WHAT WILL YOU PAY FOR THE COMBINE? CREDIT OPTIONS

Performance Standard (6C/8A/8C).J

Write the explicit and recursive forms of the sequence of an amortization schedule, and compare the cost of purchasing the combine with different interest rates and compounding periods.

- *Mathematical knowledge*: generalize patterns using recursively defined sequences; know how to apply sequences and their properties to solve real problems.
- *Strategic knowledge*: solve the problem.
- *Explanation*: explain completely and clearly what was done and why it was done.

Procedures

1. ***In order to compute and estimate using mental mathematics, paper-and-pencil methods, calculators and computers (6C); describe numerical relationships using variables and patterns (8A); and solve problems using systems of numbers and their properties (8C),*** students should experience sufficient learning opportunities to develop the following:
   - Estimate an appropriate answer for a given term of a sequence.
   - Represent relationships arising from various contexts using symbolic expressions, including iterative and recursive forms.
   - Symbolize growth patterns using variables.
   - Explain the differences and similarities of different forms of growth formulas.
   - Apply sequences and their properties to solve real problems.

   Agricultural students need to be able to calculate the cost of purchasing machinery over time. Any capital item purchased usually involves financing and a variety of payment plans that should be evaluated. Understanding differences in terms, will help students make more informed decisions about credit which will ultimately improve their "bottom line."
2. Provide each student a copy of the "What Will You Pay for the Combine? Credit Options" task sheet and the rubric. Have students review and discuss the task to be completed and how the rubric will be used to evaluate it.
3. Ask students to do the following problem:
   You are going to purchase a combine for $90,000 and finance $80,000 of that purchase price. You have found three different loans that sound promising, but you need to decide which option is the best for your situation. You have decided you can afford to pay off about $15,000 per year toward the purchase of the combine.
   - Option #1: The First National Bank has offered you an $80,000 loan at 6.25% compounded quarterly. They will allow you to pay one $15,000 payment yearly for 6 years. The balance will be due at the end of the 7th year.
   - Option #2: American Bank and Trust offered a loan at 6.375% compounded annually. They will also allow you to make $15,000 payments yearly for 6 years with the balance of the loan due at the end of the 7th year.
   - Option #3: A third organization, Federal Savings and Loan, offers the $80,000 loan at 6.25% compounded quarterly. They require quarterly payments of $3,750 with the balance due at the end of the 3rd quarter of the 7th year.

   Compare the total amount paid for the combine under each of these payment plans, and decide which is the best option. Fully describe all calculations. Justify your choice of plans.
4. Evaluate each student's work using all three dimensions of the rubric and its guide to determine the performance level. A 4 in mathematical knowledge should reflect three different sequences, each representing different compounding and payment schedules. This could be done on a spreadsheet. The best option is Option #3 which allows quarterly payments, since the amount compounded is reduced quarterly before interest is calculated. This option has a total of $98,073.67 being paid during the life of the loan (not counting the down payment on the combine). The second-best option is Option #2 which is compounded annually. Even though the interest rate appears higher, it costs less since there are fewer compounding periods. This plan has a total of $100,945 being paid during the life of the loan. The most costly option is the first, which would cost a total of $101,042.28 over the life of the loan. A 4 in strategy would require the appropriate formulas. A 4 in explanation would require a complete explanation of what was done and why.

Examples of Student Work

- **Meets**
- **Exceeds**

Time Requirements

- 30 minutes

Resources

- Copies of the "What Will You Pay for the Combine? Credit Options" task sheet
- Calculator
- Mathematics Rubric

NAME _____ DATE _____

WHAT WILL YOU PAY FOR THE COMBINE? CREDIT OPTIONS

Student Task Sheet

You are going to purchase a combine for $90,000 and finance $80,000 of that purchase price. You have found three different loans that sound promising, but you need to decide which option is the best for your situation. You have decided you can afford to pay off about $15,000 per year toward the purchase of the combine.

- Option #1: The First National Bank has offered you an $80,000 loan at 6.25% compounded quarterly. They will allow you to pay one $15,000 payment yearly for 6 years. The balance will be due at the end of the 7th year.
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Compare the total amount paid for the combine under each of these payment plans, and decide which is the best option. Fully describe all calculations. Justify your choice of plans.

MATHEMATICS RUBRIC

NAME _____ **DATE** _____

- ☐ Exceeds standard (must receive a 4 in each area)
- ☐ Meets standard (must receive all 3's or a combination of 3's and 4's)
- ☐ Approaches standard (must receive all 2's or any combination which may include a 3 or a 4)
- ☐ Begins standard (has no 3's or 4's but not all 1's)
- ☐ Absent (has all 1's and 0's)

	Mathematical Knowledge	**Strategic Knowledge**	**Explanation**
4	• Wrote the right answer. • Used math words correctly to show understanding of how math works. • Worked it out with no mistakes. • Used the right math words and labeled the answers.	• Identified all the important parts of the problem, and knew how they went together. • Showed all the steps used to solve the problem.	• Wrote what was done and why it was done. • If a drawing was used, all of it was explained in writing.
3	• Knew how to do the problem, but made small mistakes.	• Identified most of the important parts of the problem. • Showed most of the steps used to solve the problem.	• Wrote mostly about what was done. • Wrote a little about why it was done. • If a drawing was used most of it was explained in writing.
2	• Understood a little, but made a lot of big mistakes.	• Identified some of the important parts of the problem. • Showed some of the steps used to solve the problem.	• Wrote some about what was done or why it was done but not both. • If a drawing was used, some of it was explained in writing.
1	• Tried to do the problem, but didn't understand it.	• Identified almost no important parts of the problem. • Showed almost none of the steps used to solve the problem.	• Wrote or drew something that didn't go with the answer. • Wrote an answer that was not clear.
0	• No answer attempted.	• No strategy shown.	• No written explanation.
Score			