The British Sub-Aqua Club

FIRST CLASS DIVER

DIVING KNOWLEDGE EXAM: Mar 2016

ANSWER GUIDELINES

Please note that the answers provided here are for guidance only. The nature of the examination means that for some questions there may be other 'correct answers'.

MEDICAL

1. See BSAC information sheet T.13d. In-water Rescue There are new recommendations about this and BSAC now recommends the following in-water rescue sequence: • Give one minute of rescue breaths (10 RBs) • If no spontaneous breathing returns Then either • Tow the victim to shore as quickly as possible without further RB Or • Continue on the spot with approximately 10 RBs per minute until support from rescue boat or helicopter arrives to take over the resuscitation. This decision will depend on the local situation, such as sea conditions, distance to shore, and availability of rescue boat or rescue helicopter. • In either case, when reaching shore, or having access to the boat or helicopter, the casualty should be promptly de=kitted and landed as quickly as possible without further rescue breaths.

2. Pain / tenderness, Bruising, Blood in spittle / urine, Shock without obvious blood loss

3. Rescue Breathing, Oxygen-enriched if possible, Chest compressions if required, Recovery position, Evacuate to medical attention, Even if apparently fully recovered, Complications of secondary drowning

4. Ref: SCUBA April 2015 Article: Oral glucose tablets or a tube of glucose paste; Emergency intramuscular injection of glucagon; Glucose measurement sticks together with the necessary glucometer kit and CLEAR instructions for use of such a kit.

5. Ref: DAN website:
http://www.diversalertnetwork.org/medical/articles/Immersion_Pulmonary_Edema

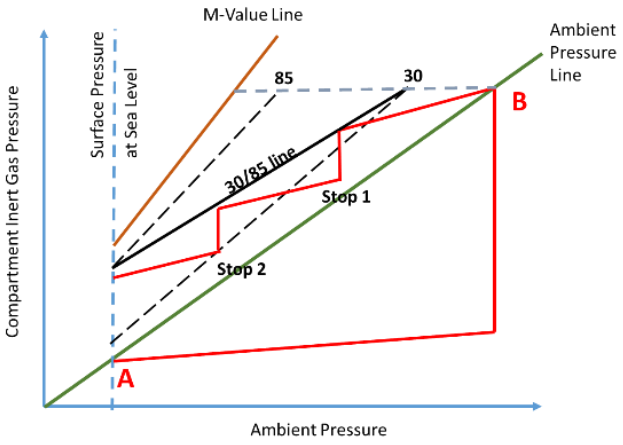
When this occurs, a diver or surface swimmer experiences an accumulation of fluid in the lungs. Symptoms include shortness of breath or the sensation of not getting enough air while at depth, often after only a few minutes in the water. Typically the symptoms start before ascent.

As divers with this condition ascend, they experience no improvement. In fact, they usually cough up pink, frothy sputum: Such fluid in the lungs can reduce the amount of oxygen reaching the blood. The diver may have noisy breathing that can be heard without a stethoscope. The condition usually occurs after only a few minutes in the water at a shallow depth, so it is not usually confused with cardiorespiratory decompression sickness (or "chokes"). Chest pain is usually absent, unless the condition is due to a heart attack. If the diver lacks sufficient amounts of oxygen, he or she may exhibit confusion or loss of consciousness.

6. Treat as DCI. Lay flat, re-assure, and administer 100% oxygen. Monitor casualty. Call Coastguard for assistance. Prepare vessel for helicopter evacuation.

DECOMPRESSION

7. Notes on the graph.
Relationship of Low(30) and High(85) gradient factor lines must be correct, i.e low is nearest ambient pressure line and high is nearest m-value line.
Correct position of 30/85 line, i.e starts to left of point B and finishes above point A.
Ascent profile (red line) is between 30/85 line (black) and ambient pressure line (green). Does not need to touch 30/85 line but can do.
Two stops clearly shown as steps in ascent profile
Diver surfaces between point A and 30/85 line



8. 1.6, 9m (ref page 5 of BSAC Ox-Stop tables para 7.) A maximum PO2 of 1.6bar is permitted for decompression stops at depths of 9m or shallower.

9. As per procedure in 7, plan the bailout using Nitrox tables. 27%. 1min at 9 and 15mins at 6m. Slate should as below. Note that bottom time is 2 mins shorter than dive time. Nitrox table page 11. *Technically the PO2 of 30% at 38m is 1.44bar above the recommended 1.4bar so depth should be kept to 36m.*

		Depth (m)	Duration (mins)	Run Time (mins)	Gas (O_2%)
BAIL-OUT (Deco gas loss)		0		55	30
	Deco Stops	6	15	54	30
		9	1	39	30
			Time to 1st stop	38	30
	Max depth	38	Leave bottom	36	30

Nov 2014

10: Extract from Safe Diving : “Depth limits (Nitrox and Trimix Diving)” … All divers using mixed gas should be suitably qualified in its use. Divers planning an expedition may conduct dives to depths beyond those currently recognised by BSAC provided that they have **recognised qualifications gained outside BSAC**. Dives in excess of **100 metres** demand **very serious dive planning and logistical requirements including support diver teams,** etc.”

So 100m, recognised qualifications gained outside BSAC, very serious dive planning and logistical requirements including support diver systems.

11.

