

10 Pluto is a dwarf planet. Fig. 10.1 shows the direction of motion of Pluto as it follows its elliptical orbit around the Sun.

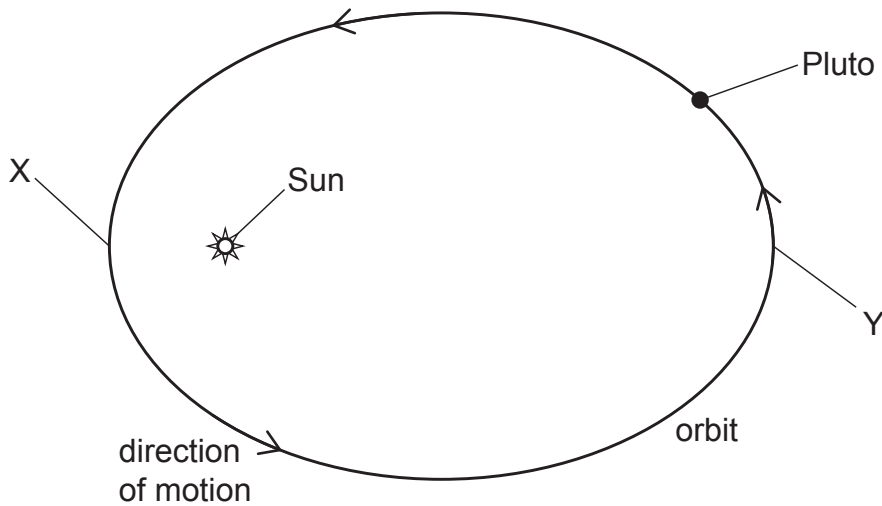


Fig. 10.1 (not to scale)

(a) Point X is the point in the orbit closest to the Sun and point Y is the point furthest away.

The orbital speed of Pluto varies as it orbits the Sun.

(i) Describe how the speed of Pluto varies as it moves from X to Y and then back to X.

.....  
 ..... [1]

(ii) Explain, in terms of energy transfers, why the speed of Pluto varies in this way.

.....  
 .....  
 .....  
 ..... [3]

(b) The average temperature on the surface of Pluto is 43K.

(i) Convert this temperature to a value in degrees Celsius ( $^{\circ}\text{C}$ ).

temperature = .....  $^{\circ}\text{C}$  [1]

(ii) Pluto has a white surface, as shown in Fig. 10.2. As Pluto rotates, the white surface alternately faces towards and away from the Sun.

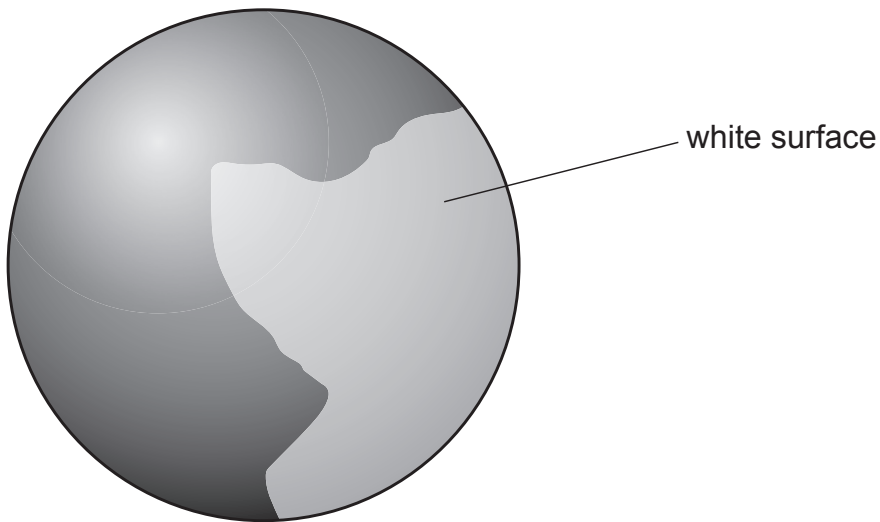


Fig. 10.2

Explain how this affects the temperature of Pluto as it rotates on its own axis.

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 .....  
 .....  
 ..... [2]