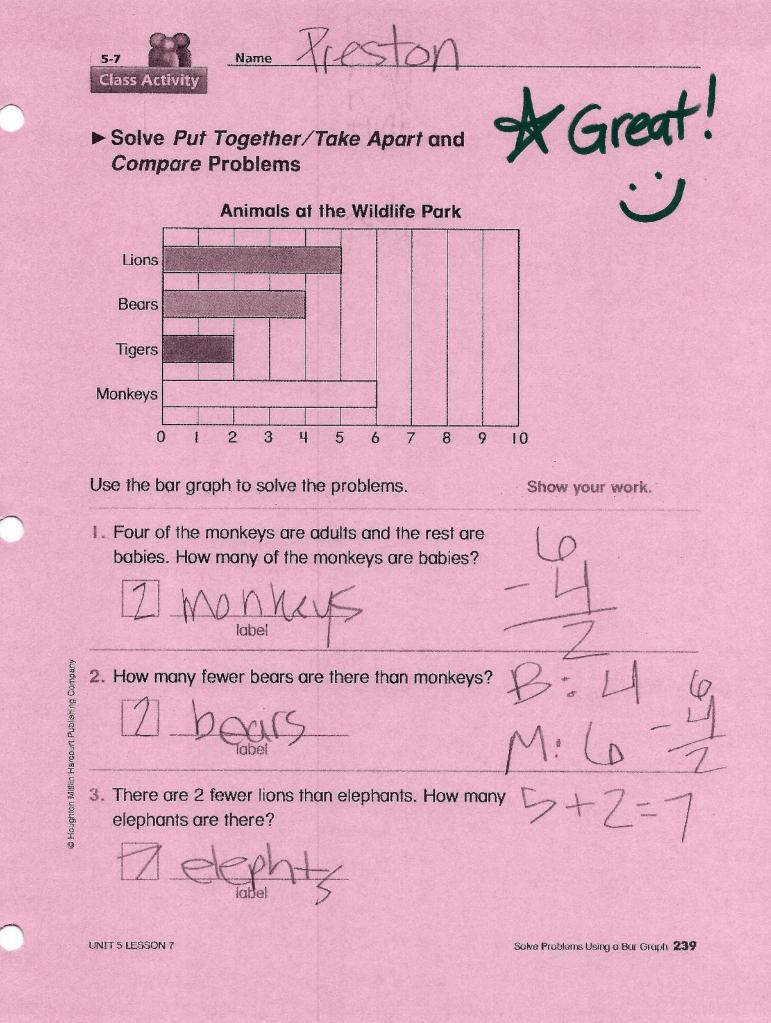
C Houghton Mittlin Harcourt Publishing Company

A.M. P.M.

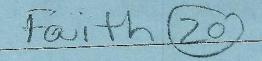
	Time	Sunlight	Part of the Day	Activity
1	4:00 а.м.	dark	morning	sleeping
	I 2:30 р.м.	light	afternam	lunch
	9:00 р.м.	dark	night	Sleep!

For each activity, ring the most appropriate time.





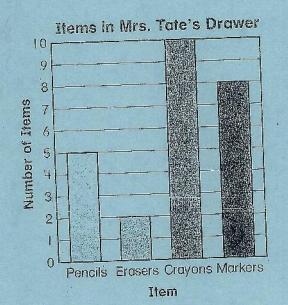




Name

Use the bar graph. Write the number. Ring more or fewer.

- 7. There are 8 more fewer erasers than crayons.
- 8. There are 25 items in Mrs. Tate's drawer in all.



I, M CONFULS

Use the bar graph to solve the problem.

