Algebra 2 - Rational Expressions and Equations

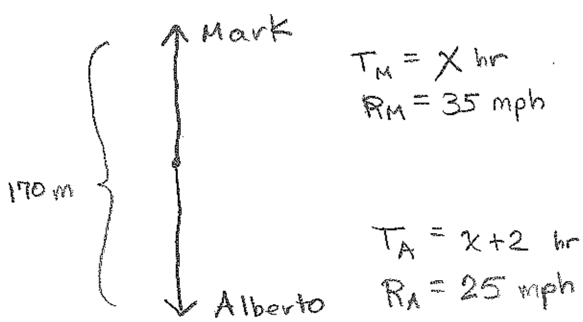
Name SOLUTIONS

Distance-Rate-Time Practice Problems

Date 5/20/14

1) Alberto left the movie theater and drove south at an average speed of 25 mph. Mark left two hours later and drove in the opposite direction with an average speed of 35 mph. Find the number of hours Mark needs to drive before they are 170 mi. apart.

Diagram:



Model:

$D = R \cdot T$ No constants

we want $D_A + D_M = 170$ m.

Equations & work:

$D_A = R_A \cdot T_A = 25(x+2)$

$D_A = 25x + 50$

$D_M = R_M \cdot T_M = 35(x)$

$D_M = 70$

$D_A + D_M = 170$

$25x + 50 + 35x = 170$

$60x + 50 = 170$

$60x = 120$

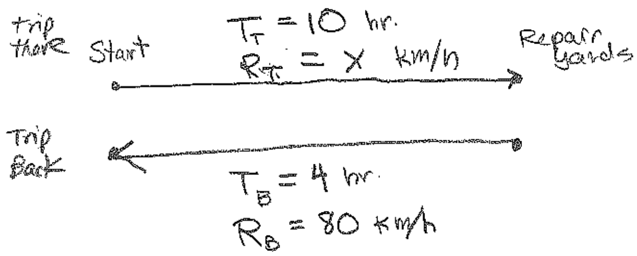
$x = 2$

Solution:

Mark must drive for 2 hours before they are 170 miles apart.

2) A freight train traveled to the repair yards and back. The trip there took ten hours and the trip back took four hours. It averaged 80 km/h on the return trip. Find the average speed of the trip there.

Diagram:



Model:

$D = R \cdot T$ Distance is constant inverse variation

Equations & work:

$D = R_B \cdot T_B = 80(4) = 320$

$D = R_T \cdot T_T$

$320 = x(10)$

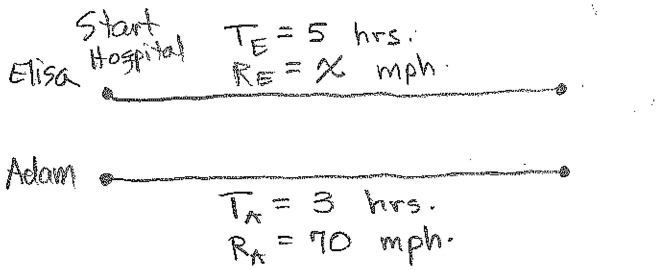
$x = 32$

Solution:

The average speed of the trip there was 32 km/hr.

3) Elisa left the hospital and traveled toward her friend's house. Two hours later Adam left traveling at 70 mph in an effort to catch up to Elisa. After traveling for three hours Adam finally caught up. Find Elisa's average speed.

Diagram:



Model:

$D = R \cdot T$

Distance is constant. Inverse Variation.

Equations & work:

$D = R_A \cdot T_A = 70(3) = 210$ m

$D = R_E \cdot T_E$

$210 = x(5)$

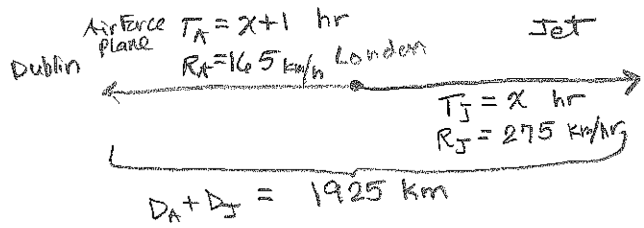
$x = 42$

Solution:

Elisa's average speed was 42 mph.

4) An Air Force plane left London and flew toward Dublin at an average speed of 165 km/h. A jet left one hour later and flew in the opposite direction with an average speed of 275 km/h. How long does the jet need to fly before the planes are 1925 km apart?

Diagram:



Model:

$D = R \cdot T$ No constants.

Need total distance

$D_A + D_J = 1925$ km

Equations & work:

$D_A = R_A \cdot T_A = 165(x+1)$
$= 165x + 165$

$D_J = R_J \cdot T_J = 275(x)$
$= 275x$

$D_A + D_J = 1925$

$165x + 165 + 275x = 1925$

$440x = 1760$

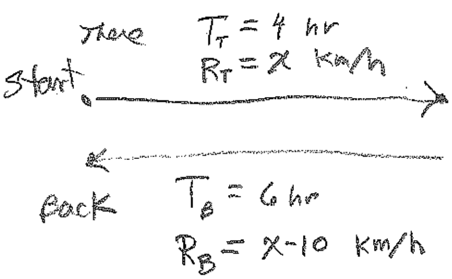
$x = 4$

Solution:

The jet must fly for 4 hours before the planes are 1925 km apart.

5) Molly drove to the recycling plant and back. The trip there took four hours and the trip back took six hours. She averaged 10 km/h faster on the trip there than on the return trip. Find Molly's average speed on the outbound trip.

Diagram:



Model:

$D = R \cdot T$ Distance is constant. Inverse Variation.

