**Grade 7 | Unit 6, Lesson 9**

**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 solve mark up and mark down problems using double number lines and equations. |
| **Key Point** |
| * Markup/down represents a percent change. |
| **Standard** |
| 7.RP.3  Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, and percent error.  7.EE.2  Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.  7.EE.3  Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. |
| **State Test Alignment** |
| *Taken from SmarterBalance 2016 Released Items* |
| **Assessment** |
| **Exit Ticket:**   1. Games Galore buys videogames at the wholesale price of $30.00. The markup rate at Games Galore is 40%. How much would you pay for the game at Games Galore (not including tax)? 2. Target is having a huge winter season sale on all of their televisions. A 42in screen tv that usually retails at $580 is marked down by 20%. If you brought $450 to the store, do you have enough money to buy the tv? Explain your reasoning.   **Student Work:**   1. *S can also find 40% of the whole and add it to the wholesale price*   $30 = whole  40% = markup = 140% of the whole  Quantity = Percent x Whole  Quantity = 1.4(30)  Quantity = $42, you would pay $42 for a game at Games Galore   1. *S can find 20% of the whole and then subtract from the whole*   $580 = whole  20% = markdown = 100% - 20% of the whole = 80%  Quantity = Percent x Whole  Quantity = 0.8(580)  Quantity = $464  The cost of the tv after the markdown will be $464. If you brought $450 you would have enough to buy the tv. |
| **Connection to learning And Conceptual Understanding** |
| * How does this lesson connect to previous lessons?   + In the previous 4 lessons, students have been learning about the percent equation and its application to percent change by calculating either the quantity after the change, the whole, or the percent change. In this lesson, students apply their knowledge of percent change to markups, markdowns, and sale price which are forms of percent changes. * 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: Students understand that a markup, markdown, or sale price is a type of percent change and that the percent equation can be applied to solve contextual problems involving them as they would a percent change. Students understand that DNL’s are used to visualize the markup, markdown, and sale price before writing an equation.   + Do: Students calculate the quantity after the change, the whole, or the percent change in a markup or markdown situation by applying the percent equation. |
| **How** |
| * Key Strategy   + Annotate the problem for quantity (change or amount after change), whole, and percent increase/decrease   + Draw a DNL to visualize and setup the problem   + Write and substitute values into the percent equation   + Solve the problem for the missing value * CFS for top quality work   + Problem is annotated for quantity, whole, and percent change   + DNL is drawn to represent the problem   + Percent change is calculated and shown   + Percent equation is written and values are substituted to solve for the unknown |
| **Anticipated Misconceptions and Errors** |
| * Students might not convert the percent to a decimal when evaluating * **Students might keep the percent change as is instead of finding the actual percent of the whole by adding or subtracting to 100%.** * Students might use the wrong operation when determining the correct percentage (add = increase, subtract = decrease) |
| **Key Vocabulary** |
| * **Percent**: A ratio comparing a number and 100.   + - * **Ratio**: A comparison of two quantities by division.       * **Proportion**: An equation that states that two ratios are equivalent. |
| **Materials** |
| * Handout * Calculator |

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| **Opening – Prompt for work time, Circulate, Debrief, Synthesis, & Frame – 12-15 min** |
| **THINK ABOUT IT!**  Home Depot buys a portable heater from a manufacturer for $80. Home Depot marks up the price of a heater by 50% to sell the heater at their store. Use a double number line to represent the problem and write and solve an equation to determine how much you would pay for the heater if you bought it at Home Depot. |
| **Prompt for Work Time (<30 sec)**  *T sets timing for work and sets work expectations.*  **Circulate (≤ 5 min)**  While circulating, collect data on the following:   |  |  | | --- | --- | | **Scholar thinking (correct and erroneous)** | **Scholar Initials - Work to show call** | | S creates a correct DNL that represents the problem and shows a percent increase |  | | S uses the percent equation to determine the sell price Q = (100% + 50%) x $80 = $120 (or S finds 50% of 80 using the percent equation, and adds 40 and 80. |  | | S determines 50% of 80 and says the sale price is $40 |  | | S does not represent with DNL and/or doesn’t use an equation. |  |   **Debrief (≤ 8-10 min)**  **Key Point:** *Markup/down represents a percent change*  **What is a markup? TT. CC.** SMS: A markup is when a business increases the price of something in order to make a profit.  Show Call: S creates a vertical DNL showing 50% increase  **Do you agree with this representation? CC.** SMS: I agree with the double number line because the scholar represented 80 as 100% of the cost of the heater and then added 50% to 100% to represent the markup and labeled it 150% and the corresponding value is unknown.  Show Call: Two pieces of work; 1) S uses the percent equation with 150% and 2) S uses 50% to only find the amount of the markup  **Which scholar do you agree with? TT. Vote. CC.** SMS: I agree with the first scholar because they used the percent equation where the quantity is the price HD sells the heater for, the whole is the price that HD pays the manufacturer, and the percent is 150% because the price is being increased. They get a final answer of $120 which makes sense because they wouldn’t sell the heater for less than they bought it for. The other scholar only found 50% of the original price which is the amount that they marked up the price.  **How could you use the second scholar’s work to find the price at which HD sells the heater? CC.** SMS: You could add 50% of the original price to the original price of $80.  **What type of percent problem is a markup problem? CC. Discuss.** SMS: Because there is an original value that is being increased by a certain percentage to get a different value, this is a percent increase problem.  **Key Learning Synthesis (≤ 2 min)**  **Key Point**:*Markup/down represents a percent change.*  **Based on what we just learned about a markup, what do you think a markdown is?** SMS: A markdown decreases the price of an item by a specific percentage.  **Let’s form our key point for today. With your partner, come up with a key point about markups and markdowns.**  *Students might not include markdowns as they were not explicitly used in the TAI (but will be in the INM). Students might also say “A markup is a percent increase and a markdown is a percent decrease” which the T should validate and simplify.*  **Frame (≤ 30 sec) –**  You have just formed our key point for today. For the past four lessons, we have been working with percent change. Today is a common application of percent change in the form of markup and markdown. Every time you buy something, you are experiencing markups and/or markdowns. This is how businesses make money and how they market to you through sale prices to get you to spend more.  When working with markups/down, the original price is the whole, the selling price is the quantity, and the markup/down is the percent change and should be solved as you would a percent change problem. |

