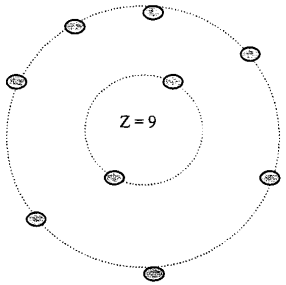
FORT STREET – YEAR 11 HALF YEARLY EXAM 2009

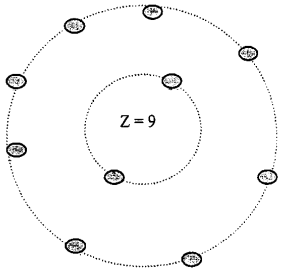
1. Which of the following electron shell diagrams represents an ion with a charge of -1?

Z = atomic number. Electrons are represented by the shaded dots.

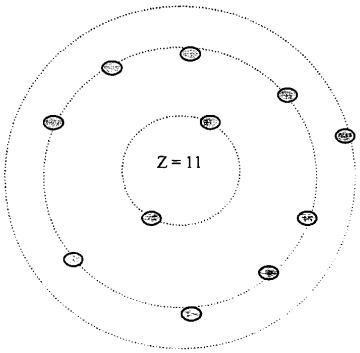
(A)



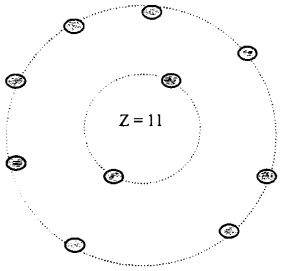
(B)



(C)



(D)



2. Atoms of element Q contain 11 protons, atoms of element R contain 16 protons.

Which one of the following gives the correct formula and bonding type for a compound of Q and R?

(A) Q_2R with ionic bonds

(B) Q_2R with covalent bonds

(C) QR_2 with ionic bonds

(D) QR_2 with covalent bonds.

3. The following table lists the physical properties of a range of different substances:

Substance	Melting Point (°C)	Electrical conductivity in		
		solid state	liquid state	solution (aq)
W	-38	very good	very good	insoluble
X	882	very poor	good	good
Y	3730	good	poor	insoluble
Z	146	very poor	very poor	very poor

Which substance is likely to be graphite?

(A) W

(B) X

(C) Y

(D) Z

4. Electrolysis of the molten ionic compound, sodium chloride, gives sodium metal and chlorine gas.

$$2\,NaCl_{(l)} \longrightarrow 2\,Na_{(l)} + Cl_{2\,(g)}$$

Which one of the following describes what happens during this reaction?

(A) Sodium ions gain electrons and chloride ions lose electrons.

(B) Sodium ions lose electrons and chloride ions gain electrons.

(C) Sodium and chloride ions both gain electrons.

(D) Sodium and chloride ions both lose electrons.

5. Why has the number of pure metals available to industry increased over the last 200 years?

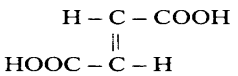
(A) New synthetic metals have been produced.

(B) Mining methods have improved.

(C) Nuclear reactions in the lithosphere have created new metallic elements.

(D) Methods of extraction have improved.

6. The structure of fumaric acid can be drawn as follows.



Which one of the following is the empirical formula of fumaric acid?

(A) $C_4H_4O_4$

(B) HOC=COH

(C) $(CHO)_2$

(D) CHO

7. Which is the correctly balanced equation?

(A) $FeS + HCl \longrightarrow FeCl_2 + H_2S$

(B) $Cu + 4HNO_3 \longrightarrow Cu(NO_3)_2 + 2NO_2 + 2H_2O$

(C) $Al_2(SO_4)_3 + 4NaOH \longrightarrow 2Al(OH)_3 + 2Na_2S0_4$

(D) $Cu(OH)_2 \longrightarrow CuO + 2H_2O$

8. Aluminium ore is called bauxite and the aluminium mineral is alumina or aluminium oxide. The correct formula for aluminium oxide is:

(A) Al_2O_3

(B) Al_3O_2

(C) AlO

(D) AlO_2

9. Using the systematic nomenclature, the correct name for CuCl is

(A) Cuprous chloride

(B) Copper (II) chloride

(C) Copper (I) chloride

(D) Cupric chloride

10. The table below shows some information about the percentage of water and its state in one 'sphere' of earth.

Percentage of 'sphere' composed of water	70%
State of water	liquid

To which one of the following spheres does the information in the above table refer?

(A) Hydrosphere

(B) Atmosphere

(C) Biosphere (living things)

(D) Lithosphere

Part B

Total marks (30). Attempt questions 11-16

Write all answers in the space provided after each question.
Show working where calculations are involved.

Question 11. (6 marks)

The table below lists some properties of six elements, A, B, C, D, E and F.

Element	Melting Point (°C)	Electrical conductivity (Msm^{-1})	Thermal conductivity ($Js^{-1}m^{-1}K^{-1}$)	Density (g/cc)	Chemical reactivity
A	-38	2	8.3	13.6	low
B	64	14	102	0.86	very high
C	-218	10^{-14}	0.1	0.0014	high
D	3410	19	180	19.3	very low
E	1084	55	430	8.96	low
F	115	10^{-6}	0.2	2.07	Moderately low

(a) (i) Which element from the table is likely to be potassium? (1 mark)

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(ii) Which element from the table is likely to be a liquid at room temperature? (25°C) (1 mark)

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(b) Describe the structure and bonding within element E (2 marks)

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c. Choose one of the elements from the table and suggest a use for it that would suits its physical properties (2 marks)

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Question 12 (5 marks)

a. Refer to your Periodic Table to identify the element in period 2, group 1

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b. Write a balanced equation for its reaction with dilute sulfuric acid

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c. Some metal elements will react with cold water

Choose one such metal and write a balanced equation for this reaction

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d. Zinc metal will readily react with dilute hydrochloric acid

Use appropriate half equations to show that this reaction is an electron-transfer reaction

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Question 13 (3 marks)

During your study of Chemistry this year, you constructed or used models to represent the structure of metals, ionic compounds, covalent molecular compounds and covalent network compounds

For ONE of the above types of compounds, justify the design of the model you made or used

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Question 14 (4 marks)

Metals are essential to society today, but prior to about 200 years ago there was only a small number of metals known in their pure states.

Assess the role of technologies in making new metals available for human use

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Question 15 (4 marks)

a. Draw Lewis electron dot structures for: (2 marks)

(i) Hydrogen sulfide (ii) Magnesium chloride

b. Classify each substance as either covalent molecular, covalent network or ionic (2 marks)

(i) hydrogen sulfide……. (ii) magnesium chloride……

Question 16 (4 marks)

a. A student analysed a sample of Bondi beach sand and found that it contained 5.2% calcium carbonate, 11.3 % sodium chloride with the balance being silicon dioxide. Calculate the mass of silicon dioxide in a 135 g sample of beach sand (2 marks)

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b. Compare volumetric and gravimetric analysis. Include similarities and differences (2 marks)

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Question 17 (4 marks)

Give one example each of a decomposition reaction and a synthesis reaction and state the energy involved in each example. Include the reactants and products in your answer. Present your answer in a table