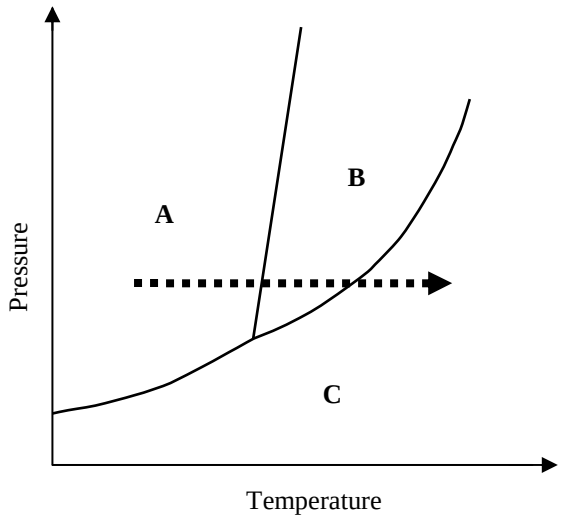
Marks 6

- Examine the following pressure/temperature phase diagram for a one component system.



Which phase exists in the fields labelled **A**, **B** and **C**?

A: **solid**	**B**: **liquid**	**C**: **gas**

Explain your assignment of these phases.

The dotted arrow on the phase diagram above passes through all three regions. It represents an increase in temperature at constant pressure. At low temperature, the particles in the system have low energy and so exist as a solid in phase A. As the temperature is increased, they gain energy and pass from solid to liquid, in phase B. At even higher temperature, they have sufficient energy to pass to gas, in phase C.

What do the lines in the diagram represent?

The lines represent the boundaries between phases. At each temperature and pressure on a line, both of the phases to the left and to the right of that point are in equilibrium and co-exist.

What happens when you move across a line either by changing temperature or pressure?

Moving across a line corresponds to a phase change.

ANSWER CONTINUES ON THE NEXT PAGE

For a compound with this phase diagram, would the solid be denser than the liquid or vice versa? Explain your answer.

The solid is denser.

The gradient of the line between A and B is positive. If the system is at the phase change between solid and liquid (i.e. a point on the line) then increasing the pressure (moving vertically upwards on the diagram) will move the system to the solid phase.

This is because the solid takes up less volume: increasing the pressure favours the solid over the liquid. If the solid takes up less volume, it must be denser.