Name:	Class: Sec _____	Index No.: _____

CORAL SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2014

LOWER SECONDARY SCIENCE (CHEMISTRY)

10 October 2014

SECONDARY 2 EXPRESS **Duration: 45 minutes**

Candidates must answer ALL questions in the spaces provided in the Question Paper.

READ THESE INSTRUCTIONS FIRST

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen. You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Section A: Multiple Choice Questions [10 marks]
Answer **all** questions in the table provided at the end of the section on page 5.

Section B: Structured Questions [18 marks]

Section C: Free Response Questions [12 marks]
Answer **all** questions. Write your answers in the spaces provided.
The number of marks is given in brackets [ ] at the end of each question or part question.
A copy of the Periodic Table is printed on page 12.

ELECTRONIC CALCULATORS MAY BE USED IN THIS PAPER.

For Examiner's Use		
Section	**Question(s)**	**Marks**
A	**1 – 10**	
B	**11 – 13**	
C	**14**	
	Total Marks	

This question paper consists of **12** printed pages, including this page.

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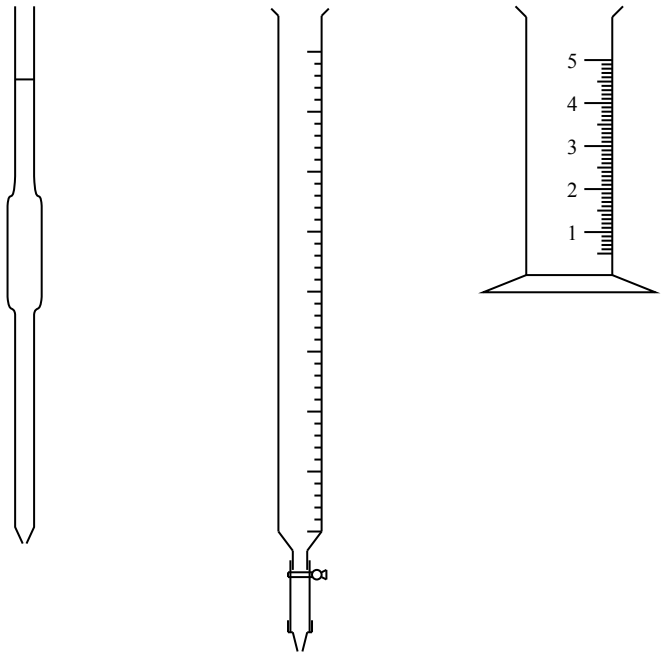
Section A [10 Marks]

Answer **all** questions in the table provided at the end of the section.

1 Four pieces of apparatus are shown.

Which apparatus is **not** used to measure the volume of a liquid?

A **B** **C** **D**



2 A liquid boils at a temperature of 100 ^{o}C.

Which other property of the liquid proves that it is pure water?

A It freezes at 0 ^{o}C.

B It is neither acidic nor alkaline.

C It does not leave a residue when boiled.

D It has a pH of 7 when tested with Universal Indicator.

3 Which of the following shows the correct number of elements and atoms in sodium sulfate, Na_2SO_4?

	number of elements	number of atoms
A	3	3
B	3	7
C	7	3
D	7	7

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4 The table below shows the melting and boiling points of four metals.

metal	melting point / °C	boiling point / °C
caesium	29	685
potassium	63	766
rubidium	39	701
sodium	98	890

When the metals are cooled to 50 °C, some of these metals will solidify.

Which metals will solidify?

