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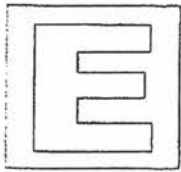
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GAN ENG SENG SCHOOL
Mid-Year Examination 2016



CANDIDATE
NAME

CLASS

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INDEX
NUMBER

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SCIENCE

Paper 1 Multiple Choice

10 May 2016

Papers 1 & 2: 2 hours

Sec 1 Express

Additional Materials: OTAS

Calculators are allowed in the examination

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, class and index number on the OTAS.

There are **thirty** questions in Section A. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the answer you consider correct and record your choice in soft pencil on the separate OTAS.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Read the instructions on the OTAS very carefully.

A copy of the periodic table is inserted on page 11.

You may proceed to answer Paper 2 as soon as you have completed Paper 1.

Any rough working should be done in this booklet.

Total marks
30

This paper consists of **11** printed pages including of the cover page

Answer all the questions with the most suitable option A, B, C or D.

1. Thomas Edison was a famous inventor who invented the light bulb. Before he successfully invented the light bulb, he experienced hundreds of failures. Which of the following qualities did he demonstrate?
 - A Curiosity
 - B Perseverance
 - C Responsibility
 - D Open-mindedness

2. Pouring unused chemicals back into their containers is discouraged. Why?
 - A Doing so causes an explosion.
 - B Doing so contaminates the chemicals.
 - C Doing so dilutes the chemicals.
 - D Doing so increases the concentration of the chemicals

3. The following statement is written by a student who is carrying out the scientific method.
"More sugar is dissolved in a fixed volume of water when the water is heated with a Bunsen flame."
At which stage is the student carrying out the scientific method?
 - A The student is asking a question.
 - B The student is constructing a hypothesis.
 - C The student is making an observation.
 - D The student is recording experimental results.

4. What should a student have done when he first noticed the small crack at the side of the test-tube at the start of his experiment?
 - A Exchange the test-tube for another one at the teacher's bench quietly.
 - B Inform his teacher about the crack and dispose the cracked test-tube in a dustbin for sharps.
 - C Inform his teacher about the crack and dispose the cracked test-tube in a general dustbin.
 - D Place the cracked test-tube back into the test-tube rack without informing his teacher.

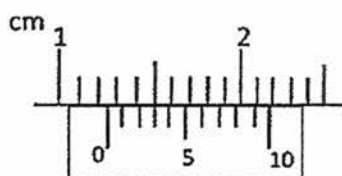
5. Which of the following laboratory apparatus is correctly matched to its function?

	Apparatus	Function
I	round bottom flask	used to hold a solid for heating
II	tripod stand	used to support apparatus during heating
III	evaporating dish	used to contain a solution to be heated
IV	measuring cylinder	used to measure an approximate volume of liquid

- A I and II
 B I and III
 C II and III
 D III and IV
6. Various objects are used to scratch against each other and the observations are recorded in the table below.
- Object A was used to rub against object B to cause scratches. Scratch marks were seen on object A.
 - Object B was used to rub against object C to cause scratches. Scratch marks were seen on object C.
 - Object A was used to rub against object C to cause scratches. Scratch marks were seen on object A.

Which of the following statement best explain the observations above?

- A Object A is stronger than object C and object C is stronger than object B.
 B Object B is stronger than object C and object C is stronger than object A.
 C Object A is harder than object C and object C is harder than object B.
 D Object B is harder than object C and object C is harder than object A.
7. What is the reading on the Vernier calipers?

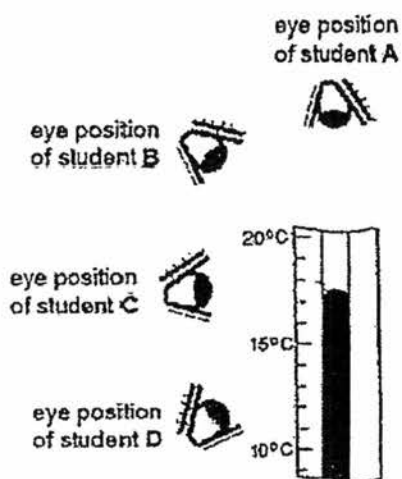


- A 1.03 cm
 B 1.23 cm
 C 1.50 cm
 D 1.53 cm

8. A material can bend without breaking and return to its original size and shape after bending. What is the physical property that is being described?

