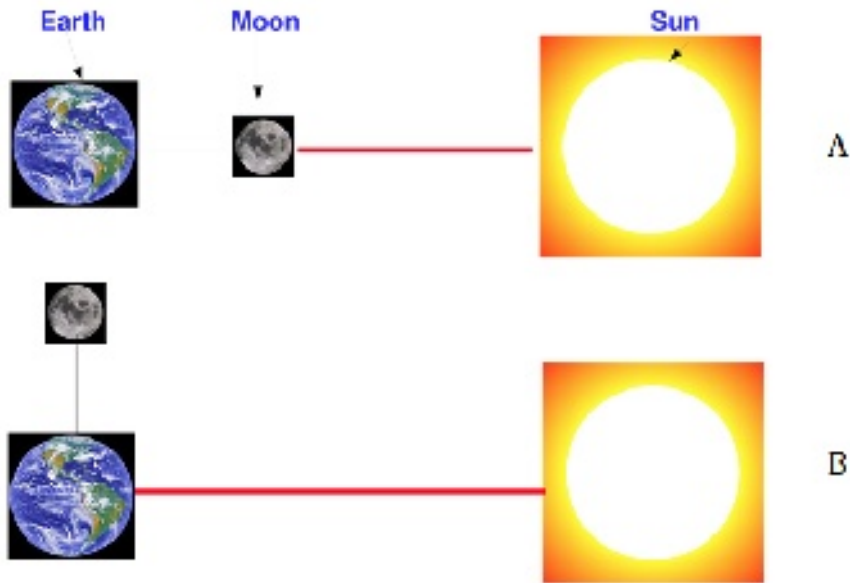


**HYDROSPHERE written test IESO 2011**

Name \_\_\_\_\_ Country \_\_\_\_\_

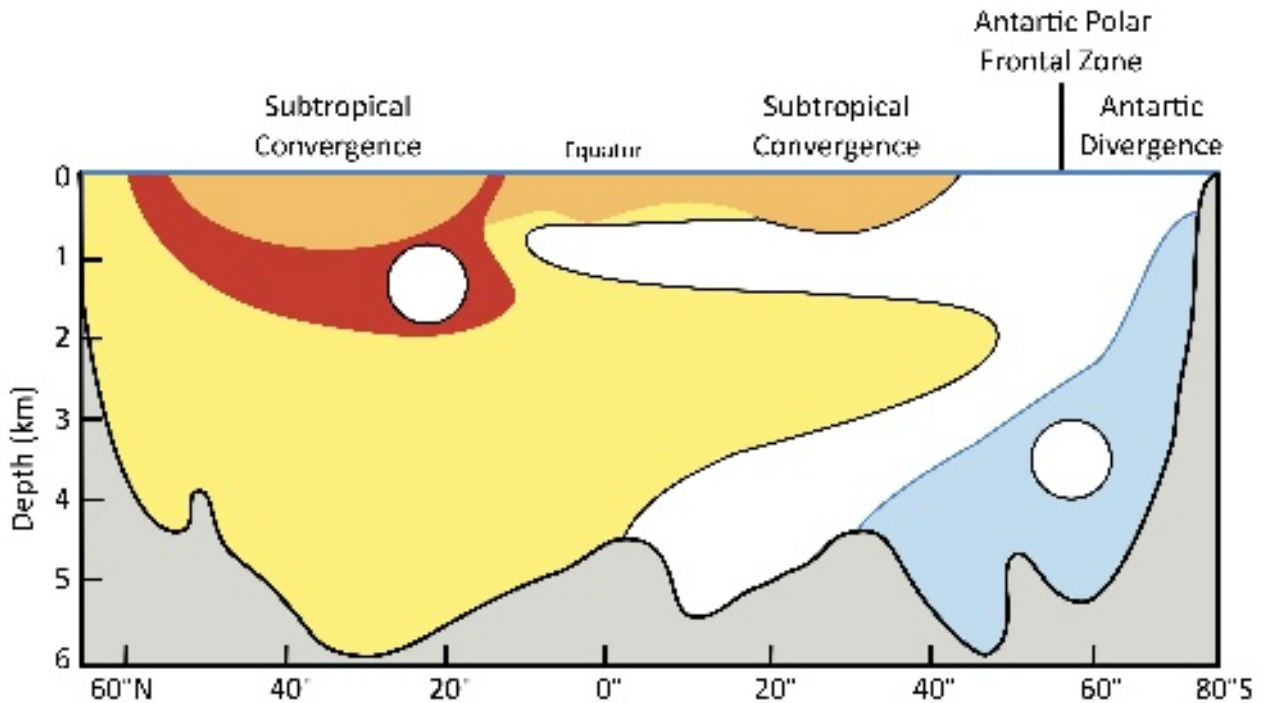
**1. Tides in the Earth system.**



The Figure illustrates two (labelled A and B) different configurations of the Earth-moon-sun system. Which of the three statements below is correct? /1 pt

