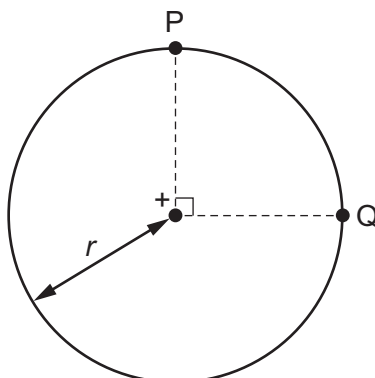**30** The diagram shows two points P and Q which lie 90° apart on a circle of radius r.
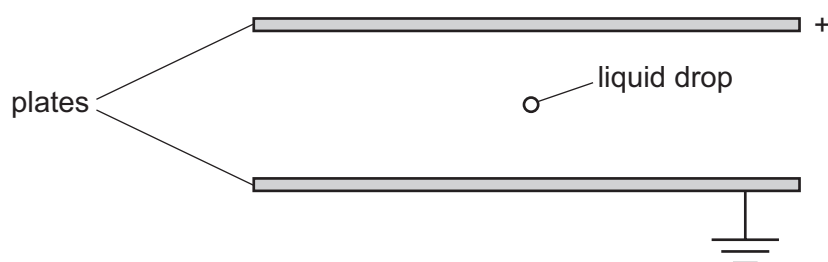
A positive point charge at the centre of the circle creates an electric field of magnitude E at both P and Q.

Which expression gives the work done in moving a unit positive charge from P to Q?

A   0   **B** $E \times r$ **C** $E \times \left(\dfrac{\pi r}{2} \right)$ **D** $E \times (\pi r)$

31 The diagram shows two parallel horizontal metal plates. The top plate is positively charged and the bottom plate is earthed.

A small charged liquid drop, midway between the plates, is held in equilibrium by the combination of its weight and the electric force acting on it.

The acceleration of free fall is g and the electric field strength is E.

What is the polarity of the charge on the drop, and the ratio of charge to mass of the drop?

	polarity	$\dfrac{\text{charge}}{\text{mass}}$
A	negative	$\dfrac{E}{g}$
B	negative	$\dfrac{g}{E}$
C	positive	$\dfrac{E}{g}$
D	positive	$\dfrac{g}{E}$