

Q	Marking Instructions	AO	Marks	Typical Solution
8(a)	States the correct derivative	AO1.1b	B1	$2^x \ln 2$
8(b)	Selects an appropriate method for integrating, which could lead to a correct exact solution (this could be indicated by an attempt at a substitution or attempting to write the integrand in the form $f'(x)f(x)^n$)	AO3.1a	M1	Let $u = 2^x$ Then $\frac{du}{dx} = 2^x \ln 2$ And $\frac{1}{\ln 2} \frac{du}{dx} = 2^x$
	Correctly writes integrand in a form which can be integrated (condone missing or incorrect limits)	AO1.1b	A1	$I = \int (3+u)^{\frac{1}{2}} \frac{1}{\ln 2} \frac{du}{dx} dx$ $= \frac{1}{\ln 2} \int (3+u)^{\frac{1}{2}} du$
	Integrates 'their' expression (allow one error)	AO1.1a	M1	$= \frac{2}{3 \ln 2} (3+u)^{\frac{3}{2}} + c$
	Substitutes correct limits corresponding to 'their' method	AO1.1a	M1	Sub limits: $\left[\frac{2}{3 \ln 2} (3+u)^{\frac{3}{2}} \right]_1^2$
	Obtains correct value in an exact form	AO1.1b	A1	$\frac{2}{3} \times \frac{1}{\ln 2} (5\sqrt{5} - 8)$
	Mark awarded if they have a completely correct solution, which is clear, easy to follow and contains no slips Substitution should be clearly stated in exact form and change of variable or solution by direct inspection should be achieved correctly with correct use of symbols and connecting language	AO2.1	R1	ALT (direct inspection) $\int 2^x \sqrt{3+2^x} dx$ $= \frac{1}{\ln 2} \int 2^x \ln 2 \sqrt{3+2^x} dx$ $= \frac{1}{\ln 2} \int 2^x \ln 2 (3+2^x)^{\frac{1}{2}} dx$ $= \frac{1}{\ln 2} \times \frac{2}{3} (3+2^x)^{\frac{3}{2}}$ $\left[\frac{1}{\ln 2} \times \frac{2}{3} (3+2^x)^{\frac{3}{2}} \right]_0^1$ $\frac{2}{3} \times \frac{1}{\ln 2} (5\sqrt{5} - 8)$
Total			7	