**Grade 7 | Unit 6, Lesson 12**

**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 simple interest problems using the formula I = prt |
| **Key Point** |
| * Simple interest measures the amount of money earned over time (in a bank account) |
| **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.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 EngageNY 2016 Released Items* |
| **Assessment** |
| **Exit Ticket:**   1. Martin deposits $700 into a savings account that gains interest at a rate of 5.5% annually. If he waits 7 years to withdraw the money, will he have earned more or less than $275 and by how much? 2. Kristina deposits $850 into a savings account that has a yearly interest rate of 6.5%. Determine the total amount of money that she will have if she withdraws all her money 18 months later? Round your answer to the nearest cent.   **Student Work:**   1. I = Prt   I = 700(0.055)(7)  I = $269.50  Martin will have earned less than $275 after seven years by 275 – 269.50 = $5.50   1. I = Prt   t = 18 months = 1.5 years  I = 850(0.065)(1.5)  I = 82.875 approximately $82.88  Total amount in the account = Principal + Interest = $850 + $82.88 = $932.88 |
| **Connection to learning And Conceptual Understanding** |
| * How does this lesson connect to previous lessons?   + In the previous lesson, students calculated the percent error given an exact value and an approximate value. In this lesson, students apply another application of percents to calculate and solve problems that involve simple interest. The simple interest equation of I=Prt is used to find the interest earned in an account based on the initial investment or deposit, also known as the principal, multiplied by the interest rate as a percent and multiplied by the total amount of time that the account it left to mature. * 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 bank and investment accounts gain money over time based on the initial amount and the interest rate. Students understand that the amount of time when calculating simple interest must be in the correct units based on how the account matures (commonly annually – once per year). Students understand that the simple interest formula does not calculate the total amount in an account which must be determined by adding the interest earned to the principal.   + Do: Students solve simple interest problems using the formula I=Prt. Students convert between units of time to use in the simple interest formula. |
| **How** |
| * Key Strategy   + Annotate the problem for interest, principal, interest rate, and time   + Convert the time to match the units of time that the interest is earned.   + Write the simple interest formula   + Substitute values and evaluate * CFS for top quality work   + Problem is annotated for interest, principal, interest rate, and time   + Simple interest formula is written   + Values are substituted and the formula is evaluated. |
| **Anticipated Misconceptions and Errors** |
| * Students might not convert the interest rate to a decimal (especially with small interest rates e.g. 2.3% = 0.023) * Students might not convert the time given to match the units of the interest rate (e.g. interest is 5% annually, calculate after 18 months – must convert 18 months to years) * Students might only apply the formula and not use the information to complete the problem (e.g. finding the total amount in an account requires adding the interest to the principal). |
| **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!**  Margo goes to the bank and opens a savings account by depositing $400. The bank said that it would give Margo 5% of the initial amount she deposited every year as a way of saying “Thank you” for choosing their bank.  Step A: How much money would the bank give her after 1 year?  Step B: How much money would the bank give her after 3 years?  Step C: How much money would the bank give her if she only kept it in the bank for 6 months? |
| **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 work correctly finds 5% of 400 = 20 using a percent equation |  | | S work incorrectly uses the percent increase to determine the amount of money in the account after a year |  | | S work correctly multiples 20 by 3 to get 60 |  | | S work correctly multiples 20 by ½ to get 10 after 6 months |  | | S work incorrectly multiplies 20 by 6 for 6 months |  |   **Debrief (≤ 8-10 min)**  **Fencepost 1:** *Interest is a percent of an initial amount in a loan or investment*  Show Call: S work correctly uses the percent equation to determine 5% of 400 to be 20  **Do you agree with this work? Vote. CC.** SMS: I agree because the problem says that the bank will give Margo 5% of the initial amount so this is a problem where we have to find the percent of a number. The scholar used the percent equation to find 5% of 400 which is $20 so the bank gave her $20 for keeping her money in the bank for a year.  **We call this amount interest. Whenever you have an investment like a savings account, banks will pay you interest for putting your money with them. This also works for a loan like for a car. If you can’t pay for a car outright, a bank will give you a loan but you have to pay them interest for using their money.**  **Name the fencepost: Define interest. TT. CC.** SMS: Interest is a percent of an initial amount in a loan or investment.  **Key Point:** *Simple interest measures the amount of money earned over time (in a loan or investment)*  Show Call: S work multiplies $20 by 3 to get the amount after 3 years.  **Do you agree with this work? Vote. CC.** SMS: I agree because the bank said that it would give Margo 5% every year. If she gets $20 after one year, then she would get three times that amount for three years which is $60.  Show Call: Two pieces; 1) S work multiples $20 by ½ to get 10 and, 2) S work multiplies $20 by 6 using months instead of years.  **Which scholar do you agree with? Vote. CC. Discuss.** SMS: The scholar that multiplied by ½ is correct because if she get $20 for an entire year, then she would only get half that for 6 months since 6 months is half a year. The other scholar’s answer doesn’t make sense because she shouldn’t get more money for keeping her money in for less time.  **If a bank if paying interest yearly, then we have to make sure that we are using years to multiply the interest. This process of finding the amount of interest earned over a certain amount of time is called Simple Interest.**  **Key Learning Synthesis (≤ 2 min)**  **Key Point**:*Simple interest measures the amount of money earned over time (in a loan or investment)*  **Let’s form our key point for today. With your partner, reiterate the definition of Simple Interest.**  **Frame (≤ 30 sec) –**  You have just formed our key point for today. When working with simple interest, we usually see the equation I=Prt where I is the interest earned, P is the initial amount or whole, r is the interest rate which is a percent, and t is the amount of time that the Principal is left in the account or loan. Simple interest is basically finding the percent of a number and then multiplying it by the amount of time. We can think of it as the percent equation multiplied by time. *T should write out the equation for simple interest and the percent equation and show that Interest = Quantity, Percent = Rate, Whole = Principal, and that the percent equation multiplied by time is the same as the equation for simple interest.* |

