Algebra Word Problems

Lesson 10

Worksheet 10

Algebra Word Problems

Involving

Work

Algebra Word Problems – Lesson 10 - Worksheet 10 - Algebra Word Problems Involving Work

Problem 1) Jackie can paint a fence in 9 hours and Jeremy can paint it in 6 hours. How many hours, to the nearest tenth, would it take to paint it if they work together?

Problem 2) Walter and James are asked to paint a house. Walter can paint the house by himself in 12 hours. James can paint the house by himself in 16 hours. How many hours, to the nearest two decimals, will it take to paint the house if they work together?

Problem 3) Mike and Lacey have to stuff and mail 1000 envelopes for a new marketing campaign. Mike can do the job alone in 6 hours. If Lacey helps, they can get the job done in 4 hours. How many hours would it take for Lacey to do the job alone?

Problem 4) One pipe can fill a swimming pool in 10 hours, while another pipe can fill the same pool in 15 hours. How many hours will it take if both pipes are used to fill the tank?

Problem 5) One roofer can put a new roof on a house three times faster than another. Working together, they can roof the house in 5 days. Approximately how many days, to the nearest tenth, would it take the faster roofer working alone?

Problem 6) Using a riding lawn mower, Jack, the landscaper of a large park, can mow the lawn in 8 hours. With a small mower, his assistant Bob needs 14 hours to mow the same lawn. If Jack and Bob work together mowing the lawn, approximately how many hours will it take?

Problem 7) Jack and Jill are going up the hill to pull weeds. Jack can pull all of the weeds by himself in 8 hours. If Jill helps him, they can pull the same amount of weeds in 5 hours. How many hours, to the nearest tenth, would it take Jill to pull the weeds working alone?

Problem 8) Will and Matt own a small business. Will, working alone, can complete a task in 7 hours. Matt can complete the same task in 9 hours. Exactly how many hours would it take them to complete the task working together?

Problem 9) An experienced carpenter can frame a house twice as fast as an apprentice. Working together, it takes both of them 2 days. How many days would it take the apprentice working alone?

Problem 10) One hose can fill a tank in 15 minutes and another separate hose can fill it is 45 minutes. If both hoses are used, how many minutes will it take to fill the tank? Express your answer with two decimals.

Problem 11) A cold water faucet can fill the bathtub in 12 minutes, and a hot water faucet can fill the bathtub in 18 minutes. How many minutes, to the nearest tenth, would it take to fill the bath tub with warm water (the faucets on at the same time)?

Problem 12) Brian, Mark and Jeff are painting a house. Brian would take 15 hours to paint the house by himself. Mark would take 20 hours to paint the house by himself. Jeff would take 25 hours to paint the house by himself. How long, in hours to the nearest tenth, would it take all three men to paint the house together?

Problem 13) Jamie can repair a fence in 16 hours and Mark can repair it in 24 hours. How many hours, to the nearest tenth, would it take to repair the fence if they work together?

Problem 14) Janice can complete a project in 55 mintues. If Janice and Jessica both work on the project, it takes 35 minutes. How many minutes would it take for Jessica to complete the project by herself? Express your answer with two decimals.

Problem 15) Heather and Kathleen are asked to prepare the food for a banquet. Heather can prepare the food by herself in 15 hours. Kathleen can prepare the food by herself in 18 hours. How many hours, to the nearest two decimals, will it take to prepare the food if they work together?

Problem 16) David and Lucy have to stuff and mail 500 envelopes for a new marketing campaign. David can do the job alone in 8 hours. If Lucy helps, they can get the job done in 4 hours. How many hours would it take for Lucy to do the job alone?

Problem 17) One pipe can fill a swimming pool in 18 hours, while another pipe can fill the same pool in 24 hours. How long, to the nearest tenth of an hour, will it take if both pipes are used to fill the tank?

Problem 18) Jason can mow his lawn in 4 hours and Randy can mow it in 6 hours. How many hours, to the nearest tenth, would it take to mow it if they work together?

