

8.4 Rational Expressions -- Application problems

Math 0980 AS

WORK PROBLEMS:

1. A bathtub can be filled by the cold water faucet in 10 minutes and by the hot water faucet in 12 minutes. How long does it take to fill the tub if both faucets are open?
2. If Clyde can do a job in 8 days and Irv can do the same job in 3 days, how long would it take them to do the job together?
3. When each works alone, Brad Rodgers can mow a lawn in 3 hr less time than Don Cole. When they work together, it takes 2 hrs. How long does it take each to do the job by himself?
4. It takes Sybil 6 hrs longer to paint a room than it takes Joanne. Working together, they can paint the room in 4 hours. How long would it take each working alone to paint the room?
5. Matt can plow out all the driveways on his street with his new 4-wheel-drive truck in 6 hours. His neighbor using a snow blade on a lawn tractor can plow out the same number of driveways in 9 hours. How long would it take them to do the work together?
6. Pipe A and pipe B can together fill a swimming pool in 2 hours. If only pipe A is used, the pool can be filled in 3 hours. How long would it take for only pipe B to fill the pool?
7. The new laser printer can print a 100 page report in 3 minutes. The old dot matrix printer can print 100 pages in 9 minutes. If the two printers worked together, how long would it take to print the 100 page report?

GENERAL THOUGHT CONCERNING WORK PROBLEMS:

1. First determine what it is that you don't know! Are you looking for a "time together" or are you given the time together and are looking for the rate of one of the participants.
2. Estimate the range of reasonable answers. For example, in number 2, it will take less than 3 days working together since Clyde could *just sit and watch* Irv and the job would *still* be finished in 3 days! So if you come up with an answer of 3 days or more -- look for an error in your work

1. A bathtub can be filled by the cold water faucet in 10 minutes and by the hot water faucet in 12 minutes. How long does it take to fill the tub if both faucets are open?

Rate of cold: $1/10$

Equation: $x/10 + x/12 = 1$

Rate of hot: $1/12$

Time together: x

Solution: about $5 \frac{1}{2}$ minutes.

2. If Clyde can do a job in 8 days and Irv can do the same job in 3 days, how long would it take them to do the job together?

Rate of Clyde: $1/8$

Equation: $x/8 + x/3 = 1$

Rate of Irv: $1/3$

Time together: x

Solution: $24/11$ days (just over 2 days)

3. When each works alone, Brad Rodgers can mow a lawn in 3 hr less time than Don Cole. When they work together, it takes 2 hrs. How long does it take each to do the job by himself?

Rate of Brad: $x - 3$

Equation: $2/(x-3) + 2/x = 1$

Rate of Don: x

Time together: 2 hrs

Solution: Brad 3 hours, Don 6 hours

4. It takes Sybil 6 hrs longer to paint a room than it takes Joanne. Working together, they can paint the room in 4 hours. How long would it take each working alone to paint the room?

Rate of Sybil: $6 + x$

Equation: $4/(6+x) + 4/x$

Rate of Joanne: x

Time together: 4 hrs

Solution: Sybil: 12 hours, Joanne: 6 hours

5. Matt can plow out all the driveways on his street with his new 4-wheel-drive truck in 6 hours. His neighbor using a snow blade on a lawn tractor can plow out the same number of driveways in 9 hours. How long would it take them to do the work together?

Rate of Matt: $1/6$

Equation: $x/6 + x/9 = 1$

Rate of neighbor: $1/9$

Time together: x

Solution: 3.6 hours

6. Pipe A and pipe B can together fill a swimming pool in 2 hours. If only pipe A is used, the pool can be filled in 3 hours. How long would it take for only pipe B to fill the pool?

Rate of pipe A: 3 hours

Equation: $2/3 + 2/x = 1$

Rate of pipe B: x hours

Together: 2 hours

Solution: B could fill the pool in 6 hours

7. The new laser printer can print a 100 page report in 3 minutes. The old dot matrix printer can print 100 pages in 9 minutes. If the two printers worked together, how long would it take to print the 100 page report?

Rate of laser: $1/3$

Equation: $x/3 + x/9 = 1$

Rate of dot matrix: $1/9$

Time together: x

Solution: 2.25 minutes