Question Number	Scheme	Marks
6(a)	States or uses $M=(5,4)$ **or** grad $AB=\frac{1}{3}$ o.e.	B1
	States or uses $M=(5,4)$ **and** grad $AB=\frac{1}{3}$ o.e.	B1
	Equation of l is $y-4=-3(x-5)$	M1
	$y=-3x+19$	A1
		(4)
(b)	$k=-2$	B1 ft
		(1)
(c)	Attempts radius or radius ^{2} E.g. $(11-7)^2+(6--2)^2$	M1
	States $(x-7)^2+(y+'2')^2=(11-7)^2+(6--2)^2$	dM1
	$(x-7)^2+(y+2)^2=80$	A1
		(3)
		(8 marks)

(a)

B1: States or uses $M=(5,4)$ **or** grad $AB=\frac{1}{3}$ o.e. such as $\frac{4}{12}$

Note that gradient AB may be implied by use of a gradient for l of -3 o.e.

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Note that gradient AB may be implied by use of a gradient for l of -3 o.e.

M1: Attempts equation of l using their M and their correctly adapted gradient.

The gradient used must be the negative reciprocal of their gradient of AB. If it just appears without any working it must be correct.

If the form $y=mx+c$ is used this mark is only scored when they proceed as far as $c=\ldots$

A1: CAO $y=-3x+19$

(b)

B1ft: $k=-2$ or follow through on the value of their $'-3'\times 7+'19'$

Allow this to be scored if the coordinates of P are given.

For example, as $(7,-2)$ or even $y=-2$ following use of 7

(c)

M1: Attempts either the radius^2 or the radius using their $(7,k)$ and one of the given points

E.g. $(11-7)^2+(6-'-2')^2$ or $\sqrt{\left(7-(-1)\right)^2+('-2'-2)^2}$

It does not need to be correctly identified as r or r^2

dM1: Attempts equation of circle using their radius ^{2} and their $(7,k)$

Note that $(x-7)^2+(y-'k')^2=(11-7)^2+(6-'k')^2$ would score M1 dM1

A1: $(x-7)^2+(y+2)^2=80$ The rhs of the equation must be simplified and ISW after a correct answer.

Alt (c)

M1: Writes equation of circle as $x^2+y^2-14x-2'k'y=\lambda$ following through on their k

dM1: Substitutes $(-1,2)$ or $(11,6)$ into the equation of the circle and finds a value for λ

A1: $x^2 + y^2 - 14x + 4y = 27$

Question Number	Scheme	Marks
7 (i)	$\frac{1}{2}\{\log 4 + \log 9 + 2(\log 5 + \log 6 + \log 7 + \log 8)\}$	B1
	$= \frac{1}{2}\log(4\times 9) + \log(5\times 6\times 7\times 8) \quad = \log 10080$	M1 A1
		(3)
(ii)	$2\log_5(5-a) - \log_5(a+25) = 1$	
	$2\log_5(5-a) = \log_5(5-a)^2$ **OR** $1 = \log_5 5$	B1
	$\log_5 \frac{(5-a)^2}{(a+25)} = 1$	M1
	$a^2 - 15a - 100 = 0$	A1
	$(a-20)(a+5) = 0$	dM1
	$a = -5$	A1
		(5)
		(8 marks)

(i) Do not be concerned if the 10's completely disappear or disappear and reappear from the $\log_{10}$

B1: For writing down a correct expression for the approximate area using the trapezium rule.
The bracketing must be correct (condoning a missing trailing bracket) or implied to be correct by subsequent work. It is not implied by answers rounding to 4.0
Allow the calculation with separate trapezia. E.g.

$$\frac{1}{2}(\log 4 + \log 5) + \frac{1}{2}(\log 5 + \log 6) + \frac{1}{2}(\log 6 + \log 7) + \frac{1}{2}(\log 7 + \log 8) + \frac{1}{2}(\log 8 + \log 9)$$

M1: Attempts some correct log work seen at least once within an attempted trapezium rule.
This will usually be for a correct use of the addition law at some point but could be for $2\log 5 = \log 25$.
It cannot be scored for $\log k = 4.00 \Rightarrow k = 10^{4.00}$

A1: $\log 10080$ following the award of the M mark.
This cannot be scored by candidates who approximate the result to be 4.003…for instance and then use their
calculators to get the $\log 10080$

(ii) Do not be concerned if a different variable is used or the base 5 is omitted

B1: For $2\log_5(5-a) = \log_5(5-a)^2$ **OR** replacing 1 by $\log_5 5$

M1: Correctly combines any two terms which will usually be

$$2\log_5(5-a) - \log_5(a+25) = 1 \Rightarrow \log_5 \frac{(5-a)^2}{(a+25)} = ...$$

Alternatives exist. E.g. $2\log_5(5-a) = \log_5(a+25) + 1 \Rightarrow ... = \log_5(5a+125)$

A1: Correct 3TQ $a^2 - 15a - 100 = 0$ o.e.

dM1: Correct attempt to find at least one value of *a*. It is dependent upon previous M and having reached a quadratic equation. Apply usual rules for solving a quadratic.
Allow calculator solutions but you will need to check that they are/it is correct

A1: $a = -5$ ONLY
If $a = 20$ is written down it must be rejected