Lesson Plan: Calculating Speed, Distance, and Time Using the Magic Triangle

NGSS Standard: MS-PS2-2 Motion and Stability: Forces and Interactions

Objective:

Students will be able to calculate speed, distance, and time using the magic triangle method and apply this knowledge to solve related problems.

Materials:

- Cricut machine
- Cricut Design Space software
- Cricut mat
- Cricut pen (0.4 Tip, Black)
- Cardstock paper (12" x 12")
- Popsicle sticks, wooden dowel or a pencil
- Glue or tape
- Printed finger cutouts (using Cricut's print-then-cut feature)
- Worksheet with practice problems (attached)

Teacher Preparation Using Cricut:

1. **Magic Triangle Creation:**
    - Use the Cricut machine to design and cut out a large magic triangle on a 12 x 12 sheet of paper. The triangle will have three sections: Distance (D), Speed (S), and Time (T).
    - Cut out separate pieces for each section (D, S, T) using removable adhesive vinyl or cardstock. These pieces will be used for visualization by placing them on and off the triangle.
2. **Finger Pointer Creation:**
    - Use Cricut's print-then-cut feature to create a cutout of a finger (print on white or colored cardstock paper)
    - Print the finger design on cardstock, then cut it out using the Cricut machine.
    - Glue the finger cutout onto popsicle sticks to create pointers that students will use to visualize which part of the triangle they are focusing on when solving problems.

Lesson Procedure:

1. **Introduction (10 minutes):**
   - Begin with a brief discussion on the relationship between speed, distance, and time.
   - Introduce the magic triangle method as a visual tool to help solve these problems.

2. **Demonstration (15 minutes):**
   - Show students the Cricut-created magic triangle on the board or using a projector. Explain how each part of the triangle corresponds to the formulas:
     - Speed = Distance / Time
     - Distance = Speed × Time
     - Time = Distance / Speed
   - Demonstrate how to cover one section of the triangle to reveal the formula needed to solve for that variable.

3. **Interactive Activity (20 minutes):**
   - Hand out the removable pieces of the magic triangle to the students and have them practice placing the pieces on the triangle and using the finger pointers to cover sections as they solve sample problems.
   - Allow students to work in pairs, guiding them through the process of using the magic triangle to solve problems.

4. **Guided Practice (15 minutes):**
   - Distribute the worksheet with five practice problems related to speed, distance, and time.
   - Walk around the classroom to provide support as students use their magic triangles and finger pointers to solve the problems.

5. **Review and Conclusion (10 minutes):**
   - Go over the worksheet problems as a class, discussing the solutions and clarifying any misconceptions.
   - Reinforce the importance of the magic triangle as a tool for solving these types of problems.

Assessment:

- Students' understanding will be assessed through their ability to correctly solve the worksheet problems and their participation in the interactive activity.

This lesson combines the use of technology (Cricut) with hands-on learning to make abstract concepts more tangible and understandable for students.

Optional Enrichment Activity:

- **Custom Magic Triangle Creation:**
  - As an enrichment activity, the teacher can use the Cricut machine to cut out blank triangles on cardstock or paper.
  - Students can then create their own magic triangle by decorating it with any design they want, labeling the sections for Distance, Speed, and Time.
  - This activity allows students to personalize their learning tool, making it more engaging and reinforcing their understanding of the concepts.

Rubric for Speed, Distance, and Time Calculations

Criteria	Almost There (3 points)	Got It (5 points)	Not Quite Yet (1 point)
Correct Answers	Most answers are correct, with 1-2 small mistakes.	All answers are correct.	Many mistakes that affect the answers.
Using Formulas	Formulas are mostly used correctly, with some confusion.	Formulas are used correctly in every problem.	Formulas are often used incorrectly.
Showing Work	Shows most steps, but some may be missing or unclear.	All steps are shown clearly for each problem.	Steps are missing or unclear.
Completion	Most questions are answered, with one left unfinished.	All questions are answered completely and correctly.	Several questions are left unfinished.
Using the Magic Triangle	The magic triangle is used correctly most of the time, with a few errors.	The magic triangle is used correctly every time.	The magic triangle is rarely or incorrectly used.

Scoring Guide:

- **Almost There:** 13-15 points
- **Got It:** 16-20 points
- **Not Quite Yet:** 12 points or below

Name _____

Worksheet - Practicing Speed, Distance and Time

1. **Problem 1: A car travels 180 kilometers in 3 hours. What is the speed of the car?**
   - What is the formula you will use? _____
   - What is the answer? _____
2. **Problem 2: A cyclist rides at a speed of 15 km/h for 4 hours. How far does the cyclist travel?**
   - What is the formula you will use? _____
   - What is the answer? _____
3. **Problem 3: A train covers a distance of 240 miles at a speed of 80 miles per hour. How long does the journey take?**
   - What is the formula you will use? _____
   - What is the answer? _____
4. **Problem 4: If a runner covers 10 miles in 2 hours, what is their average speed?**
   - What is the formula you will use? _____
   - What is the answer? _____
5. **Problem 5: How much time will it take to travel 300 miles at a speed of 60 miles per hour?**
   - What is the formula you will use? _____
   - What is the answer? _____