SOLVING EQUATIONS

A DEFINITIONS

Discover: Welcome to the Math Escape Room! Today, you will embark on a journey to find the secret one-digit code. With your team, you must use your problem-solving skills to crack the code!
The code is:

$$\triangle + 10 = 1 + 2 \times 6$$
$$\triangle = \square$$

You have only one opportunity.

- Louis proposes to enter $\boxed{8}$
- Su proposes to enter $\boxed{3}$

Which code will you use to enter?

Answer: We will test each proposed code to determine which one satisfies the given equation.

- Test Louis's code: $\triangle = 8$

$$\begin{aligned} (8) + 10 &= 1 + 2 \times 6 && \text{(Substitute)} \\ 18 &= 1 + 12 \\ 18 &= 13 && \text{(False)} \end{aligned}$$

- Test Su's code: $\triangle = 3$

$$\begin{aligned} (3) + 10 &= 1 + 2 \times 6 && \text{(Substitute)} \\ 13 &= 1 + 12 \\ 13 &= 13 && \text{(True)} \end{aligned}$$

Therefore, the correct code to enter is: $\triangle = 3$.

Definition **Solving an Equation**

Solving an equation involves finding the values of the variable, called **solutions**, that make the equation true.
In this context, the variable is called the **unknown**.
We often use the letter x to represent the unknown.

Ex: Show that a solution of $3 + x = 5$ is $x = 2$.

Answer: For $x = 2$:

$$\begin{aligned} 3 + (2) &= 5 && \text{(substituting)} \\ 5 &= 5 && \text{(True)} \end{aligned}$$

Ex: Show that $x = 1$ is **not** a solution of $3 + x = 5$.

Answer: For $x = 1$:

$$\begin{aligned} 3 + (1) &= 5 && \text{(substituting)} \\ 4 &= 5 && \text{(False)} \end{aligned}$$

B SOLVING BY TRIAL AND ERROR

Method **Trial and Error**

The **trial and error method** is a problem-solving strategy used to find a solution to an equation by testing different values for the unknown variable until the correct value is found.

Ex: Consider the equation $2x + 3 = 11$.
Use the trial and error method to find a solution.

Answer:

- Let's try $x = 2$:

$$\begin{aligned} 2 \times (2) + 3 &= 11 && \text{(Substitute)} \\ 4 + 3 &= 11 \\ 7 &= 11 && \text{(False)} \end{aligned}$$

- Let's try $x = 3$:

$$\begin{aligned} 2 \times (3) + 3 &= 11 && \text{(Substitute)} \\ 6 + 3 &= 11 \\ 9 &= 11 && \text{(False)} \end{aligned}$$

- Let's try $x = 4$:

$$\begin{aligned} 2 \times (4) + 3 &= 11 && \text{(Substitute)} \\ 8 + 3 &= 11 \\ 11 &= 11 && \text{(True)} \end{aligned}$$

Therefore, a solution to the equation $2x + 3 = 11$ is $x = 4$.