A caesium and rubidium only

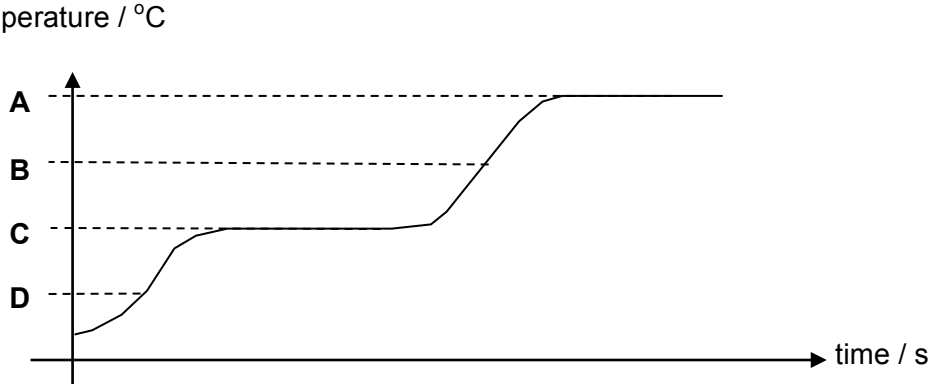
B potassium and sodium only

C rubidium and sodium only

D all metals

5 A sample of a pure substance was heated. The graph below shows the change in temperature with time.

Which letter shows the melting point of the substance?



[Turn over

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6 The table below gives the structure of four atoms.

Which atom has the largest mass number?

	number of electrons	number of neutrons	number of protons
A	5	6	5
B	5	7	5
C	6	4	6
D	6	5	6

7 Which statement explains why noble gases are unreactive?

A They all have completely filled valence shells.

B They all have eight electrons in their valence shells.

C They all have an even number of electrons.

D They all have the same number of electrons and protons.

8 The table shows the number of protons in five elements.

atom of element	number of protons
U	18
V	9
W	17
X	11
Y	4

Which pair of atoms forms a covalent molecule?

A two atoms of **U**

B two atoms of **V**

C an atom of **W** and an atom of **X**

D an atom of **X** and an atom of **Y**

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9 What was observed when a piece of damp litmus paper was dipped into hydrochloric acid?

A The blue litmus paper turns red.

B The red litmus paper turns blue.

C No change was observed.

D The blue litmus paper turns red then blue.

10 Ammonium chloride is heated with substance **X**. Ammonia gas is given off.

What type of substance is **X**?

A acid

B alkali

C salt

D metal

ANSWERS FOR SECTION A

No.	Answer	No.	Answer
1		6	
2		7	
3		8	
4		9	
5		10	

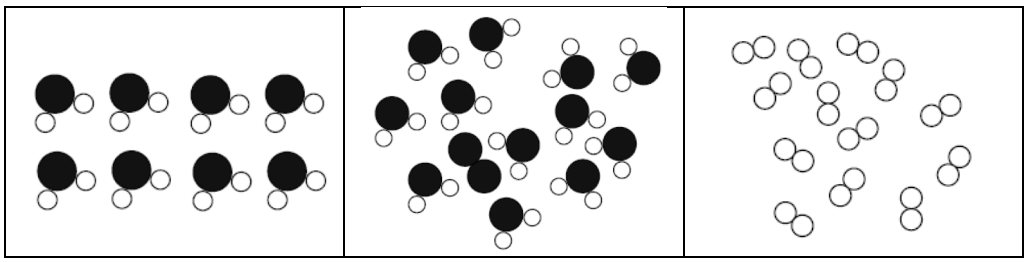
[10]

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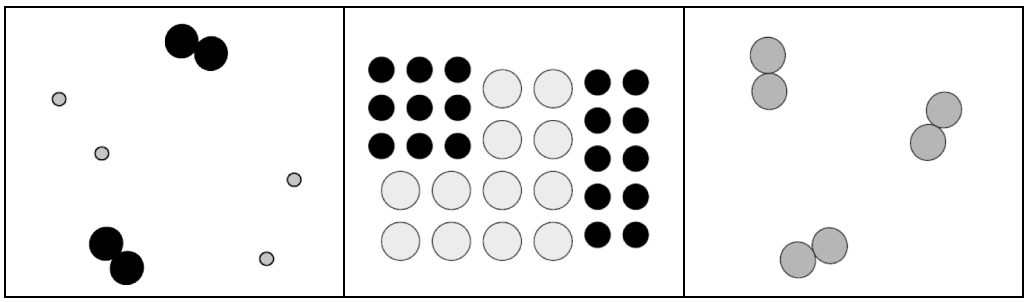
SECTION B [18 Marks]

Answer **all** questions. Write your answers in the spaces provided.

