



YEAR 10 SCIENCE EXAMINATION

Semester 1 2016

**KINROSS
COLLEGE**
Believe • Act • Achieve

Question and Answer Booklet

STUDENT NAME:
TEACHER:
DATE:

Time allowed for this paper: 1 hour and 30 minutes

Materials required:

Pens, pencils, eraser, ruler, calculator

Marks received				
Multiple Choice	Molecular Theory	Energy and Motion	Investigating	Total
(25)	(47)	(43)	(11)	(126)

hydrogen 1 H 1.0079	beryllium 4 Be 9.0122	lithium 3 Li 6.941	lithium 3 Li 6.941	beryllium 4 Be 9.0122	boron 5 B 10.811	carbon 6 C 12.011	nitrogen 7 N 14.007	oxygen 8 O 15.999	fluorine 9 F 18.998	helium 2 He 4.0026											
potassium 19 K 39.098	calcium 20 Ca 40.078	sodium 11 Na 22.990	magnesium 12 Mg 24.305	aluminum 13 Al 26.982	silicon 14 Si 28.086	phosphorus 15 P 30.974	sulfur 16 S 32.065	chlorine 17 Cl 35.453	argon 18 Ar 39.948												
rubidium 37 Rb 85.468	strontium 38 Sr 87.62	cesium 55 Cs 132.91	barium 56 Ba 137.33	yttrium 39 Y 88.906	zinc 30 Zn 65.39	cadmium 48 Cd 112.41	mercury 80 Hg 200.59	tin 50 Sn 118.71	lead 82 Pb 207.2												
francium 87 Fr [223]	radium 88 Ra [226]	actinium 89 Ac [227]	thorium 90 Th 232.04	scandium 21 Sc 44.956	titanium 22 Ti 47.867	vanadium 23 V 57-70 50.942	chromium 24 Cr * 51.996	manganese 25 Mn * 54.938	iron 26 Fe * 55.845	cobalt 27 Co * 58.933	nickel 28 Ni * 58.693	copper 29 Cu * 63.546	zinc 30 Zn * 65.39	gallium 31 Ga * 69.723	germanium 32 Ge * 72.61	arsenic 33 As * 74.922	selenium 34 Se * 78.96	bromine 35 Br * 79.904	krypton 36 Kr * 83.80		
				niobium 41 Nb * 92.906	zirconium 40 Zr * 91.224	niobium 41 Nb * 92.906	molybdenum 42 Mo * 95.94	technetium 43 Tc * [98]	ruthenium 44 Ru * 101.07	rhodium 45 Rh * 102.91	palladium 46 Pd * 106.42	silver 47 Ag * 107.87	cadmium 48 Cd * 112.41	indium 49 In * 114.82	tin 50 Sn * 118.71	antimony 51 Sb * 121.76	tellurium 52 Te * 127.60	iodine 53 I * 126.90	xenon 54 Xe * 131.29		
				lanthanum 57 La * 138.91	cerium 58 Ce * 140.12	praseodymium 59 Pr * 140.91	neodymium 60 Nd * 144.24	promethium 61 Pm * [145]	samarium 62 Sm * 150.36	europium 63 Eu * 151.96	gadolinium 64 Gd * 157.25	terbium 65 Tb * 158.93	dysprosium 66 Dy * 162.50	holmium 67 Ho * 164.93	erbium 68 Er * 167.26	thulium 69 Tm * 168.93	ytterbium 70 Yb * 173.04	radon 86 Rn * [222]			
				actinium 89 Ac * [227]	thorium 90 Th * 232.04	protactinium 91 Pa * 231.04	uranium 92 U * 238.03	neptunium 93 Np * [237]	plutonium 94 Pu * [244]	americium 95 Am * [243]	curium 96 Cm * [247]	berkelium 97 Bk * [247]	californium 98 Cf * [251]	einsteinium 99 Es * [252]	fermium 100 Fm * [257]	mendelevium 101 Md * [258]	nobelium 102 No * [259]				
				unbinilium 110 Uun * [271]	ununilium 111 Uuu * [272]	unununium 112 Uuuu * [272]	unbinilium 113 Uub * [277]	ununilium 110 Uun * [271]	unununium 111 Uuu * [272]	unbinilium 112 Uub * [277]	ununilium 110 Uun * [271]	unununium 111 Uuu * [272]	unbinilium 112 Uub * [277]	ununilium 110 Uun * [271]	unununium 111 Uuu * [272]	unbinilium 112 Uub * [277]	ununilium 110 Uun * [271]	unununium 111 Uuu * [272]	unbinilium 112 Uub * [277]	ununilium 110 Uun * [271]	unununium 111 Uuu * [272]

