Question Number	Scheme	Marks
1.	$\text{Area } = \int_0^a \left(x^2 + ax\right)\mathrm{d}x = \left[\frac{1}{3}x^3 + \frac{1}{2}ax^2\right]_0^a = \frac{5a^3}{6}$	M1A1
	$\int \frac{1}{2}y^2\,\mathrm{d}x = \int_0^a \frac{1}{2}\left(x^4 + 2ax^3 + a^2x^2\right)\mathrm{d}x$	M1
	$= \frac{1}{2}\left[\frac{1}{5}x^5 + \frac{a}{2}x^4 + \frac{a^2}{3}x^3\right]_0^a \left(= \frac{31a^5}{60}\right)$	DM1A1
	$\bar{y} = \frac{\int \frac{1}{2}y^2\,\mathrm{d}x}{\int y\,\mathrm{d}x} = \frac{31a^5}{60} \div \frac{5a^3}{6} = \frac{31a^2}{50}$	M1A1 (7)
		[7]

M1	Attempt the **area** by integration. Powers of both terms to increase by 1.
A1	Correct area.
M1	Use $\int \frac{1}{2}\,y^2\,dx$ to give $\int_0^2 \frac{1}{2}(x^4 + 2ax^3 + a^2x^2)dx$. Limits not needed. Squaring to be correct. For method mark, condone missing $\frac{1}{2}$ or any multiple.
DM1	Attempt the integration (powers of at least 2 terms to increase by 1). Depends on second M mark.
A1	Correct integration and correct limits shown. Limits needed but substitution does not need to be seen.
M1	Use $\bar{y} = \frac{\int \frac{1}{2}y^2\,\mathrm{d}x}{\int y\,\mathrm{d}x}$ Note: This independent method mark is for use of the correct formula.
A1	Correct answer.