11 In the boxes, each circle represents an atom. Circles of different sizes and colour show different elements.



A **B** **C**



D **E** **F**

Use the letters **A** to **F** to identify a

(a) solid compound; ..... [1]

(b) liquid element; ..... [1]

(c) solid mixture; ..... [1]

(d) gaseous mixture of elements; ..... [1]

(e) liquid mixture of elements and compounds. ..... [1]

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12 An atom of fluorine has nine electrons.

(a) Draw a diagram to show the arrangement of electrons in a fluorine atom.

[1]

(b) Fluorine reacts with magnesium metal to form magnesium fluoride.

Draw a dot-and-cross diagram of magnesium fluoride.

[2]

(c) Fluorine also reacts with hydrogen to form hydrogen fluoride.

Draw a dot-and-cross diagram of hydrogen fluoride. Show only the outer shell electrons.

[2]

[Turn over

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(d) Magnesium fluoride and hydrogen fluoride have very different boiling points.

Use your knowledge of the bonding in magnesium fluoride and hydrogen fluoride to explain the difference in boiling points.

……

……

……

……

…… [3]

13 Complete the following table by writing the missing formula and electrical conductivity.

substance	chemical formula	electrical conductivity	
		solid state	molten state
oxygen gas		poor	
sulfur trioxide		poor	
potassium carbonate		poor	
calcium oxide		poor	
iron		good	

[5]

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SECTION C [12 Marks]

Answer **all** questions. Write your answers in the spaces provided.

14 **(a)** Complete the table to indicate if there is a chemical reaction when the following substances are added in a test-tube.

State 'yes' if there is a chemical reaction and name the products formed.

State 'no' if there is no chemical reaction.

substances added	is there a chemical reaction?	names of products formed
calcium + sodium nitrate		
zinc oxide + hydrochloric acid		
sodium carbonate + nitric acid		

[3]

(b) When nitric acid reacts with magnesium metal, magnesium nitrate and a gas is formed.

(i) Describe a test to confirm the identity of this gas.

test……

observation……

…….. [2]

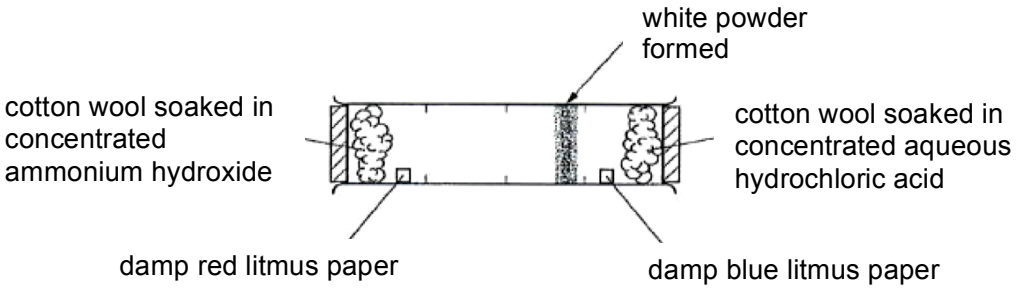
(ii) When magnesium metal was replaced with another metal, no reaction was observed.

Suggest the identity of the metal.

…….. [1]

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(c) The following experiment was set up to investigate the movement of gases.



The white powder forms on the tube due to the reaction between ammonium hydroxide and hydrochloric acid.

