# Qudratic Equation Lesson

## Quadratic Equation Lesson

In this lesson, we will explore how to apply the quadratic equation and graphically demonstrate the correctness of the solution.

### Define variables

- We'll use **d** instead of `c` to avoid conflicts with the reserved function name in R.

[ a = 1, b = -1, d = -2 ]

### Quadratic Equation

The quadratic equation is given by:

$f(x) = ax^2 + b + d = 0$

Let's calculte the solutions to this equation.

```
# Define the quadratic equation coefficients
a <- 1
b <- -1
d <- -2

# Calculate the discriminant
discriminant <- b^2 - 4*a*d

# Check if the discriminant is non-negative (real solutions)
if (discriminant >= 0) {
  # Calculate the solutions
  x1 <- (-b + sqrt(discriminant)) / (2*a)
```

```
    x2 <- (-b - sqrt(discriminant)) / (2*a)

  # Print the solutions
    cat("Solutions: x1 =", x1, ", x2 =", x2, "\n")
  } else {
    cat("The quadratic equation has no real solutions.\n")
  }
```

Solutions: x1 = 2 , x2 = -1

**Graph**

```
# Generate x values for plotting the quadratic function
x_values <- seq(-3, 3, length.out = 100)
y_values <- a * x_values^2 + b * x_values + d

# Plot the quadratic function
plot(x_values, y_values, type = "l", col = "blue", lwd = 2, main = "Quadratic Equation Gra
      xlab = "x", ylab = "f(x)", ylim = c(min(y_values) - 2, max(y_values) + 2))
grid()
```

## Quadratic Equation Graph