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| **Interaction with New Material – 10 min** |
| **Post the Key Point in visible place for student reference:** *Markup/down represents a percent change.*  Let’s use our key point from the TAI and apply it to solve an advanced problem!  **Ex. 1) Best Buy purchases their tv’s straight from the companies that produce them (e.g. Sony, LG, Panasonic, etc.). Best Buy has a standard markup of 125% on all televisions that they sell in their store. During a holiday, they have a 40% off sale on all their tv’s. If the sale is applied after the 125% markup, what is the price of the tv during the holiday sale that originally cost Best Buy $500? How much profit does Best Buy make on the tv?**  **Understand**  T directs all Ss to read the prompt and annotate for meaning.  **Without using numbers, what is happening in the problem? CC.** SMS: A TV at Best Buy is marked up from where they purchased it, and then marked down for a sale.  **What information is known? CC.** SMS: We know the original cost of the TV, as well as the percent increase and the percent decrease.  **What information is unknown? CC.** SMS: We don’t know the price after the mark up or during the mark down. We also don’t know the profit.  **How can we model this problem?** TT. CC. *T draws the models on the board as the class shares out.* SMS: We can draw two DNL’s, one that increases 500 by 125% and another that takes that selling price and decreases it by 40%  ***[Planner’s Note: One of the most challenging parts of markups/downs is determining the percent change, especially when it is above 100%. The DNL will help immensely in visualizing/calculating this.]***  **Plan**  Based on our understanding of the problem, come up with a plan to solve this problem. TT. CC.  Increase 500 by 125%  Decrease the selling price by 40%  Find the difference between the original cost and the sale price for profit  **Estimate/Predict**  **Predict, will the final sale price be more or less than $500?** SMS: I think that the price will be more than $500 because increasing the price by 125% is more than doubling the price and then decreasing by 40% is not quite finding half.  **Solve**  We will use your plan to solve the problem. On your own, draw a double number line for the 125% increase and find the Best Buy’s selling price before the sale.  *Show Call exemplar work.*  **What do we do next? CC.** SMS: Next we have to apply a 40% decrease of the selling price to find the sale price which is the same thing as calculating 60% of the selling price.  *T can go into more detail about selling price vs. sale price to help with any confusion around the language of the problem*  Independently, draw a double number line that represents the sale price after the markdown.  *Show Call exemplar work. .*  **What does our answer represent? TT. Vote. CC**.SMS: Our answer is the sale price that someone would pay for the tv during the holiday sale. This is after Best Buy marks up the price by 125% and then decreases it by 40%.  **Is this our final answer? CC.** SMS: No, we also have to determine what the profit is for Best Buy.  Independently determine the profit.  *Show Call: Exemplar.*  **What does our answer represent? CC.** SMS: $175 represents the amount of profit that Best Buy would make even after the 40% decrease during the sale.  **Check**  **Was your prediction correct? CC.** SMS: Yes, because the increase did result in more than doubling the price and then taking less than half of that price.  **Key Learning Synthesis**  **How did we apply our key point for today to solve this example problem? TT. CC.** SMS: We applied mark-ups/mark-downs as percent changes and used a DNL/the percent equation to solve.  **Frame for PP/IP**  You will have 5 minutes to work with a partner on PP. Today during PP and IP, make sure your work meets each of the following  CFS   * + Problem is annotated for quantity, whole, and percent change   + DNL is drawn to represent the problem   + Percent change is calculated and shown   + Percent equation is written and values are substituted to solve for the unknown |

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

**CFS for top quality work**

* + Problem is annotated for **quantity**, **whole**, and **percent change**
  + DNL is drawn to represent the problem
  + Percent change is **calculated** and **shown**
  + Percent equation is **written** and values are **substituted** to solve for the **unknown**

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

UNIT 6 LESSON 9

**AIM**: SWBAT solve contextual problems with markups and markdowns

**THINK ABOUT IT!**

Home Depot buys a portable heater from a manufacturer for $80. Home Depot applies a markup of 50% to sell the heater at their store. Use a double number line to represent the problem and write and solve an equation to determine how much you would pay for the heater if you bought it at Home Depot.

