

Expanding Triple Brackets *extend*

ANSWERS

1



Expand and simplify

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

$$x^3 + 2x^2 + 27x + 27$$

$$- (x^3 - 2x^2 + 27x - 27)$$

$$18x^2 + 54$$

Answer

2



Find the values of a and b for which

$$(ax+1)(x-2)(x+b)$$

$$\equiv 2x^3 + 3x^2 - 11x - 6$$

$$x^3: a = 2; \text{ numbers: } -2b = -6$$

$$\text{check: } (2x+1)(x^2+x-6)$$

$$a = 2, b = 3$$

Answer

3



A cylinder has radius $(x+2)$ cm and height $(2x-1)$ cm. Find an expression for its volume in terms of π , expanded and simplified.

$$\pi(x+2)^2(2x-1)$$

$$\pi(x^2 + 4x + 4)(2x-1)$$

$$\pi(2x^3 + 7x^2 + 4x - 4) \text{ cm}^3$$

Answer

4



A block is $(x+4)$ cm by $(x+2)$ cm by x cm. A square hole 2 cm by 2 cm is cut straight through it, along its x cm edges. Find the volume of wood left, expanded and simplified.

$$x(x+4)(x+2) - 2 \times 2 \times x$$

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

$$(x^3 + 6x^2 + 4x) \text{ cm}^3$$

Answer

5



The coefficient of x^2 in the expansion of $(x+k)(x-3)(2x+1)$ is 9. Find the value of k .

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

$$x^2 \text{ terms: } -5x^2 + 2kx^2, \text{ so } 2k - 5 = 9$$

$$k = 7$$

Answer

6



A box is a hollow cube with outside edges $(x+2)$ cm and inside edges x cm. Find an expression for the volume of the walls. The walls are 56 cm^3 . Find x .

$$(x+2)^3 - x^3 = 6x^2 + 12x + 8$$

$$x^2 + 2x - 8 = 0, x = 2$$

$$(6x^2 + 12x + 8) \text{ cm}^3; x = 2$$

Answer

7



Prove that when you multiply three consecutive whole numbers and add the middle one, the answer is the cube of the middle number.

$$\text{middle } n: (n-1)n(n+1) + n$$

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

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

Proof

8



Prove that the sum of the cubes of any three consecutive whole numbers is a multiple of 3.

$$(n-1)^3 + n^3 + (n+1)^3$$

$$= 3n^3 + 6n, \text{ the } n^2 \text{ terms cancel}$$

$$3n^3 + 6n = 3(n^3 + 2n)$$

Proof