Provincial Education Department Sabaragamuwa

Subject: Mathematics

Week- 28

Grade: 10

Translated by: N. Dematage
Ke/Dehi/ Ruwanwella Royal College

23·Formulae

Change the subject of a formula which involves squares and roots

Example:

1. Let's make u the subject of the formula $v^2 = u^2 + 2fs$

To make u^2 the subject of the formula, the term $2fs$ should remove from the right hand side

For that, let's us subtract $2fs$ from both side

$$v^2 - 2fs = u^2 + 2fs - 2fs$$

$$v^2 - 2fs = u^2$$

Now, to make u the subject of the formula, let us take the square root of both sides.

$$\sqrt{v^2 - 2fs} = \sqrt{u^2}$$
$$\underline{\sqrt{v^2 - 2fs} = u}$$

2. Let's make g the subject of the formula, $T = 2\pi\sqrt{\frac{l}{g}}$

First, let's remove 2π from the right hand side. For that, divide both side from 2π

$$\frac{T}{2\pi} = \frac{2\pi\sqrt{\frac{l}{g}}}{2\pi}$$

$$\frac{T}{2\pi} = \sqrt{\frac{l}{g}}$$

Now, to remove the square root of g, square both sides

$$\left(\frac{T}{2\pi}\right)^2 = \left(\sqrt{\frac{l}{g}}\right)^2$$

$$\frac{T^2}{4\pi^2} = \frac{l}{g}$$

Since g is in the denominator, multiply both side by g

$$\frac{T^2}{4\pi^2} \times g = \frac{l}{\cancel{g}} \times \cancel{g}$$

$$\frac{T^2}{4\pi^2} \times g = l$$

Now, to remove $\frac{T^2}{4\pi^2}$, multifly both sides by $\frac{4\pi^2}{T^2}$

$$\frac{\cancel{T^2}}{\cancel{4\pi^2}} g \times \frac{\cancel{4\pi^2}}{\cancel{T^2}} = l \times \frac{4\pi^2}{T^2}$$

$$g = \frac{4\pi^2 l}{T^2}$$

Exercise :

Do the exercise 23.1 in the text book

Find the value of an unknown term in a formula when the values of the other unknown terms are given.

3. Given below is the formula for the volume (v) of a cylinder, in terms of its radius (r) and its height (h).

$$v = \pi r^2 h$$

Find the value of r when $v = 6160 \; and \;\; h = 10$. Take π as $\frac{22}{7}$

Let's first make r the subject of the formula $v = \pi r^2 h$

$$\frac{v}{\pi h} = \frac{\cancel{\pi} r^2 \cancel{h}}{\cancel{\pi h}}$$

$$\frac{v}{\pi h} = r^2$$

$$\sqrt{\frac{v}{\pi h}} = r$$

Now let us substitute the given values

$$r = \sqrt{\frac{v}{\pi h}}$$

$$r = \sqrt{\frac{6160}{\frac{22}{7} \times 10}}$$

$$r = \sqrt{\frac{\overset{28}{\cancel{6160}}}{\cancel{22} \times \cancel{10}} \times 7}$$

$$r = \sqrt{28 \times 7}$$
$$r = \sqrt{196}$$
$$r = 14$$

Exercises:

Do the exercise 23.2 in the text book