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**7.** A transformation from the $z$-plane to the $w$-plane is given by

$$w = \frac{(1 + \mathrm{i})z + 2(1 - \mathrm{i})}{z - \mathrm{i}} \qquad z \neq \mathrm{i}$$

The transformation maps points on the imaginary axis in the $z$-plane onto a line in the $w$-plane.

(a) Find an equation for this line.

**(2)**

The transformation maps points on the real axis in the $z$-plane onto a circle in the $w$-plane.

(b) Find the centre and radius of this circle.

**(6)**

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**Q7**

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