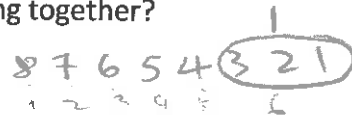


Example 3

You take eight children to the movies. In how many ways can they be seated in a row if Ahmed, Zinni, and Terry are best friends and insist on sitting together?



$$6! \cdot 3!$$

$$(6 \times 5 \times 4 \times 3 \times 2 \times 1) \times (3 \times 2 \times 1)$$

$$= 4320$$

Example 4

The University of Winnipeg bookstore has 12 textbooks that they want to display in their store window. There are 3 different science textbooks, 5 different mathematics textbooks, and 4 different engineering textbooks. In how many ways can the textbooks be displayed in a row if the bookstore wants to keep books from the same subject grouped together?



$$4! \cdot 5! \cdot 3! \cdot 3!$$

$$= 103680$$

Example 5

A teachers is lining 10 children up for a class photo.

a) How many ways can this be done if Dan and Nick, a pair of identical twins, must be kept together?



Together =

$$9! \cdot 2!$$

b) How many ways can this be done if Dan and Nick, a pair of identical twins, must be kept apart?

Apart A part TOTAL - together
 $10! - (9! \cdot 2!)$
 $3628800 - 72576$
 $= 2903040$