FIRST CLASS DIVER

DIVING KNOWLEDGE EXAM: March 2018

ANSWER GUIDELINES

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

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MEDICAL

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1a)   If a casualty has spent a long period immersed in the water
b)   Keep casualty in horizontal attitude at all times
c)   Discourage any movement or activity by the casualty
d)   Contact the emergency services, Reassure, keep casualty quiet, Lay casualty down, Keep warm and comfortable, Administer oxygen, Monitor condition.

2a)   Type 1 Pneumothorax,
b)   Bubbles enter the lung circulation and can cause blockages, Air escapes the lungs into the space between the lungs and the chest wall
c)   Type 2 Emphysema
d)   air travels to cavity where heart, major blood vessels, trachea and bronchi are OR under the skin

3a)   IPO When we are immersed in water, the hydrostatic pressure causes compression of leg veins. As a result, blood that normally pools in the legs is pushed centrally into the chest. The increased central blood volume increases the pressure in the alveolar capillaries and may cause fluid to leak into the lungs and cause difficulty breathing and if not corrected can cause death.
b)   Due to Negative Pressure caused via the breathing loop

4a)   Low Oxygen
b)   Level below 0.16

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5a) Changes in the colour of your skin, turning blue.
b) Confusion
c) Fast heart rate
d) Rapid breathing

6a) No, not proven
b) No, not proven

DECOMPRESSION

7a) EAD = [(FN2 / .79) x (D + 10)] − 10
  100%-32% = 68%
  EAD = [(.68 / .79) x (30 + 10)] − 10
  EAD = [0.86 x 40] − 10
  EAD = 34.4 − 10
  EAD = 24.4m
  ∴ EAD = 24m for diver rounding

8a) FO2 = PO2/Pabs FN2 = END x (FN2 (air) / Pabs)
  70m = 8 BAR   END 30m = ENDabs = 4BAR
  END Oxygen:
  1.4 / 8 = 0.175 ∴ 17.5 %
  Diver rounding should be 17% not 18%, this would push the partial pressure past 1.4
  Nitrogen:
  30m = 4 BAR 4 x .79 = 3.16
  3.16 / 8 = 0.395 ∴ 39.5%
  Diver rounding can be 40% as this will make a slightly shallower END
  Helium: 100 - 17 - 40 = 43%   Gas mix:17/43

9a) CNS
b) 80%
c) UPTD's
d) 300

10a) Adv. 50% Get on it earlier 18mtrs, cheaper
b) Disadv 50% slightly longer deco
c) Adv. 80% Reduced deco time by minutes
d) Disadv 80% only be accessed at shallower depth 9mtrs

11a) Buhmann Zurich model 8 compartment adaptive micro bubble algorithm
b) This algorithm is used in computers which can accurately monitor air consumption and instantaneous rate of air consumption to model work load (exertion) via changes in the rate of gas consumption, which allows plausible modelling of additional decompression obligation based on exertion at depth. It also monitors ambient temperature and selects the choice of risk tissue accordingly

12a) For a Gradient Factor of 50/80, the GF (low) determines the first stop, so in this case when the tissue is 50% or half way in the decompression zone. The GF (high) determines the final stop. All other stops are on a line between the two points.

b)
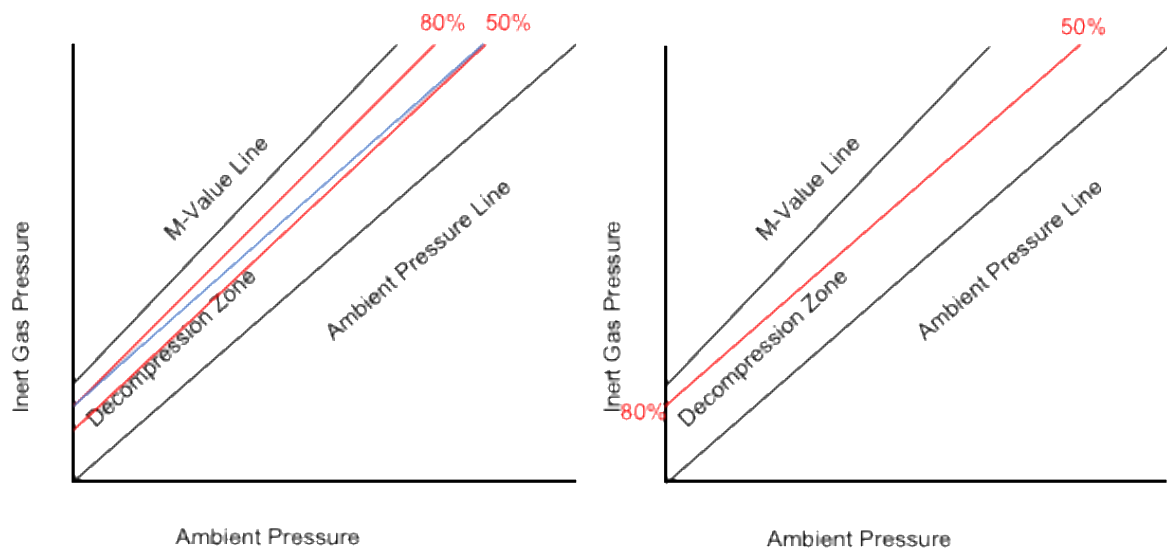
EQUIPMENT

13a) Deutsche Industrie Norm.
b) 300Bar

14a) See BH Manual for diagram, long tow, strong connection on transom & floor of towed boat, weight at rear of boat
b) See BH Manual for diagram, side by side, bow to stern diagonally
c) (b)
d) better manoeuvring and no long rope in-between

