**The British Sub-Aqua Club**

# FIRST CLASS DIVER

DIVING KNOWLEDGE EXAM: Sat 5th October 2019 10:30am

Name: _____

Membership No: _____

Please read the following instructions carefully before you begin answering the questions.

- **Answer all 30 questions**. Write your answers in the spaces on the question paper. Please remember to put your name on the paper.
- Brief answers are possible for most questions. Answer as concisely as possible. Use diagrams where these help your answer or where they are asked for.
- There are 2 marks for each question
- You are allowed 15 minutes to read the paper and plan how to answer it.
- You are allowed 60 minutes for writing your answers
- Write all answers in ink, as clearly as possible.
- You may use a calculator but please show all calculations.
- You will need your own copy of the complete BS-AC'88 Tables, levels 1-4 and BSAC Nitrox Tables and BSAC Ox-Stop Tables. No other reference material of any kind is allowed.
- You will need chart work instruments (i.e. Breton plotter or parallel rules, pencil, compass).
- All questions assume sea water (density 1.025 kg/litre) and the prevailing conditions in the United Kingdom unless otherwise stated.
- Please check your work very carefully. A mistake at an early stage of some questions may result in a series of wrong answers and a loss of marks.

**Please note that the mark awarded by the examiners for your performance on this paper is final and under no circumstances can the examiners enter into any correspondence or discussion with you regarding this paper.**

# MEDICAL

1. State four ways to monitor the effectiveness of rescue breaths administered during land-based BLS

a) _____

b) _____

c) _____

d) _____

2. State two reasons why a transient worsening of DCI symptoms might take place when oxygen administration is commenced

a) _____

b) _____

3. Give two signs or symptoms of Hyperthermia and give two things you might have to do in order to treat Hyperthermia

a) _____

b) _____

c) _____

d) _____

4. State four factors that contribute to Immersion pulmonary oedema (IPO)

a) _____

b) _____

c) _____

d) _____

5. A diver in your group feels ill in the hotel the night before your dive trip. Their speech is slurred, they have a weakness in one arm and one side of their face appears to have fallen
a) What medical condition do you suspect
b) What is the acronym commonly used to remember how to test for this condition

a) _____

b) _____

_____

6. Explain briefly how Ultrasound can be used
a) To detect a PFO
b) To detect bubbles present in blood vessels

a) _____

_____

b) _____

_____

## DECOMPRESSION

7. What do the following four acronyms related to decompression stand for

HPNS _____

ICD _____

RMV _____

RGBM _____

8. After 17 minutes of a dive to 45m, the dive computer worn by a diver is showing an ascent time (ASC/TTS) of 15 minutes. The diver deploys their DSMB and starts to ascend. On reaching 25m the computer now shows an ascent time (ASC/TTS) of 20 minutes. Give two possible reasons why this has occurred

a) _____

_____

b) _____

_____

9. Name four factors that may increase the likelihood of CNS oxygen toxicity

a) _____

b) _____

c) _____

d) _____

10. A CCR diver has their gradient factor set to 50/80 for a dive. Due to equipment failure they need to bail out to open circuit and elect to switch to an 80/90 gradient factor. What is the benefit of doing this and what is the risk that it creates

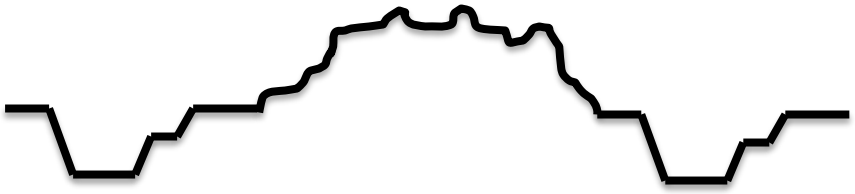
a) _____

_____

b) _____

_____

11. You start your day on a CTC of B1 with a dive at 08:00 to 18mtr for 45min dive time. You have a surface interval of 110mins. You are planning a second dive at a different site, the second site involves an ascent to 900mtr, the ascent is gradual and exact level transition would be difficult to predict, so assume instantaneous transition at journey start. As time at levels is unknown and ascents are provocative, penalise and give no surface interval. At the end of the journey assume instantaneous transition to level 1. The weather forecast for the whole area of dive operations is 995mb. You plan a second dive to 15mtr for 40min



