

Module 3.B : Algebra- Solving Equations

SECTION 1 : Solve a linear equation.

Steps to solving a linear equation.

- Use the distributive property to remove all parentheses.
- Collect like terms.
- Isolate the variable on one side of the equal sign, numbers to the other side of the equal sign.

EXERCISE 3

$$\text{Solve } 4x - (x - 8) + 2x - 3(x + 1) = 1$$

SOLUTION

$$4x - (x - 8) + 2x - 3(x + 1) = 1$$

$$4x - x + 8 + 2x - 3x - 3 = 1$$

$$2x + 5 = 1 \Rightarrow 2x = -4 \Rightarrow x = -2$$

SECTION 2 : Solve a system of linear equations.

EXERCISE 4

Solve the following system of equations.

$$\begin{cases} 4x - 3y = 1 \\ -6x + 6y = -1 \end{cases}$$

SOLUTION

To solve, we will use the addition method. We will multiply equation 1 by 2 to eliminate the variable y .

$$\left. \begin{array}{l} 2(4x - 3y = 1) \\ -6x + 6y = -1 \end{array} \right\} \Rightarrow \left. \begin{array}{l} 8x - 6y = 2 \\ \underline{-6x + 6y = -1} \end{array} \right\}$$
$$2x = 1 \Rightarrow x = \frac{1}{2}$$

Now, we substitute $x = \frac{1}{2}$ into the one of the equations.

$$4\left(\frac{1}{2}\right) - 3y = 1 \Rightarrow 2 - 3y = 1 \Rightarrow -3y = 1 - 2 \Rightarrow -3y = -1 \Rightarrow y = \frac{-1}{-3} \Rightarrow y = \frac{1}{3}$$

The solution is $\left(\frac{1}{2}, \frac{1}{3}\right)$.

SECTION 3 : Solve a quadratic equation.

Steps to solve a quadratic equation.

First: collect all terms on one side of the equation.

Then:

- Factor (if possible).
- Set each factor equal to zero.
- Solve for x .

Or

- Use the quadratic formula, $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

EXERCISE 5

Solve. $x^2 - 3x = 18$

SOLUTION

$$x^2 - 3x = 18 \Rightarrow x^2 - 3x - 18 = 0 \Rightarrow (x - 6)(x + 3) = 0 \Rightarrow x - 6 = 0 \text{ or } x + 3 = 0 \Rightarrow x = 6 \text{ or } x = -3$$

SECTION 4 : Solve an application word problem.

EXERCISE 6

You earn a 75, 87, 58 and a 94 on the first four exams respectively. What do you need to earn on the last exam to earn a B for the course (an 80 percent average)? Note all of the exams are weighted the same.

SOLUTION

To get a B, you need $(80)(5) = 400$ points.

So far, you earned $75 + 87 + 58 + 94 = 314$.

$400 - 314 = 86$. You need to earn an 86 on the last exam.

MODULE 3.B - ASSESSMENT

_____3. Solve $2x - (3x - 8) + 5x - 6(x - 1) = 11$

- A** $-\frac{3}{2}$ **B** $\frac{3}{2}$ **C** $\frac{-25}{2}$ 14 **D** 1 **E** I do not know

_____4. Solve the following system of equations, $\begin{cases} 3x - 2y = 6 \\ -2x + 4y = -8 \end{cases}$.

- A** $\left(1, \frac{3}{2}\right)$ **B** $\left(1, -\frac{3}{2}\right)$ **C** $\left(-\frac{1}{2}, -\frac{9}{4}\right)$ **D** $\left(\frac{5}{2}, \frac{3}{4}\right)$ **E** I do not know

_____5. You earn a 60, 97, 80 and a 85 on four exams. What do you need to earn on the last exam to earn a B for the course (an 80 percent average)? All of the exams are weighted the same.

- A** 70 **B** 68 **C** 70.5 **D** none of these **E** I do not know

_____6. Solve $x^2 - 5x - 36 = 0$.

- A** $x = 9, -4$ **B** $x = -9, 4$ **C** $x = 6, 11$ **D** $x = 9, 4$ **E** I do not know