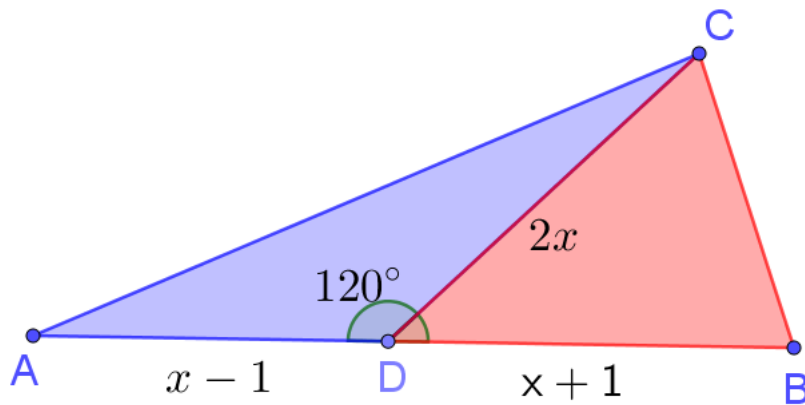


The following diagram shows a quadrilateral ABCD.



$AD = x - 1$  ,  $BD = x + 1$  ,  $DC = 2x$  and  $\angle ADC = 120^\circ$

The sum of the area of triangle ADC and triangle BDC is  $4\sqrt{3}$

Find  $x$

$$\text{Area of triangle ADC} = \frac{1}{2} \times 2x(x - 1) \times \sin 120^\circ$$

$$= x(x - 1) \times \frac{\sqrt{3}}{2}$$

$$\text{Area of triangle BDC} = \frac{1}{2} \times 2x(x + 1) \times \sin 60^\circ$$

$$= x(x + 1) \times \frac{\sqrt{3}}{2}$$

$$\text{Sum of areas} = 4\sqrt{3}$$

$$\frac{\sqrt{3}}{2}x(x - 1) + \frac{\sqrt{3}}{2}x(x + 1) = 4\sqrt{3}$$

$$\text{Factorise } \frac{\sqrt{3}}{2}x\{(x - 1) + (x + 1)\} = 4\sqrt{3}$$

$$\frac{\sqrt{3}}{2}x(2x) = 4\sqrt{3}$$

$$\sqrt{3}x^2 = 4\sqrt{3}$$

$$x^2 = 4$$

$$x = 2$$