Problem 19) Using a riding lawn mower, John, the landscaper of a large park, can mow the lawn in 14 hours. With a small mower, his assistant Becky needs 18 hours to mow the same lawn. If John and Becky work together mowing the lawn, exactly how many hours will it take?

Problem 20) Bill and Jack decide to pull weeds. Bill can pull all of the weeds by himself in 5 hours. If Jack helps him, they can pull the same amount of weeds in 3 hours. How many hours, to the nearest tenth, would it take Bill to pull the weeds working alone?

Answers - Algebra Word Problems – Lesson 10 - Worksheet 10 - Algebra Word Problems Involving Work

Problem 1) Jackie can paint a fence in 9 hours and Jeremy can paint it in 6 hours. How many hours will it take to paint it if they work together? Round your answer to the nearest tenth.

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{x}{9} + \frac{x}{6} = 1$$

Multiply the equation by 18:

$$18\left(\frac{x}{9} + \frac{x}{6} = 1\right)$$

$$2x + 3x = 18$$

$$5x = 18$$

$$x = \frac{18}{5} = 3.6$$

Answer: 3.6 hours

Problem 2) Walter and James are asked to paint a house. Walter can paint the house by himself in 12 hours. James can paint the house by himself in 16 hours. How many hours, to the nearest two decimals, will it take to paint the house if they work together?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{x}{12} + \frac{x}{16} = 1$$

Multiply the equation by 48:

$$48\left(\frac{x}{12} + \frac{x}{16} = 1\right)$$

$$4x + 3x = 48$$

$$7x = 48$$

$$x = \frac{48}{7} = 6.86$$

Answer: 6.86 hours

Problem 3) Mike and Lacey have to stuff and mail 1000 envelopes for a new marketing campaign. Mike can do the job alone in 6 hours. If Lacey helps, they can get the job done in 4 hours. How many hours would it take for Lacey to do the job alone?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{4}{6} + \frac{4}{t} = 1$$

Multiply the equation by $6t$:

$$6t\left(\frac{4}{6} + \frac{4}{t} = 1\right)$$

$$4t + 24 = 6t$$

$$24 = 2t$$

$$t = \frac{24}{2} = 12$$

Answer: 12 hours

Problem 4) One pipe can fill a swimming pool in 10 hours, while another pipe can fill the same pool in 15 hours. How many hours will it take if both pipes are used to fill the tank?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{x}{10} + \frac{x}{15} = 1$$

Multiply the equation by 30:

$$30\left(\frac{x}{10} + \frac{x}{15} = 1\right)$$

$$3x + 2x = 30$$

$$5x = 30$$

$$x = \frac{30}{5} = 6$$

Answer: 6 hours

Problem 5) One roofer can put a new roof on a house three times faster than another. Working together, they can roof the house in 5 days. Approximately how many days would it take the faster roofer working alone?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{5}{3t} + \frac{5}{t} = 1$$

Multiply the equation by $3t$:

$$3t\left(\frac{5}{3t} + \frac{5}{t} = 1\right)$$

$$5 + 15 = 3t$$

$$20 = 3t$$

$$t = \frac{20}{3} = 6.\bar{6} \sim 6.7$$

Answer: 6.7 days

Problem 6) Using a riding lawn mower, Jack, the landscaper of a large park, can mow the lawn in 8 hours. With a small mower, his assistant Bob needs 14 hours to mow the same lawn. If Jack and Bob work together mowing the lawn, approximately how many hours will it take?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{x}{8} + \frac{x}{14} = 1$$

Multiply the equation by 56:

$$56\left(\frac{x}{8} + \frac{x}{14} = 1\right)$$

$$7x + 4x = 56$$

$$11x = 56$$

$$x = \frac{56}{11} = 5.09 \sim 5$$

Answer: 5 hours

Problem 7) Jack and Jill are going up the hill to pull weeds. Jack can pull all of the weeds by himself in 8 hours. If Jill helps him, they can pull the same amount of weeds in 5 hours. How many hours would it take Jill to pull the weeds working alone?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{5}{8} + \frac{5}{t} = 1$$

