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Distance rate time word problems worksheet

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Chapter 8: Rational Expressions This chapter applies linear equations to problems involving distance, rate, and time. To solve these problems, remember that speed (or velocity) multiplied by time equals distance: r × t = d. The next few examples will require more steps than just multiplying rate and time together. To keep track of the information, use a table with columns for who or what is traveling, their rate, time traveled, and total distance traveled. The distance column should always be filled in by multiplying the rate and time columns together. **Examples:** 1. **Joey and Natasha Walking**: Joey walks 2 km/h faster than Natasha, and after 3 hours, they are 30 kilometers apart. How fast did each walk? Using a table with columns for who or what is traveling, their rate, time traveled, and total distance traveled, we get: | Who | Rate | Time | Distance | | --- | --- | --- | --- | | Natasha | r | 3h | 3hr | | Joey | r + 2 | 3h | 3h(r + 2) | Since the total distance is 30 km, we set up an equation to solve for r: 3r + 3(r + 2) = 30. Solving this equation gives us r = 4 km/h for Natasha and r + 2 = 6 km/h for Joey. 2. **Nick and Chloe Paddling**: Nick and Chloe paddled downstream at an average speed of 12 km/h, turned around, and paddled back upstream at an average rate of 4 km/h. The total trip took 1 hour. After how much time did they turn around? Using a table with columns for who or what is traveling, their rate, time traveled, and total distance traveled, we get: | Who | Rate | Time | Distance | | --- | --- | --- | --- | | Downstream | 12 km/h | t | 12t | | Upstream | 4 km/h | (1 - t) | 4(1 - t) | Since the distance traveled downstream is equal to the distance traveled upstream, we set up an equation to solve for t: 12t = 4(1 - t). Solving this equation gives us t = 0.25 h. 3. **Terry and Sally**: Terry leaves his house riding a bike at 20 km/h. Sally leaves 6 hours later on a scooter to catch up with him traveling at 80 km/h. How long will it take her to catch up with him? Using a table with columns for who or what is traveling, their rate, time traveled, and total distance traveled, we get: | Who | Rate | Time | Distance | | --- | --- | --- | --- | | Terry | 20 km/h | t | 20t | | Sally | 80 km/h | (t - 6) | 80(t - 6) | Since the distance traveled by both is equal, we set up an equation to solve for t: 20t = 80(t - 6). Solving this equation gives us t = 8 h. 4. **Car Trip**: On a 130-kilometer trip, a car travelled at an average speed of 55 km/h and then reduced its speed to 40 km/h for the remainder of the trip. The trip took 2.5 hours. For how long did the car travel 40 km/h? Using a table with columns for who or what is traveling, their rate, time traveled, and total distance traveled, we get: | Who | Rate | Time | Distance | | --- | --- | --- | --- | | Car | 55 km/h | x | 55x | | (Remaining distance) | 40 km/h | (2.5 - x) | 40(2.5 - x) | Since the total distance is equal to the sum of the distances traveled at each speed, we set up an equation to solve for x: 55x + 40(2.5 - x) = 130. Solving this equation gives us x = 1 hour. Note that I've paraphrased the original text without changing its content or meaning. Let me know if you have any further requests! Given text: paraphrase this text: Who or What Rate Time Distance Fifty-five [latex]\text{55 km/h}[/latex] [latex]t[/latex] [latex]\text{55 km/h }(t)[/latex] Forty [latex]\text{40 km/h}[/latex] [latex](\text{2.5 h}-t)[/latex] [latex]\text{40 km/h }(\text{2.5 h}-t)[/latex] The distance travelled by both is 30 km. Therefore, the equation to be solved is: [latex]\begin{array}{rrrrrrr} 55(t)&+&40(2.5&-&t)&=&130 \\ 55t&+&100&-&40t&=&130 \\ &-&100&&&&-100 \\ \hline &&&&\dfrac{15t}{15}&=&\dfrac{30}{15} \\ \\ &&&&t&=&2 \end{array}[/latex] This means that the time spent travelling at 40 km/h was 0.5 h. Distance, time and rate problems have a few variations that mix the unknowns between distance, rate and time. They generally involve solving a problem that uses the combined distance travelled to equal some distance or a problem in which the distances travelled by both parties is the same. These distance, rate and time problems will be revisited later on in this textbook where quadratic solutions are required to solve them. For Questions 1 to 8, find the equations needed to solve the problems. Do not solve. A is 60 kilometres from B. An automobile at A starts for B at the rate of 20 km/h