Question Number	Scheme	Marks
5 (a)	$(x-y)^3 = x^3 - 3x^2y + 3xy^2 - y^3$	M1
	$(x-y)^3 > x^3 - y^3 \Rightarrow -3x^2y + 3xy^2 > 0$	A1
	$\Rightarrow 3xy(y-x) > 0$	dM1
	As x and y are positive numbers $(y-x) > 0 \Rightarrow y > x$ *	A1*
		(4)
(b)	Chooses a suitable counter example. E.g. $x = 3, y = -1$	M1
	Shows that $(3--1)^3 > (3)^3 - (-1)^3$ as $64 > 28$ (BUT $-1 < 3$)	A1
		(2)
		(6 marks)

(a)

M1: Attempts $(x-y)^3 = x^3 \pm Ax^2y \pm Bxy^2 \pm y^3$ but may be unsimplified. Condone at most one slip in an index as long as the middle terms have at least xy in them.

A1: Correct simplified inequality, cubed terms cancelled, other terms may not all be gathered.

E.g $-3x^2y + 3xy^2 > 0$ o.e. Terms need not be all on one side, e.g. $3xy^2 > 3x^2y$

dM1: Takes out a common factor of kxy or divides by kxy. Must be clear division or stated as dividing, but dividing and rearranging to the given answer in one step from $-3x^2y + 3xy^2 > 0$ to $y > x$ is dM0 if method/intermediate step is not stated.

A1*: Requires

- correct working (no incorrect lines) before achieving $y > x$
- reasoning given in the correct/appropriate place,
  - e.g. as x and y are positive so $3xy(y-x) > 0 \Rightarrow (y-x) > 0$

Alt

M1: Attempts $(x-y)^3 = (x-y)(x^2 + axy + y^2)$ **and** $x^3 - y^3 = (x-y)(x^2 + bxy + y^2)$ but may be unsimplified

A1: Both expressions correct $(x-y)^3 = (x-y)(x^2 - 2xy + y^2)$ **and**

$x^3 - y^3 = (x-y)(x^2 + xy + y^2)$

dM1: Takes to one side, takes out a common factor $(x-y)$ (dividing by this term is M0) and cancels square terms.

A1*: Requires

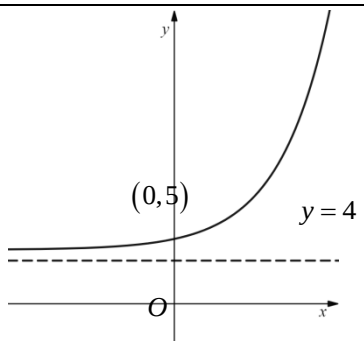
- correct working (no incorrect lines) before achieving $y > x$
- reasoning given in the correct/appropriate place,
  - e.g. as x and y are positive so $3xy(y-x) > 0 \Rightarrow (y-x) > 0$

(b)

M1: Chooses a suitable counter example. E.g. $x = 3, y = -1$

Any positive x and negative y will work. Substitution is not needed for this mark. Note that if they choose x and y both positive it is M0.

A1: Shows that the result is not true for their values. As a minimum accept substitution into both sides of the inequality.

Question Number	Scheme	Marks
6.(a)		
	Shape **or** asymptote	M1
	Intercept	B1
	Fully correct	A1
		(3)
	$h = 0.3$	B1
(b)	Area $\approx \frac{0.3}{2}\left\{0 + 4.3137 + 2\times\left(0.3246 + 0.8629 + 1.6643 + 2.7896\right)\right\}$	M1
	= awrt 2.34	A1
		(3)
(c) (i)	$\int_2^{3.5}\left(2^x + 2x\right)\mathrm{d}x = \int_2^{3.5}\left(2^x - 2x + 4x\right)\mathrm{d}x = 2.34 + \left[2x^2\right]_2^{3.5}$	M1
	$= 2.34 + 16.5 = 18.84$	A1ft
(ii)	$\int_2^{3.5}\left(2^{x+1} - 4x\right)\mathrm{d}x = \int_2^{3.5} 2\left(2^x - 2x\right)\mathrm{d}x = 2\times 2.34 = 4.68$	B1 ft
		(3)
		(9 marks)

(a)

M1: For either the correct shape, an increasing curve in any position in quadrants 1 and 2 **or** for the correct asymptote (labelled in some way at height 4) but must have a curve approaching as an asymptote, not just the line drawn. Be tolerant on "pen slips" approaching the asymptote.

B1: Correct intercept (touching or crossing). Accept 5 on axis, or stated as (0,5). Condone (5,0) on the graph if it is in the right place.

A1: Fully correct. Shape in quadrants 1 and 2 only with the *y* intercept at 5 and asymptote of $y = 4$ clearly drawn on the graph and labelled or stated separately. Be tolerant on "pen slips" approaching the asymptote. If there is conflicting information, what is on the graph takes precedence.

(b)

B1: For $h = 0.3$ This is implied by sight of $\frac{0.3}{2}$ in front of the bracket.

M1: Applies the trapezium rule with correct bracket condoning slips in copying (or even truncating) values. May use separate trapezia. Allow a missing final bracket, but otherwise bracketing must be correct or recovered by correct answer.

A1: awrt 2.34 Note that the calculator answer for this integral is 2.30