Question Number	Scheme	Marks
8(i)	Eg $7^2+11^2=170 \Rightarrow 170$ is a multiple of 10 so the statement is untrue *	M1A1*
		(2)
(ii)	Check first if they have multiplied the inequality e.g. by 4 to give $4<4x^2-xy<60$	M1A1
	Concludes that $1<x^2-\frac{xy}{4}<15$ for all x and y that are positive even integers less than 6 *	A1*
		(3)
		(5 marks)

x	y	$x^2-\frac{xy}{4}$ or $4x^2-xy$	
2	2	3	12
2	4	2	8
4	2	14	56
4	4	12	48

(i)

M1 Attempts to find a^2+b^2 using two consecutive prime numbers a and b. It does not matter whether this combination of prime numbers results in a multiple of 10 to score M1. Condone slips in their evaluation of the sum of the squares of these two numbers. If a candidate has several combinations, you only need to look for one calculation using two consecutive prime numbers.
Note $1^2+2^2=...$ as the only calculation is M0A0

A1* Correctly:

- evaluates the sum of two consecutive prime numbers squared
- either
  - makes a comment that the answer is a multiple of 10
  - makes a comment that 10 is a factor of their answer
  - makes a comment that their answer is divisible by 10 (do not accept can be divided by 10)
  - shows that the answer is a multiple of 10 (such as splitting the number into two factors, one of which is 10, or showing the number is divisible by 10 e.g. $\frac{170}{10}=17$)
- concludes not true o.e. (condone e.g. "not correct", "not always true")

If a candidate has several combinations, you do not need to check all of them. Just look for one which would lead to correct counter example.

Below are a list of common combinations which provide the required counter example but there will be others

- $7^2+11^2=170$
- $11^2+13^2=290$
- $17^2+19^2=650$
- $19^2+23^2=890$
- $23^2+29^2=1370$

(ii)

M1 Attempts at least two valid combinations of x and y and evaluates $x^2 - \frac{xy}{4}$ condone slips in the evaluation of the combinations.
Alternatively, attempts at least two valid combinations of x and y and evaluates $4x^2 - xy$

A1 All four valid combinations of x and y correctly evaluated for $x^2 - \frac{xy}{4}$ (or in the alternative method $4x^2 - xy$)

A1* A minimal conclusion that $1 < x^2 - \frac{xy}{4} < 15$ (or condone $4 < 4x^2 - xy < 60$) for all x and y that are positive even integers less than 6.
e.g. "hence statement is true", "they are all between 1 and 15" (or 4 and 60 in the alternative), "proven", "QED" or they may have a preamble which can be concluded with a tick or similar.

Question Number	Scheme	Marks
9a	$3\cos\theta(\tan\theta\sin\theta+3)=11-5\cos\theta$ $3\sin^2\theta+9\cos\theta=11-5\cos\theta$ or $3\cos\theta\left(\frac{\sin\theta}{\cos\theta}\sin\theta+3\right)=11-5\cos\theta$ $3(1-\cos^2\theta)+9\cos\theta=11-5\cos\theta$ $3\cos^2\theta-14\cos\theta+8=0$ *	M1 dM1 A1*
		(3)
b	$\cos 2x=\frac{2}{3}$ $x=\frac{\cos^{-1}\left(\frac{2}{3}\right)}{2}=...$ $x=$ awrt 24.1, awrt 155.9, awrt 204.1, awrt 335.9	B1 M1 A1A1
		(4)
		(7 marks)

(a)

M1 Substitutes or uses $\tan\theta=\frac{\sin\theta}{\cos\theta}$ to achieve an equation in sine and cosine only.
May be in another variable and condone if there is a mix of variables in the same equation for this mark.

dM1 Attempts to use $\pm\sin^2\theta\pm\cos^2\theta=\pm1$ to achieve an equation in cosine only. It is dependent on the previous method mark. Condone slips in their manipulation of the equation.
May be in another variable and condone if there is a mix of variables in the same equation for this mark.

A1* Achieves $3\cos^2\theta-14\cos\theta+8=0$ with no errors seen including brackets. Withhold this mark for poor notation used such as $3\cos\theta^2-14\cos\theta+8=0$
Allow a candidate to work consistently in one variable and then change to θ but withhold this final mark if there is a mixture of variables within the same equation/line of working.

(b) **Note that answers only scores 0 marks. May work in any variable and do not be concerned as to whether they are writing e.g. *x* or 2*x* in their working**

B1 $(\cos...=)\ \frac{2}{3}$ (ignore any reference to 4)

M1 Solves using the correct order of operations to find at least one value for *x*. You may need to check this on your calculator. May be implied by a correct value for $\cos 2x="\frac{2}{3}"$

A1 Two of awrt 24, awrt 156, awrt 204, awrt 336 . (Condone in radians two of awrt 0.42, awrt 2.7, awrt 3.6, awrt 5.9)

A1 awrt 24.1, awrt 155.9, awrt 204.1, awrt 335.9 and no others in the range
Minimum acceptable to be able to score full marks:
e.g. $\cos...=\frac{2}{3}\Rightarrow$ *answers* or $(...=)\ \cos^{-1}\left(\frac{2}{3}\right)\Rightarrow$ *answers*