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| **Interaction with New Material – 10 min** |
| **Post the Key Point in visible place for student reference:** *Simple interest measures the amount of money earned over time (in a loan or investment)*  Let’s use our key point from the TAI and apply it to solve an advanced problem!  **Ex. 1) Samantha spends $875 over the holiday break on gifts for friends, airplane tickets, food, and a hotel. She put everything on her credit card which charges 2.35% simple interest monthly. What will be the total cost of her holiday trip if she takes one year to pay off her credit card?**  **Understand**  T directs all Ss to read the prompt and annotate for meaning.  **Without using numbers, what is happening in the problem? CC.** SMS: Samantha is spending money over the holidays on her credit card which charges interest, and she does not pay if off right away.  **What do we know? CC.** SMS: We know how much she spend in total, we know the percent interest, and we know the time before she paid it off.  **What do we not know? CC.** SMS: We don’t know the amount of interest she has to pay and we don’t know the total cost.  **Plan**  Based on our understanding of the problem, come up with a plan to solve this problem. TT. CC.  Determine the interest earned over a year  Add the interest to the original amount of the trip  **Estimate/Predict**  **How could we estimate the interest?** SMS: 875 is almost 1000. 1% of 1000 is 10 so 2% is 20 meaning that 2.35% of 875 has to be around 20. There are 12 months in a year so 20 x 12 = 240. The amount of interest should be around $240.  **Solve**  We will use your plan to solve the problem. **What do we do first?** SMS: We have to find the amount of interest earned by using the simple interest formula of I=Prt.  **Independently determine the interest earned.**  *Show Call: Two piece of work; 1) S uses 12 for t correctly and 2) S uses 1 for t incorrectly*  **Which scholar do you agree with? Vote. CC.** SMS: I agree with the scholar that got $246.75 because they used 875 for the principal, 0.0235 for the interest rate, and they used 12 for the time since the problem says that they charge the interest monthly. There are 12 months in a year so we have to use 12. The other scholar found the interest after only 1 month, not after a year because they didn’t convert their time.  **This will not always be the case. For example, a problem might say that interest is earned annually which means every year and they will ask you the interest after 3 years. This is the trickiest part of simple interest that you have to pay special attention to while solving.**  **What does our answer represent? CC.** SMS: $247.75 is the amount of interest you would have to pay after a year of the listed purchases.  **Are we done? CC.** SMS: No, the problem wants to know the total cost of everything if she waited a year to pay off her credit card so we have to add the interest to the principal.  **Independently determine the total cost.**  *Show Call exemplar.*  **This is how banks and credit cards make their money off you.** **If and when you borrow money, take out a loan, or use a credit card, what should you keep in mind? CC.** SMS: The cost of the product will be more than what we actually paid based off the interest rate and the amount of time it takes to pay off so we should look for a low interest rate and pay it off as fast as possible.  **Check**  **Is our final answer reasonable? Vote. CC.** SMS: Yes because we estimated that the amount of interest would be $240 and it was actually $246.75 which is very close to our estimate.  **Key Learning Synthesis**  **How did we apply our key point for today to solve this example problem? TT. CC.** SMS: We used the simple interest formula to help us determine the total cost of the vacation.  **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 interest, principal, interest rate, and time   + Simple interest formula is written   + Values are substituted and the formula is evaluated.   ***[Planner’s Note: Review PP #2 and 1P#2- Students are going to struggle here with 6 months being ½ of a year and 18 months being 1.5 years.]*** |

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

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

**CFS for top quality work**

* + Problem is annotated for **interest**, **principal**, **interest rate**, and **time**
  + Simple interest formula is written
  + Values are **substituted** and the formula is **evaluated**.

