



Quadratic Equations Ex 8.6 Q7

**Answer :**

The given quadric equation is  $(b-c)x^2 + (c-a)x + (a-b) = 0$ , and roots are real

Then prove that  $2b = a + c$ .

Here,

$$a = (b-c), b = (c-a) \text{ and } c = (a-b)$$

As we know that  $D = b^2 - 4ac$

Putting the value of  $a = (b-c), b = (c-a) \text{ and } c = (a-b)$

$$D = b^2 - 4ac$$

$$= (c-a)^2 - 4 \times (b-c) \times (a-b)$$

$$= c^2 - 2ca + a^2 - 4(ab - b^2 - ca + bc)$$

$$= c^2 - 2ca + a^2 - 4ab + 4b^2 + 4ca - 4bc$$

$$= c^2 + 2ca + a^2 - 4ab + 4b^2 - 4bc$$

$$= a^2 + 4b^2 + c^2 + 2ca - 4ab - 4bc$$

As we know that  $(a^2 + 4b^2 + c^2 + 2ca - 4ab - 4bc) = (a + c - 2b)^2$

$$D = (a + c - 2b)^2$$

The given equation will have real roots, if  $D = 0$

$$(a + c - 2b)^2 = 0$$

Square root both side we get

$$\sqrt{(a + c - 2b)^2} = 0$$

$$a + c - 2b = 0$$

$$a + c = 2b$$

$$\text{Hence } \boxed{2b = a + c}$$

Quadratic Equations Ex 8.6 Q8

**Answer :**

The given quadric equation is  $(a^2 + b^2)x^2 - 2(ac + bd)x + (c^2 + d^2) = 0$ , and roots are real

Then prove that  $\frac{a}{b} = \frac{c}{d}$ .

Here,

$$a = (a^2 + b^2), b = -2(ac + bd) \text{ and } c = (c^2 + d^2)$$

As we know that  $D = b^2 - 4ac$

Putting the value of  $a = (a^2 + b^2), b = -2(ac + bd) \text{ and } c = (c^2 + d^2)$

$$\begin{aligned} D &= b^2 - 4ac \\ &= \{-2(ac + bd)\}^2 - 4 \times (a^2 + b^2) \times (c^2 + d^2) \\ &= 4(a^2c^2 + 2abcd + b^2d^2) - 4(a^2c^2 + a^2d^2 + b^2c^2 + b^2d^2) \\ &= \cancel{4a^2c^2} + 8abcd - \cancel{4b^2d^2} - \cancel{4a^2c^2} - 4a^2d^2 - 4b^2c^2 - \cancel{4b^2d^2} \\ &= -4a^2d^2 - 4b^2c^2 + 8abcd \\ &= -4(a^2d^2 + b^2c^2 - 2abcd) \end{aligned}$$

The given equation will have real roots, if  $D = 0$

$$\begin{aligned} -4(a^2d^2 + b^2c^2 - 2abcd) &= 0 \\ (a^2d^2 + b^2c^2 - 2abcd) &= 0 \\ (ad)^2 + (bc)^2 - 2(ad)(bc) &= 0 \\ (ad - bc)^2 &= 0 \end{aligned}$$

Square root both sides we get,

$$ad - bc = 0$$

$$ad = bc$$

$$\frac{a}{b} = \frac{c}{d}$$

Hence  $\boxed{\frac{a}{b} = \frac{c}{d}}$

**Answer :**

The given equations are

$$ax^2 + 2bx + c = 0 \dots\dots (1)$$

$$bx^2 - 2\sqrt{ac}x + b = 0 \dots\dots (2)$$

Roots are simultaneously real

Then prove that  $b^2 = ac$ .

Let  $D_1$  and  $D_2$  be the discriminants of equation (1) and (2) respectively,

Then,

$$D_1 = (2b)^2 - 4ac$$

$$= 4b^2 - 4ac$$

And

$$D_2 = (-2\sqrt{ac})^2 - 4 \times b \times b$$

$$= 4ac - 4b^2$$

Both the given equation will have real roots, if  $D_1 \geq 0$  and  $D_2 \geq 0$

$$4b^2 - 4ac \geq 0$$

$$4b^2 \geq 4ac$$

$$b^2 \geq ac \dots\dots (3)$$

$$4ac - 4b^2 \geq 0$$

$$4ac \geq 4b^2$$

$$ac \geq b^2 \dots\dots (4)$$

From equations (3) and (4) we get

$$b^2 = ac$$

Hence,  $\boxed{b^2 = ac}$

\*\*\*\*\* END \*\*\*\*\*