Write the quadratic equation whose roots are 4 and -2, and whose leading coefficient is 4 .

(Use the letter to represent the variable.)

Solution:

A polynomial whose highest exponent is 2 is called a quadratic expression. The standard form of a quadratic expression is: $ax^2 + bx + c$ (in this polynomial, the highest power of the variable x is 2). In the quadratic expression (or the equation), a, b and c are called constants.

We can write a quadratic equation from its given roots by substituting them into separate expressions and then expanding those expressions. Substitute the roots into the form $y = (x - a)(x - b)$, where one root is substituted for "a" and the other for "b." In this task, substituting 4 and -2 into the form results in $y = (x - 4)(x + 2)$. In our case the leading coefficient is 4.

Multiply the two expressions with x together. Firstly we multiply the terms within the second pair of parentheses with the x of the first expression. Then multiply them by the constant in the first expression. In our task, multiplying x to x + 2 results in $x^2 + 2x$, and multiplying -4 to $x + 2$ results in $-4x - 8$. The equation now reads as $y = x^2 + 2x - -4x - 8$. Combine like terms to finalize the equation. Concluding this example, $2x$ and $-4x$ are similar terms, so combining them results in $2x - 4x = -2x$. So we get the quadratic equation $y = x^2 - 2x - 8$. In our task the leading coefficient is 4, so we multiply $4(x^2 - 2x - 8)$. The final quadratic equation $y = 4x^2 - 8x - 32$. We can check roots of the getting quadratic equation $4x^2 - 8x - 32$. Notice that we could divide through by 4. We get the quadratic equation in form $x^2 - 2x - 8 = 0$. Firstly submit root 4:

$$4^2 - 2 \cdot (4) - 8 = 0$$

$$16 - 8 - 8 = 0$$

$$16 - 16 = 0$$

Then submit second root -2:

$$(-2)^2 - (-2) \cdot 2 - 8 = 0$$

$$4 + 4 - 8 = 0$$

$$8 - 8 = 0$$

Answer: the quadratic equation whose roots are 4 and -2, and whose leading coefficient equals 4 is $y = 4x^2 - 8x - 32$