| Q | Marking instructions | AO | Marks | Typical solution |
|---|---|---|---|---|
| 15(a) | Differentiates $x^2$ to obtain $2x$ | 1.1b | B1 | |
| | Uses implicit differentiation and obtains either $Ay^2\frac{dy}{dx}$ or $Bx\frac{dy}{dx}$ terms | 3.1a | M1 | |
| | Uses product rule to obtain $\pm 4y \pm 4x\frac{dy}{dx}$ condone sign errors | 1.1a | M1 | |
| | Obtains $2x+6y^2\frac{dy}{dx}-4y-4x\frac{dy}{dx}=0$ OE | 1.1b | A1 | $x^2+2y^3-4xy=0$<br>$2x+6y^2\frac{dy}{dx}-4y-4x\frac{dy}{dx}=0$ |
| | Substitutes $\frac{dy}{dx}=0$ into their differentiated expression which contains either $Ay^2\frac{dy}{dx}$ or $Bx\frac{dy}{dx}$ PI by later work. | 1.1a | M1 | At stationary point $\frac{dy}{dx}=0$<br>So |
| | Deduces $x=2y$ or $2x=4y$ or $-x=-2y$ or $-2x=-4y$ Must have scored A1 with no incorrect rearrangement of $2x+6y^2\frac{dy}{dx}-4y-4x\frac{dy}{dx}=0$ used. | 2.2a | R1 | $2x-4y=0$<br>$x=2y$<br>$(2y)^2+2y^3-4(2y)y=0$<br>$4y^2+2y^3-8y^2=0$<br>$2y^3-4y^2=0$<br>$y^2(y-2)=0$ |
| | Eliminates $x$ in given equation and completes reasoned argument with at least one intermediate step to show the given result. Must have scored first 6 marks with no incorrect rearrangement of $2x+6y^2\frac{dy}{dx}-4y-4x\frac{dy}{dx}=0$ used. | 2.1 | R1 | |
| | **Subtotal** | | **7** | |

| Q | Marking instructions | AO | Marks | Typical solution |
|---|---|---|---|---|
| 15(b) | Obtains $y$-coordinate of 2<br>Accept $y = 2$ | 1.1b | B1 | (4, 2) |
| | Obtains $x$-coordinate of 4<br>Accept $x = 4$ | 1.1b | B1 | |
| | **Subtotal** | | **2** | |

| | | | | |
|---|---|---|---|---|
| | **Question 15 Total** | | **9** | |