

Algebra 1: 1AL3-4 Work Problems

© The Team

MULTIPLE CHOICE

1. On the repair of a security system, two locksmiths are working. The first can finish the job alone in 3 hours and the second in 15 hours. Both locksmiths work together on the repair for 1 hours, and then the second locksmith leaves. How long must the first locksmith work to finish the job? Round your answer to the nearest minute.
- a. 9 hours
b. 1 hours 48 minutes
c. 2 hours 40 minutes
d. 1 hours 3 minutes

ANS: B

Always remember in problems involving “work” that you must **first** put all of the information into the common unit: “what fraction of the job is done in **one** hour?” (or whatever time unit is given). Here:

- locksmith 1 can do: $\frac{1}{3}$ of the job in one hour.
- locksmith 2 can do: $\frac{1}{15}$ of the job in one hour.

Together, they can do: $\left(\frac{1}{3} + \frac{1}{15}\right)$ of the job in one hour.

The problem says that they work together 1 hours so when the second locksmith leaves, they have finished:

$$1 \cdot \left(\frac{1}{3} + \frac{1}{15}\right) \text{ of the job.}$$

Now, let x = number of hours that it takes the first locksmith to finish the job. Remember that every hour, this locksmith does $\frac{1}{3}$ of the job.

VERY IMPORTANT: The whole job is “1” .

So: $1 \cdot \left(\frac{1}{3} + \frac{1}{15}\right) + x \cdot \frac{1}{3} = 1$. This is our equation. (Whew!!)

We leave the solution of this equation to the reader (aren’t we the meanies...).

Anyway: $x = 1.8$ hours. The integer part of this number is the hours.

Subtracting the integer part, we have: $0.8 \cdot 60 = 48$ minutes.

The answer is: The first locksmith must work 1 hours 48 minutes.

	Feedback
A	The first locksmith remained, not the second!
B	Correct!
C	This is a decent guess, but it is wrong.
D	You forgot to find the common denominator when adding $\left(\frac{1}{3} + \frac{1}{15}\right)$.

PTS: 4 DIF: Grade 8 REF: 1ALG.15.0
OBJ: Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems. TOP: Algebra 1 KEY: work | real-world problems | equations-solving
NOT: whole number of minutes

7. On the repair of a tv, two electricians are working. The first electrician can do the job alone in 16 hours. Together they can do the job in 9 hours. How long does it take the second electrician to do the job alone? Round your answer to the nearest minute.
- a. 19 hours 59 minutes c. 7 hours
 b. 20 hours 34 minutes d. 13 hours 34 minutes

ANS: B

Always remember in problems involving “work” that you must **first** put all of the information into the common unit: “what fraction of the job is done in **one** hour?” (or whatever time unit is given). Here:

- electrician 1 can do: $\frac{1}{16}$ of the job in one hour.

Let x = hours it takes for the second electrician to do the whole job. Then:

- electrician 2 can do: $\frac{1}{x}$ of the job in one hour.

So, from this information: together they can do: $\left(\frac{1}{16} + \frac{1}{x}\right)$ of the job in one hour.

The problem states that they can do: $\frac{1}{9}$ of the job in one hour.

So: $\left(\frac{1}{16} + \frac{1}{x}\right) = \frac{1}{9}$ and this is our equation.

We leave the solution of this equation to the reader (aren’t we the meanies...).

Anyway: $x = 20.571428571429$ hours. The integer part of this number is the hours.

Subtracting the integer part, we have: $0.571428571429 \cdot 60 = 34.28571 = 34$ minutes.

The answer is: The second electrician must work 20 hours 34 minutes.

	Feedback
A	This is a decent guess, but it is wrong.
B	Correct!
C	This is absolutely the wrong way to do “work” problems.
D	This is just a guess.

PTS: 3

DIF: Grade 8

REF: 1ALG.15.0

OBJ: Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems.

TOP: Algebra 1

KEY: work | real-world problems | equations-solving

NOT: must round minutes

NUMERIC RESPONSE

1. Kevin and Cathy are milking the cows. Together it takes them 6 hours. Last time Kevin did the job alone and the time before that Cathy did the job alone, but in 9 more hours than Kevin. How many hours does it take Kevin to do the job alone?

ANS: 9

PTS: 3 DIF: Grade 8 REF: 1ALG.15.0

OBJ: Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems. KEY: work | real-world problems | equations-solving

2. Cynthia takes 2 hours to wash 141 dishes. Martin takes 2 hours to wash 313 dishes. How many hours will it take them together to wash 454 dishes?

ANS: 2

PTS: 3 DIF: Grade 8 REF: 1ALG.15.0

OBJ: Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems. KEY: work | real-world problems | equations-solving

3. If it takes 11 bulldozers to dig a hole in 32 hours, how many bulldozers will it take to dig a hole in 16 hours?

ANS: 22

PTS: 1 DIF: Grade 8 REF: 1ALG.15.0

OBJ: Students apply algebraic techniques to solve rate problems, work problems, and percent mixture problems. KEY: work | real-world problems | equations-solving