Equations & Work:

$D = R_T \cdot T_T = x(4) = 4x$

$D = R_B \cdot T_B = (x-10)(6) = 6x - 60$

$4x = 6x - 60$

$60 = 2x$

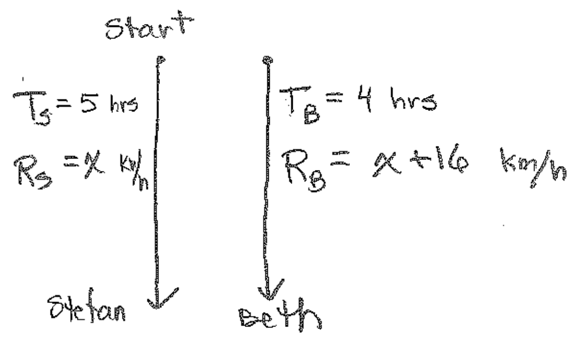
$x = 30$

Solution:

Molly averaged 30 km/h on the outbound trip.

6) Stefan left the movie theater and traveled south. One hour later Beth left traveling 16 km/h faster in an effort to catch up to him. After four hours Beth finally caught up. What was Stefan's average speed?

Diagram:



Model:

$D = R \cdot T$ Distance is constant. Inverse Variation.

Equations & Work:

$D = R_S \cdot T_S = x(5) = 5x$

$D = R_B \cdot T_B = (x+16)(4) = 4x + 64$

$5x = 4x + 64$

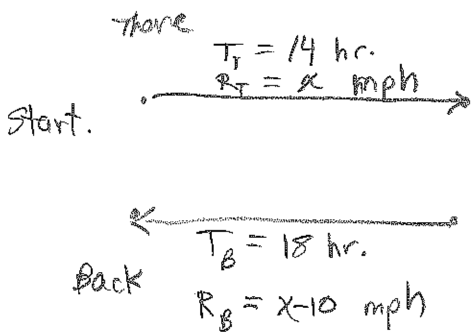
$x = 64$

Solution:

Stefan's average speed was 64 km/h.

7) A passenger train traveled to the fueling station and back. The trip there took 14 hours and the trip back took 18 hours. It averaged 10 mph faster on the trip there than on the return trip. What was the passenger train's average speed on the outbound trip?

Diagram:



Model:

$D = R \cdot T$ Distance is constant. Inverse variation.

Equations & Work:

$D = R_T \cdot T_T = x(14) = 14x$

$D = R_B \cdot T_B = (x-10)(18) = 18x - 180$

$14x = 18x - 180$

$180 = 4x$

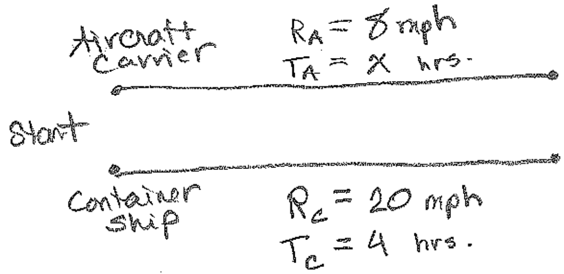
$x = 45$

Solution:

The passenger train's average speed on the outbound trip was 45 mph.

8) An aircraft carrier left Hawaii and traveled toward dry dock at an average speed of 8 mph. A container ship left some time later traveling in the same direction at an average speed of 20 mph. After traveling for four hours the container ship caught up with the aircraft carrier. How long did the aircraft carrier travel before the container ship caught up?

Diagram:



Model:

$D = R \cdot T$ Distance is constant. Inverse variation.

Equations & work:

$D = R_c \cdot T_c = 20(4) = 80$

$D = R_A \cdot T_A$

$80 = 8(x)$

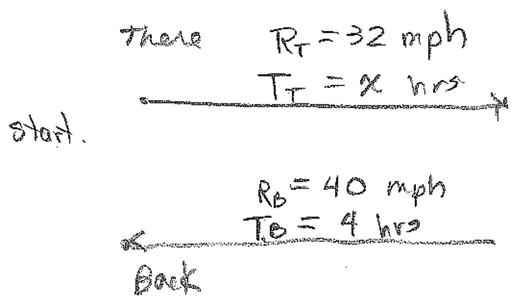
$x = 10$

Solution:

The aircraft carrier traveled for 10 hours before the container ship caught up.

9) Sarawong made a trip to his cabin on the lake and back. On the trip there he drove 32 mph and on the return trip he went 40 mph. How long did the trip there take if the return trip took four hours?

Diagram:



Model:

$D = R \cdot T$

Distance is constant.
Inverse Variation.

Equations & Work:

$D = R \cdot T$

$D = R_B \cdot T_B = 40(4) = 160$

$D = R_T \cdot T_T = 32(x)$

$160 = 32x$

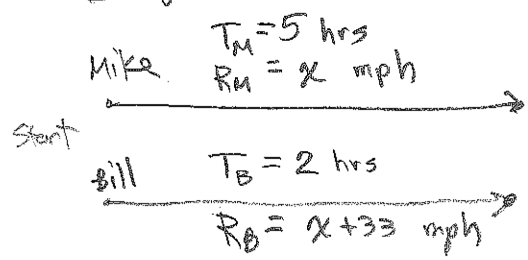
$x = 5$

Solution:

The trip there took 5 hours.

10) Mike left home and traveled toward his friend's house. Three hours later Bill left traveling 33 mph faster in an effort to catch up to him. After two hours Bill finally caught up. What was Mike's average speed?

Diagram:



Model:

$D = R T$

Distance is constant.
Inverse Variation.

Equations & Work:

$D = R_m \cdot T_m = x(5) = 5x$

$D = R_B \cdot T_B = (x+33)(2) = 2x + 66$

$5x = 2x + 66$

$3x = 66$

$x = 22$

Solution:

Mike's average speed was 22 mph.