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Grade Level: High School Algebra 3 (Advanced Math/Precalculus)
Topic of lesson: Abstract Rate Problems

Topic of October 7 Math Ese: Comprehension of word problems

This is a lesson on setting up abstract rate problems. Some of my students have had trouble setting up abstract rate problems. They can usually simplify with ease after they have set them up. I have found that putting the information in a table as this lesson suggests really helps them comprehend how to set up the problem better.

Stephanie Whitney
Advanced Math (Algebra 3)
Abstract Rate Problems

A. **Objective**: Students will solve abstract rate/distance problems
Process Standard 5.1: Use algebraic…representations to model mathematical situations.
Process Standard 5.2: Use tables to organize mathematical ideas

B. Instruction
Remind students that distance = rate x time. Remind them that if you know the rate, you can find time by dividing distance by rate, and so forth.

"Jan traveled m miles at p miles per hour and arrived 2 hours early. How fast should she have traveled to arrive on time?" It helps to set up a table as follows

	First Part	*Second Part*
Rate	p	
Time		
Distance	m	

Since d=rt, we can find the time by dividing m by p. The new time must be two hours later, so we can take m/p +2. The distance is still m in the second part. We are trying to find what her rate should have been.

	First Part	*Second Part*
Rate	p	unknown
Time	m/p	m/p + 2
Distance	m	m

D=rt, so to find the rate, we will divide m by m/p + 2 . If you simplify this you will get (mp)/(m+2p)

Example 2 (from Saxon Advanced Math): "The boat traveled k miles in t hours and was 40 miles short of the goal when the gun went off. If the skipper tried again, how long would it take to reach the goal if she increased the rate of travel by 10 mph."

	First Part	*Second Part*
Rate		
Time	t	
Distance	k	

Rate would be k/t since d=rt. For the second part, the distance is increased by 40 miles, and the rate was increased by 10 mph.

	First Part	*Second Part*
Rate	k/t	k/t + 10
Time	t	unknown
Distance	k	k+40

To find the unknown time, we would divide distance by rate. (k+40)/((k/t)+10). Algebraic simplification would result in a distance of (t(k+40))/(k+10t)

In closure, I would go over any parts of this that the particular class had trouble with. If a person or a class was struggling, we would work through additional examples.

C. Assessment on the next page

D. Modification/Assessment

As needed for individual students. In this particular class, no one is much ahead or behind anyone else. If a class or individual needed the extra challenge the units could be changed on some of these problems to include unit conversions in the solution.

E. Reflection

The tables did help my students to break these problems down and to understand them.

Name:_____

Abstract Rate Problems Practice

1. The train traveled at n miles at t miles per hour but arrived 2 hours late. How fast should the train have traveled to have arrived on time?

	FIRST PART	SECOND PART
RATE		
TIME		
DISTANCE		

2. The racer ran h yards in p seconds. What would his rate be in yards per second if he ran twice as far in 15 more seconds?

	FIRST PART	SECOND PART
RATE		
TIME		
DISTANCE		

3. The jet flew b miles in g hours but arrived 3 hours late. How fast should the jet have flown to get there in time?

	FIRST PART	SECOND PART
RATE		
TIME		
DISTANCE		

4. On the first leg, Jonathan traveled for W hours at R miles per hour. The next leg was 75 miles longer. How fast did he have to travel to cover this distance in only M hours more than he took for his first leg?

	FIRST PART	SECOND PART
RATE		
TIME		
DISTANCE		

5. The first leg of the trip was m miles. David drove at k miles per hour. He arrived 3 hours late. If the time allotted for the second leg of the trip was the same and the second leg was 15 miles longer, how fast would he have to travel on the second leg to get there on time?

	FIRST PART	SECOND PART
RATE		
TIME		
DISTANCE		

6. The horse traveled c miles at x miles per hour but arrived 7 hours late. How fast should the horse have traveled to arrive on time?

	FIRST PART	SECOND PART
RATE		
TIME		
DISTANCE		

7. Gander the Goat traveled b miles at y miles per hour but arrived 3 hours late. If the distance were decreased by 10 miles, how fast would he have to travel to arrive on time?

	FIRST PART	SECOND PART
RATE		
TIME		
DISTANCE		

8. The army marched m miles at k miles per hour and arrived two hours early. If they had started 8 miles further away, how fast should they have traveled to get there on time?

	FIRST PART	SECOND PART
RATE		
TIME		
DISTANCE		