EXPANDING TRIPLE BRACKETS

Task 1 – Expand and fully simplify.

1) $x(x+2)(x+3) = \mathbf{x^3 + 5x^2 + 6x}$

2) $x(x-4)(x+1) = \mathbf{x^3 - 3x^2 - 4x}$

3) $x(x+5)(x-2) = \mathbf{x^3 + 3x^2 - 10x}$

4) $x(x-3)(x-6) = \mathbf{x^3 - 9x^2 + 18x}$

5) $x(x+7)(x-5) = \mathbf{x^3 + 2x^2 - 35x}$

Task 2 – Expand and fully simplify.

6) $(x+1)(x+2)(x+3) = \mathbf{x^3 + 6x^2 + 11x + 6}$

7) $(x+4)(x+5)(x+6) = \mathbf{x^3 + 15x^2 + 74x + 120}$

8) $(x+2)(x+3)(x+1) = \mathbf{x^3 + 6x^2 + 11x + 6}$

9) $(x-2)(x+3)(x+5) = \mathbf{x^3 + 6x^2 - x - 30}$

10) $(x+6)(x-1)(x+2) = \mathbf{x^3 + 7x^2 + 4x - 12}$

11) $(x-3)(x-2)(x+4) = \mathbf{x^3 - x^2 - 14x + 24}$

12) $(x-5)(x-1)(x+3) = \mathbf{x^3 - 3x^2 - 13x + 15}$

13) $(x-4)(x+4)(x+1) = \mathbf{x^3 + x^2 - 16x - 16}$

14) $(x-6)(x-2)(x-1) = \mathbf{x^3 - 9x^2 + 20x - 12}$

15) $(x+7)(x-3)(x+2) = \mathbf{x^3 + 6x^2 - 13x - 42}$

Task 3 – Expand and fully simplify.

16) $(2x+1)(x+3)(x+2) = \mathbf{2x^3 + 11x^2 + 17x + 6}$

17) $(x+1)(3x+2)(x+5) = \mathbf{3x^3 + 20x^2 + 27x + 10}$

18) $(x+4)(x+2)(2x+3) = \mathbf{2x^3 + 15x^2 + 34x + 24}$

19) $(2x-1)(x+3)(x-5) = \mathbf{2x^3 - 5x^2 - 28x + 15}$

20) $(x-2)(x+4)(4x+1) = \mathbf{4x^3 + 9x^2 - 30x - 8}$

21) $(3x+2)(x-1)(x+5) = \mathbf{3x^3 + 14x^2 - 7x - 10}$

22) $(x-3)(2x+1)(x-2) = \mathbf{2x^3 - 9x^2 + 7x + 6}$

23) $(2x-5)(x-1)(x+2) = \mathbf{2x^3 - 3x^2 - 9x + 10}$

24) $(x-6)(x+2)(5x-3) = \mathbf{5x^3 - 23x^2 - 48x + 36}$

25) $(4x+1)(x-4)(x+3) = \mathbf{4x^3 - 3x^2 - 49x - 12}$

Challenge

26) Expand and fully simplify

$$(ax+1)(x+b)(x+c)$$

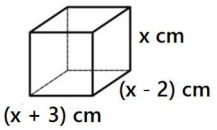
$$= (ax+1)(x^2 + cx + bx + bc)$$

$$= ax^3 + acx^2 + abx^2 + abcx + x^2 + cx + bx + bc$$

$$= ax^3 + abx^2 + acx^2 + x^2 + bx + cx + abcx + bc$$

$$= \mathbf{ax^3 + (ab + ac + 1)x^2 + (b + c + abc)x + bc}$$

27) The dimensions of a cuboid are shown below.

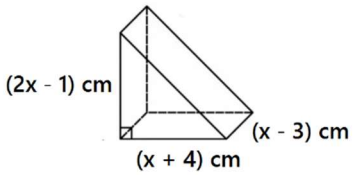


Given that volume of the cuboid is 350 cm^3, show that

$$x^3 + x^2 - 6x - 350 = 0$$

$$V = x(x-2)(x+3) = 350$$
$$x(x^2 + 3x - 2x - 6) = 350$$
$$x(x^2 + x - 6) = 350$$
$$x^3 + x^2 - 6x = 350$$
$$\mathbf{x^3 + x^2 - 6x - 350 = 0}$$

28) The dimensions of the base, height and length of a triangular prism are as pictured below.



Given that the volume of the triangular prism is 931 cm^3, show that

$$2x^3 + x^2 - 25x - 1850 = 0$$

$$V = \frac{1}{2}(2x-1)(x+4)(x-3) = 931$$
$$(2x-1)(x^2 - 3x + 4x - 12) = 1862$$
$$(2x-1)(x^2 + x - 12) = 1862$$
$$2x^3 + 2x^2 - 24x - x^2 - x + 12 = 1862$$
$$\mathbf{2x^3 + x^2 - 25x - 1850 = 0}$$