A flexibility
B hardness
C durability
D strength

9. What is the correct temperature reading?



A 16.0 °C
B 16.5 °C
C 17.5 °C
D 18.5 °C

10. Luke took a ball of clay weighing 200 g and flattened it. Which of the following statements about the clay is true?

A Its mass and density have increased.
B Its mass and density have decreased.
C Its mass and density remain the same.
D Its mass remains the same but the density is changed.

11. Most metals such as copper and iron have high melting points. Which of the following is an advantage of this property?

A It allows metal parts to be reshaped more easily.
 B It enables people to use pots and pans made of metal to cook food.
 C It keeps cars from becoming too hot on sunny days.
 D It prevents machine parts made of metal from rusting.

12. Hillary wanted to find out how much space an irregular piece of rock occupies. What should she measure, and what instrument should she use?

	Measurement	Instrument
A	Mass	Beam balance
B	Mass	Displacement can
C	Volume	Beam balance
D	Volume	Displacement can

13. Paint dissolves completely in turpentine, but not in water. Which statement is **not** true?

A Turpentine is the solvent that can dissolve paint.
 B Stirring the paint in turpentine decreases the time taken for the paint to dissolve.
 C No residue is seen after filtration when the paint is placed in turpentine.
 D It shows that the type of solvent affects solubility of paint.

14. Which of the following statements **incorrectly** describes an element?

A An element can be combined chemically to form a compound.
 B An element can be differentiated from another element by its physical and chemical properties.
 C An element is the simplest form of matter found naturally.
 D An element is made up of many different simpler substances.

[illegible]

- GESS 1EXP Science Mid-Year Exam 2016 LYT

19. Liquid X has a boiling point of 75 °C while liquid Y has a boiling point of 120 °C. Liquid X can be separated from liquid Y via fractional distillation. What will be the most suitable temperature for the fractional distillation to be conducted at?
- A 65 °C
 - B 90 °C
 - C 120 °C
 - D 130 °C
20. Which of the following methods is most suitable to separate a liquid from a mixture of a liquid and a solid?
- A chromatography
 - B distillation
 - C evaporation
 - D filtration
21. A distillation set-up involves the use of a condenser. The purpose of this piece of apparatus is to
- A change liquid into vapour.
 - B change vapour into a liquid.
 - C change vapour into a gas.
 - D change vapour into a solid
22. Which of the following does not make use of filtration?
- I. Making a cup of tea using a teabag
 - II. Separating dirt from air in a vacuum cleaner
 - III. Using a sieve to remove pulp from fruit juice
 - IV. Removing salt from a mixture of salt and water
- A II only
 - B IV only
 - C I and III only
 - D II and IV only
23. Which of the following separation techniques relies on the solubility of the particles?
- A distillation
 - B filtration
 - C magnetic attraction
 - D paper chromatography

24. Which of the following statements is true about a solution and a suspension?

- A Both solution and suspension can be separated into their components by filtration.
- B The liquid in both solution and suspension can be separated and obtained by distillation.
- C A solution has different chemical properties from its components but a suspension has the same chemical properties as its components.
- D The solids of both solution and suspension will eventually settle to the bottom of the container if left to stand long enough.

25. The table gives some information about three indicators.

indicator	colour at pH = 1	pH at which colour changes	colour at pH = 12
naphthyl red	red	4	yellow
bromocresol purple	yellow	6	purple
thymolphthalein	colourless	9	blue

