

Watch the video “Baseball”, (extracted from the movie “Little big league”, 1994).

Tasks :

1°) Explain to the jury what the boy has to do for his homework.

2°) a) Three of the baseball players offer solutions of 15 hours, 8 hours and 4 hours. Explain how they obtain these solutions, and comment on the answers.

b) One of the baseball players says “*Maybe this is trick question, and perhaps there is no answer, maybe it’s one of those trick questions*”. He is wrong. Why ?

c) What is the final calculation in the video?

3°) Explaining the formula

a) Assume that it takes “ a ” hours for one person to paint a house. What fraction of the house is painted in one hour ?

b) With the help of a second person needing “ b ” hours, deduce the fraction of the house which is painted in one hour by the two people together.

$$\frac{a \times b}{a + b}$$

Then prove the formula $\frac{a \times b}{a + b}$ used by the last baseball player.

c) Compare with the answer given by the last baseball player.

4°) Applying the formula

Together, Arthur and Ben can paint a wall in one hour. If it takes Arthur 3 hours working alone to paint it, how long does it take Ben working alone to paint this wall ?

5°) If time, what do you think about the formula involving 3 people ?

Answers :

1°) The boy has the following word problem to solve : “Joe can paint a house in three hours, and Sam can paint the same house in five hours. How long does it take for them to do it together ?”

2°) *Pour ces questions, un raisonnement mathématique n'est pas attendu, et le bon sens suffit.*

a) Joe, working alone, can paint the house in three hours. Of course, with Sam's help, it will take less than three hours to do it together.

b) It's not a trick question, as it's obviously possible to perform that situation, and there is an answer, timing if needed.

c) $(3 \times 5) / (3 + 5)$ written on the board.

3°) a) He can do $\frac{1}{a}$ of the task in one hour.

b) The second person can do $\frac{1}{b}$ of the task in one hour. Together, they can do $\frac{1}{a} + \frac{1}{b}$ in one hour.

Solving the equation $\left(\frac{1}{a} + \frac{1}{b}\right) \times t = 1$ for t , we get $t = \frac{a \times b}{a + b}$.

c) The answer of $\frac{3 \times 5}{3 + 5} = \frac{15}{8} = 1\frac{7}{8}$ hours.

4°) using the formula, we get $\frac{3 \times b}{3 + b} = 1$.

Solving the equation for b : $3 \times b = 3 + b \Leftrightarrow 2b = 3 \Leftrightarrow b = 1.5$

Then Ben can paint the house in 1.5 hour.

5°) If time

Imagine that Tom can paint the house in four hours. Then, Tom can paint $\frac{1}{4}$ of the house in one hour

Together, in one hour, Joe, Sam, and Tom can paint $\frac{1}{5} + \frac{1}{3} + \frac{1}{4} = \frac{12}{60} + \frac{20}{60} + \frac{15}{60} = \frac{47}{60}$ of the house.

Together, they need $\frac{60}{47}$ hour.

The formula for 3 people is not $\frac{a \times b \times c}{a + b + c}$, but $\frac{a \times b \times c}{ab + bc + ac}$.