15a) Poseidon's solution is an oxygen sensor that's based on unique luminescent dyes, which are excited with red light and show an oxygen-dependent luminescence in the range of near infrared light (NIR). This technology impresses by its high precision, high reliability, low power consumption, low cross sensitivity, and fast response times.
b) Does not require calibration once bought
c) Last a life time 700hrs

16a) Sensor Dye
b) Excitation Filter
c) LED
d) Photo diode
e) Filter

17a) This type of valve operates in the same manner as the unbalanced piston except that when the piston moves causing the valve to open, the valve is not influenced by the high pressure air coming from the tank. Thus the valve will open and close unaffected by the change in the tank pressure. This will provide a more consistent and smoother flow of regulated air to the second stage

b) The valve is affected by the pressure change in the air entering from the tank. As tank pressure decreases the valve will alter its sensitivity and breathing actually becomes more laboured toward the lower pressure. This is because as the cylinder pressure drops, the intermediate pressure increases but due to the small orifice sizes dictated by the design of unbalanced valves, air flow is decreased so much that even with the higher intermediate pressure, breathing resistance is increased

18a) Balanced pressure as cylinder pressure decreases

b) Balanced are more costly to manufacture

c) Unbalanced will become harder to breath as pressure in cylinder drops

d) Unbalanced are cheaper to make

DIVE PLANNING & TECHNIQUES

19a) From Compass ADD East to get True bearing

b) Magnetic bearing = 100° Variation of 5° East = 100 + 5 = 105°T

20a) See wreck appreciation course for layout of ship

Boilers/engine   prop
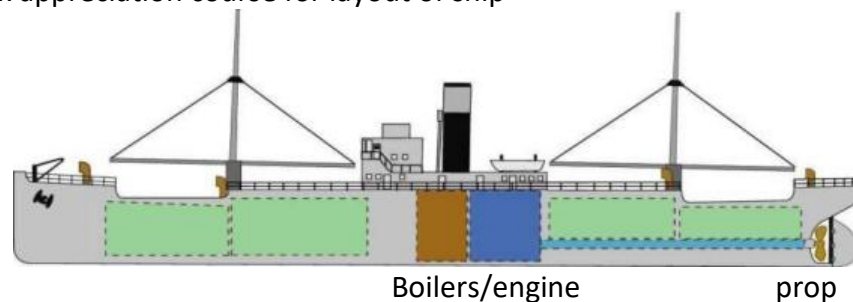
b) Look for the Prop at the stern

21a)

Signal	Surface (Diver)	Diver (Buddy)
1 Pull	Are you OK	I am OK
2 Pulls	Stay Put	I am Stationary
3 Pulls	Go Down (or away from me)	Going down (or away from you)
4 Pulls	Come Up (or towards me)	Coming up (or towards you)
Continuous Pulls Not answered	Emergency – come to surface (Help me)	Emergency – bring me to surface (Help me)

22a) Explain that they should have obtained a license from the MMO, as they have used a lift-bag on an object which has been on the seabed over a year.
b) The ROW needs to be informed via a droit
c) BSAC considers take only photos, leave only bubbles.
d) Conservation is the key to enable others to enjoy the beauty.

23a) Secondary, close to Primary
b) Placement, simple easy to release
c) Line Wrap, simple easy to release
d) Primary, Initial and must be in open water

24a) Place a 5mtr transect line in running N to S. Take tapes in and a compass. Run out 5mtrs from 1st datum in E direction then turn, copy from 2nd datum. Square should be complete. Could use a square m² grid as an edge from the transect line. Measuring the diagonal also will prove its square.
b) Slate and diver either side of area or square m² grid.

WEATHER & SEAMANSHIP

25a) 62
b) 63
c) 64
d) Maritime Safety Information

26a) Very High Frequency
b) Digital Selective Calling
c) Maritime Mobile Service Identity
d) Global Maritime Distress and Safety System

27a) Allow for tide a 1.1knots, 197 degrees and 1.8 knots at 196 degrees from tidal diamond. Plotting graphically, tide would throw you off by 7 degrees without taking action, therefore steer
45-7=38 degrees to counteract the tide.

28a) November over Charlie
b) Charlie

29a) Flares
b) Horn
c) Wave arms
d) May Day

30a)

Beaufort Scale	Wind Speed mph	Wind Speed Knots
2	4-7	4-6
4	13-18	11-16
6	25-31	22-27
8	39-46	34-40