**Grade 6 | Unit 5, Lesson 10[[1]](#footnote-1)**

**Intellectual Preparation Cover Sheet**

**Directions: Complete the IPP Cover Sheet for every lesson due for submission.**

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| **Step**  | **Action:**  |
| 1. Understand the concept and/or big ideas at play in the lesson and be able to articulate them clearly and crisply.
 | * Read the entire Lesson Plan and identify the key concepts/big ideas students need to understand. Create a **lesson summary** annotation that describes, in your own words, the purpose of the lesson (why), the key concepts students need to understand (big ideas/what), and how they will come to understand these within the lesson.
 |
| 1. Do the core tasks of the lesson to develop/refine exemplar work and clear CFS for anticipated strategies.
 | * Print the classwork and complete this step directly in the student packet for the TAI, INM/TTC problem (include exemplar annotations), and all GP/IP problems.
 |
| 1. Anticipate misconceptions and create questions/supports to address these misconceptions.
 | * For each core task, annotate to describe expected errors on the tasks and back pocket questions to respond to these errors
* Identify the questions in the TAI debrief and INM/TTC that elicit the most important understandings and annotate with the following:
	+ The exemplar student responses
	+ 1-2 misconceptions or errors that could surface in response to these questions
	+ BPQs and/or the instructional strategy to address these misconceptions.
 |
| 1. Optional/As needed: Adjust the plan for any individualized AOTY or intellectual preparation goals.
 | * As determined with coach, you might:
	+ Script MVP directions into lesson plans
	+ Script in additional planned investment moves
	+ Create rapid & batched feedback forms to capture data
	+ Determine additional points for differentiation (especially for very high and very low performance during the lesson)
* If you will meet in person to scrimmage this lesson, your coach may also ask you to submit a proposed practice objective and identify the lesson segment to practice.
 |
| **Submit annotated plans and any additional work as per IPP expectations in soft copy of LPs to your coach weekly (and at least 48 hours in advance of the IPP meeting). Implement any feedback from coach prior to the phase 2 meeting.** |
| 1. Rehearse and Refine:
	1. Meet with coach to further internalize and practice executing the plan. Refine plan as needed.
	2. Refine plan as needed based on practice and/or student exit ticket data.
	3. If possible, prior to teaching the day of, analyze student work from TAI administered at end of CR block; select S work to show call to drive TAI debrief discussion to land Fence Posts and key point.
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| **Lesson Type: Exercise Based Lesson** |
| **Aim** |
| * SWBAT find the whole, given the part and the percent by using ratio reasoning and a double number line diagram
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| **Key Point**  |
| * We can use benchmark percents to find an unknown total
 |
| **Standard** |
| **Understand ratio concepts and use ratio reasoning to solve problems**6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.1. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
 |
| **State Test Alignment**  |
| *From 2016 NYSE*Residents of a small city voted on whether to allow a developer to build a shopping center. The number of votes in favor of the shopping center was 4,400. The number of votes against the shopping center was 17,600. What percent of the voters were in favor of building the shopping center? 1. 20%
2. 25%
3. 40%
4. 44%

The circus had one perfermance at the Dewey Civic Center and one at the Atlantic Auditorium. The Dewey Civic Center has 1,600 seats. Tickets for 85% of the total number of seats were sold. How many tickets were sold? *From SBAC sample items*Ethan correctly answers 80% of the total questions on his history test. He correctly answers 32 questions. Enter the number of questions on Ethan’s history test.  |
| **Assessment** |
| **Exit Ticket:** 1. A serving size of Oreo cookies is 3 cookies, which is 20% of a box of cookies. How many cookies come in a box?
2. Jackie has $36 in her purse. This is 75% of all the money she has from babysitting this week. Ms. DePass thinks Jackie has $27 in total from babysitting. Explain why Ms. DePass’s claim is unreasonable, and state the correct amount of money Jackie has made babysitting

**Student Work:** 1. 15 cookies come in a box

C:\Users\MarcellaChibbaro\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\FIW7AUAG\IMG_0762.jpg1. This claim is unreasonable because $36 represents only 75%, or part of the money she has from babysitting. Therefore the total amount she has, or 100% of the money, must be more than $36 because 100% is > 75%. Therefore $27 is unreasonable. She has $48 in total from babysitting.