(i) Complete the following word equation.

ammonium hydroxide + hydrochloric acid → ……

…….. [1]

(ii) What is the name given to this reaction?

…….. [1]

(iii) Explain why the white powder does not form in the centre of the tube.

……

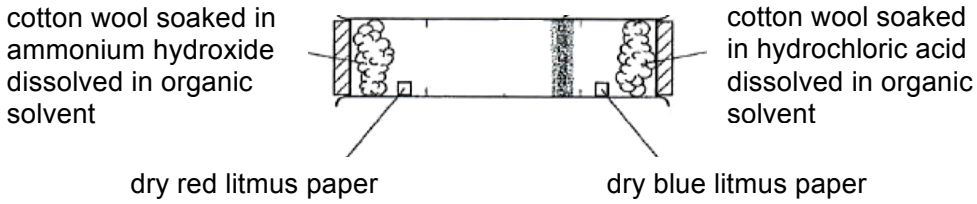
……

……

…… [2]

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(iv) The experiment was repeated using cotton wool soaked in ammonium hydroxide and hydrochloric acid dissolved in an organic solvent and dry litmus papers.



At the end of the experiment, it was observed that the colour of the two litmus papers were different from that of those observed at the end of the first experiment.

Describe and explain the difference in observations.

……..

……..

……..

……..

……..

……..

……..

……..

……. [2]

~ END OF PAPER ~

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The Periodic Table of the Elements

Group I	II											III	IV	V	VI	VII	0
																	4 He helium 2
						1 H hydrogen 1						11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
7 Li lithium 3	9 Be beryllium 4											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
23 Na sodium 11	24 Mg magnesium 12											70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
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	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	– Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	– Po polonium 84	– At astatine 85	– Rn radon 86
133 Cs caesium 55	137 Ba barium 56	139 La lanthanum 57 *	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80						
– Fr francium 87	– Ra radium 88	– Ac actinium 89 †															

*58-71 Lanthanoid series
†90-103 Actinoid series

140 Ce cerium 58	141 Pr praseodymium 59	144 Nd neodymium 60	– Pm promethium 61	150 Sm samarium 62	152 Eu europium 63	157 Gd gadolinium 64	159 Tb terbium 65	162 Dy dysprosium 66	165 Ho holmium 67	167 Er erbium 68	169 Tm thulium 69	173 Yb ytterbium 70	175 Lu lutetium 71
232 Th thorium 90	– Pa protactinium 91	238 U uranium 92	– Np neptunium 93	– Pu plutonium 94	– Am americium 95	– Cm curium 96	– Bk berkelium 97	– Cf californium 98	– Es einsteinium 99	– Fm fermium 100	– Md mendelevium 101	– No nobelium 102	– Lr lawrencium 103

Key: a = relative atomic mass; X = atomic symbol; b = proton (atomic) number

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

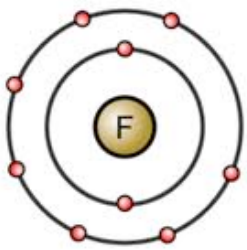
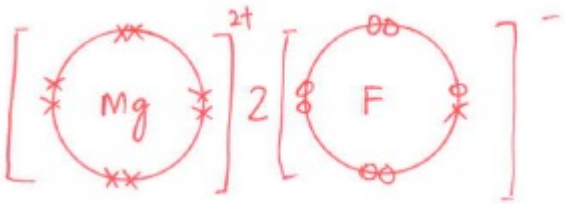
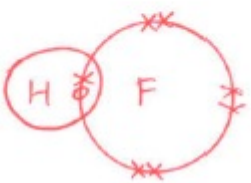
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Coral Secondary School
EOY 2014
Sec 2E Lower Sec Science (Chemistry)

Section A: Multiple Choice Questions (Total Marks: 10)

Question No.	Answer	Question No.	Answer
1	**D**	6	**B**
2	**A**	7	**A**
3	**B**	8	**B**
4	**B**	9	**A**
5	**C**	10	**B**

