



The sketch shows a machine called a classifier, which is used in some chemical processes for separating solid particles from liquids. It consists of a moving rake arm AJ, which moves solids up an inclined trough out of the liquid. The rake is moved by forces **P** and **Q** applied as shown. The links AB and IJ are at right angles to the rake arm.

- (a) (5 marks) Draw free-body diagrams of all parts of the machine and identify all two-force members. Use the outlines of the parts on the answer sheet as a basis for your diagrams. All joints are pinned.
- (b) (10 marks) The rake arm AJ has a mass of 1000 kg, which may be assumed concentrated at the centre of gravity G. Determine the force **Q** and the forces in the links AB and IJ required to support the rake.
- (c) (10 marks) Calculate the force in the link EF and the force **P**.

Total Marks for this paper: 25

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