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| **Connection to learning** |
| * How does this lesson connect to previous lessons?
	+ In the previous lesson, students learned how to find a percent of a number using a double number line diagram and benchmark percents. In this lesson, students use the same ratio reasoning and modeling to find an unknown total given a percent and a part. They either use the benchmark percent and scale or use repeated addition to find the total, OR use a multiple of the benchmark to work backwards to find the benchmark and then scale or use repeated addition to find the total.
* What do we want every student to take away or do as a result of this lesson? How will a teacher know if students have met this goal?
	+ Understand: As a result of this lesson, we want every student to understand that they can use benchmark percents and a double number line diagram to find an unknown total given a part and a percent. When given a benchmark percent, students identify the number of times the given percent goes into 100% and uses that relationship to figure out how many times the given part goes into the unknown total as well as to figure out the total. When given a percent that is not a benchmark, students consider the known percent as a multiple of a benchmark and use that information to partition the DNL and reason about the value of each part, which helps them find the unknown total. Additionally, we want students to understand that finding an unknown total represents a third variation when working with percents. They already have found the unknown percent and the unknown part. Now, they recognize that there can be an unknown total that has to be found.
	+ Do: Find an unknown total given a part and a percent by identifying the number of times the given percent goes into 100% and using that relationship to figure out how many times the given part goes into the unknown total as well as to figure out the total. When given a percent that is not a benchmark, students consider the known percent as a multiple of a benchmark and use that information to partition the DNL and reason about the value of each part, which helps them find the unknown total.
 |
| **How** |
| * Key Strategy/ies for plotting and identifying coordinate pairs
	+ Annotate the problem with margin notes
	+ Represent the percent ratio and the part to unknown total ratio on the double number line diagram.
	+ Partition the double number line using a benchmark percent
	+ Find the value of each part
	+ Find the value of the total
	+ Write answer statement
* CFS for top quality work
	+ Problem is annotated with margin notes to provide additional meaning
	+ Double number line diagram:
		- Is accurate
		- Includes units and values labeled
		- Includes arrows for scale factors or repeated addition
	+ All work is shown
	+ Answer statement is written
 |
| **Anticipated Misconceptions and Errors** |
| * Ss may struggle to figure out what the benchmark percent is given the percent in the problem (which will be a multiple of a benchmark).
* Ss may not identify the known and unknown information correctly (i.e. thinking the known information is the total when it is in fact the part.
 |
| **Key Vocabulary** |
| **Percent -** Percent means ‘per 100.’ A percent can be represented using a ratio of ‘a’ to 100. |
| **Materials** |
| * Handout
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| **Opening – Prompt for work time, Circulate, Debrief, Synthesis, & Frame – 12-15 min** |
| **THINK ABOUT IT!** Mr. Davis’ truck holds a certain amount of gas. He went to the gas station when his tank had 8 gallons left, which is 25% of a full tank. How many gallons of gas does his truck’s gas tank hold when it is full? Show your work or explain your thinking. |
| **Prompt for Work Time (<30 sec)**You will have 5 minutes to work on this Think About It. Please use the entire 5 minutes. Please show all of your thinking. **Circulate (≤ 5 min)**While circulating, collect data on the following:

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| **Scholar thinking (correct and erroneous)** | **Scholar Initials - Work to show call** |
| S finds 25% of 8 and gets an answer of 2 |  |
| S reasons that 25% is ¼ of a whole, and multiplies 8 by 4 |  |
| S uses a DNL to model the problem correctly  |  |

**Debrief (≤ 8-10 min)** **KEY POINT:** *We can use benchmark percents to find an unknown total*Show call S work that incorrectly found an answer of 2 gallons **Did this S solve correctly? How do you know?** **Vote. TT. CC. Discuss.** SMS: The student did not solve correctly because they found an unreasonable answer. If we are trying to find the amount of gas the tank holds when it is full, then the amount of gallons should be greater than 8 gallons, which is only part of the tank. The problem gives us the part and we are trying to find the unknown total. This S thought that the 8 gallons was the total and that we had to find the unknown part. ***[Planner’s Note: It is most important in this discussion that Ss are able to articulate why 2 is unreasonable given that you are looking for a total, so the answer must be more than 8. If they do not all understand how to find the correct answer (in the next question), don’t get stuck there. You will be able to clear up questions during the INM.]*** **BPQ: is an answer of 2 reasonable?****BPQ: What does 2/8/25% represent in the context of the problem?**Show call correct S work using a double number line diagram **Did this S solve correctly? How do you know? Vote. TT. CC.** SMS: The S did solve correctly. S/he used a DNL and set up 25% to relate to the part, which is 8 gallons. Then, s/he partitioned the DNL into four parts since 25% is a benchmark percent that goes into 100% four times. Since 25% is 8 gallons, then 50% is 16 gallons, 75% is 24 gallons, and 100% is 32 gallons. Therefore, the total amount of gas the tank holds is 32 gallons. **What was different about this problem from problems we solved over the last three days? CC.** SMS: In this problem, we were given the percent and the part and had to find the total. In the last three days, we were given the part and total and had to find the percent, and we were given the percent and the total, and had to find the part. **What was similar about this problem from problems we solved over the last three days?** SMS: In this problem, we used the benchmark percent of 25% to help us solve and a double number line diagram, which is similar to what we did when finding a percent of a number. **Key Learning Synthesis (≤ 2 min)****Key Point**: *We can use benchmark percents to find an unknown total***Let’s form our key point for the day. With your partner, come up with a key point for today about finding an unknown total.** TT. CC.**Frame (≤ 30 sec)**You all just came up with today’s key point. We can use benchmark percents to find an unknown total. Let’s apply our key point to a more rigorous problem!  |