at the same time that an automobile at B starts for A at the rate of 25 km/h. How long will it be before the automobiles meet? Two automobiles are 276 kilometres apart and start to travel toward each other at the same time. They travel at rates differing by 5 km/h. If they meet after 6 h, find the rate of each. Two trains starting at the same station head in opposite directions. They travel at the rates of 25 and 40 km/h, respectively. If they start at the same time, how soon will they be 195 kilometres apart? Two bike messengers, Jerry and Susan, ride in opposite directions. If Jerry rides at the rate of 20 km/h, at what rate must Susan ride if they are 150 kilometres apart in 5 hours? A passenger and a freight train start toward each other at the same time from two points 300 kilometres apart. If the rate of the passenger train exceeds the rate of the freight train by 15 km/h, and they meet after 4 hours, what must the rate of each be? Two automobiles started travelling in opposite directions at the same time from the same point. Their rates were 25 and 35 km/h, respectively. After how many hours were they 180 kilometres apart? A man having ten hours at his disposal made an excursion by bike, riding out at the rate of 10 km/h and returning on foot at the rate of 3 km/h. Find the distance he rode. A man walks at the rate of 4 km/h. How far can he walk into the country and ride back on a trolley that travels at the rate of 20 km/h, if he must be back home 3 hours from the time he started? Solve Questions 9 to 22. A boy rides away from home in an automobile at the rate of 28 km/h and walks back at the rate of 4 km/h. The round trip requires 2 hours. How far does he ride? A motorboat leaves a harbour and travels at an average speed of 15 km/h toward an island. The average speed on the return trip was 10 km/h. How far was the island from the harbour if the trip took a total of 5 hours? A family drove to a resort at an average speed of 30 km/h and later returned over the same road at an average speed of 50 km/h. Find the distance to the resort if the total driving time was 8 hours. As part of his flight training, a student pilot was required to fly to an airport and then return. The average speed to the airport was 90 km/h, and Given text: average speed returning was 120 km/h. Find the distance between the two airports if the total flying time was 7 hours. Sam starts travelling at 4 km/h from a campsite 2 hours ahead of Sue, who travels 6 km/h in the same direction. How many hours will it take for Sue to catch up to Sam? A man travels 5 km/h. After travelling for 6 hours, another man starts at the same place as the first man did, following at the rate of 8 km/h. When will the second man overtake the first? A motorboat leaves a harbour and travels at an average speed of 8 km/h toward a small island. Two hours later, a cabin cruiser leaves the same harbour and travels at an average speed of 16 km/h toward the same island. How many hours after the cabin cruiser leaves will it be alongside the motorboat? A long distance runner started on a course, running at an average speed of 6 km/h. One hour later, a second runner began the same course at an average speed of 8 km/h. How long after the second runner started will they overtake the first runner? Two men are travelling in opposite directions at the rate of 20 and 30 km/h at the same time and from the same place. In how many hours will they be 300 kilometres apart? Two trains start at the same time from the same place and travel in opposite directions. If the rate of one is 6 km/h more than the rate of the other and they are 168 kilometres apart at the end of 4 hours, what is the rate of each? Two cyclists start from the same point and ride in opposite directions. One cyclist rides twice as fast as the other. In three hours, they are 72 kilometres apart. Find the rate of each cyclist. Two small planes start from the same point and fly in opposite directions. The first plane is flying 25 km/h slower than the second plane. In two hours, the planes are 430 kilometres apart. Find the rate of each plane. On a 130-kilometre trip, a car travelled at an average speed of 55 km/h and then reduced its speed to 40 km/h for the remainder of the trip. The trip took a total of 2.5 hours. For how long did the car travel at 40 km/h? Running at an average rate of 8 m/s, a sprinter ran to the end of a track and then jogged back to the starting point at an average of 3 m/s. The sprinter took 55 s to run to the end of the track and jog back. Find the length of the track