Key Point:

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| ­­­­­\_\_\_\_\_\_\_\_\_\_\_/\_\_\_\_\_\_\_\_\_\_\_ represents a percent change. |

**Interaction with New Material**

**Ex.1)** Best Buy purchases their tv’s straight from the companies that produce them (e.g. Sony, LG, Panasonic, etc.). Best Buy has a standard markup of 125% on all televisions that they sell in their store. During a holiday, they have a 40% off sale on all their tv’s. If the sale is applied after the 125% markup, what is the price of the tv during the holiday sale that originally cost Best Buy $500? How much profit does Best Buy make on the tv?

**CFS for top quality work**

* + Problem is annotated for **quantity**, **whole**, and **percent change**
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**PARTNER PRACTICE**

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| *Bachelor Level* |

1. A boat is marked up 20% on the original price. The original price was $50. What is the sale price of the boat before sales tax?

**CFS for top quality work**

* + Problem is annotated for **quantity**, **whole**, and **percent change**
  + DNL is drawn to represent the problem
  + Percent change is **calculated** and **shown**
  + Percent equation is **written** and values are **substituted** to solve for the **unknown**

a) $10

b) $40

c) $60

d) $70

Choose one answer choice above and explain why it is unreasonable.

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1. A football is marked down 35% off the original price. The original price was $60. What is the sale price of the football?

**CFS for top quality work**

Problem is annotated for **quantity**, **whole**, and **percent change**

DNL is drawn to represent the problem

Percent change is **calculated** and **shown**

Percent equation is **written** and values are **substituted** to solve for the **unknown**

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| *Master Level* |

1. Zack has an old car. He wants to sell at a markup of 19% the current price. The market price is $1,120. How much money would he receive in exchange for the car if he could sell it at that rate?

**INDEPENDENT PRACTICE**

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| *Bachelor Level* |

1. What is the original price if there is a 10% discount and the sale price is $76.50?

**CFS for top quality work**

* + Problem is annotated for **quantity**, **whole**, and **percent change**
  + DNL is drawn to represent the problem
  + Percent change is **calculated** and **shown**
  + Percent equation is **written** and values are **substituted** to solve for the **unknown**

1. Timmy wants to buy a scooter and the price was $50. When he goes to the store a second time, he found that price was marked down by 20%. Which statements below are true? Select all that apply.

a) The scooter is now cheaper than when he saw it originally

b) The new cost of the scooter is more than $50

c) He can determine the new cost of the scooter by multiplying 50 by 0.2

c) He can determine the new cost of the scooter by multiplying 50 by 1.2

**Find the cost of the scooter.**

**CFS for top quality work**

* + Problem is annotated for **quantity**, **whole**, and **percent change**
  + DNL is drawn to represent the problem
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  + Percent equation is **written** and values are **substituted** to solve for the **unknown**

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| *Master Level* |

1. A painting is marked down 52.5% off. The sale price is $320. What was the original price to the nearest cent?
2. A winter coat that was original purchased at $65 was marked up to $70.20. What is the percent of markup?
3. An original Captain America comic book is valued at $270 and is marked up by 33% to be sold at Comic World. Gary buys it at this price and sells it to his friend at an additional markup of 5%. How much money did Gary make in this deal?
4. Gas stations all buy their gas at the same price. Gas prices are different based on the markup that each station uses to sell gas. Gas station A applies a markup of 4.2% and Gas station B applies a markup of 5.1%. How much more would someone spend on gas if they went to Gas Station B and both stations bought their gas at an original price of $2.40 (round to the nearest cent)?

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| *PhD Level* |

1. A coat is originally $250 but is placed on sale at a markdown of 15%. Winston has a coupon for an additional 10% off any sale price. Winston says that he can add the two markdowns together to for a combined 25% markdown. His mom says that you have to apply the first markdown and then apply the second markdown to the sale price. Are the two both correct? If not, who is correct? Prove and explain by calculating using both methods.

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**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. Games Galore buys videogames at the wholesale price of $30.00. The markup rate at Games Galore is 40%. How much would you pay for the game at Games Galore (not including tax)?

**CFS for top quality work**

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  + DNL is drawn to represent the problem
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1. Target is having a huge winter season sale on all of their televisions. A 42in screen tv that usually retails at $580 is marked down by 20%. If you brought $450 to the store, do you have enough money to buy the tv? Explain your reasoning.

**CFS for top quality work**

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