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| **Interaction with New Material – 10 min** |
| **Post the Key Point in visible place for student reference:** We can use benchmark percents to find an unknown totalLet’s use our key point from the TAI and apply it to solve an advanced problem! **Ex.1) Martin and Cayla spent the weekend cleaning up the Connecticut River near Hartford by picking up trash along the river bank. Of all the trash that they collected, 60% of it was recyclable. If 33 pounds of the trash was recyclable, how many total pounds of trash did they pick up over the weekend?** **Understand** T directs all Ss to read the prompt without making annotations. **Without using numbers, what is happening in this problem? CC.** SMS: Two friends are picking up trash. Some of it is recyclable. T directs all Ss to read the prompt a second time and annotate for meaning.**What is our goal in this problem? CC.** SMS: Our goal is to find out the total number of pounds of trash that they picked up over the weekend.**What information is known?** **How did you annotate the problem? CC.** SMS: We know that 33 pounds of the trash was recyclable and that represents the part. We know that the 33 pounds also relates to the 60%, because that is the percent of all the trash that was recyclable. **Is there any missing information that we need to know to help us get to the solution? CC.** SMS: We don’t have a benchmark percent (might need BPQ: What kind of % do we have? What does our KP say we need?)**Plan** **Based on our understanding of the problem, what is our plan for solving this problem? Why should we take each step? TT. Discuss. CC exemplar plan.**Plan: 1) Create a double number line diagram, 2) determine the benchmark percent 3) find the value of the part 4) find the total.**Estimate/Predict** **Let’s make a prediction. Will the number of pounds of trash be more or less than 33 pounds? Why? CC.** SMS: The number of pounds of trash must be more than 33 pounds because 33 is a part and we are looking for a total. The total amount would have to be more than the part. **Solve****What should we do first? CC.** SMS: We should set up our DNL by writing 0 and 0, 100% and an x (or ?), and 33 and 60%. **60% doesn’t go evenly into 100%. I’m confused as to how we are going to use this DNL. With your partner, discuss how we can use the DNL to find the total.**  **TT. Discuss. CC.** SMS: We should partition the DNL into five parts that are each 20% because 60% is a multiple of the benchmark percent of 20%. Then we have to see how many groups of 20% are in 60%. Since there are 3, then we have to divide the 33 into three parts and we know that each part is worth 11 (meaning 20% of the total is 11). Then we can use 20% to find the total by multiplying 11 by 5 because there are 5 groups of 20 in 100.*Look for Ss who say divide the 33 by 5 thinking that they have to partition the known amount by as many parts as there are.**Look for Ss who want to partition the DNL into ten parts that each represent 10%. While this works, the calculations are trickier and that should be discussed in comparison to using 20%.****[Planner’s Note: THIS is the most important question in this sequence. Allot your time accordingly.]*****On your own, figure out what the total is.** *CC S to share out and show call work under doc cam. Direct Ss to correct work.* **Check****How can we check to make sure our answer makes sense?** SMS: Our answer makes sense because 55 tells us that there were 55 total pounds of trash collected and 33 pounds of the trash was recyclable. Since 33 pounds is a little more than half of 55 (27.5) and 60% is a little more than 50%, the answer makes sense. **Key Learning Synthesis****How did we apply our key point for today to solve this example problem?** TT. CC. SMS: We used the percent we were given to find the corresponding value of the benchmark percent, which we then could use to find the total.**Frame for PP/IP**For the next 5 minutes, you’ll be working with your partner applying the key point that we just stamped. While working, make sure that you are meeting our CFS for top quality work. CFS for top quality work* + Problem is annotated with margin notes to provide additional meaning
	+ Double number line diagram:
		- Is accurate
		- Includes units and values labeled
		- Includes arrows for scale factors or repeated addition
	+ All work is shown
	+ Answer statement is written
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Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

UNIT 5 LESSON 10

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| AIM: | SWBAT solve percent problems  |

**THINK ABOUT IT!**

Mr. Davis’ truck holds a certain amount of gas. He went to the gas station when his tank had 8 gallons left, which is 25% of a full tank. How many gallons of gas does his truck’s gas tank hold when it is full? Show your work or explain your thinking.

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Key Point

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| We can use benchmark percents to find an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |

**Interaction with New Material**

Example 1) Martin and Cayla spent the weekend cleaning up the Connecticut River near Hartford by picking up trash along the river bank. Of all the trash that they collected, 60% of it was recyclable. If 33 pounds of the trash was recyclable, how many total pounds of trash did they pick up over the weekend?

