Pair of Linear Equations in Two varibles Ex 3.10 Q12

Answer :

Let the speed of rowing in still water be x km/hr and the speed of the current be y km/hr

Speed upstream $=(x-y)\,km/hr$

Speed downstream $=(x+y)\,km/hr$

Now,

Time taken to cover 20 km down stream $=\dfrac{20}{x+y}\,hrs$

Time taken to cover 4 km upstream $=\dfrac{4}{x-y}\,hrs$

But, time taken to cover 20 km downstream in $2hours$

$$\frac{20}{x+y}=2$$

$$20=2(x+y)$$

$$20=2x+2y\cdots(i)$$

Time taken to cover 4 km upstream in 2 hours

$$\frac{4}{x-y}=2$$

$$4=2(x-y)$$

$$4=2x-2y \quad \ldots(ii)$$

By solving these equation (i) and (ii) we get

$$2x+2y=20$$

$$2x-2y=4$$

$$4x=24$$

$$x=\frac{24}{4}$$

$$x=6$$

Substitute $x=6$ in equation (i)we get

$$2x+2y=20$$

$$12+2y=20$$

$$2y=20-12$$

$$2y=8$$

$$y=\frac{8}{2}$$

$$y=4$$

Hence, the speed of rowing in still water is $\boxed{6\ km/hr}$.

The speed of current is $\boxed{4\ km/hr}$ .4 km/ hr

Pair of Linear Equations in Two varibles Ex 3.10 Q13

Answer :

Let the speed of A and B be x Km/hr and y Km/hr respectively. Then,

Time taken by A to cover $30km = \frac{30}{x} hrs$,

And, Time taken by B to cover $30km = \frac{30}{y} hrs$.

By the given conditions, we have

$$\frac{30}{x} - \frac{30}{y} = 3$$

$$\frac{10}{x} - \frac{10}{y} = 1 \cdots (i)$$

If A doubles his pace, then speed of A is $2x \ km/hr$

Time taken by A to cover $30km = \frac{30}{2x} hrs$,

Time taken by B to cover $30km = \frac{30}{y} hrs$.

According to the given condition, we have

$$\frac{30}{y} - \frac{30}{2x} = 1\frac{1}{2}$$

$$\frac{30}{y} - \frac{30}{2x} = \frac{3}{2}$$

$$\frac{30}{y} \times \frac{1}{3} - \frac{30}{2x} \times \frac{1}{3} = \frac{3}{2} \times \frac{1}{3}$$

$$\frac{^{10}\cancel{30}}{y}\times\frac{1}{\cancel{3}}-\frac{^{10}\cancel{30}}{2x}\times\frac{1}{\cancel{3}}=\frac{\cancel{3}}{2}\times\frac{1}{\cancel{3}}$$

$$\frac{10}{x}-\frac{5}{y}=\frac{1}{2}$$

$$-\frac{10}{x}+\frac{20}{y}=1$$

Putting $\frac{1}{x}=u$ and $\frac{1}{y}=v$, in equation (i) and (ii), we get

$$10u-10v=1$$

$$10u-10v-1=0\cdots(iii)$$

$$-10u+20v=1$$

$$-10u+20v-1=0\cdots(iv)$$

Adding equations (iii) and (iv), we get,

$$10v-2=0$$

$$10v=2$$

$$v=\frac{2}{10}$$

$$v=\frac{1}{5}$$

Putting $v=\frac{1}{5}$ in equation (iii), we get

$$10u-10v-1=0$$

$$10u-10\times\frac{1}{5}-1=0$$

$$10u - 2 - 1 = 0$$

$$10u - 3 = 0$$

$$10u = 3$$

$$u = \frac{3}{10}$$

Now, $u = \frac{3}{10}$

$$\frac{1}{x} = \frac{3}{10}$$

$$x = \frac{10}{3}$$

and, $v = \frac{1}{5}$

$$\frac{1}{y} = \frac{1}{5}$$

$$y = 5$$

Hence, the A's speed is $\boxed{\frac{10}{3}\ km/hr}$.

The B's speed is $\boxed{5\ km/hr}$.

********** END **********