

An experienced machine shop operator produces a part in 10 minutes. His first student produces a part in 16 minutes and the second student produces a part in 20 minutes. Together they produced 51 parts. How many parts did each make?

Solution:

We can determine the overall rate of all 3 workers (working together):

$$\frac{1}{10} + \frac{1}{16} + \frac{1}{20} = \frac{8}{80} + \frac{5}{80} + \frac{4}{80} = \frac{17}{80} \frac{\text{part}}{\text{min}}$$

let x represent the time it takes for the 3 workers to make 51 parts.

$$\frac{17}{80} x = 51 \rightarrow 17x = (80)(51), x = 80 \frac{(51)}{17}$$

$$x = 80(3), x = 240 \text{ minutes.}$$

then

$$\frac{1}{10} \frac{\text{Part}}{\text{min}} \times 240 \text{ min} = 24 \text{ parts (experienced operator)}$$

$$\frac{1}{16} \frac{\text{Part}}{\text{min}} \times 240 \text{ min} = 15 \text{ parts (1st student)}$$

$$\frac{1}{20} \frac{\text{Part}}{\text{min}} \times 240 \text{ min} = 12 \text{ parts (2nd student)}$$