* **CFS for top quality work**
	+ Annotated with *numbers* circled and *terms* underlined
	+ Double number line diagram:
		- Is accurate
		- Includes units and values labeled
		- Includes arrows for scale factors or repeated addition
	+ Work is shown/Answer statement is written

**PARTNER PRACTICE**

* **CFS for top quality work**
	+ Annotated with *numbers* circled and *terms* underlined
	+ Double number line diagram:
		- Is accurate
		- Includes units and values labeled
		- Includes arrows for scale factors or repeated addition
	+ Work is shown/Answer statement is written

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| *Bachelor Level* |

1. 10% of what number is 8? Use a double number line diagram to **show your work**.

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1. Ms. Johnson brought 50% of her class outside at lunch for showing over 10% growth on their weekly quiz. She brought 20 students outside at lunch. Circle each statement below that applies to this scenario. **Select all that apply.**

a) There are fewer than 20 students in Ms. Johnson’s class

b) There are more than 20 students in Ms. Johnson’s class

c) There are 2 students in Ms. Johnson’s class

d) There are 10 students in Ms. Johnson’s class

e) There are 40 students in Ms. Johnson’s class

f) There are 200 students in Ms. Johnson’s class

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| *Master Level* |

1. A six foot tall person is 30% the length of an average Great White Shark. Is it reasonable for the Great White Shark to be 2 feet long? Explain.

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**INDEPENDENT PRACTICE**

* **CFS for top quality work**
	+ Annotated with *numbers* circled and *terms* underlined
	+ Double number line diagram:
		- Is accurate
		- Includes units and values labeled
		- Includes arrows for scale factors or repeated addition
	+ Work is shown/Answer statement is written

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| *Bachelor Level* |

1. 54 is 20% of what total? Use a double number line diagram to **show your work.**

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1. Fernando only read 20 pages of his independent reading book over the weekend, which was 80% of his book. Read each statement below and decide whether it is “true” or “false.”

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| --- | --- | --- |
| Statement | True | False |
| Fernando’s book is less than 20 pages long |  |  |
| Fernando’s book is 16 pages long |  |  |
| Fernando read 16 pages of his book |  |  |
| Fernando’s book is 25 pages long |  |  |
| Fernando read 25 pages of his book |  |  |

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| *Master Level* |

1. Jaden gave away 42 stickers to his friends, which was 60% of his personal collection.
	1. How many stickers did Jaden originally have?

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* 1. How many stickers did Jaden keep for himself?

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1. Erin got 75% of the questions on her last test correct. She got 24 of all the questions correct. She wanted to figure out how many questions were on the test in all. She did some calculations and found that there are 18 questions in all. Did she find the correct total amount? Explain why she is or is not correct. If she is not correct, also explain the mistake in her thinking.

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1. The Bridgeport 5th and 6th graders went on a field trip to the zoo. Below, you can see the results of a survey that asked students about their favorite animal at the zoo. 80% of all the students who went on the trip answered the survey question. How many students went on the trip?

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| --- | --- |
| **Animal** | **Number of Students** |
| Lion | 95 |
| Seal | 28 |
| Rattlesnake  | 82 |
| Giraffe | 83 |

1. An Apple Store only let in 144 people to buy the new iPhone 5. The **other 90%** went home crying. How many people were on line for the iPhone?
	1. 16
	2. 129
	3. 160
	4. 1,440

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| *PhD Level* |

1. Alphonso and his friends had a free-throw shooting competition. Alphonso made 8 free-throws, which was 80% of the number of free-throws his friend Jane made. Jane made 20% the number of free-throws that Adaeze made. And, Ms. Murray made 40% of the number of free-throws that Adaeze made. How many free-throws did Ms. Murray make?
* **CFS for top quality work**
	+ Annotated with *numbers* circled and *terms* underlined
	+ Double number line diagram:
		- Is accurate
		- Includes units and values labeled
		- Includes arrows for scale factors or repeated addition
	+ Work is shown/Answer statement is written

**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**EXIT TICKET**

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| Self-assessment | I mastered the learning objective today. | I am almost there.  | Need more practice and feedback. |
| Teacher feedback | You mastered the learning objective today. | You are almost there.  | You need more practice and feedback. |

1. A serving size of Oreo cookies is 3 cookies, which is 20% of a box of cookies. How many cookies come in a box? **Show your work.**

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1. Jackie has $36 in her purse. This is 75% of all the money she has from babysitting this week. Ms. DePass thinks Jackie has $27 in total from babysitting. Explain why Ms. DePass’s claim is unreasonable, and state the correct amount of money Jackie has made babysitting

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1. Problems and strategies drawn heavily from Engage NY Grade 6, Module 1, Lessons 26 [↑](#footnote-ref-1)