9. Three of the crayons are red. The rest are blue. How many blue crayons are there?

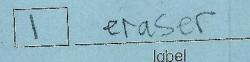
plue crayons labe



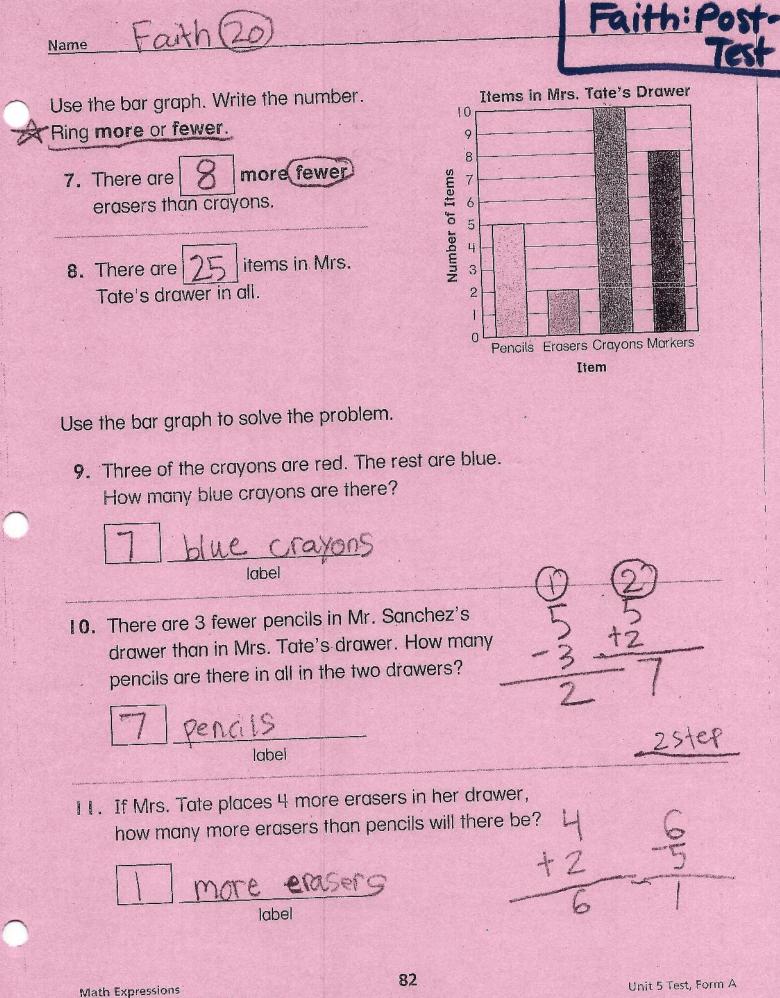
There are 3 fewer pencils in Mr. Sanchez's drawer than in Mrs. Tate's drawer. How many pencils are there in all in the two drawers?



11. If Mrs. Tate places 4 more erasers in her drawer, how many more erasers than pencils will there be?



Math Expressions © Houghton Mifflin Harcourt Publishing Company Unit 5 Test, Form A

