

1 Question 1

1.1 (a) Prove $a + d = p + q$

Assume $x = \overline{AE} = \overline{EB}$

Make a point G on \overline{AB} which $\overline{GF} \perp \overline{AB}$

$$\because a + d = \frac{1}{2} * x * \overline{GF} \text{ and } p + q = \frac{1}{2} * x * \overline{GF} \quad (1)$$

$$\therefore a + d = p + q \quad (2)$$

1.2 (b) Prove $a + r = c + p$

Assume $y = \overline{DF} = \overline{FC}$

Make a point H on \overline{DC} which $\overline{HE} \perp \overline{DC}$

$$\because c + d = \frac{1}{2} * y * \overline{HE} \text{ and } r + q = \frac{1}{2} * y * \overline{HE} \quad (3)$$

$$\therefore c + d = r + q \quad (4)$$

We can use Equation (2) - Equation (4), we get:

$$a + d - c - d = p + q - q - r \quad (5)$$

$$a - c = p - r \quad (6)$$

$$a + r = p + c \quad (7)$$