**Grade 6 | Unit 5, Lesson 11[[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.
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| 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.
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| **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 represent and find a percent of a quantity using an equation.
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| **Key Point** |
| * An equation can be used to find a percent of a number by solving either vertically or horizontally.
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| **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.
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| **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. Joaquim sold 40% of the fruit at Saturday’s Farmer’s market. He started the day with 60 pieces of fruit. How much fruit did he sell?
2. Kristina wants to find 45% of 600.
	1. Which equation(s) can be used to find 45% of 600? Select all that apply.
		1. $\frac{45}{100}=\frac{x}{600}$
		2. $\frac{45}{100}=\frac{600}{x}$
		3. $\frac{9}{20}=\frac{x}{600}$
		4. $\frac{45}{600}=\frac{x}{100}$
		5. $0.45=\frac{x}{600}$
	2. What is 45% of 600?

**Student Work:** 1. Joaquim sold 24 pieces of fruit..

 $\frac{40÷10 }{100÷10}=\frac{x}{60}$ $\frac{4 x 6}{10 x 6}=\frac{24}{60}$ x = 24; he sold 24 pieces of fruit.1. a) i, iii, v; b) 270

 $\frac{45x6}{100x6}=\frac{x}{600}$ |
| **Connection to learning** |
| * How does this lesson connect to previous lessons?
	+ In the previous four lessons, students learned to use a DNL to find an unknown percent, part, and total given two other pieces of known information. In this lesson, students make a connection between using an equation and a DNL in order to make sense of and use equations to solve ‘percent of’ problems. This is the first day of two days working with equations to solve percent problems.
* 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 an equation to efficiently and effectively solve a percent problem. Students understand that they can use an equation leveraging two relationships that are apparent. They can think of the relationship between the terms within each ratio or they can think about the relationship between the terms across each ratio. For example, when finding 10% of 50, students write the equation ($\frac{10}{100}=\frac{x}{50}$), which can be solved by either dividing each total by 10 (vertical relationship that aligns to the DNL model) or by dividing each term in the ratio 10:100 by 2 (horizontal relationship that aligns to what they have learned about writing equivalent ratios). Students also understand that when there is not an apparent vertical or horizontal relationship between terms, then they can simplify the percent ratio in order to write an equivalent ratio for which a relationship might exist.
	+ Do: Find a percent of a number by writing an equation and finding a scale factor (simplifying if necessary).
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| **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 using an equation
	+ If possible, use existing vertical or horizontal relationship between terms to find unknown part
	+ As needed, simplify the percent ratio to illuminate a relationship between terms in the ratios
	+ Write answer statement
* CFS for top quality work
	+ Problem is annotated with margin notes to provide additional meaning
	+ Equation is written with known and unknown information correctly
	+ All work is shown (including the relationship between terms)
	+ Answer statement is written
 |
| **Anticipated Misconceptions and Errors** |
| * Ss may struggle to see relationships between and within the terms of each ratio (especially if there is no obvious scale factor)
* Ss may set up their equation incorrectly
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| **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!** Karin’s teacher asked her to find 20% of 10. She set up the equation below. $$\frac{20}{100}=\frac{x}{10}$$Can she use the equation to find 20% of 10? Prove it.  |
| **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 draws DNL and gets 2. |  |
| S connects DNL to equation by thinking about 100 divided by 5 is 20 and 10 divided by 5 is 2. Dividing by 5 is same as partitioning the DNL into 5 parts. |  |
| S solves the equation by dividing each term in 20:100 by 10 using equivalent ratio reasoning  |  |

