APT tuition lab

Changing subject of formula

Students are supposed to make another unknown variable the new subject of the formula. Answer should always be left in the simplest form to prevent unnecessary lose of marks (take out common factor, change negative signs when possible)

As every question will be different, the following steps should be taken as a guideline, and not to be applied blindly.

1. Square both sides if there are any square roots to be removed. (note that all terms must be squared)

Example:

(Make p the subject of formula) $xy = \sqrt{\frac{2p}{3}}$

$x^2y^2 = \frac{2p}{3}$

Square both sides

2. If any side has 2 fractions, make them the same base and combine them.

Example:

(Make q the subject of formula) $x = \frac{1}{p} - \frac{3p+2}{q}$

$x = \frac{1}{pq} - \frac{p(3p+2)}{pq}$

Make both fractions have the same denominator

$x = \frac{1-p(3p+2)}{pq}$

Combine both fractions into 1 fraction

3. Use cross multiplication to change equation with fractions to linear equation

Example:

(Make p the subject of formula) $\frac{x}{3} = \frac{2x+p}{p+2}$

$x(p+2) = 3(2x+p)$

Cross multiply both fractions

4. Expand all the terms in order to take out terms with the interested unknown

Example:

(Make y the subject of formula) $x(3p + xy) = 4p(5 - y)$

$3px + x^2y = 20p - 4py$

Expand all terms

5. Move terms with interested unknown to 1 side and everything else to the other side

Example:

(Make q the subject of formula) $xp^2 + 2q = 3y^2 - 5x^2q$

$2q + 5x^2q = xp^2 + 3y^2$

Move terms with interested unknown (q) to 1 side and everything else to the other side

6. Take out interested unknown as a common factor

Example:

(Make x the subject of formula) $3x^2 + x^2pq = 2p^2 - pq^2$

$x^2(3 + pq) = 2p^2 - pq^2$

Take out x^2 as a common factor

7. Move the uninterested terms by dividing both sides (moving to the denominator of the other side)

Example:

(Make a the subject of formula) $a(3x^2 - 2xy) = 2 - 5pq$

$a = \frac{2-5pq}{(3x^2-2xy)}$

Divide both sides with the term that is not the interested unknown

8. Simplify the answer if necessary

Example:

(Make p the subject of formula) $p = \frac{q^2-9}{-(2q^2+6q)}$

$p = \frac{(q+3)(q-3)}{-2q(q+3)}$

Simplify the answer (factorization is a form of simplification)

$p = \frac{q-3}{-2q}$

Cancel out common factors

$p = \frac{3-q}{2q}$

Further simplification by removing negative sign (multiply (-1) to numerator and denominator

9. Square root the answer if necessary.

Example:

(Make a the subject of formula) $a^2 = \frac{3p+2}{qp}$

$a = \pm\sqrt{\frac{3p+2}{qp}}$

Square root both sides (don't forget to put $\pm$)