

## WHAT WILL THE COMBINE BE WORTH? DEPRECIATION SCHEDULE

### Performance Standard (8A/8B).H

Write the explicit and recursive forms of the sequence of a depreciation schedule, and compare the value of the combine over its useful life:

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

### Procedures

1. ***In order to describe numerical relationships using variables and patterns (8A) and using tables, graphs and symbols (8B)***, students should experience sufficient learning opportunities to develop the following:
  - Investigate and describe linear, quadratic and exponential patterns recursively.
  - Investigate and write algebraic expressions to describe the  $n$ th term of a simple linear, power or exponential sequence.
  - Determine a specific term of a pattern of numbers or drawings.
  - Graph a set of points and describe the relationship as linear or non-linear.
  - Describe the relationships between symbolic expressions and graphs of lines using the appropriate vocabulary for the intercepts and slope of the line.

Agricultural students need to be able to calculate depreciation on their equipment annually for income tax purposes. Any capital item purchased should be depreciated.
2. Provide each student a copy of the "Depreciation Schedule" 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:

As you answer each of the following questions, make sure to show all work and write an explanation of what you did and why you did each step.

  1. Find and write the values for each of the first 5 years of life of a combine you purchased for \$80,000. Using the straight-line method of depreciation, assume the combine will be used for 10 years and have no value at the end of those 10 years.
  2. Write the recursive form for the sequence in #1.
  3. Decide what kind of sequence it is, and write the explicit form of the sequence. Use the answer to find the value of the combine at the end of the 8<sup>th</sup> year.
  4. Compare the value of the combine at the end of the 5<sup>th</sup> year with its value at the end of the 8<sup>th</sup> year. How does that change compare to the change in value between when it was purchased new and its value at the end of the 3<sup>rd</sup> year?
  5. Graph the value of the combine over the 10 years of its useful life. Explain why this method of depreciation is called the straight-line method.
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 a sequence of \$8000, \$7200, \$6400, \$5600, \$4800, \$4000, \$3200, \$2400, \$1600, \$800, \$0. The mathematics involves understanding a constant reduction of \$800 per year starting at year 0 or when purchased and lasting until the end of year 10. The change between year 5 and year 8 should equal the change between year 0 and year 3. The linearity of the relationship and the constant rate of change should be discussed as the slope of the line in the straight-line method. A 4 in strategy would require the appropriate formulas. A 4 in explanation would require a complete explanation of the what and why of the process.

**Examples of Student Work**

- [Meets](#)
- [Exceeds](#)

**Time Requirements**

- 30 minutes

**Resources**

- Copies of the "Depreciation Schedule" task sheet and graph paper
- Calculator
- Mathematics Rubric

NAME \_\_\_\_\_ DATE \_\_\_\_\_

### DEPRECIATION SCHEDULE

As you answer each of the following questions, make sure to show all work and write an explanation of what you did and why you did each step.

1. Find and write the values for each of the first 5 years of life of a combine you purchased for \$80,000. Using the straight-line method of depreciation, assume the combine will be used for 10 years and have no value at the end of those 10 years.
2. Write the recursive form for the sequence in #1.
3. Decide what kind of sequence it is, and write the explicit form of the sequence. Use the answer to find the value of the combine at the end of the 8<sup>th</sup> year.
4. Compare the value of the combine at the end of the 5<sup>th</sup> year with its value at the end of the 8<sup>th</sup> year. How does that change compare to the change in value between when it was purchased new and its value at the end of the 3<sup>rd</sup> year?
5. Graph the value of the combine over the 10 years of its useful life. Explain why this method of depreciation is called the straight-line method.

## 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)

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