Section B: Structured Questions (Total Marks: 18)

Qn No.	Answer	
11a **11b** **11c** **11d** **11e**	A C E D B	1 1 1 1 1
12 (a)		1
12 (b)		1 – correct charges + electrons 1 – correct ratio of 1:2
12 (c)		1 – correct number of atoms 1 – correct number of bonding electrons

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<table>
<tr><td>12 (d)</td><td>Magnesium fluoride is an <u>ionic compound</u> with a high boiling point while hydrogen fluoride is a <u>covalent compound</u> with low boiling point.
Magnesium fluoride has <u>strong force of attraction between ions</u> hence its melting point is high.
Hydrogen fluoride <u>has weak van der Waals forces of attraction between molecules/intermolecular force</u> which require less energy to break, hence it's melting point is low.</td><td>1- difference in melting points/difference in <u>heat</u> energy required
1- naming the type of compound
1- description of bonding</td></tr>
<tr><td>13</td><td>
<table>
<tr><th rowspan="2">substance</th><th rowspan="2">chemical formula</th><th colspan="2">Electrical conductivity</th></tr>
<tr><th>solid state</th><th>molten state</th></tr>
<tr><td>oxygen gas (element, non-metal)</td><td><u>O_2</u></td><td>poor</td><td><u>Poor</u></td></tr>
<tr><td>sulfur trioxide (covalent compound)</td><td><u>SO_3</u></td><td>poor</td><td><u>Poor</u></td></tr>
<tr><td>potassium carbonate (ionic compounds)</td><td><u>K_2CO_3</u></td><td>poor</td><td><u>Good</u></td></tr>
<tr><td>calcium oxide (Ionic compound)</td><td><u>CaO</u></td><td>poor</td><td><u>Good</u></td></tr>
<tr><td>iron</td><td><u>Fe</u></td><td>good</td><td><u>Good</u></td></tr>
</table>
</td><td>Every 2 correct - 1M</td></tr>
</table>

<u>Section C: Free-Response Questions (Total Marks: 12)</u>

<table>
<tr><td>14 (a)</td><td>
<table>
<tr><th>substances added</th><th>is there a chemical reaction?</th><th>name of products formed</th></tr>
<tr><td>calcium + sodium nitrate</td><td>No</td><td>Nil</td></tr>
<tr><td>zinc oxide + hydrochloric acid</td><td>Yes</td><td>Zinc chloride + water</td></tr>
<tr><td>sodium carbonate + nitric acid</td><td>Yes</td><td>Sodium nitrate + water + carbon dioxide</td></tr>
</table>
</td><td>1
1
1</td></tr>
<tr><td>14 (b) i</td><td>Introduce a lighted splint.
The gas will <u>extinguish</u> a <u>lighted splint with a 'pop' sound.</u></td><td>1
1</td></tr>
<tr><td>14 (b) ii</td><td>Copper/Silver</td><td>1</td></tr>
<tr><td>14 (c) i</td><td>ammonium chloride + water / ammonium chloride</td><td>1</td></tr>
<tr><td>14 (c) ii</td><td>Neutralisation</td><td>1</td></tr>
</table>

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14 (c) iii	Ammonia has a **lower molecular mass** than hydrogen chloride. Hence it **diffuses/travels faster** than hydrogen chloride. Hence the white powder is formed nearer to hydrogen chloride.	1 1
16 (c) iv	For the first experiment, at the end, the **red litmus paper turns blue** while the **blue litmus paper turns red**. However in the second experiment, **both litmus paper remains unchanged**. In the first experiment, due to the presence of water, both hydrogen chloride and ammonia dissociated to form hydrogen ions & hydroxide ions respectively. However in the second experiment, as there was no water, the hydrogen chloride and ammonia **were not able to dissociate into its ions**, hence no colour change was observed.	1 1

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Name:	Class: Sec _____	Index No.: _____

CORAL SECONDARY SCHOOL
END-OF-YEAR EXAMINATION 2014

LOWER SECONDARY SCIENCE PHYSICS **Paper 1**

9 October 2014

SECONDARY 2 EXPRESS

Duration: 45 minutes

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Section A: Multiple Choice Questions [10 marks]

Answer **all** questions in the table provided at the end of the section on **page 4**.

