$$m_{PQ} = \frac{10-2}{4-6} = \frac{8}{-2} = -4$$

$$m_{\perp} = \frac{1}{4}$$

$$y-6 = \frac{1}{4}(x-5)$$

$$4(y-6) = x-5$$

$$4y-24 = x-5$$

$$4y = x+19$$
(b) Centre of circle has x-coordinate directly above the midpoint of QR.
$$x = \frac{6+12}{2} = 9$$

$$x = \frac{6+12}{2} = 9$$

$$4y = x+19$$

$$= 9+19$$

$$= 9+19$$

$$= 28$$

$$y = 7$$
Cective (9.7)
$$(x-9)^{2} + (y-7)^{2} = 34$$

Midpoint of PQ =  $(\frac{4+6}{2}, \frac{10+2}{2}) = (5,6)$ 

Cestre (9,7)

Question			Generic scheme	Illustrative scheme	Max mark
13.	(a)		•¹ find midpoint of PQ	•¹ (5,6)	4
			•² find gradient of PQ	$e^2$ -4 or $-\frac{8}{2}$	
			<ul> <li>find perpendicular gradient</li> <li>find equation of perpendicular bisector</li> </ul>	$ \bullet^3  \frac{1}{4} $ $ \bullet^4  4y = x + 19 $	

## Notes:

- 1. 4 is only available as a consequence of using a perpendicular gradient and a mid-point.
- 2. The gradient of the perpendicular bisector must appear in fully simplified form at •³ or •⁴ stage for •³ to be awarded.
- 3. At  $\bullet^4$  accept 4y-x=19, 4y-x-19=0, or any other rearrangement of the equation where the constant terms have been simplified.

## **Commonly Observed Responses:**

(b)	• $^{5}$ identify $x$ -coordinate of centre	• <sup>5</sup> 9	4
	• find $y$ -coordinate of centre	•6 7	
	• <sup>7</sup> find radius	• <sup>7</sup> √34	
	• <sup>8</sup> state equation of circle	$  \bullet  ^8 (x-9)^2 + (y-7)^2 = 34$	

## Notes:

- 4. Do not accept "centre = (9,2)" as evidence of  $\bullet^5$ .
- 5. Where candidates use PQ, QR or PR as the diameter of the circle no marks are available.
- 6. <sup>7</sup> and <sup>8</sup> are only available as a consequence of using the point of intersection of two perpendicular bisectors and a point on the circumference of the circle.
- 7. Accept  $r^2 = 34$  for •<sup>7</sup>.
- 8.  $(x-9)^2 + (y-7)^2 = (\sqrt{34})^2$  does not gain •8.

## Commonly Observed Responses:

Candidate A - horizontal line through midpoint of PQ

Centre = (9,6)Radius = 5

Equation:  $(x-9)^2 + (y-6)^2 = 25$ • 8 **x**Candidate B - perpendicular bisector of PR

Perpendicular bisector of PR: y = x-2Centre = (9,7):

[END OF MARKING INSTRUCTIONS]