

Expanding Triple Brackets

ANSWERS

1

Expand and simplify

$$(x+1)(x+2)(x+3)$$

the first two brackets

×	x	$+2$
x	x^2	$2x$
$+1$	x	2

$$= x^2 + 3x + 2$$

then multiply by the third

×	x^2	$+3x$	$+2$
x	x^3	$3x^2$	$2x$
$+3$	$3x^2$	$2x$	6

Answer $x^3 + 6x^2 + 11x + 6$

2

Expand and simplify

$$(x+1)(x+1)(x+2)$$

the first two brackets

×	x	$+1$
x	x^2	x
$+1$	x	1

$$= x^2 + 2x + 1$$

then multiply by the third

×	x^2	$+2x$	$+1$
x	x^3	$2x^2$	x
$+2$	$2x^2$	$4x$	2

Answer $x^3 + 4x^2 + 5x + 2$

3

Expand and simplify

$$(x+2)(x+3)(x+4)$$

the first two brackets

×	x	$+3$
x	x^2	$3x$
$+2$	$2x$	6

$$= x^2 + 5x + 6$$

then multiply by the third

×	x^2	$+5x$	$+6$
x	x^3	$5x^2$	$6x$
$+4$	$4x^2$	$20x$	24

Answer $x^3 + 9x^2 + 26x + 24$

4

Expand and simplify

$$(x+1)(x+2)(x+5)$$

the first two brackets

×	x	$+2$
x	x^2	$2x$
$+1$	x	2

$$= x^2 + 3x + 2$$

then multiply by the third

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

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

5

Expand and simplify

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

the first two brackets

×	x	$+3$
x	x^2	$3x$
$+1$	x	3

$$= x^2 + 4x + 3$$

then multiply by the third

×	x^2	$+4x$	$+3$
x	x^3	$4x^2$	$3x$
-2	$-2x^2$	$-8x$	-6

Answer $x^3 + 2x^2 - 5x - 6$

6

Expand and simplify

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

×	x	$+2$
x	x^2	$2x$
$+2$	$2x$	4

$$= x^2 + 4x + 4$$

×	x^2	$+4x$	$+4$
x	x^3	$4x^2$	$4x$
$+1$	x^2	$4x$	4

Answer $x^3 + 5x^2 + 8x + 4$

7

Expand and simplify

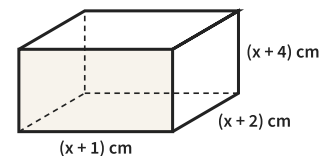
$$(x+3)^3$$

$$(x^2 + 6x + 9)(x+3)$$

Answer $x^3 + 9x^2 + 27x + 27$

8

A cuboid has edges of $(x+1)$ cm, $(x+2)$ cm and $(x+4)$ cm. Find an expression for its volume. Expand and simplify.



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

Answer $x^3 + 7x^2 + 14x + 8 \text{ cm}^3$

Expanding Triple Brackets further practice

ANSWERS

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Expand and simplify

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

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

Answer $2x^3 + x^2 - 13x + 6$

10

Expanding $(x+2)(x-1)(x+a)$ gives $x^3 + 4x^2 + x - 6$. Find the value of a .

$$(x^2 + x - 2)(x+a)$$

$$\text{the number term: } -2a = -6$$

Answer $a = 3$

11

Expand and simplify

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

$$x^3 + 5x^2 - 4x - 20$$

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

Answer $2x^2 - 7x - 21$

12

A cuboid planter is w cm wide. Its length is 3 cm more than its width and its height is 2 cm less than its width. Find an expression for its volume. Expand and simplify.

$$w(w+3)(w-2)$$

Answer $w^3 + w^2 - 6w \text{ cm}^3$

13

Find the coefficient of x^2 in the expansion of $(x+3)(x-5)(3x+2)$

$$x^2 \text{ terms: } 21x^2 - 15x^2 + 2x^2$$

$$2 - 15 + 9 = -4$$

Answer -4

14

Expand and simplify $n(n-1)(n+1)$. Use your answer to work out $19 \times 20 \times 21$ without a calculator.

$$n(n^2 - 1) = n^3 - n$$

$$n = 20: 8000 - 20$$

Answer $n^3 - n, 7980$

15

A cube has edges of $(x+1)$ cm. A cuboid is x cm by $(x+1)$ cm by $(x+2)$ cm. Which has the bigger volume, and by how much?

$$\text{cube: } x^3 + 3x^2 + 3x + 1$$

$$\text{cuboid: } x^3 + 3x^2 + 2x$$

Answer the cube, by $(x+1) \text{ cm}^3$

16

Expand and simplify $(n+1)^3 - n^3$. Use your answer to explain why the difference between two consecutive cube numbers is always odd.

$$3n^2 + 3n + 1 = 3n(n+1) + 1$$

$$n(n+1) \text{ is even, so } 3n(n+1) \text{ is even}$$

Answer $3n(n+1) + 1 \text{ is odd}$