

Expanding Triple Brackets



REVISE THIS TOPIC

1 Expand and simplify (x+1)(x+2)(x+5) $(x+1)(x+2) = x^2 + 2x + x + 2$ $= x^2 + 3x + 2$ $(x^2 + 3x + 2)(x + 5)$ $= x^3 + 5x^2 + 3x^2 + 15x + 2x + 10$ $x^3 + 8x^2 + 17x + 10$

(Total for Question 1 is 3 marks)

2 Expand and simplify (x+3)(x+4)(x+6)

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

$$= x^{2} + 7x + 12$$

$$(x+6)$$

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

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

(Total for Question 2 is 3 marks)

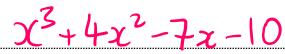
3 Expand and simplify (x+5)(x-2)(x+1)

$$(x+s)(x-2) = x^{2}-2x+5x-10$$

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

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

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



(Total for Ouestion 3 is 3 marks)



4 Expand and simplify (x-3)(x-4)(x+2)

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

$$= x^{2}-7x+12$$

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

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

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

(Total for Question 4 is 3 marks)

5 Expand and simplify (y-2)(y-3)(y-4)

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

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

$$= y^{3} - 4y^{2} - 4y^{2} + 16y + 14y - 16$$

$$= y^{3} - 8y^{2} + 20y - 16$$
(Total for Question 5 is 3 marks)

6 Expand and simplify $(x+5)(x+3)^2$

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

$$= x^2 + 8x + 15$$

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

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



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

(Total for Question 6 is 3 marks)

7 Expand and simplify $(x+10)(x-6)^2$

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

$$= x^{2} + 4x - 60$$

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

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

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

(Total for Question 7 is 3 marks)

8 Expand and simplify $(h-5)^3$

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

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

(Total for Question 8 is 3 marks)

9 Expand and simplify (x+12)(x-2)(x+2)

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

$$= x^{2} - 4$$

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



x3+12x2-4x-48

(Total for Question 9 is 3 marks)

10 Expand and simplify (2x + 1)(x - 3)(x - 1)

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

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

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

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

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

(Total for Question 10 is 3 marks)

11 Expand and simplify (3p + 2)(2p + 1)(p + 5)

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

= $6p^2 + 7p + 2$
 $(6p^2 + 7p + 2)(p + 5)$
= $6p^3 + 30p^2 + 7p^2 + 35p + 2p + 10$

$$6p^3 + 37p^2 + 37p + 10$$
(Total for Question 11 is 3 marks)

12 Expand and simplify (3x+1)(2x-1)(4x-1)

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

$$(6x^{2}-x-1)(4x-1)$$
= $24x^{3}-6x^{2}-4x^{2}+x-4x+1$



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

(Total for Ouestion 12 is 3 marks)

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

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

$$= 9x^{2}-1$$

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

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

(Total for Question 13 is 3 marks)

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

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

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

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

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

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

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

$$= x^{2} + 4x + 4$$

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



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

(Total for Question 14 is 6 marks)



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.

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

$$= x^{2} + 7x + 12$$

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

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

$$(x+1)(x-1) = x^2 - 2x + 2x - 4$$

$$= x^2 - 4$$

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

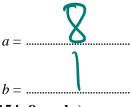
$$x^{3}+6x^{2}+5x-12-(x^{3}+5x^{2}-4x-20)$$

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

$$=x^{2}+9x+8$$

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





(Total for Question 15 is 8 marks)