10. a) $P = 4.99087 \left(\dfrac{\cancel{24.55}}{42.5 - 24.55} \right)^{1.81}$

$= 929$ points

b) $850 = 0.188807 (600 - 210)^k$

$850 = 0.188807 \times 390^k$

$4502 = 390^k$ $\implies$ $\log 4502 = \log 390^k$

$\log_{390} 4502 = k$ $\qquad \log 4502 = k \log 390$

$k = 1.41$ $\qquad\qquad k = \dfrac{\log 4502}{\log 390} = 1.41$

Question			Generic scheme	Illustrative scheme	Max mark
10.	(a)		$\bullet^1$ evaluate P for $t = 24.55$	$\bullet^1$ 929	**1**

Notes:

1. Accept any answer which rounds $929.0368007\ldots$ to at least 2 significant figures.

Commonly Observed Responses:

Question			Generic scheme	Illustrative scheme	Max mark
	(b)		$\bullet^2$ substitute for P and D	$\bullet^2$ $850 = 0.188807\left(600 - 210\right)^k$	**4**
			$\bullet^3$ arrange equation in the form $a = b^k$	$\bullet^3$ $\dfrac{850}{0.188807} = \left(600 - 210\right)^k$	
			$\bullet^4$ write in logarithmic form	$\bullet^4$ eg $\ln\left(\dfrac{850}{0.188807}\right) = \ln\left(600 - 210\right)^k$ or $k = \log_{(600-210)} \dfrac{850}{0.188807}$	
			$\bullet^5$ solve for k	$\bullet^5$ 1.41	

Notes:

2. $\bullet^3$ may be implied by $\bullet^4$.
3. Any base may be used at $\bullet^4$ stage.
4. Accept 1.4 at $\bullet^5$.
5. The calculation at $\bullet^5$ must follow from the valid use of exponentials and logarithms at $\bullet^3$ and $\bullet^4$. See Candidate A.
6. For candidates who take an iterative approach to arrive at the value $t = 1.41$ award 1/4. However, if, in the iterations P is calculated for $t = 1.405$ and $t = 1.415$ then award 4/4.

Commonly Observed Responses:

Candidate A – invalid use of exponentials		**Candidate B – transcription error**	
$850 = 0.188807\left(600 - 210\right)^k$	$\bullet^2$ ✔	$850 = 0.18807\left(600 - 210\right)^k$	$\bullet^2$ ✘
$850 = 73.63473^k$	$\bullet^3$ ✘ $\bullet^4$ ✘ $\bullet^5$ ✘	$4519.59\ldots = 390^k$	$\bullet^3$ ✔ 1
$\log_{73.63473} 850 = k$		$\log_{390} 4519.59\ldots$	$\bullet^4$ ✔ 1
$1.56\ldots$		$1.41\ldots$	$\bullet^5$ ✔ 1

[END OF MARKING INSTRUCTIONS]