a) What is your SC after your first dive
b) What is your CTC after your surface interval, just prior to starting your journey
c) What is your CTC on your overland journey
d) How long would you need to wait before being able to do the second dive without incurring any decompression

a) _____

b) _____

c) _____

d) _____

12. Give two methods of reducing the level of exertion and improving the comfort of divers who are expecting to complete long in water decompression stops on a tidal dive site

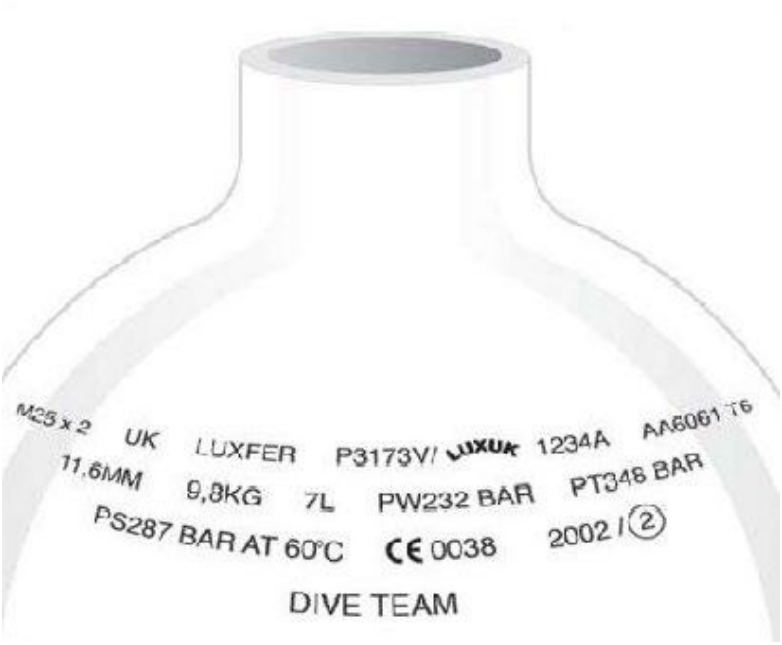
a) _____

_____

b) _____

_____

## EQUIPMENT




12. A cylinder has the above markings. What is its buoyancy in fresh water when empty? State your answer to the nearest kg
(You should assume that density of aluminium is 2,600 kg / $m^3$, and that the valve has a mass of 200g and of negligible volume)

a) _____

_____

_____

_____

13. What maintenance must be done on an unbalanced p-valve and a balanced p-valve

a) _____

_____

b) _____

_____

14. A trimix diver is looking to buy an independent suit inflation system for their dry-suit. What are the four items that they need to purchase, other than the hardware required to attach the system to their kit

a) _____

b) _____

c) _____

d) _____

15. A compressor has a broken pressure maintaining valve (PMV). It will still fill cylinders to 232 bar. Explain the consequences on air purity and moisture content of the failed PMV

a) _____

_____

_____

_____


16. A diver in your branch has bought a rescue beacon that uses AIS and GPS (pictured above). Explain what these two acronyms and how they would help a diver be rescued

a) _____

b) _____

c) _____

d) _____

17. What is a “waster” rope. Briefly describe how one is used in practice

a) _____

b) _____

_____

_____

_____

18. Sketch a Mk9 thunder flash and identify the main parts of it. List two precautions you should take prior to deploying it

a)

b) _____

c) _____

19. Using the BSAC Nitrox Blender table below, calculate how much oxygen is required by a group of 12 divers to obtain a 36% mix in each of their twinsets (2 x 12lt), working pressure 232bar. The J cylinder they are decanting from is 72lt water capacity. Show your workings

