Math Diversion Problem 559

P. Reany

May 5, 2025

Every big idea needs someone to defend it.
— Cybersecurity

The YouTube video is found at:

```
Source: https://www.youtube.com/watch?v=IxO6lM2Vwo0
Title: Math Olympiad
 Presenter: Learncommunolizer
```

1 The Problem

Given the relation

$$\frac{(x+6)!}{(x+2)!} = 1680\,, \tag{1}$$

find the integer values of x.

2 The Solution

The Given relation can be simplified to

$$(x+6)(x+5)(x+4)(x+3) = 1680\,, \tag{2}$$

and let's setup a table to assist.

x	$(x+6)(x+5)(x+4)(x+3)$
1	$7 \cdot 6 \cdot 5 \cdot 4 = 840$
2	$8 \cdot 7 \cdot 6 \cdot 5 = 1680$ ✓

Table 1: Heuristic: Solved by Table.

Hence, our solution is:

$$x = 2\,. \tag{3}$$