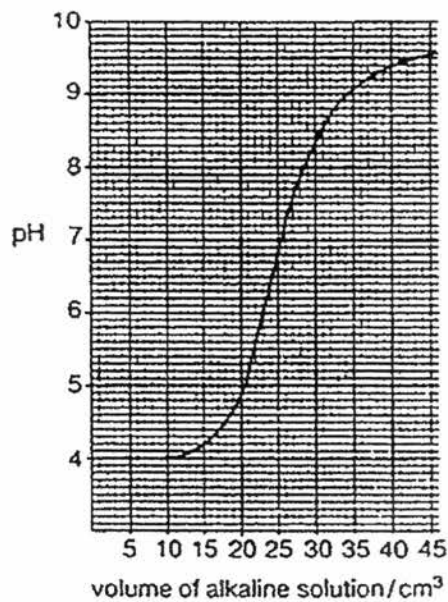
Which colours would be seen when each indicator is added separately into pure water?

	naphthyl red	bromocresol purple	thymolphthalein
A	red	yellow	blue
B	red	yellow	colourless
C	yellow	purple	blue
D	yellow	purple	colourless

26. A piece of moist blue litmus paper remains blue when placed in liquid X. A piece of moist red litmus paper turns blue when placed in liquid X. What is the most appropriate identity of liquid X?

- A bleach
- B distilled water
- C hydrochloric acid
- D lime juice

27. The graph shows how the pH changed when an alkaline solution was added to an acid.



Which volume of alkaline solution had been added when the mixture became neutral?

- A 5 cm³
 - B 15 cm³
 - C 25 cm³
 - D 35 cm³
28. Which of the following is a property of an alkali?
- A Feels soapy.
 - B Reacts with a metal to produce hydrogen gas and a salt.
 - C Removes rusts from metals.
 - D Tastes sour.

29. A large pool of acid is being spilled on the floor of the laboratory. What can be added to the acid as a mean to safely remove the acid?
- A calcium carbonate
 - B magnesium
 - C sodium hydroxide
 - D water
30. Which of the following are the products formed from a reaction of acid with metal?
- A Salt and carbon dioxide
 - B Salt and hydrogen gas
 - C Salt, hydrogen gas and water
 - D Salt and water

END OF PAPER 1

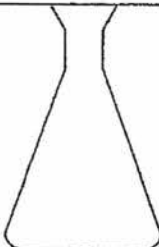
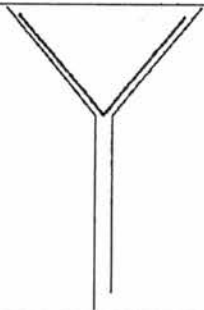
I		II		Group										III		IV		V		VI		VII		0													
7 Li Lithium 3		9 Be Beryllium 4		1 H Hydrogen 1										5 B Boron 5		6 C Carbon 6		7 N Nitrogen 7		8 O Oxygen 8		9 F Fluorine 9		10 Ne Neon 10													
23 Na Sodium 11		24 Mg Magnesium 12												13 Al Aluminium 13		14 Si Silicon 14		15 P Phosphorus 15		16 S Sulfur 16		17 Cl Chlorine 17		18 Ar Argon 18													
39 K Potassium 19		40 Ca Calcium 20		45 Sc Scandium 21		48 Ti Titanium 22		51 V Vanadium 23		52 Cr Chromium 24		55 Mn Manganese 25		56 Fe Iron 26		59 Co Cobalt 27		59 Ni Nickel 28		64 Cu Copper 29		65 Zn Zinc 30		70 Ga Gallium 31		73 Ge Germanium 32		75 As Arsenic 33		79 Se Selenium 34		80 Br Bromine 35		84 Kr Krypton 36			
85 Rb Rubidium 37		88 Sr Strontium 38		89 Y Yttrium 39		91 Zr Zirconium 40		93 Nb Niobium 41		96 Mo Molybdenum 42		101 Ru Ruthenium 44		106 Pd Palladium 46		106 Ag Silver 47		112 Cd Cadmium 48		115 In Indium 49		119 Sn Tin 50		122 Sb Antimony 51		127 I Iodine 53		131 Xe Xenon 54		137 Cs Cesium 55		138 Ba Barium 56		139 La Lanthanum 57		173 Lu Lutetium 71	
226 Fr Francium 87		227 Ra Radium 88		227 Ac Actinium 89		173 La Lanthanum 57		174 Ce Cerium 58		175 Pr Praseodymium 59		176 Nd Neodymium 60		177 Pm Promethium 61		178 Sm Samarium 62		179 Eu Europium 63		180 Gd Gadolinium 64		181 Tb Terbium 65		182 Dy Dysprosium 66		183 Ho Holmium 67		184 Er Erbium 68		185 Tm Thulium 69		186 Yb Ytterbium 70		187 Lu Lutetium 71			
226 Fr Francium 87		227 Ra Radium 88		227 Ac Actinium 89		173 La Lanthanum 57		174 Ce Cerium 58		175 Pr Praseodymium 59		176 Nd Neodymium 60		177 Pm Promethium 61		178 Sm Samarium 62		179 Eu Europium 63		180 Gd Gadolinium 64		181 Tb Terbium 65		182 Dy Dysprosium 66		183 Ho Holmium 67		184 Er Erbium 68		185 Tm Thulium 69		186 Yb Ytterbium 70		187 Lu Lutetium 71			
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226 Fr Francium 87		227 Ra Radium 88		22																																	

