**1.** D

[1]

**2.** (a) (i) oxygen concentration falls as temperature rises / negative correlation/
inverse relationship;
steady decline below 4.2/4.3/4.4°C / *vice versa*:
rapid decrease between 4.2/4.3/4.4°C and 5°C;
zero oxygen concentration at/above 9 °C; 2 max

(ii) warmer water can hold less oxygen / lower oxygen solubility as
temperature rises;
lower oxygen concentration of water reaching gills / less oxygen
available from the water to diffuse into the gills;
higher metabolic rate / faster rates of respiration / more oxygen
consumption as temperature rises; 2 max

(b) not enough energy/ATP/aerobic respiration (for muscle contraction/movement) 1

(c) (i) rising trend overall;
annual rise and fall / fluctuations; 2

(ii) (CO2 emissions from) increased burning of fossil fuels/deforestation/
other anthropogenic factor;
variation in photosynthesis rates during the year / variations in CO2
uptake in the oceans; 2

(d) (i) diffusion in both directions during each year;
diffusion from atmosphere to water during most of the year;
diffusion from water to atmosphere for part of year/autumn/fall/
seasonal;
increasing diffusion from water to atmosphere in later years; 2 max

(ii) (no net diffusion because) concentrations will become equal / there
will be no gradient;
water concentration higher than atmospheric concentration as often
as atmospheric concentration higher than water concentration; 1 max

(e) (i) 300 ppm *(Allow answers in the range 295–305 ppm) unit must be
included to earn mark.* 1

(ii) 3.3°C *(Allow answers in the range 3.0–3.3°C) unit must be
included to earn mark.****N.B.*** *A maximum of* ***[1]*** *per exam can be deducted for a
missing unit.* 1

(f) positive correlation / higher temperature with higher CO2 concentration 1

(g) oceans may cease to act as sink / store for CO2;
atmospheric CO2 concentration may then rise more rapidly;
atmospheric CO2 concentration is higher than for at least 400 000 years/
any time in recent (geological) time;
Antarctic temperatures will (probably) rise higher than at any time in
400 000 years/any time in recent (geological) time;
rising (sea water) temperature would reduce oxygen availability in water;
significant changes in habitat/abiotic factors;
populations may not be able to adapt; 3 max

[18]