**Debrief (≤ 8-10 min)** **Key Point:** *An equation can be used to find a percent of a number by solving either vertically or horizontally.* Show call a DNL that correctly finds 20% of 10. CC. **Explain how the S used a DNL to find 20% of 10. CC (this should be very quick).** SMS: This student used a DNL to find 20% of 10 by setting 20% as a part and 10 as a total. They broke 10 into 5 parts because there are 5 groups of 20% in 100%. 10/5 = 2 so they got an answer of 2. Show call S work that shows a vertical relationship (100÷5 = 20 and 10÷5 = x) between the terms in each ratio to solve for x. **­*[Planner’s Note: You might have to create this work and have it ready.]*** **How do you see the equation represented in the DNL? CC**. SMS: Each ratio is represented on the DNL horizontally, 20:100 and x:10. The 20:100 represents 20% and the x:10 represents the part to total relationship. We don’t know the part, so Karin used x. Karin partitioned the 100% into five parts to show the benchmark of 20% and similarly partitioned the 10 into 5 parts to figure out the part.**How did Karin use the equation to solve and how does that relate to the DNL**? **TT. CC. Discuss**. SMS: In the equation, the S also divided each total by 5 to get to 20% and the part, 2, just like you would in the DNL. Show call S work that shows a horizontal relationship (100÷10 = 10 and 20÷10=x) between the terms in each ratio to solve for x. ***[Planner’s Note: You might have to create this work and have it ready.]*** **Do you agree with this work? Vote. CC**. SMS: I do agree with this work. The S found the relationship between each corresponding term in the equivalent ratios, which is divide each by 10. This kept the relationship constant in order to find an equivalent ratio. **Key Learning Synthesis (≤ 2 min)****Key Point**: *An equation can be used to find a percent of a number by solving either vertically or horizontally.***Let’s form our key point for the day. With your partner, come up with a key point for today about finding a percent of a number. TT. CC.****BPQ: What are the two ways we can think about relationships between the ratios?** SMS: We can think of the relationship between the terms within each ratio (vertically) or they can think about the relationship between the terms across each ratio (horizontally).**Frame (≤ 30 sec)**You all just came up with today’s key point. An equation can be used to find a percent of a number by solving either vertically or horizontally. Let’s apply our key point to another problem!  |

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| **Interaction with New Material – 10 min** |
| **Post the Key Point in visible place for student reference:** An equation can be used to find a percent of a number by solving either vertically or horizontally.Let’s use our key point from the TAI and apply it to solve another problem! **Ex 1) Aaliyah went to the 2016 Summer Olympics and watched the US women’s volleyball match against Brazil. 70% of the serves from Brazil were out of bounds. Aaliyah saw 30 serves from Brazil. How many serves from Brazil were out of bounds?****Understand** T directs all Ss to read the prompt without making annotations. **Without using numbers, what is happening in this problem? CC.** SMS: Aaliyah watched a volleyball match at the Olympics. Some of the serves were out of bounds. 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 serves that were out of bounds. **What information is known?** **How did you annotate the problem? CC.** SMS: We know that 70% of the serves were out of bounds, and that she saw 30 total serves from Brazil. **Is there any missing information that we need to know to help us get to the solution? CC.** SMS: No we have what we need to get started. **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 equation 2) Find a vertical or horizontal relationship 3) find the value of the part **Estimate/Predict** **Let’s make a prediction. Will the number of serves that were out of bound be more or less than 30? Why? CC.** SMS: The number of serves that were out of bound will be less than 30 because 30 represents the total amount of serves and the number of serves that were of bounds is a part of 30.**Solve****What should we do first? CC.** SMS: We can write an equation to represent the percent ratio and the part-to-total relationship. **On your own, set up an equation.** *T hunts for Ss who come up with correct equation. Debrief the equation.* **Did the S set up the equation correctly? How do you know? CC**. *T directs Ss to fix their equation as needed.* **How can we use the equation to figure out 70% of 30? TT. CC**. SMS: Since there is not a vertical or horizontal relationship, I think you can simplify the ratio of 70:100 first and write it as 7:10. This is similar to using benchmark percents on the DNL when you cannot easily figure out how to partition the DNL when the provided percent isn’t a benchmark. Once you’ve simplified, you can use a horizontal relationship because 10 goes into 30 evenly. Multiply 7 also by 3 and you get 21 serves going out of bounds.***[Planner’s Note: This is the most difficult variation for student so it is important to stamp this key idea here. Ss might be confused because there is not a vertical or horizontal relationship. Hunt for the S who thinks you can simplify 70/100 first because it is a similar strategy to using a benchmark percent on a DNL. If the strategy does not come out in discussion, leverage BPQs.]*****Check****How can we check to make sure our answer makes sense?**  **CC.** SMS: Our answer makes sense because 21 represents the number of serves that went out of bounds. It is less than our total of 30, just like our prediction. **Key Learning Synthesis****How did we apply our key point for today to solve this example problem?** TT. CC. SMS: We used an equation and found a horizontal relationship to find a part of a 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
	+ Equation is written with known and unknown information correctly
	+ All work is shown (including the relationship between terms)
	+ Answer statement is written
 |

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

UNIT 5 LESSON 11

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| AIM: | SWBAT solve percent problems  |

**THINK ABOUT IT!**

Karin’s teacher asked her to find 20% of 10. She set up the equation below.

$$\frac{20}{100}=\frac{x}{10}$$

Can she use the equation to find 20% of 10? Prove it.