- a. Configuration A represents a spring tide, while configuration B represents a neap tide
- b. The two configurations represent a spring tide
- c. Configuration B represents a spring tide, while configuration A represents a neap tide
- d. The two configurations represent a neap tide

## 2. Water Masses in the Atlantic Ocean



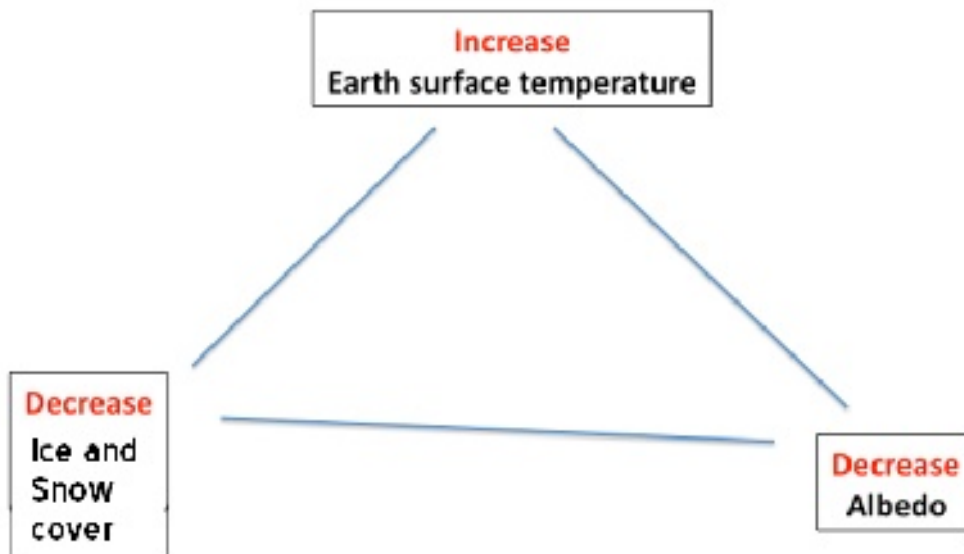
i) Match the corresponding water masses listed below by letter (a-e) to the correct location in the map. Each water mass category applies only to a single color (grey excluded since it indicates the bottom topography) **\_/1 pt (0.20x5)**

- a. North Atlantic Deep Water (NADW)
- b. Antarctic Intermediate Water (AAIW)
- c. Mediterranean Water (MedW)
- d. Surface Water (SW)
- e. Antarctic Bottom Water (AABW)

ii) Oceanographers were able to collect two water samples as reported in the table below. Indicate in the two circles in the figure which is Station A and which is Station B. **\_/0.5 pt**

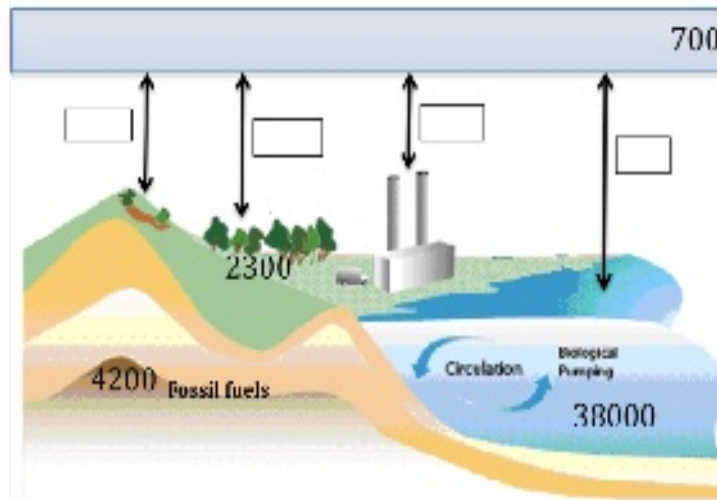
Station	Temperature (C)	Salinity
A	-2	34.6
B	8	35.4

