

# PROBLEM 10.1

KNOWN: Schematic diagram of a piston and crank mechanism.

FIND: (a) Piston force, (b) Crank force, (c) Crank angle.

SCHEMATIC DATA: Schematic diagram of a piston and crank mechanism.

ASSUMPTIONS: (1) Neglect the weight of the piston and crank. (2) Neglect friction between the piston and the cylinder wall.

PROPERTIES: None.

ANALYSIS: (a) The piston force is the force exerted on the piston by the gas. It is equal to the gas pressure times the piston area.

(b) The crank force is the force exerted on the crank by the piston. It is equal to the piston force times the crank radius.

(c) The crank angle is the angle between the crank and the horizontal. It is equal to the angle between the piston and the horizontal.

COMMENTS: The piston force is the force exerted on the piston by the gas. It is equal to the gas pressure times the piston area.

The crank force is the force exerted on the crank by the piston. It is equal to the piston force times the crank radius.

The crank angle is the angle between the crank and the horizontal. It is equal to the angle between the piston and the horizontal.

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