Math Diversion 554

P. Reany

May 3, 2025

> In every area of mathematics there are one or
> two really key ideas that capture all
> the important ideas.
> — Richard Bocherds

The YouTube video is found at:

```
Source: https://www.youtube.com/watch?v=e4iXxNNaj00
Title: This Simple Trick Solves Math Problem in Seconds!
 Presenter: Magna Math
```

1 The Problem

What's the value of the following sum?

$$\phi = \sum_{n=5}^{100} (3n - 2)\,. \tag{1}$$

2 The Preparation

I'm going to want to use the formula;

$$\sum_{j=1}^{n} j = \frac{n \cdot (n+1)}{2}\,, \tag{2}$$

and this too

$$\sum_{j=5}^{n} B = \sum_{j=1}^{n} B - \sum_{j=1}^{4} B\,. \tag{3}$$

3 The Solution

$$\phi = \sum_{n=5}^{100}(3n-2) \tag{4a}$$

$$= \sum_{n=1}^{100}(3n-2) - \sum_{n=1}^{4}(3n-2) \tag{4b}$$

$$= 3\sum_{n=1}^{100} n - 2\sum_{n=1}^{100} 1 - \Big[3\sum_{n=1}^{4} n - 2\sum_{n=1}^{4} 1\Big] \tag{4c}$$

$$= 3\frac{100\cdot 101}{2} - 2\cdot 100 - \big[3\cdot 10 - 2\cdot 4\big] \tag{4d}$$

$$= 15,150 - 200 - (30-8) \tag{4e}$$

$$= 14,928\,. \tag{4f}$$