lanthanum 57 La * 138.91	cerium 58 Ce * 140.12	praseodymium 59 Pr * 140.91	neodymium 60 Nd * 144.24	promethium 61 Pm * [145]	samarium 62 Sm * 150.36	europium 63 Eu * 151.96	gadolinium 64 Gd * 157.25	terbium 65 Tb * 158.93	dysprosium 66 Dy * 162.50	holmium 67 Ho * 164.93	erbium 68 Er * 167.26	thulium 69 Tm * 168.93	ytterbium 70 Yb * 173.04
actinium 89 Ac * [227]	thorium 90 Th * 232.04	protactinium 91 Pa * 231.04	uranium 92 U * 238.03	neptunium 93 Np * [237]	plutonium 94 Pu * [244]	americium 95 Am * [243]	curium 96 Cm * [247]	berkelium 97 Bk * [247]	californium 98 Cf * [251]	einsteinium 99 Es * [252]	fermium 100 Fm * [257]	mendelevium 101 Md * [258]	nobelium 102 No * [259]

* Lanthanide series

** Actinide series

There is a Periodic Table attached to your exam paper. You may use it to help you answer the questions in this section.

1. Look at Group I in your periodic table.
 - a. Write 3 elements that belong to this group.

1 Mark

- b. Give **two** properties of the elements in this group.

2 Marks

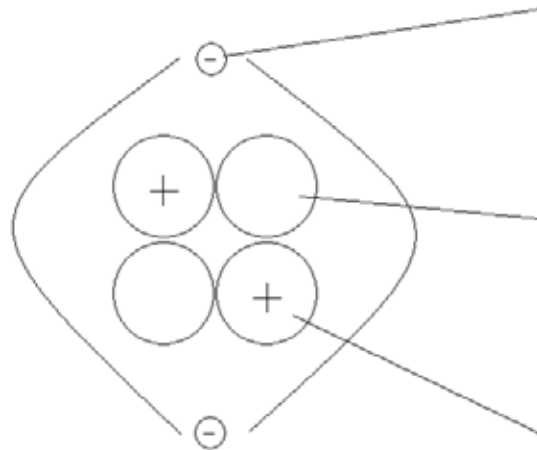
- c. Does the reactivity of the Group I elements increase or decrease as you go down the group?

1 Mark

2.
 - a. Atoms are the smallest particles that can still be identified as a specific substance, however, atoms themselves are made from three types of even smaller particles. What are the three types of smaller particles called?

3 Marks

2. **b.** Label the diagram below with the names of the particles from your answer to part a.



3 Marks

- c.** For the atom in the diagram above, what is its:

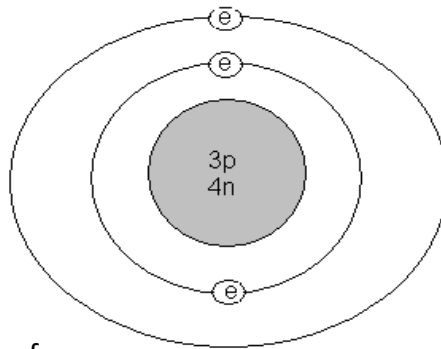
(i) atomic number?

(ii) mass number?

(iii) name?

3 Marks

3. Below is a diagram of an atom of lithium:



Draw similar diagrams for:

a. Boron

3 Marks

b. Fluorine

3 Marks

c. Sodium

3 Marks

4. Atoms join together through the formation of **bonds**. The table below has various descriptions of bonds. Write the correct bond type (either **ionic or covalent**) to match the description. You may use each type more than once.

Bond type	Description
	Electrons are shared between atoms.
	Formed between atoms of non-metals
	Formed when a metal atom bonds with a non-metal atom
	Electrons are transferred from one atom to another
	Oppositely charged ions are attracted to each other

5 Marks

5. The table below contains the valencies of some common ions:

Name	Symbol	Valency	Name	Symbol	Valency
Hydrogen	H	+1	Fluorine	F	-1
Sodium	Na	+1	Chlorine	Cl	-1
Ammonium	NH ₄	+1	Iodine	I	-1
Magnesium	Mg	+2	Hydroxide	OH	-1
Calcium	Ca	+2	Oxygen	O	-2
Aluminium	Al	+3	Sulphur	S	-2
Iron	Fe	+3	Sulphate	SO ₄	-2
			Carbonate	CO ₃	-2
			Nitrogen	N	-3

Write the formula for the following substances:

a. Sodium Chloride _____ 1 Mark

b. Sulphuric acid (hydrogen sulphate) _____ 1 Mark

c. Ammonium carbonate _____ 1 Mark

d. Calcium hydroxide _____ 1 Mark)