Section B: Structured Questions [20 marks]

Section C: Free Response Questions [10 marks]

Answer **all** questions. Write your answers in the spaces provided.

The number of marks is given in brackets [ ] at the end of each question or part question.

Unless otherwise stated, use g = 10 m s^{-2} for all your calculations.

ELECTRONIC CALCULATORS MAY BE USED IN THIS PAPER.

For Examiner's Use		
Section	**Question(s)**	**Marks**
A	**1 – 10**	
B	**11 – 15**	
C	**16**	
	Total Marks	

This question paper consists of **9** printed pages, including this page.

[Turn over

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SECTION A [10 MARKS]

Answer **ALL** questions by writing the correct option in the table found on page 4.

1 Which of the following is a vector quantity?

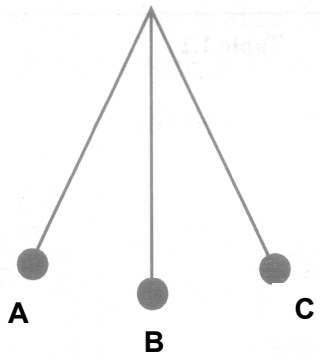
A time

B speed

C distance

D acceleration

2 The diagram shows a simple pendulum that oscillates between **A** and **C**. The pendulum takes 0.3 s to move from **A** to **B**.



What is the period of the pendulum?

A 0.3 s **B** 0.6 s **C** 1.2 s **D** 2.4 s

3 Mary is measuring the period of 4 different pendulums – **A**, **B**, **C** and **D**. The table shows the length and mass of each pendulum.

Which pendulum will have the **shortest** period?

	length / cm	mass / g
A	20	50
B	40	40
C	60	30
D	80	20

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4 According to Newton's First Law of Motion, when there is no resultant force acting on a moving object, the object will

A slow down and stop moving.

B continue moving at the same speed in the same direction.

C continue moving at the same speed but direction might change.

D continue moving at the same acceleration in the same direction.

5 Which of the following is **not** possible when a force acts on an object?

A The object slows down.

B The object moves faster.

C The object changes its mass.

D The object changes its shape.

6 Two forces of magnitudes 10 N and 15 N are acting on an object.

Which of the following is **not** a possible value for the resultant force?

A 5 N **B** 12 N **C** 25 N **D** 30 N

7 A pressure of 100 Pa is equal to

A 100 N m^{-2} **B** 1000 N m^{-2} **C** 1000 N cm^{-2} **D** 10000 N cm^{-2}

8 Which of the following properties of light explains why shadows are formed?

A Light is a form of energy.

B Light can be reflected.

C Light travels in straight lines.

D The speed of light changes when it passes into a different medium.

9 The human eye is able to see a non-luminous object because

A the human eye gives out light.

B the non-luminous object gives out light.

C light is reflected from the non-luminous object into the human eye.

D light is reflected from the human eye onto the non-luminous object.

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10 When you look at a convex mirror, the image of your face is

A upright and bigger than your face.

B inverted and bigger than your face.

C upright and smaller than your face.

D inverted and smaller than your face.

ANSWERS FOR SECTION A

No.	Answer	No.	Answer
1		6	
2		7	
3		8	
4		9	
5		10	

[10]

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SECTION B [20 MARKS]

Answer **ALL** questions. Write your answers in the spaces provided.

11 Peter is running along a circular path in the park. The distance of one complete round around the circular path is 800 m. Peter takes 12 min to run three complete rounds.

