

## 2.2 Literal Equations

### A. Discussion

These are equations with many variables in them. The goal is to solve for one of them. To do this, treat all other variables as if they were numbers.

#### Strategy:

Move everything with the desired variable to one side and move everything else to the other side. Use the same methods as before.

### B. Examples

**Example 1:** Solve  $6xy - 3y = 2xy + 2$  for  $x$

#### Solution

Identify the terms with  $x$ :

$$\underline{6xy} - 3y = \underline{2xy} + 2$$

Move the terms with  $x$  to the same side: move  $2xy$  to the left

$$6xy - 3y \underline{-2xy} = 2xy + 2 \underline{-2xy}$$

$$4xy - 3y = 2$$

Identify the terms without  $x$ :

$$4xy \underline{-3y} = 2$$

Move the terms without  $x$  to the same side: move  $-3y$  to the right

$$4xy - 3y \underline{+3y} = 2 \underline{+3y}$$

$$4xy = 2 + 3y$$

Now divide by  $4y$  to get  $x$  by itself:  $\frac{4xy}{4y} = \frac{2+3y}{4y}$

**Ans**  $\boxed{x = \frac{2+3y}{4y}}$

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**Example 2:** Solve  $4 - \frac{a-2}{6} = \frac{3b}{2} - a$  for  $a$

**Solution**

Clear fractions: Multiply by LCD= 6

$$6 \left[ 4 - \frac{a-2}{6} \right] = 6 \left[ \frac{3b}{2} - a \right]$$

$$24 - (a - 2) = 9b - 6a$$

Clear parentheses:  $24 - a + 2 = 9b - 6a$

Thus we have  $26 - a = 9b - 6a$

Now identify the terms containing  $a$ :

$$26 \underline{-a} = 9b \underline{-6a}$$

Now get the terms with  $a$  in them to the same side: move them to the left

$$26 - a \underline{+6a} = 9b - 6a \underline{+6a}$$

$$26 + 5a = 9b$$

Now identify the terms without  $a$ :

$$\underline{26} + 5a = 9b$$

Now get the terms without  $a$  to the other side: move them to the right

$$26 + 5a \underline{-26} = 9b \underline{-26}$$

$$5a = 9b - 26$$

Divide by 5 to get  $a$  by itself:  $\frac{5a}{5} = \frac{9b-26}{5}$

**Ans**  $\boxed{a = \frac{9b-26}{5}}$