Predict the name and formula of the substance formed when:

e. Sodium reacts with fluorine

2 Marks

f. Magnesium reacts with iodine

2 Marks

g. Aluminium reacts with oxygen

2 Marks

6. Write word, symbol and balanced symbol equations for the following reactions:

a. Hydrogen (H_2) burns in oxygen (O_2) to form water (H_2O):

Word:

Symbol:

Balanced:

4 Marks

b. Ethane (C₂H₆) burns in oxygen (O₂) to produce carbon dioxide (CO₂) and water (H₂O):

Word:

Symbol:

Balanced:

6 Marks

ENERGY AND MOTION

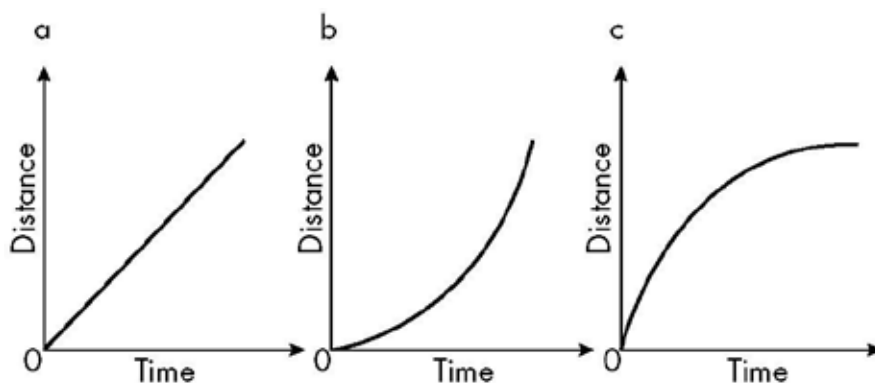
7. **Scalar** quantities only have a magnitude (size), while **vector** quantities have a magnitude **and** a direction. Place the following quantities into the correct column in the table:

Mass; speed; velocity; displacement; weight; distance

Scalar quantity	Vector quantity

3 Marks

8. Below are 3 distance-time graphs:



Underline the correct description for each graph:

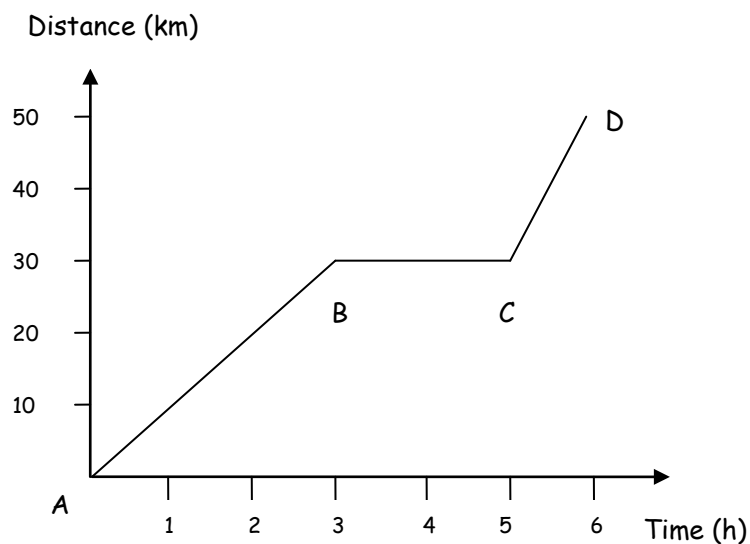
Graph a shows an object that is speeding up/ slowing down/ traveling at a steady speed.

Graph b shows an object that is speeding up/ slowing down/ traveling at a steady speed.

Graph c shows an object that is speeding up/ slowing down/ traveling at a steady speed.

3 Marks

9. Ben and Jordan went out cycling one day. The graph below shows how far they traveled during the ride.



a. How far did they travel in total?

1 Mark

b. For how long were they cycling before they stopped?

1 Mark

c. Between which two points did they travel fastest?

1 Mark

d. How can you tell this from the graph?

1 Mark

e. For how long did they stop for lunch?

1 Mark

10. The following questions are based on the motion equations:

$$v=s/t$$

$$s=vt$$

$$t=s/v$$

$$a=(v-u)/t$$

$$v=u+at$$

$$t=(v-u)/a$$

$$s=(ut)+(0.5at^2)$$

$$\text{when } u=0: \quad t = \sqrt{\frac{2s}{a}}$$

$$a=2s/t^2$$

Where:

v = final velocity s = displacement t = time a = acceleration

u = initial velocity

if something is falling, then acceleration = 9.8 m/s/s

Show all your working. You will be awarded:

- 1 mark for identifying the information you've been given,
- 1 mark for picking the correct equation,
- 1 mark for getting the right answer and
- 1 mark for giving the correct unit.

a. A car travels 100km in 2 hours. What is its velocity?