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Key Point:

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| An \_\_\_\_\_\_\_\_\_\_\_\_\_\_ can be used to find a percent of a number by solving either \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  |

**Interaction with New Material**

Aaliyah went to the 2016 Summer Olympics and watched the US women’s volleyball match against Brazil. 70% of the serves from Brazil were out of bounds. Aaliyah saw 30 serves from Brazil. How many serves from Brazil were out of bounds?

* **CFS for top quality work**
	+ Annotated with *numbers* circled and *terms* underlined
	+ Equation is written with ***known*** and ***unknown*** information correctly
	+ All work is shown (including the relationship between terms)
	+ Answer statement is written

**PARTNER PRACTICE**

* **CFS for top quality work**
	+ Annotated with *numbers* circled and *terms* underlined
	+ Equation is written with ***known*** and ***unknown*** information correctly
	+ All work is shown (including the relationship between terms)
	+ Answer statement is written

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| *Bachelor Level* |

1. What is 10% of 20? Use an equation and show how to find the unknown part.

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1. What is 60% of 80? Use an equation to show your work.

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| *Master Level* |

1. What is 45% of 10?

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1. 75% of the referee calls made during a New York Jets game were said to be incorrect by NFL reporters. The referees made 60 calls in all during the game. Which equations below represent how you could solve for the number of incorrect calls that were made? **Select all that apply.**

a) $\frac{75}{100}=\frac{60}{x}$

b) $\frac{75}{100}=\frac{x}{60}$

c) $\frac{3}{4}=\frac{x}{60}$

d) $\frac{3}{4}=\frac{60}{x}$

**INDEPENDENT PRACTICE**

**CFS for top quality work**

Annotated with *numbers* circled and *terms* underlined

Equation is written with ***known*** and ***unknown*** information correctly

All work is shown (including the relationship between terms)

Answer statement is written

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| *Bachelor Level* |

1. What is 20% of 50? Use an equation and show how to find the unknown part.

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1. Part A: A street performer earns 45% of all of his daily earnings at the Barclays Center subway station. He earns about $300 daily. How much does he earn at the Barclays Center subway station? **Show your work.**

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| *Master Level* |

1. Mr. Vasquez lifts 140 pounds on a heavy workout day and lifts 85% of that on a light workout day. How many pounds does he lift on a light workout day?

1. Javi wants to figure out what 44% of 80 is. Circle all of the equations below that he could use to find 44% of 80.
	1. $\frac{44}{100}=\frac{80}{x}$
	2. $\frac{44}{100}=\frac{y}{80}$
	3. $\frac{11}{25}=\frac{w}{80}$
	4. $\frac{44}{80}=\frac{x}{100}$
	5. $\frac{22}{50}=\frac{x}{80}$
	6. $0.44=\frac{y}{80}$
2. Over the weekend, Justin went shopping for new clothes. All of his purchases are recorded in the table below.

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| **Item** | **Cost ($)** |
| Shoes | 110 |
| Jeans | 55 |
| Shirt | 35 |
| Socks | 20 |

Justin received a coupon for 35% off his total purchase when he checked out. What was the discount, in dollars, that he received on his purchase?

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| *PhD Level* |

1. In 2014, Adele sold 2,500,000 records. In 2015, she sold 90% of the number of records she sold in 2014. In 2016, she sold 80% of the number of records she sold in 2015. How many records did she sell in 2016? **Show your work.**
2. Write an equation that could be used to find X% of any number, N.

**CFS for top quality work**

Annotated with *numbers* circled and *terms* underlined

Equation is written with ***known*** and ***unknown*** information correctly

All work is shown (including the relationship between terms)

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. Joaquim sold 40% of the fruit at Saturday’s Farmer’s market. He started the day with 60 pieces of fruit. How much fruit did he leave with? **Show your work.**

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1. Kristina wants to find 45% of 600.
	1. Which equation(s) can be used to find 45% of 600? **Select all that apply.**
		1. $\frac{45}{100}=\frac{x}{600}$
		2. $\frac{45}{100}=\frac{600}{x}$
		3. $\frac{9}{20}=\frac{x}{600}$
		4. $\frac{45}{600}=\frac{x}{100}$
		5. $0.45=\frac{x}{600}$
	2. What is 45% of 600? **Show your work.**

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1. Problems and strategies drawn heavily from Engage NY Grade 6, Module 1, Lessons 27 [↑](#footnote-ref-1)