

$$\textcircled{8} P(2, -3), Q(10, y)$$

$$\begin{aligned} PQ &= 10 \\ \Rightarrow PQ^2 &= 10^2 \\ (10-2)^2 + (y+3)^2 &= 100 \\ \Rightarrow 8^2 + y^2 + 9 + 6y &= 100 \\ \Rightarrow y^2 + 6y + 9 + 64 - 100 &= 0 \\ \Rightarrow y^2 + 6y - 27 &= 0 \\ \Rightarrow (y+9)(y-3) &= 0 \\ \Rightarrow y+9=0, y-3=0 \\ \Rightarrow y=-9, y=3 \\ \therefore y &= -9, 3 \end{aligned}$$

$$\textcircled{9} Q(0, 1), P(5, -3), R(x, 6)$$

$$\begin{aligned} QP &= QR \\ \Rightarrow QP^2 &= QR^2 \\ (5-0)^2 + (-3-1)^2 &= (x-0)^2 + (6-1)^2 \\ \Rightarrow 25 + 16 &= x^2 + 25 \\ \Rightarrow x &= \pm 4 \\ QP &= \sqrt{(5-0)^2 + (-3-1)^2} \\ &= \sqrt{25+16} \\ &= \sqrt{41} \end{aligned}$$

$$\begin{aligned} x &= 4 \\ QR &= \sqrt{(4-0)^2 + (6-1)^2} \\ &= \sqrt{16+25} \\ &= \sqrt{41} \end{aligned}$$

$$\begin{aligned} x &= -4 \\ QR &= \sqrt{(-4-0)^2 + (6-1)^2} \\ &= \sqrt{16+25} \\ &= \sqrt{41} \end{aligned}$$

$$\begin{aligned} x &= 4 \\ PR &= \sqrt{(4-5)^2 + (6+3)^2} \\ &= \sqrt{(-1)^2 + 9^2} \\ &= \sqrt{1+81} \\ &= \sqrt{82} \end{aligned}$$

$$\begin{aligned} x &= -4 \\ PR &= \sqrt{(-4-5)^2 + (6+3)^2} \\ &= \sqrt{81+81} \\ &= \sqrt{162} \\ &= \sqrt{9 \times 9 \times 2} \\ &= 9\sqrt{2} \end{aligned}$$

$$\textcircled{10} P(x, y), A(3, 6), B(-3, 4)$$

$$\begin{aligned} PA &= PB \\ \Rightarrow PA^2 &= PB^2 \\ (3-x)^2 + (6-y)^2 &= (-3-x)^2 + (4-y)^2 \\ \Rightarrow 9 + x^2 - 6x + 36 + y^2 - 12y &= 9 + x^2 + 6x + 16 + y^2 - 8y \\ \Rightarrow 45 - 6x - 12y &= 9 + 6x + 16 - 8y \\ \Rightarrow 12x + 4y - 20 &= 0 \\ \Rightarrow 3x + y - 5 &= 0 \end{aligned}$$