### 3. Climate feedbacks in the Earth system



1. Put the correct arrow heads to complete the albedo feedback loop sketched in the figure above  
\_/0,5pt.
2. The feedback is \_/0,5 pt.
  - a. Always positive
  - b. Always negative
  - c. Neutral
  - d. Some times positive and some times negative

4. The global carbon cycle.

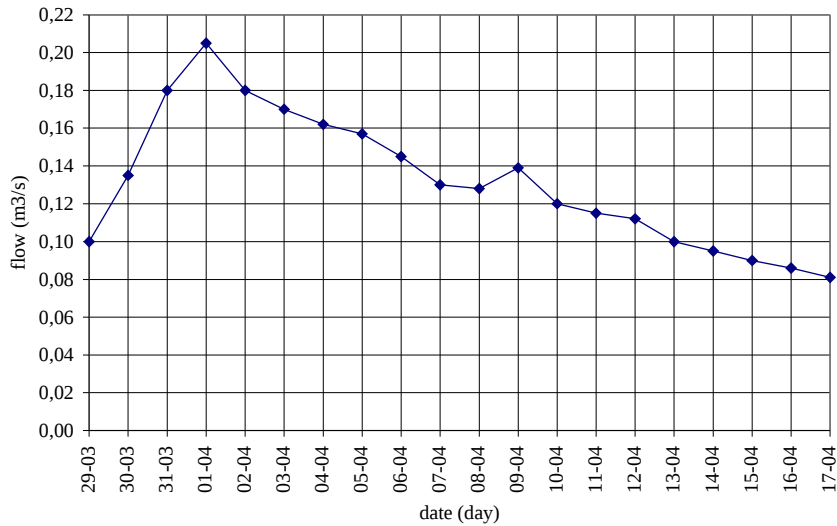


This is a schematic picture of the global carbon cycle with some estimates of the major carbon (C) reservoirs and fluxes from IPCC (2007).

1. What are the units of the values on the graph? (C is the symbol for carbon) **\_/1 pt.**
  - a.  $\text{kg C m}^{-3}$
  - b. Pg C
  - c. mol C
  - d. Gt C
  - e. answers b. and d. are true
  - f. answers b. and c. are true
2. Indicate the estimated direction(s) of the flux by circling the correct arrow head. **\_/1,5 pt. (0,25 x 6)**
3. Label the fluxes in the four blank boxes by writing the corresponding letter from the list below: **\_/1 pt. (0,25 x 4)**
  - a. ocean pump
  - b. terrestrial net production
  - c. anthropogenic emissions
  - d. soil respiration
  - e. land-use change
  - f. weathering
4. The present atmosphere contains about 700 ... C in the form of  $\text{CO}_2$ . Estimated fossil fuel reserves contain at least 4200 ... C, mostly in the form of coal. At present, about half the  $\text{CO}_2$  produced by the burning of fossil fuels remains in the atmosphere. If this ratio remained constant and we burned up all of our fossil fuels instantaneously, by how much would atmospheric  $\text{CO}_2$  rise in the longer term? (Express the answer in terms of the new  $\text{CO}_2$  stock divided by the current one) **\_/1.5 pt.**

### Question 5

The graph represents the mean daily discharges, expressed in  $\text{m}^3/\text{s}$ , of a spring in the Central Apennines registered between March 29 and April 17. The table shows the data used to build the graph. Compute in the most accurate way the water volume coming from the spring between April 12 and April 17. /2 pt.



Date	Discharge ( $\text{m}^3/\text{s}$ )
29-03	0.100
30-03	0.135
31-03	0.180
01-04	0.205
02-04	0.180
03-04	0.170
04-04	0.162
05-04	0.157
06-04	0.145
07-04	0.130
08-04	0.128
09-04	0.139
10-04	0.120
11-04	0.115
12-04	0.112
13-04	0.100
14-04	0.095
15-04	0.090
16-04	0.086
17-04	0.081

- a)  $39700 \text{ m}^3$
- b)  $48700 \text{ m}^3$
- c)  $0.5 \text{ m}^3$
- d)  $0.6 \text{ m}^3$