a) Calculate the litres used

b) Pressure drop in the J cylinder

| | Litres of O2 | Fill Pressure (bar) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 40 | 50 | 200 | 205 | 210 | 215 | 220 | 225 | 232 |
| | 22 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| Nitrox Mix (% O2) | 23 | 5 | 5 | 5 | 5 | 5 | 5 | 6 | 6 | 6 |
| | 24 | 7 | 7 | 8 | 8 | 8 | 8 | 8 | 9 | 9 |
| | 25 | 10 | 10 | 10 | 10 | 11 | 11 | 11 | 11 | 12 |
| | 26 | 12 | 12 | 13 | 13 | 13 | 14 | 14 | 14 | 15 |
| | 27 | 14 | 15 | 15 | 16 | 16 | 16 | 17 | 17 | 18 |
| | 28 | 17 | 17 | 18 | 18 | 19 | 19 | 19 | 20 | 21 |
| | 29 | 19 | 20 | 20 | 20 | 21 | 21 | 22 | 23 | 23 |
| | 30 | 22 | 22 | 23 | 23 | 24 | 24 | 25 | 26 | 26 |
| | 31 | 24 | 25 | 25 | 26 | 27 | 27 | 28 | 28 | 29 |
| | 32 | 26 | 27 | 28 | 29 | 29 | 30 | 31 | 31 | 32 |
| | 33 | 29 | 30 | 30 | 31 | 32 | 33 | 33 | 34 | 35 |
| | 34 | 31 | 32 | 33 | 34 | 35 | 35 | 36 | 37 | 38 |
| | 35 | 34 | 35 | 35 | 36 | 37 | 38 | 39 | 40 | 41 |
| | 36 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 |
| | 37 | 38 | 39 | 41 | 42 | 43 | 44 | 46 | 46 | 47 |
| | 38 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 50 |

Workings_____

_____

_____

_____

a) _____

b) _____

20. List four pieces of information that the Dive Manager should include in their dive briefing

a) _____

b) _____

c) _____

d) _____

21. You are driving a RHIB entering the mouth of an outer harbour where you see a vessel showing the day marks for a vessel engaged in underwater operations. As well as the marks for being restricted in its ability to manoeuvre, what other marks would be shown and what do they indicate. The vessel sounds three short blasts on their ships whistle, what does this signal mean and how may it affect your boat

a) _____

b) _____

c) _____

d) _____

22. When creating any blend of Nitrox, what determines the amount of air and oxygen to be added

a) _____

_____

_____

23. Draw a decompression trapeze with bars at 6 and 9 metres and label the key features. In tidal conditions why would a quick release clip at either end of the transfer line be a good idea

a) _____

b) _____

_____

24. List four things a diver can do to reduce stress

a) _____

b) _____

c) _____

d) _____

25. $\frac{(1-FO_2) \times (D+10)}{0.79} - 10$ is the formula for calculating what

a) _____

## WEATHER & SEAMANSHIP

26. What do the two following acronyms stand for LAT and MLWS. Which tidal reference do we measure the height of buildings on charts off. Which tidal reference do we measure the height of cables off

a) _____

b) _____

c) _____

d) _____

27. Sketch an Emergency Wreck Marking Buoy and indicate its colour pattern and the colour of any light, state what its function and purpose of an Emergency Wreck Buoy

a) _____

b) _____

c) _____

_____

d) _____

_____

28. List four of the items you would expect to include on Boat Safety Briefing

a) _____

b) _____

c) _____

d) _____

29. The UK's weather is influenced by several air masses. Name four of these and describe for each the characteristics of the weather they would be expected to bring

a) _____

_____

b) _____

_____

c) _____

_____

d) _____

_____

30. What is CG66 and what has it been superseded by

a) _____

_____

b) _____

_____