4 A diver works in the sea on a day when the atmospheric pressure is 101 kPa and the density of the seawater is 1028 kg/m^3.

(a) The diver uses compressed air to breathe under water.

1700 litres of air from the atmosphere is compressed into a 12-litre gas cylinder.

The compressed air quickly cools to its original temperature.

Calculate the pressure of the air in the cylinder.

(3)

pressure = ... kPa

(b) (i) State the equation linking pressure difference, depth, density and *g*.

(1)

(ii) Calculate the increase in pressure when the diver descends from the surface to a depth of 11 m.

(2)

increase in pressure = ... kPa

(iii) Calculate the total pressure on the diver at a depth of 11 m.

Assume that the atmospheric pressure remains at 101 kPa.

(1)

total pressure = ... kPa

(c) As the diver breathes out, bubbles of gas are released and rise to the surface.

The bubbles increase in volume as they rise.

Explain this increase in volume.

(2)

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(Total for Question 4 = 9 marks)