that a reflected photon (white side) imparts twice the momentum that is absorbed (black side). Thus the white sides should be pushed away from the light source, a conclusion clearly in conflict with observation. At this stage the student should dismiss this possible mechanism of operation.

The second explanation that should be looked into at this stage is based on the presence of gas in the bulb. Following up on the likelihood that the black sides of the vanes absorb more light than the white sides and are therefore warmer, the student here can draw upon the gas law, $PV = nRT$, to predict an increased PV in the gas close to the black sides of the vanes as the T of the gas increases. This increased PV should "push" the black sides away from the region of increased PV, thus causing the rotor to turn. This is not in fact the whole story, but it is good enough for some marks. The instructor will probably ask what the vanes are made of at this stage. After some period of puzzlement the student will possibly conclude that they must be made of insulating material, since materials that are good conductors of heat would soon lead to the white sides being the same temperature as the black sides and there would be no net force on the vanes.

A possible third mechanism is increased electromagnetic radiation away from the warm black sides of the vanes, as compared with the cooler white sides. This can lead to lengthy discussion but it is usually dismissed on the grounds that the bulb has to contain some gas for the rotor to rotate as demonstrated and thus this third possible mechanism must be secondary to the gas heating mechanism.

Scoring for this question consisted generally of 4 points for a scientifically-valid consideration of the first mechanism, with 4 more points for the second mechanism, and 2 discretionary points for such items as the third mechanism or questions relating to the composition of the vanes and its effect on the heating of the gas.