Multiply the equation by $8t$:

$$8t\left(\frac{5}{8} + \frac{5}{t} = 1\right)$$

$$5t + 40 = 8t$$

$$40 = 3t$$

$$t = \frac{40}{3} = 13.\bar{3} \sim 13.3$$

Answer: 13.3 hours

Problem 8) Will and Matt own a small business. Will, working alone, can complete a task in 7 hours. Matt can complete the same task in 9 hours. Exactly how many hours would it take them to complete the task working together?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{x}{7} + \frac{x}{9} = 1$$

Multiply the equation by 63:

$$63\left(\frac{x}{7} + \frac{x}{9} = 1\right)$$

$$9x + 7x = 63$$

$$16x = 63$$

$$x = \frac{63}{16} = 3.9735$$

Answer: 3.9735 hours

Problem 9) An experienced carpenter can frame a house twice as fast as an apprentice. Working together, it takes both of them 2 days. How many days would it take the apprentice working alone?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{2}{2t} + \frac{2}{t} = 1$$

Multiply the equation by $2t$:

$$2t\left(\frac{2}{2t} + \frac{2}{t} = 1\right)$$

$$2 + 4 = 2t$$

$$6 = 2t$$

$$t = \frac{6}{2} = 3$$

Answer: 3 days

Problem 10) One hose can fill a tank in 15 minutes and another separate hose can fill it is 45 minutes. If both hoses are used, how many minutes will it take to fill the tank? Express your answer with two decimals.

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{x}{15} + \frac{x}{45} = 1$$

Multiply the equation by 45:

$$45\left(\frac{x}{15} + \frac{x}{45} = 1\right)$$

$$3x + x = 45$$

$$4x = 45$$

$$x = \frac{45}{4} = 11.25$$

Answer: 11.25 minutes

Problem 11) A cold water faucet can fill the bathtub in 12 minutes and a hot water faucet can fill the bathtub in 18 minutes. How many minutes, to the nearest tenth, would it take to fill the bath tub with warm water (the faucets on at the same time)?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{x}{12} + \frac{x}{18} = 1$$

Multiply the equation by 36:

$$36\left(\frac{x}{12} + \frac{x}{18} = 1\right)$$

$$3x + 2x = 36$$

$$5x = 36$$

$$x = \frac{36}{5} = 7.2$$

Answer: 7.2 minutes

Problem 12) Brian, Mark and Jeff are painting a house. Brian would take 15 hours to paint the house by himself. Mark would take 20 hours to paint the house by himself. Jeff would take 25 hours to paint the house by himself. How long, in hours to the nearest tenth, would it take all three men to paint the house together?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by three people A, B and C, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} + \frac{x}{t_C} = 1$$

Substitute the numbers into the above formula:

$$\frac{x}{15} + \frac{x}{20} + \frac{x}{25} = 1$$

Multiply the equation by 300:

$$300\left(\frac{x}{15} + \frac{x}{20} + \frac{x}{25} = 1\right)$$

$$20x + 15x + 12x = 300$$

$$47x = 300$$

$$x = \frac{300}{47} = 6.382978 \sim 6.4$$

Answer: 6.4 hours

Problem 13) Jamie can repair a fence in 16 hours and Mark can repair it in 24 hours. How many hours, to the nearest tenth, does it take to repair the fence if they work together?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{x}{16} + \frac{x}{24} = 1$$

Multiply the equation by 48:

$$48\left(\frac{x}{16} + \frac{x}{24} = 1\right)$$

$$3x + 2x = 48$$

$$5x = 48$$

$$x = \frac{48}{5} = 9.6$$

Answer: 9.6 hours

Problem 14) Janice can complete a project in 55 mintues. If Janice and Jessica both work on the project, it takes 35 minutes. How many minutes would it take for Jessica to complete the project by herself? Express your answer to two decimals.

