(5)

There is a number consisting of two digits; the sum of the digits is equal to one-fourth of the number, and if 18 be added to the number the digits will be inverted. What is the number?

Let xy be the number, which will consequently be equal to $10x + y$

Now by the question $x + y = \frac{10x + y}{4}$

and $10x + y + 18 = 10y + x$

From the first $4x + 4y = 10x + y$

$\therefore 3y = 6x$

$y = 2x$

Substituting this value of y in the second $10x + 2x + 18 = 20x + x$

$12x - 21x = -18$

$9x = 18$

$\therefore x = 2$

and $y = 2x = 4$

Hence the number is 24.

(6)

There is a certain fraction; if 1 be added to the numerator it becomes $\frac{1}{2}$, but if 3 be added to the denominator it becomes $\frac{1}{3}$. What is the fraction?

Let $\frac{x}{y}$ = the fraction,

Then $\frac{x+1}{y} = \frac{1}{2}$

and $\frac{x}{y+3} = \frac{1}{3}$