4 Marks

b. If a motorbike is traveling at 25m/s and accelerates at 5m/s/s for 3s, what is its final velocity?

4 Marks

- c. Terry is fixing a broken tile on his roof when he falls off. If it takes him 1s to hit the ground, how high was his roof?

4 Marks

11. The following questions are also based on the motion equations given in question 10. However, to work out the answer you will need to use 2 of the equations. Your answer to the first equation is required in the second equation.

Show all your working. You will be awarded:

- 1 mark for identifying the information you've been given,
 - 2 marks for picking the correct equation,
 - 2 marks for getting the right answer and
 - 2 marks for giving the correct unit.
- a. A train accelerates from 20m/s to 40m/s in 10s. How far did it travel during this acceleration?

7 Marks

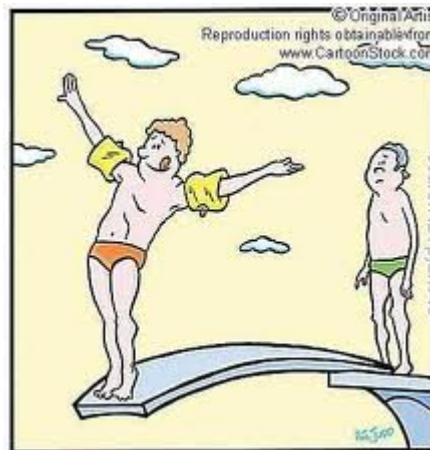
12. The information below can be used to answer the questions that follow.

- **Energy cannot be created or destroyed, only changed from one form to another**
- **Gravitational potential energy = mass x gravity x height**
- **Kinetic energy = $\frac{1}{2}$ x mass x velocity x velocity**
- **Velocity = square root of $2 \times \text{KE} / \text{mass}$**
- **Acceleration due to gravity = 9.8 m/s/s**

Show all your working. You will be awarded:

- 1 mark for picking the correct equation,
- 1 mark for getting the right answer and
- 1 mark for giving the correct unit.

Kim weighs 75kg. He dives from a 10m diving board.



- a. How much gravitational potential energy does he have when he is standing on the board waiting to dive?

3 Marks

b. When he has fallen 1 metre:

(i) How much gravitational potential energy does he have now?

3 Marks

(ii) How much kinetic energy does he have?

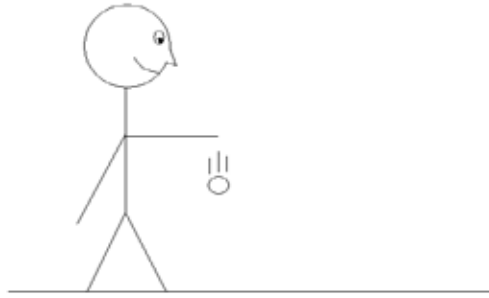
3 Marks

(iii) What is his velocity?

4 Marks

INVESTIGATING

13. You have been asked to plan an investigation to see if the type of surface a ball is dropped onto will affect how high the ball bounces.



- a. (i) What variable will you **change (independent)** in this experiment?

1 Mark

- (ii) What variable will you **measure (dependent)** in this experiment?

1 Mark

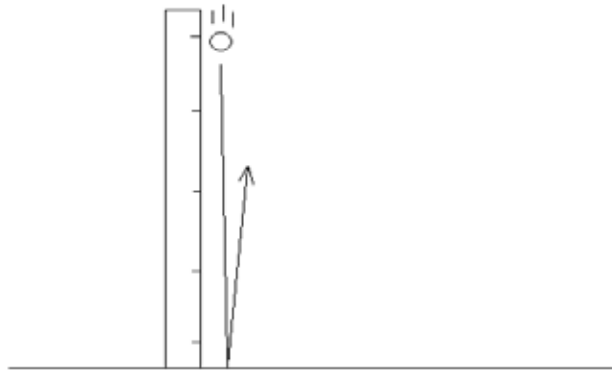
- (iii) List 2 variables you will **keep the same (controlled)** to ensure it is a fair test?

2 Marks

- b. (i) Calypso is also doing this experiment. She plans to drop a ball onto concrete, carpet and sand. What effect do you expect these different surfaces to have on the height her ball bounces? **Using the word energy**, explain **why** you think this will happen.

3 Marks

14. John carried out a similar experiment, but he was investigating how the height a ball was dropped from affected the height of its bounce. He used the same golf ball for all his experiments and used a metre ruler to measure heights:



Here is a table of his results:

	Height of Drop (cm)		
	20	60	100
Height of Bounce (cm)	15	45	40

- a. Suggest a way in which John's experiment could have been improved.

1 Mark

- a. One of John's results doesn't fit into the pattern you might expect for this experiment. Say which one it is and explain your choice.

3 Marks

End of question paper