The Weekly Rigor

No. 366 "A mathematician is a machine for turning coffee into theorems." June 26, 2021

50 Word Problems Involving Rational Equations

(Part 16)

26. Let *x* be how long it will take if they work together.

$\frac{1}{3}+\frac{1}{5}=\frac{1}{x} \quad \Longrightarrow \quad \frac{8}{15}=\frac{1}{x} \quad \Longrightarrow \quad x=\frac{15}{8}=1\frac{7}{8}$ hours working together.

32. Let *x* be how long Katie would take by herself.

$\frac{1}{6}+\frac{1}{x}=\frac{1}{\left(\frac{18}{5}\right)} \quad \Longrightarrow \quad \frac{x+6}{6x}=\frac{5}{18} \quad \Longrightarrow \quad 18(x+6)=30x \quad \Longrightarrow \quad x=9$ hours working by herself.

34. Let *x* be how long it will take Dan working by himself.

$\frac{1}{x}+\frac{1}{x-10}=\frac{1}{12} \quad \Longrightarrow \quad 12(x-10)+12x=x(x-10) \quad \Longrightarrow \quad x=30.$

∴ Dan would take 30 minutes and Julio 20 minutes each working alone.

36. Let *x* be how long before the tank overflows.

$\frac{1}{10}-\frac{1}{12}=\frac{1}{x} \quad \Longrightarrow \quad 12x-10x=120 \quad \Longrightarrow \quad x=60.$

∴ The tank will overflow in 60 minutes.

41. $0.90(1.5)+0.60x=0.80(1.5+x) \quad \Longrightarrow \quad 0.75=x.$

44. $0.50x+0.75(100-x)=0.60(100) \quad \Longrightarrow \quad 60=x.$ ∴ 60 pints of A and 40 of B.

47. $0.20(20)+1.00x=0.25(20+x) \quad \Longrightarrow \quad x=\frac{4}{3}=1\frac{1}{3}$ ounces.

48. $0.80(20) - 1.00x = 0.70(20 - x) \quad \Longrightarrow \quad x = \frac{20}{3} = 6\frac{2}{3}$ ounces of water to evaporate.

49. Let *x* be the amount of the \$1.05 coffee. Let *y* be the amount of the \$0.85 coffee.
$x + y = 20 \quad \Longrightarrow \quad y = 20 - x.$ $1.05x + 0.85y = 0.90(x + y).$
$\overset{\text{SUB}}{\therefore} \quad 1.05x + 0.85(20 - x) = 0.90(20) \quad \Longrightarrow \quad x = 5.$
$\therefore$ 5 pounds of the \$1.05 coffee and 15 pounds of the \$0.85 coffee.