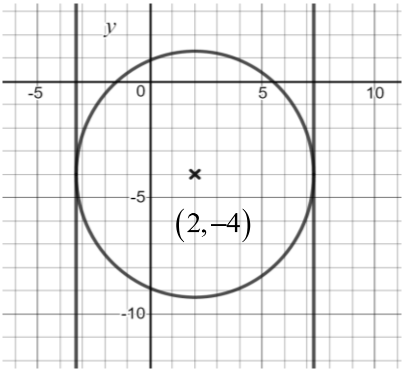
<table>
<tr><th>Question</th><th>Scheme</th><th>Marks</th><th>AOs</th></tr>
<tr><td rowspan="5">10(a)</td><td>$x^2+y^2-4x+8y-8=0$</td><td></td><td></td></tr>
<tr><td>Attempts $(x-2)^2+(y+4)^2-4-16-8=0$</td><td>M1</td><td>1.1b</td></tr>
<tr><td>(i) Centre $(2,-4)$</td><td>A1</td><td>1.1b</td></tr>
<tr><td>(ii) Radius $\sqrt{28}$ oe Eg $2\sqrt{7}$</td><td>A1</td><td>1.1b</td></tr>
<tr><td></td><td>(3)</td><td></td></tr>
<tr><td rowspan="2">(b)</td><td rowspan="2">

Attempts to add/subtract 'r' from '2'

$k=2\pm\sqrt{28}$</td><td>M1</td><td>3.1a</td></tr>
<tr><td>A1ft</td><td>1.1b</td></tr>
<tr><td></td><td></td><td>(2)</td><td></td></tr>
<tr><td colspan="4" align="right">(5 marks)</td></tr>
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Notes

(a)

M1: Attempts to complete the square. Look for $(x\pm2)^2+(y\pm4)^2...$

If a candidate attempts to use $x^2+y^2+2gx+2fy+c=0$ then it may be awarded for a centre of $(\pm2,\pm4)$ Condone $a=\pm2, b=\pm4$

A1: Centre $(2,-4)$ This may be written separately as $x=2, y=-4$ BUT $a=2, b=-4$ is A0

A1: Radius $\sqrt{28}$ or $2\sqrt{7}$ isw after a correct answer

(b)

M1: Attempts to add **or** subtract their radius from their 2.

Alternatively substitutes $y=-4$ into circle equation and finds x/k by solving the quadratic equation by a suitable method.

A third (and more difficult) method would be to substitute $x=k$ into the equation to form a quadratic eqn in $y \Rightarrow y^2+8y+k^2-4k-8=0$ and use the fact that this would have one root. E.g. $b^2-4ac=0 \Rightarrow 64-4(k^2-4k-8)=0 \Rightarrow k=..$ Condone slips but the method must be sound.

A1ft: $k=2+\sqrt{28}$ and $k=2-\sqrt{28}$ Follow through on their 2 and their $\sqrt{28}$

If decimals are used the values must be calculated. Eg $k=2\pm5.29 \to k=7.29, k=-3.29$

Accept just $2\pm\sqrt{28}$ or equivalent such as $2\pm2\sqrt{7}$

Condone $x=2+\sqrt{28}$ and $x=2-\sqrt{28}$ but not $y=2+\sqrt{28}$ and $y=2-\sqrt{28}$