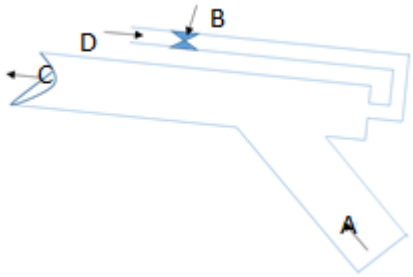
RMV = **20** lt/min	Pressure (bar)	Time (mins)	Litres air
6m to surface	**1+ (0.6/2) = 1.3 bar**	1	26
6m stop	1.6 bar	12	384
9m stop	1.9 bar	2	76
Ascent 38m to 9m	**1 +((3.8+0.9)/2) =3.35 bar**	2	**134**
Bottom @ 38m	4.8 bar	38	3648
TOTAL			**4,268**

12. Cylinder marked clearly with MOD and gas, clearly coloured/type of regulator, gas switched off and needs to be turned on, richest gas on the right, rubber band over the mouth piece for tactile sensing, regulator stowed so it is deliberately removed, if team diving, standardise kit., place and drop tanks at the MOD or higher.

EQUIPMENT

13.

A: Compressed air supply in,
B: Throttle Valve
C: Debris In
D: Debris Out



14.a. Check log book and confirm filter does not need to be replaced
b. Check air intake is away from potential contaminants and is in a well ventilated area
c. Check there is plenty of oil and fuel
d. Open all drain valves
e. Start compressor and allow to warm up
f. Close drain valves
g. Check cylinders are in test and good condition

15. Remove the hoses carrying the mouthpiece from the T pieces. Blow then suck each side of the hose. On the inhale side you should be able to blow but not suck. On the exhale side you should be able to suck but not blow

16. Ventilation is air/exhaust being drawn into the propeller. It causes the propeller to lose 'grip' on the water so reduces speed. Cavitation is collapse of water vapour bubbles generated on the low pressure face of the propeller as it moves to a region of high pressure, this can cause physical damage to the propeller e.g. pitting

17. Could help cause a free flow. Equipment corrosion reducing pressure integrity of system. Corrosion particles blocking filters etc. Toxicity of corrosion by-products, Icing.

18. Felt pads: Separate the different filter mediums
Molecular sieve: Moisture and oil mist
Activated charcoal: Oil odour
Activated alumina: Moisture

DIVE PLANNING AND TECHNIQUES

19. Using Level 1 Table A, decompression requirements are 1 minute @9m and 9 minutes @ 6m, plus one minute to the surface. This gives total head down to head up time of 46 minutes. Taking the maximum depth for the calculated consumption gives 46 min x 4.2 bar x 15 l/min = 2898 litres. Adding one third as a suitable reserve (966 litres) gives 3864 litres.
If cylinder is charged to 200 bar we need 3864/200 = 19.32 litres capacity.
Twin 10 litre cylinders @ 230 bar would give 20 x 230 = 4600 which would be OK.

20. Check diver's run –time plan and record expected time they will surface.
Prepare trapeze system for decompression attached to shot line, with suitable spare cylinders available.
Divers all descend shot line.
Divers use bottom lines to ensure returning to shot.
Use tagging system so last pair up can detach trapeze from shot line.
Excellent boat cover – large A-flag – experienced skipper

21. Diving an hour before high would mean meeting extremely early in the morning so suggest diving 5 hours after HW which gives 13.15 BST for slack. (5hrs after HW).
Would expect just over a hour. 0.2 knots 141degrees at beginning, 0.4knots 321degrees at end of dive. Divers in before "slack" at say 12.45am assuming 30minutes dives, earlier if longer dive durations. For longer dive durations more interpolation required but would expect divers to be able to dive in less than 0.5knots. Typographical error in question – last part of question should have stated speed and direction not speed and strength. Therefore speed only required.

22. A relaxed timetable would be as below. Allow adequate time for boat transit to site and for waves of divers.

9:30 - Meeting to prepare kit/launch boat
11:25 - Leave slip
12:00 - Arrive and locate with shot
12:45 - Diving first pair in
14:30 - Diving last pair out
14:45 - Recover shot and depart site

23. Tidal range is 9.5 – 2.2 = 7.3m.
Using rule of twelfths one increment is 7.3/12 = 0.6m for simplicity

			Depth
Low water			32m
+1 hour	1/12	0.6m	32.6
+ 2 hours	2/12	1.2m	33.8
+ 3 hours	3/12	1.8m	35.6
+ 4 hours	3/12	1.8m	37.4

24. Ignoring the small difference in longitude change in latitude is 2.75 degrees so 2.75 nautical miles.

WEATHER AND SEAMANSHIP

25. West 270 – 5 + 2 = 267 degrees magnetic

26. Wind Speed Force 5, Fresh Breeze gusting Force 7, Near Gale (23-33Knots)
As force 4 on Tuesday expect probable wave height of 1m, maximum probably 1.5m

27. Expect at this level observance of correct radio language.
Humber Coastguard, Humber Coastguard
This is Dive Boat BSAC Diver, Dive Boat BSAC Diver.
6 persons on board, launching from Seahouses.
Diving wreck of Somali 1 mile off Beadnall Point.
ETA back at Seahouses approximately 16:30 hours.
OVER

28. Abaft: Toward the stern, relative to some object ("abaft the fore hatch").
Astern: 1. Toward the stern (rear) of a vessel., 2. Behind a vessel
Gunwhale: Upper edge of the hull.
Abeam: On the beam, a relative bearing at right angles to the centreline of the ship's keel

29.Purpose: It is used to slow the movement of a boat in the water when driven by the wind by creating drag drag.
Increase effectiveness: Increase the length of the rope. Increase the size of the item dragging in the water by adding extra material to drag (e.g. bucket)

30. Initial winds from the South East Strengthening at first then falling as the low passes over St Kilda between four and 10 hours later. Wind would then increase again but coming from the North West as the low heads towards Fair Isle. The red areas indicate Gale warnings so the winds will be strong. Diving would be foolhardy. In such strong winds it would be inadvisable to be in a small boat in the area of St Kilda.