SAT Math: Planes, Trains, and Automobiles

by Cindy Donaldson

Riddles about two trains passing in the night are the quintessential Algebra problems. For that reason, they are often featured on Algebra finals and SAT tests. But most of us would rather spend the night at Grand Central than attempt to solve one of these transportation mysteries.

Luckily, there's a strategy that never fails when it comes to problems involving distance, rates, and time. Here's an activity that will help your teen break these problems down into five easy steps that mean they'll never miss another train.

What You Need:

- Paper
- Pencil
- The distance formula: d = r*t (distance = rate * time)

What You Do:

1. Read the problem:

   "An express train and a freight train depart San Francisco for Los Angeles at the same time. The average speed of the express train is 30 mph slower than twice the speed of the freight. In two hours, the express train is 40 miles ahead of the freight train. Find the rate of the express."

2. Make a table to clarify the variables. It should have the words "distance, rate, and time" along the top. The two traveling methods should be listed at the left:

	Distance	Rate	Time
Freight Train			
Express Train			

3. Fill in the blanks with variables that you can find in the problem. In our problem, the speed of the Express is defined in terms of the Freight.

	Distance (in miles)	Rate (in mph)	Time (in hours)
Freight Train	d	r	2
Express Train	d + 40	2r -30	2

4. Use the distance formula to make two equations based on the table:

$d = r * t$

Freight Train: $d = r * 2$ $d = 2r$

Express Train: $(d + 40) = (2r-30) * 2$

$d + 40 = 4r - 60$

5. Substitute and Solve:

Since the first equation tells us that $d = 2r$, we can substitute that in the second equation for the Freight Train:

$d + 40 = 4r - 60$ becomes $2r + 40 = 4r - 60$ $2r = 100$ $r = 50$

The Freight Train is going 50 mph.

Therefore, the Express is going $2(50) - 30 = 70$ mph.

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