Expanding Triple Brackets

SCAN ME

REVISE THIS TOPIC

1 Expand and simplify $(x + 1)(x + 2)(x + 5)$ **[3 marks]**

$(x+1)(x+2) = x^2 + 2x + x + 2$

$= x^2 + 3x + 2$

$(x^2 + 3x + 2)(x + 5)$

$= x^3 + 5x^2 + 3x^2 + 15x + 2x + 10$

Answer $x^3 + 8x^2 + 17x + 10$

2 Expand and simplify $(x + 3)(x + 4)(x + 6)$ **[3 marks]**

$(x+3)(x+4) = x^2 + 4x + 3x + 12$

$= x^2 + 7x + 12$

$(x^2 + 7x + 12)(x + 6)$

$= x^3 + 6x^2 + 7x^2 + 42x + 12x + 72$

Answer $x^3 + 13x^2 + 54x + 72$

3 Expand and simplify $(x + 5)(x – 2)(x + 1)$ **[3 marks]**

$(x+5)(x-2) = x^2 - 2x + 5x - 10$

$= x^2 + 3x - 10$

$(x^2 + 3x - 10)(x + 1)$

$= x^3 + x^2 + 3x^2 + 3x - 10x - 10$

Answer $x^3 + 4x^2 - 7x - 10$

4 Expand and simplify $(x - 3)(x - 4)(x + 2)$ **[3 marks]**

$(x-3)(x-4) = x^2 - 4x - 3x + 12$

$= x^2 - 7x + 12$

$(x^2 - 7x + 12)(x + 2)$

$= x^3 + 2x^2 - 7x^2 - 14x + 12x + 24$

Answer $x^3 - 5x^2 - 2x + 24$

5 Expand and simplify $(y - 2)(y - 2)(y - 4)$ **[3 marks]**

$(y-2)(y-2) = y^2 - 2y - 2y + 4$

$= y^2 - 4y + 4$

$(y^2 - 4y + 4)(y - 4)$

$= y^3 - 4y^2 - 4y^2 + 16y + 4y - 16$

Answer $y^3 - 8y^2 + 20y - 16$

6 Expand and simplify $(x + 5)(x + 3)^2$ **[3 marks]**

$(x+5)(x+3) = x^2 + 3x + 5x + 15$

$= x^2 + 8x + 15$

$(x^2 + 8x + 15)(x + 3)$

$= x^3 + 3x^2 + 8x^2 + 24x + 15x + 45$

Answer $x^3 + 11x^2 + 39x + 45$

7 Expand and simplify $(x + 10)(x - 6)^2$ **[3 marks]**

$(x+10)(x-6) = x^2 - 6x + 10x - 60$

$= x^2 + 4x - 60$

$(x^2+4x-60)(x-6)$

$= x^3 - 6x^2 + 4x^2 - 24x - 60x + 360$

Answer $x^3 - 2x^2 - 84x + 360$

8 Expand and simplify $(h - 5)^3$ **[3 marks]**

$(h-5)(h-5) = h^2 - 5h - 5h + 25$

$= h^2 - 10h + 25$

$(h^2-10h+25)(h-5)$

$= h^3 - 5h^2 - 10h^2 + 50h + 25h - 125$

Answer $h^3 - 15h^2 + 75h - 125$

9 Expand and simplify $(x + 12)(x - 2)(x + 2)$ **[3 marks]**

$(x+2)(x-2) = x^2 - 2x + 2x - 4$

$= x^2 - 4$

$(x^2-4)(x+12) = x^3 + 12x^2 - 4x - 48$

Answer $x^3 + 12x^2 - 4x - 48$

10 Expand and simplify $(2x + 1)(x – 3)(x – 1)$ **[3 marks]**

$(2x+1)(x-3) = 2x^2 - 6x + x - 3$

$= 2x^2 - 5x - 3$

$(2x^2 - 5x - 3)(x-1)$

$= 2x^3 - 2x^2 - 5x^2 + 5x - 3x + 3$

Answer $2x^3 - 7x^2 + 2x + 3$

11 Expand and simplify $(3p + 2)(2p + 1)(p + 5)$ **[3 marks]**

$(3p+2)(2p+1) = 6p^2 + 3p + 4p + 2$

$= 6p^2 + 7p + 2$

$(6p^2 + 7p + 2)(p+5)$

$= 6p^3 + 30p^2 + 7p^2 + 35p + 2p + 10$

Answer $6p^3 + 37p^2 + 37p + 10$

12 Expand and simplify $(3x + 1)(2x – 1)(4x – 1)$ **[3 marks]**

$(3x+1)(2x-1) = 6x^2 - 3x + 2x - 1$

$= 6x^2 - x - 1$

$(6x^2 - x - 1)(4x-1)$

$= 24x^3 - 6x^2 - 4x^2 + x - 4x + 1$

Answer $24x^3 - 10x^2 - 3x + 1$

13 Show that $(3x + 1)(3x – 1)(2x + 3)$ can be written in the form $ax^3 + bx^2 + cx + d$ where a, b, c and d are all integers. **[3 marks]**

$(3x+1)(3x-1) = 9x^2 - 3x + 3x - 1$

$= 9x^2 - 1$

$(9x^2-1)(2x+3) = 18x^3 + 27x^2 - 2x - 3$

Answer $18x^3+27x^2-2x-3$

14 Show that $(5x + 1)(x – 3)(x – 2) – (x + 2)^2$ can be written in the form $ax^3 + bx^2 + cx + d$ where a, b, c and d are all integers. **[6 marks]**

$(5x+1)(x-3) = 5x^2 - 15x + x - 3$

$= 5x^2 - 14x - 3$

$(5x^2-14x-3)(x-2)$

$= 5x^3 - 10x^2 - 14x^2 + 28x - 3x + 6$

$= 5x^3 - 24x^2 + 25x + 6$

$(x+2)(x+2) = x^2 + 2x + 2x + 4$

$= x^2 + 4x + 4$

$5x^3 - 24x^2 + 25x + 6 - x^2 - 4x - 4$

Answer $5x^3 - 25x^2 + 21x + 2$

18

15 $(x + 4)(x + 3)(x - 1) - (x + 2)(x - 2)(x + 5) \equiv (x + a)(x + b)$

Given that $a > b$, work out the values of a and b. **[8 marks]**

$(x+4)(x+3) = x^2 + 3x + 4x + 12$

$= x^2 + 7x + 12$

$(x^2+7x+12)(x-1) = x^3 - x^2 + 7x^2 - 7x + 12x - 12$

$= x^3 + 6x^2 + 5x - 12$

$(x+2)(x-2) = x^2 - 2x + 2x - 4$

$= x^2 - 4$

$(x^2-4)(x+5) = x^3 + 5x^2 - 4x - 20$

$x^3 + 6x^2 + 5x - 12 - (x^3 + 5x^2 - 4x - 20)$

$= x^3 + 6x^2 + 5x - 12 - x^3 - 5x^2 + 4x + 20$

$= x^2 + 9x + 8$

$= (x+8)(x+1)$

$a =$ 8 $b =$ 1

8