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).

Paper 1 [30 marks]					
1	B	11	B	21	B
2	B	12	D	22	B
3	C	13	B	23	D
4	B	14	D	24	B
5	C or D	15	B	25	D
6	D	16	A	26	A
7	B	17	C or D	27	C
8	A	18	A	28	A
9	C	19	B	29	A
10	C	20	B	30	B

Paper 2 Section A [30 marks]				
Q		Answers	Mark	Remarks
1.	a)	A: flammable B: corrosive C: irritant [all 3 correct = 1 mark]	1	Reject: harmful (irritant substances are not the only 'harmful' substance)
	b)	A: keep away from flame / fire [1] B: avoid direct contact to skin and eyes [1]	2	Accept: B: wearing of goggles and gloves. (although the wearing of gloves is not practiced in sec sch labs) Reject: A: do not put near Bunsen burner some students misinterpreted 'precaution' as danger.
2.	a)	A: non luminous B: luminous	2	
	b)	Soot/ carbon	1	Reject: burnt glass, burnt marks, smoke, marks caused by flame, marks caused by overheating,

6.	a)	(Fractional) Distillation		1	well done	
	b)	i	thermometer	ii	tripod stand	
		iii	condenser	iv	beaker	
	2 correct answers = 1 mark				2	well done
	c)	To ensure that the boiling process is smooth .			1	well done
	d)	To ensure maximum condensation of vapour to liquid droplets before it enters the beaker.			1	Accept: - to ensure the water that is cooling the condenser is the coolest at the bottom portion of the condenser to ensure the vapour is condensed to liquid state. - To ensure the cooling chamber of condenser is fully filled with cool water. Reject: allow all water vapour to condense (distillation can be done with other liquids, not just water) , faster condensation,
	e)	To measure the temperature of the vapour so as to ensure that only one liquid is boiling at one time.			1	distillation can be done with other liquids, not just water; do not use 'sense, detect, see, show' (they are not scientific terms)
7.		Dip a piece of red litmus paper and a piece of blue litmus paper into the two solutions separately. [1, method] If the red litmus paper remains red and the blue litmus paper turns red in colour, the solution is an acid . If the blue litmus paper remains blue and the red litmus paper turns blue in colour, the solution is an alkali . [1, result]			2	Reject: litmus paper turn red/ blue (need to state the <u>original colour</u> of the litmus paper) Accept: If student only state only the use of red/ blue litmus paper with correct results [2 marks] (this is applicable now as Q only require a test to identify an acid from an alkali. This is not applicable is Q is asking "State how you can identify an acidic solution?")
8.	a)	X: acid, Y: metal carbonate, Z: alkali (1 correct: 1m, 3 correct: 2m)			2	
	b)	1. Bubbles produced. [1] 2. A metal reacts with an acid to produce hydrogen gas and a salt . [1]			2	Reject: no marks for point 2 if there products are wrong.

