JAF03 Unit 3 Water

Task 1 Do you understand the idioms below?

1. I can't seem to get my head above water. Work just keeps piling up.
2. Bill got in deep water in algebra class. The class is too difficult for him, and he's almost failing.
3. Things were going along quite smoothly until you came along and muddied the water.
4. George and I were friends once, but that's all water under the bridge now.
5. You can lead a horse to water, but you can't make it drink.
6. You can't close the airport because one airline has problems - that's just throwing out the baby with the bath water.
7. I think you would like working here, and I'm happy to offer you the job. Come on in, the water's fine.

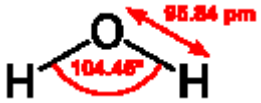
Task 2 Speaking:

Imagine you are at a party with other students from the Faculty of Science. What questions or topics would you discuss in small talk if the party is themed – the subject is ´Water´.

Task 3 Read the quiz below and decide whether the sentences about water properties are true or false:

1. Water contracts when it freezes.
2. Water has a high surface tension.
3. Condensation is water coming out of the air.
4. More things can be dissolved in sulphuric acid than in water.
5. Rainwater is the purest form of water.
6. Sea water is slightly more basic (the pH value is higher) than most natural fresh water.
7. Raindrops are tear-shaped.
8. Distilled water is water that has many of its impurities removed through the process of boiling and then condensing the steam into a clean container.

Task 4 Read the text, fill in the gaps with suitable prepositions and complete the information chart below (adapted from: www.wikipedia.org)

Water (H_2O)	
	
Properties	
Molecular formula	
Molar mass	
Appearance	
Density	
Melting point	
Boiling point	
Conductivity	
Surface tension	
Structure	
Crystal structure	
Dipole moment	

1 Water is the chemical substance with chemical formula H_2O: one molecule of water has two hydrogen atoms covalently bonded to a single oxygen atom. Water is a tasteless, odourless liquid _____ambient temperature and pressure, and appears colourless _____ small quantities, although it has its own intrinsic very light blue hue. Ice also appears colourless, and water vapour is essentially invisible _____ a gas.

2 Water is primarily a liquid under standard conditions, which is not predicted from its relationship _____ other analogous hydrides of the oxygen family in the periodic table, which are gases such as hydrogen sulphide. The reason that water forms a liquid is that oxygen is more electronegative than all of these elements _____the exception of fluorine. Oxygen attracts electrons much more strongly than hydrogen, resulting _____ a net positive charge on the hydrogen atoms, and a net negative charge on the oxygen atom. The presence of a charge on each of these atoms gives each water molecule a net dipole moment (1.85D). Its molar mass equals 18.01528(33) g/mol.

3 When cooled from room temperature liquid water becomes increasingly dense, as with other substances, but at approximately 4 °C (39 °F), pure water reaches its maximum density of 1000 kg/m^3. The solid form of most substances is denser than the liquid phase; thus, a block of most solids will sink in the liquid. However, a block of ice floats in liquid water because ice is *less* dense. Upon freezing, the density of water decreases _____ about 9% and reaches 917 kg/m^3. This is due to the 'cooling' of intermolecular vibrations allowing the molecules to form steady hydrogen bonds with their neighbours and thereby gradually locking into positions reminiscent of the hexagonal packing achieved upon freezing to ice I_h (the hexagonal crystal form of ordinary frozen water). Water also expands significantly as the temperature increases. Water near the boiling point (99.98 °C, 211.97 °F, 373.13 K) is about 96 per cent as dense as water at 4°C.

4 Air pressure affects the boiling point of water, which is why it takes longer to boil an egg at Denver, Colorado than at the beach. At higher altitudes the air pressure is lower, which means that the boiling point of water is lower. Thus, it takes longer to hard-boil an egg. At sea level water boils at 212°F (100°C), while at 5,000 feet, water boils at 202.9°F (94.9 °C). The melting point of ice is 0°C

(32°F, 273.15°K) at standard pressure, however, pure liquid water can be supercooled well below that temperature without freezing if the liquid is not mechanically disturbed. It can remain in a fluid state down to its homogeneous nucleation point of approximately 231°K (−42°C).

5 Water has a high surface tension of 72.8 mN/m at room temperature, caused _____ the strong cohesion between water molecules, the highest of the non-metallic liquids. This can be seen when small quantities of water are placed _____ a sorption-free (non-adsorbent and non-absorbent) surface, such as polyethylene or Teflon, and the water stays together as drops. Just as significantly, air trapped _____ surface disturbances forms bubbles, which sometimes last long enough to transfer gas molecules to the water.

6 Pure water does not conduct electricity. Water becomes a conductor once it starts dissolving substances around it.

Read the text again and find synonyms to the following phrases:

Par. 1: relating to the surrounding area;

belonging to or part of the real nature of sth.;

Par. 2: similar in a way to another thing or situation

Par. 3: to stay on or near the surface of a liquid;

Par. 4: the height of anything above a given planetary reference plane, especially above sea level on earth;

composed of parts or elements that are all of the same kind;

Par. 5: the act or state of uniting, or sticking together;

capable of/tending to suck up or soak up;

Par. 6: to serve as a channel or medium;

to melt, liquefy.

Task 5 Watch the video and complete the script:

(http://www.darvill.clara.net/altenerg/hydro.htm)

170 000 cubic metres of water flow past here every minute at almost 60 km/h, that's enough water to fill about a hundred thousand 1_____ every day. Standing here you can actually feel the power of the water. Harnessing that power is what hydroelectric stations had been designed to do for over a hundred years on Ontario. In essence, they're factories that convert the energy of falling water into the 2_____, or what is commonly called electricity. Electricity that powers the province.
Most hydroelectric stations use either water diverted around the natural 3_____, such as a waterfall or rapids or a dam is built across a river to raise the water level and provide the drop needed to create the 4_____. Water at the higher level is collected in the forebay. It flows through the plant intake into a pipe called the penstock, which 5_____ to a turbine water wheel at the lower water level. The water pressure increases as it flows down the penstock. It is this is pressure and flow that drives the turbine that is connected to the generator.
Inside the generator is the rotor that is spun by the turbine. Large 6_____ are attached to the rotor located within coils of 7_____ called the stator. As the generator rotor spins the magnets, a flow of electrons is created in the coils of the stator. This produces electricity that can be stepped up in voltage through the 8_____, and sent across 9_____.
The falling water, having served its purpose, exits the generating station to the tailrace, where it 10_____ of the river, to continue the cycle of creating clean, renewable energy for Ontario.

Task 6 Now label the parts of a hydroelectric station in the picture below, using the information from the listening.