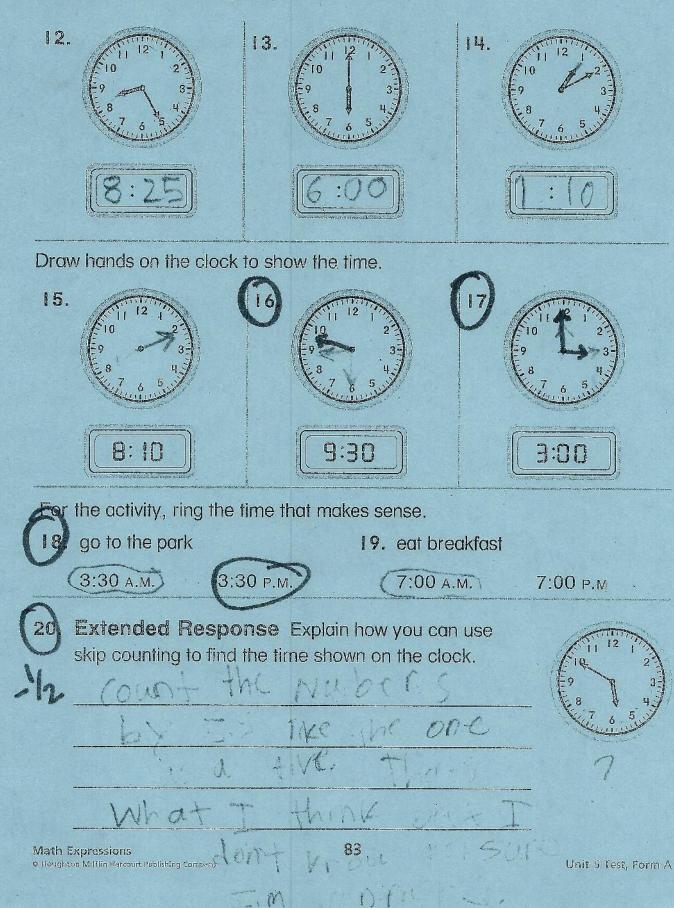


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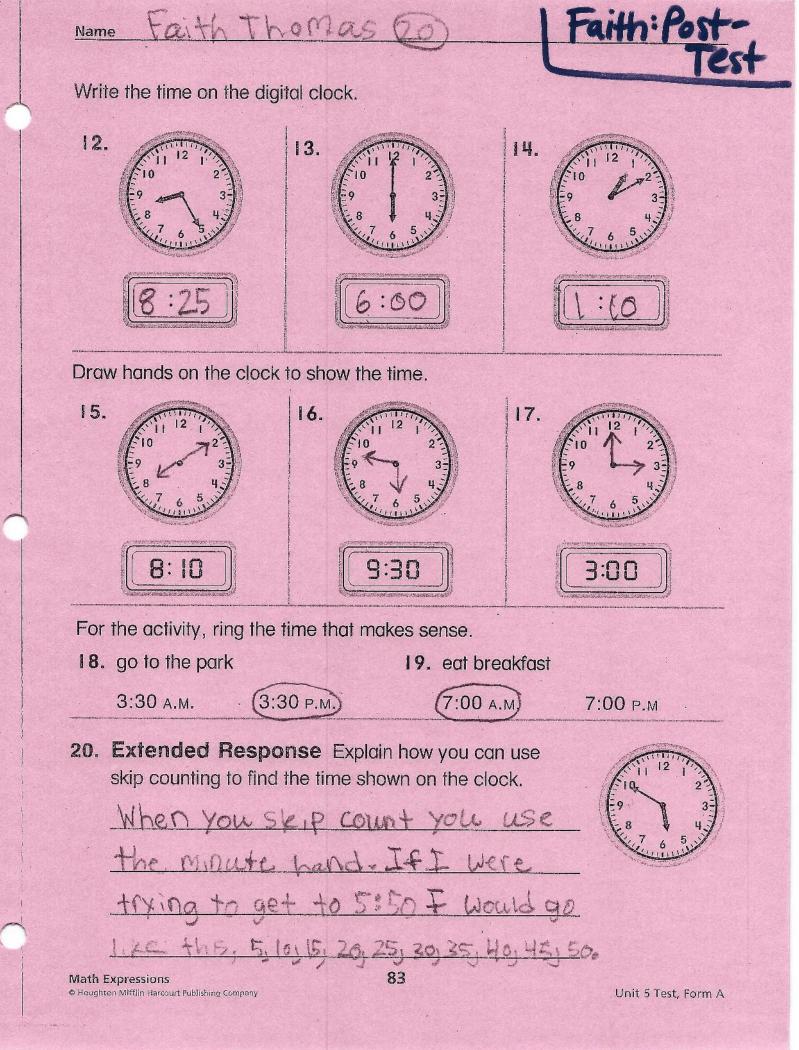


Name

Write the time on the digital clock.



I M



Pre-Test vs. Post-Test Data

Student	Pre-Test Score	Post-Test Score	Difference
Danielle	48%	95%	+ 47%
Olivia	33%	90%	+ 57%
Kavin	73%	90%	+ 17%
Deepak	75%	95%	+ 20%
Elijah	43%	95%	+ 52%
Annie	50%	95%	+ 45%
Carter	63%	95%	+ 32%
Chase	38%	87%	+ 49%
Brennan	58%	87%	+ 29%
Tyler	10%	71%	+ 61%
Lauren	40%	90%	+ 50%
Keira	63%	92%	+ 29%
Sritha	78%	100%	+ 22%
Sarina	80%	95%	+ 15%
Simran	80%	98%	+ 18%
Hamdan	58%	95%	+ 37%
Chris	60%	100%	+ 40%
Aady	53%	90%	+ 43%
lzzy	40%	90%	+ 50%
Faith	68%	98%	+ 30%
Jacob	53%	98%	+ 45%
Trisha	20%	95%	+ 75%
Julie	40%	95%	+ 55%
Preston	25%	92%	+ 67%