10.	ai)	She did not wear safety goggles. [1] She used her bare hands to hold onto the test tube while heating. [1]	2	Accept: tilting opening of the test tube towards herself. Reject: did not tie up her hair (hair band is enough for shoulder length hair) ;
	aii)	Beaker, wire gauze and tripod stand (all 3 to be correct for 1 mark)	1	Reject: • <u>round bottom flask</u>, wire gauze and tripod stand (the flask cannot balance itself on the tripod stand and wire gauze, unless a retort stand is used as well); • <u>flat bottom flask</u>, wire gauze and tripod stand (the flask will crack upon strong heating); • wire <u>mesh</u>? • retort stand & boiling tube(boiling tube will crack upon heating due to the pressure exerted by the arm of retort stand) • Bunsen burner is not an apparatus (
	bi)		1	Graduated markings are only applicable for measuring cylinder and burette as these apparatus can measure volume. Conical flask markings are only for approximate estimation only. They cannot be used for measurement.
	bii)		1	

11.	ai)	paper chromatography	1	
	aii)	E	1	Many students chose D. D is insoluble. It could be a mixture of substances that is insoluble in the solvent used in the chromatography.
	aiii)	C & E	1	
	aiv)	D is insoluble in the solvent (reject: water, as the Q did not specify water)	1	
	av)	Solute with a higher solubility in the solvent will move faster with the solvent up the paper.	1	Reject: The higher the solubility of the solute, the higher its position / greater the distance from the start line. (this does not explain the principle but just stating the obvious observation)
	b)	1. Use a magnet to attract the iron filings from the mixture [1] 2. Add water to the remaining mixture and stir to dissolve salt X completely [1] 3. Pass the mixture through a filter paper . [1] 4. The residue is salt Y. [1] 5. Heat the filtrate to dryness to obtain salt X. [1]	5	well done, many missed point 2 some just stated 'filter / filtration'.

13.	a)	<table><tr><td>P</td><td>metals</td><td>Q</td><td>glass</td></tr><tr><td>R</td><td>ceramics</td><td>S</td><td>plastics</td></tr></table> 2 correct answers = 1 mark	P	metals	Q	glass	R	ceramics	S	plastics	2	many gave a name of metal (eg. copper, iron).
	P	metals	Q	glass								
	R	ceramics	S	plastics								
	b)	- Plastics are non-biodegradable / cannot be broken down (decomposed) by organisms.[1] - They cause land pollution (build-up of waste) OR water pollution (killing of marine animals) [1] - When plastic is burnt, they releases poisonous gases. [1]	2	Non-renewable is a term used for sources of energy.								
	c)	- Material S / Plastic [1] - Material S is a poor conductor of heat and thus young children would not be hurt by the heat from the hot food in the bowl. OR - Material S is not brittle and thus would not break easily when a young children drop the bowl. [1]	2									
di)	- Plastic / wood / ceramic poor conductor of heat, prevent burns	2	Reject: plastic is a poor conductor of electricity and the person using the iron will not be electrocuted. (there is no electrical current flowing in the metallic part of the iron).									
dii)	- metal good conductor of heat, allow heat to reach the clothes readily. (accept: allow the heat to reach the clothes fast / transfer heat to clothes fast)	2	Reject: iron clothes more easily (not specific enough)									

3.	a)	It acts as a sinker.	1	well done
	b)	volume of cork = volume with stone and cork – volume with stone = $50\text{cm}^3 - 47\text{cm}^3$ [1] = 3cm^3 [1, no marks if unit is wrong]	2	well done some used $41\text{cm}^3 - 40\text{cm}^3 = 1\text{cm}^3$ (note that the cork is not fully submerged)
	c)	Density = mass / volume = $0.54\text{g} / 3\text{cm}^3$ [1] = 0.18g/cm^3 [1, no marks if unit is wrong]	2	well done allow ECF
	d)	It is less dense than water.	1	well done
4.		a) E b) C or D c) B	3	many take A as a mixture an element and a compound.
5.	a)	The elements that made up the compound urea are chemically combined . [1] The elements that made up the urea molecule is in a fixed proportion by mass . [1]	2	Reject: connected ; Accept: chemically bonded need to address the concept why this molecule can represent <u>every</u> urea molecule
	b)	4	1	well done