UNIT 6 LESSON 12

**AIM**: SWBAT calculate simple interest

**THINK ABOUT IT!**

Margo goes to the bank and opens a savings account by depositing $400. The bank said that it would give Margo 5% of the initial amount she deposited every year as a way of saying “Thank you” for choosing their bank.

Step A: How much money would the bank give her after 1 year?

Step B: How much money would the bank give her after 3 years?

Step C: How much money would the bank give her if she only kept it in the bank for 6 months?

Key Point:

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| \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ measures the amount of money earned over time (in a bank account) |

**Interaction with New Material**

Ex.1) Samantha spends $875 over the holiday break on gifts for friends, airplane tickets, food, and a hotel. She put everything on her credit card which charges 2.35% simple interest monthly. What will be the total cost of her holiday trip if she pays off her credit card in one year?

**CFS for top quality work**

* + Problem is annotated for **interest**, **principal**, **interest rate**, and **time**
  + Simple interest formula is written
  + Values are **substituted** and the formula is **evaluated**.

**PARTNER PRACTICE**

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| *Bachelor Level* |

1. Find the simple interest for $600 invested at 5% for 4 years.

**CFS for top quality work**

* + Problem is annotated for **interest**, **principal**, **interest rate**, and **time**
  + Simple interest formula is written
  + Values are **substituted** and the formula is **evaluated**.

1. How much interest would John earn on a $250 principal over 6 months with an interest rate of 3.5%?

**CFS for top quality work**

* + Problem is annotated for **interest**, **principal**, **interest rate**, and **time**
  + Simple interest formula is written
  + Values are **substituted** and the formula is **evaluated**.

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| *Master Level* |

1. Bert is planning to open a savings account that earns 1.6% simple interest. He wants to earn exactly $336 in interest after 3 years. How much money should he deposit?
   1. $70
   2. $7,000
   3. $5,376
   4. $700

**INDEPENDENT PRACTICE**

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| *Bachelor Level* |

1. Find the simple interest for $3200 invested at 7% for 2 years.

**CFS for top quality work**

* + Problem is annotated for **interest**, **principal**, **interest rate**, and **time**
  + Simple interest formula is written
  + Values are **substituted** and the formula is **evaluated**.

1. What is the amount of interest that Mike earns on the following: deposit is $780, interest rate is 3.2% each year, for 18 months?

**CFS for top quality work**

Problem is annotated for **interest**, **principal**, **interest rate**, and **time**

Simple interest formula is written

Values are **substituted** and the formula is **evaluated**.

1. Tonya took out a loan to help pay for her house. She borrowed $70,000 for 15 years at a simple interest rate of 5%. Which statements below are true? Select all that apply.

**CFS for top quality work**

* + Problem is annotated for **interest**, **principal**, **interest rate**, and **time**
  + Simple interest formula is written
  + Values are **substituted** and the formula is **evaluated**.
  1. She will pay $525,000 in interest
  2. She will pay $52,500 in interest
  3. She will pay $52,500 for the house in total
  4. She will pay $122,500 for the house in total

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| *Master Level* |

1. Find the amount of time it takes to earn $102 interest, if you deposit $340 and the interest rate is 6%.
2. Find the interest earned in three months if you deposit $500 in a savings account with an interest rate of 4% annually.
3. In one account A, you invest $2,000 in a simple interest account. The balance after 8 years is $2,720. In account B, you invest $950 and over 4 years you earn $266. Which had a better interest rate and how do you know?

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| *PhD Level* |

1. Mike is buying a car that costs $21,000. The bank loans him the money using simple interest at a rate of 5.75% annually. He doesn’t touch the account for 30 months and then starts to pay off the loan. He wants to pay off the interest first and takes 6 months to pay it off. How much would he pay back each month to pay off the interest?

**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. Martin deposits $700 into a savings account that gains interest at a rate of 5.5% annually. If he waits 7 years to withdraw the money, will he have earned more or less than $275 and by how much?

**CFS for top quality work**

* + Problem is annotated for **interest**, **principal**, **interest rate**, and **time**
  + Simple interest formula is written
  + Values are **substituted** and the formula is **evaluated**.

1. Kristina deposits $850 into a savings account that has a yearly interest rate of 6.5%. Determine the total amount of money that she will have if she withdraws all her money 18 months later? Round your answer to the nearest cent.

**CFS for top quality work**

* + Problem is annotated for **interest**, **principal**, **interest rate**, and **time**
  + Simple interest formula is written
  + Values are **substituted** and the formula is **evaluated**.