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{t}{t_A} + \frac{t}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{35}{55} + \frac{35}{t} = 1$$

$$\frac{7}{11} + \frac{35}{t} = 1$$

Multiply the equation by $11t$:

$$11t\left(\frac{7}{11} + \frac{35}{t} = 1\right)$$

$$7t + 385 = 11t$$

$$385 = 4t$$

$$t = \frac{385}{4} = 96.25$$

Answer: 96.25 minutes

Problem 15) Heather and Kathleen are asked to prepare the food for a banquet. Heather can prepare the food by herself in 15 hours. Kathleen can prepare the food by herself in 18 hours. How many hours, to the nearest tenth, will it take to prepare the food if they work together?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{x}{15} + \frac{x}{18} = 1$$

Multiply the equation by 90:

$$90\left(\frac{x}{15} + \frac{x}{18} = 1\right)$$

$$6x + 5x = 90$$

$$11x = 90$$

$$x = \frac{90}{11} = 8.\overline{18} \sim 8.2$$

Answer: 8.2 hours

Problem 16) David and Lucy have to stuff and mail 500 envelopes for a new marketing campaign. David can do the job alone in 8 hours. If Lucy helps, they can get the job done in 4 hours. How many hours would it take for Lucy to do the job alone?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{4}{8} + \frac{4}{t} = 1$$

Multiply the equation by $8t$:

$$8t\left(\frac{4}{8} + \frac{4}{t} = 1\right)$$

$$4t + 32 = 8t$$

$$32 = 4t$$

$$t = \frac{32}{4} = 8$$

Answer: 8 hours

Problem 17) One pipe can fill a swimming pool in 18 hours while another pipe can fill the same pool in 24 hours. How many hours, to the nearest tenth of an hour, will it take if both pipes are used to fill the tank?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{x}{18} + \frac{x}{24} = 1$$

Multiply the equation by 72:

$$72\left(\frac{x}{18} + \frac{x}{24} = 1\right)$$

$$4x + 3x = 72$$

$$7x = 72$$

$$x = \frac{72}{7} = 10.285714 \sim 10.3$$

Answer: 10.3 hours

Problem 18) Jason can mow his lawn in 4 hours and Randy can mow it in 6 hours. How many hours, to the nearest tenth, does it take to mow it if they work together?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{x}{4} + \frac{x}{6} = 1$$

Multiply the equation by 12:

$$12\left(\frac{x}{4} + \frac{x}{6} = 1\right)$$

$$3x + 2x = 12$$

$$5x = 12$$

$$x = \frac{12}{5} = 2.4$$

Answer: 2.4 hours

Problem 19) Using a riding lawn mower, John, the landscaper of a large park, can mow the lawn in 14 hours. With a small mower, his assistant Becky needs 18 hours to mow the same lawn. If John and Becky work together mowing the lawn, approximately exactly how many hours will it take?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{x}{14} + \frac{x}{18} = 1$$

Multiply the equation by 126:

$$126\left(\frac{x}{14} + \frac{x}{18} = 1\right)$$

$$9x + 7x = 126$$

$$16x = 126$$

$$x = \frac{126}{16} = 7.875$$

Answer: 7.875 hours

Problem 20) Bill and Jack decide to pull weeds. Bill can pull all of the weeds by himself in 5 hours. If Jack helps him, they can pull the same amount of weeds in 3 hours. How many hours, to the nearest tenth, would it take Bill to pull the weeds working alone?

Solution:

Work is calculated using for formula $r \cdot t =$work, where r is the rate and t is the time. When the work is performed by two people A and B, the formula becomes:

$$\frac{x}{t_A} + \frac{x}{t_B} = 1$$

Substitute the numbers into the above formula:

$$\frac{3}{5} + \frac{3}{t} = 1$$

Multiply the equation by $5t$:

$$5t\left(\frac{3}{5} + \frac{3}{t} = 1\right)$$

$$3t + 15 = 5t$$

$$15 = 2t$$

$$t = \frac{15}{2} = 7.5$$

Answer: 7.5 hours