Paper 2 Section B [40 marks]				
9.	a)	mixture [1] The 2 tablets contains a different proportion of ingredients. [1] For example, brand A tablet contains 450 mg of paracetamol while brand A tablet contains 440 mg of paracetamol when each tablet has a total weight of 500 mg. [1] (accept any other relevant data quoted)	3	many students did not quote data. (Q keyword: with reference to the table above) Reject: components are not chemically combined together (you cannot tell this from the data given)
	b)	compound [1] It is made up of different elements, which are carbon, hydrogen, oxygen and nitrogen. [1] It has different physical properties from the elements which it is made up of. [1]	3	Accept: have the ratio of carbon: hydrogen: nitrogen: oxygen is fixed at 8:9:1:2 (must quote the ratio)
	c)	Both paracetamol and caffeine are made up of elements carbon, hydrogen, oxygen and nitrogen. [1] The ratio (proportion) of carbon: hydrogen: nitrogen: oxygen in paracetamol is 8:9:1:2 and in caffeine is 8:10:4:2. [1]	2	Reject: - Made up of same <u>substances / components</u> - N & O are chemically combined in paracetamol but not in caffeine Accept: - Different number of atoms
	d)			Removed from paper. Total is 98 marks, to be converted to 98%.

10.	ci)	Water boils faster in a ceramic pot than in a metal pot OR Water boils faster in a metal pot than in a ceramic pot. (reject if answer provides explanation)	1	Reject: • water in ceramic pot boils first • metal pot is a good conductor of heat • the material of the pot affects the time taken for water to boil • the conductivity of the material affects the time taken for the water to boil.
	cii)	The controlled variable is the volume of water added into the pot [1, variable], as different volume will change the time taken for it to boil [1, reason]. Other possible controlled variables: size of fire, initial temperature of water, size of pot	2	Reject: • Type of water, type of fire (a stove only uses non-luminous flame), type of stove Students misunderstood the term 'controlled variable' as the variable that is changed. Controlled variable means a factor that must remain constant. Most students are not able to provide a good reason.
	ciii)	The amount of water added into the pots is not measured [1]. A possible improvement for the experiment will be to measure the amount of water added into the two pots [1]. OR The initial temperature of the water is not measured [1] and might be different. A possible improvement will be to ensure that the initial temperature is the same, or measure the difference in temperature. [1] OR The size of fire is different [1]. A possible improvement will be to ensure that the size of fire is kept constant.[1] Award 1m for reason and 1m for improvement. Variable should not be the same as that in part (cii). If the variable is already had been controlled in (cii), it should not be a concern in (ciii).	2	Reject: • The experiment is only done once. Repeat experiment to improve accuracy of results. (unfair is not inaccurate) • Water may boil at different temperatures. • Ceramic pot is thicker than metal pot (there is no way to improve this aspect of the experiment) •

12.	ai)	Q. [1] Aluminium is a metal. Since Q has high electrical conductivity and thermal conductivity and high melting point, it is a metal.[1]	2	Many students mistakenly regard aluminium as a metalloid or aluminium has low melting point and low thermal conductivity.
	aii)	Element T is oxygen. [1] Since sulfur has similar chemical properties , T must be in the same group . [1]	2	Many students failed to state 'same group'. Some named elements other than oxygen from group VI as they missed the key word 'gas' in the question.
	bi	5 g	1	
	bii	Gas Y	1	
	biii	Solubility of all three gases decreases as temperature increases .	1	Some students stated that the gases are left as residue (but the concept of residue only apply to solid solutes). Some students compared the boiling point of water and the gases (the gas are gaseous in the first place, even in cold water).
	ci	Beaker A	1	
	cii	Small crystals <u>increase surface area to volume ratio</u> for water molecules to act on. [1] <u>Stirring</u> speeds up the rate of dissolving of the small crystals [1]	2	Many students missed out the 'larger surface area <u>to volume ratio</u> '. Many students still state that a <u>smaller surface area</u> increases the rate of dissolving. Stirring does not increase solubility but the rate of dissolving.