Changing the subject of a formula

- more examples

(1) Make \( x \) the subject of:

\[
\frac{x^2}{a} - b = c \quad \text{(first make } x^2 \text{ subject)}
\]

\[
\left( + b \right) \quad \left( + b \right)
\]

\[
\frac{x^2}{b} = b + c
\]

\[
\left( x \ a \right) \quad \left( x \ a \right)
\]

\[
x^2 = a(b + c)
\]

Last step:

\[
\frac{x}{a} = \sqrt{a(b + c)}
\]

(2) Make \( x \) the subject of:

\[
x = \frac{a}{c + b}
\]

\[
\left( x + b \right) \quad \left( x + b \right)
\]

\[
x^2 + a = c(x + b)
\]

Here the letter \( x \) appears more than once. So we need to get all \( x \) terms on one side and all “non-\( x \)” terms on the other side.

\[
x^2 - a = cx + bc
\]

\[
\left( + a \right) \quad \left( + a \right)
\]

\[
x = cx + bc + a
\]

\[
\left( - cx \right) \quad \left( - cx \right)
\]

\[
x - c x = bc + a
\]

Factorize so that the letter \( x \) only appears once

\[
x(c - 1) = bc + a
\]

Divide by the bracket:
\[ xc = \frac{bc + a}{1 - c} \]

3) Make \( x \) the subject of

\[ P = \sqrt{s + \frac{x}{t}} \]

(square both sides)

\[ p^2 = s + \frac{x}{t} \]

\[ (-s) \]

\[ p^2 - s = \frac{x}{t} \]

\[ (x \times t) \]

\[ t(p^2 - s) = x \]

4)

\[ P = \frac{\sqrt{x + Q}}{R} \]

(square both sides)

\[ (PR)^2 = x + Q \]

\[ (-Q) \]

\[ P^2 R^2 - Q = x \]