Post-Test Question Data

Student	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Danielle	\checkmark		\checkmark		\checkmark	\checkmark														
Olivia	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark			\checkmark	\checkmark							
Kavin	\checkmark		\checkmark	✓	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark			\checkmark
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Elijah	\checkmark		\checkmark		✓	\checkmark	\checkmark	\checkmark												
Annie	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Carter	\checkmark	\checkmark	\checkmark	\checkmark			>	\checkmark	√	\checkmark	~	\checkmark	√	\checkmark	~	\checkmark	~	~	√	\checkmark
Chase	\checkmark	\checkmark	\checkmark			\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark							
Brennan			\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark											
Tyler			\checkmark	\checkmark			\checkmark	\checkmark					\checkmark		\checkmark	\checkmark	\checkmark		\checkmark	
Lauren	\checkmark	\checkmark	\checkmark		\checkmark															
Keira	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark			\checkmark	\checkmark	\checkmark								
Sritha	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Sarina	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark		\checkmark	\checkmark								
Simran	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
Hamdan	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark		\checkmark	\checkmark						
Chris	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Aady	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark			\checkmark								
Izzy	\checkmark	\checkmark	\checkmark	\checkmark			\checkmark	\checkmark	\checkmark		\checkmark	\checkmark								
Faith	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark													
Jacob	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark							
Trisha	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark														
Julie	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark														
Preston		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark			✓	\checkmark	\checkmark
Revisit?	No	No	No	No	Yes	Yes	No	No	No	Yes	Yes	No	Yes							

STAGE 4: REFLECTIONS ON THE UNIT

This unit was very fun to teach, and I think that the students enjoyed it as well! There were a lot of exciting activities that we could do with clocks, and I think the hands-on aspect of learning about time definitely helped the students to be more engaged. The picture and bar graph concept was a little more abstract, but once the students understood the reasoning behind graphing data and were given the opportunity to create their own graphs they really seemed to have fun! I even saw some of them conducting surveys and creating bar graphs at indoor recess. Using graphs to solve word problems was the most challenging part of this unit; however, the previous unit focused completely on word problems so I think the students had a great foundation of knowledge to begin with and were able to build on that knowledge during this unit.

If I were to teach this unit again, I would definitely make a few modifications the second time around. First of all, I do not think the unit spends enough time on the idea of "skip counting" to tell time on a clock. However, on the end of unit test, there is an extended response question regarding this concept and I think many of my students had a hard time correctly answering that question. Only 2 of the 10 lessons in this unit deal with time, so I think I would build in a mini lesson at some point that could cover the idea of skip counting on a clock more thoroughly. Secondly, I think I would try to spend more time on the two step word problems that were covered on the test. Several of my students missed these questions and I think trying to approach the problems from different angles may have made the concept "click" for more students. Perhaps using manipulatives to model the problems or having them act out what was happening in the word problem may have helped. Overall, I loved this unit and most of them did extremely well on their final test, but I think there is always room for improvement!

I learned so much about my students from teaching this unit. I learned that when they are able to draw something (like a picture graph) they become much more engaged. I learned that most of them have a great gauge on whether or not they understand something, and if they don't understand something, they are not shy about telling me! But most of all, I learned that they have the ability to improve leaps and bounds in just a few short weeks! I was blown away by their Pre-Test vs. Post-Test scores.

I also learned a few things about myself after reflecting back on this unit. I learned that when I am excited about what I am teaching, it seems to rub off on the students. This unit had so many ways to make the content fun: we built clocks, we took surveys, we drew our own graphs, etc. I found myself getting more excited each day to build on the content material from the day before and I think that is really what makes the difference between an average unit and an excellent unit! Overall, there are a few changes I would make if I taught this again, but for the most part I think it went very well and I would be excited to teach it again in the future!