(a) Calculate the distance travelled and average speed of Peter in running three complete rounds.

distance travelled = …….. m

average speed = …….. m s^{-1} [2]

(b) **(i)** State the displacement of Peter after 3 complete rounds.

displacement = …….. m [1]

(ii) Explain why the distance travelled by Peter is different from his displacement after running three complete rounds.

……..

……..

…….. [1]

12 A man took 30 min to drive from town **X** to town **Y** at an average speed of 70 km h^{-1}. He took a break for 1 h before driving from town **Y** to town **Z** in 40 min at an average speed of 60 km h^{-1}.

(a) Calculate the total distance travelled by the man from town **X** to town **Z**.

distance = …….. km [2]

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(b) Calculate the average speed of the man from town **X** to town **Z**.

average speed = …….. km h^{-1} [2]

13 **(a)** Define *acceleration*.

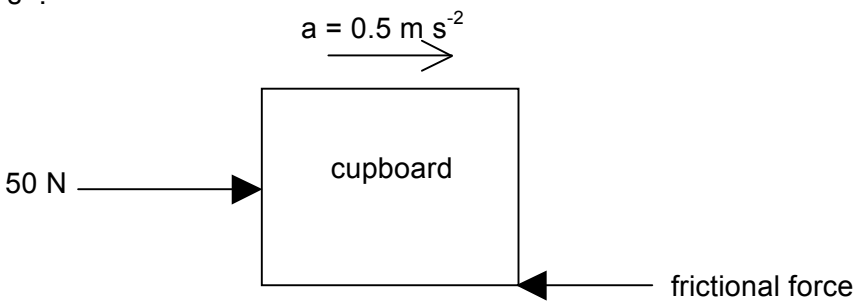
…… [1]

(b) A car travelling at an initial speed of 15 m s^{-1} slows down to a stop before a traffic junction with a deceleration of 3 m s^{-2}.

Calculate the time taken for the car to come to a stop.

time = …….. s [2]

14 The diagram below shows the forces acting on a cupboard as it is being pushed along the floor. The mass of the cupboard is 20 kg, and it is moving with an acceleration of 0.5 m s^{-2}.



(a) Calculate the resultant force acting on the cupboard.

resultant force = …….. N [2]

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(b) Calculate the frictional force.

frictional force = …….. N [2]

(c) State **one** way to reduce the friction between the cupboard and the floor.

……

…… [1]

15 A man of weight 800 N is standing on two feet. He is carrying a box that has a weight of 100 N. The total area of his two feet in contact with the floor is 400 cm^2.

(a) Calculate the pressure exerted by the man's feet on the floor, in N cm^{-2}.

pressure = …….. N cm^{-2} [2]

(b) The man is standing on soft sand and he starts to sink into it as a result of the pressure he exerts on the sand.

Suggest and explain how he can reduce the sinking effect.

……..

……..

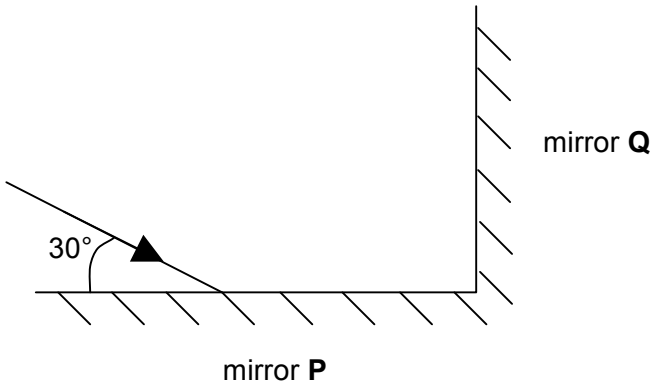
…….. [2]

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SECTION C [10 MARKS]

Answer **ALL** questions. Write your answers in the spaces provided.

16 (a) Two mirrors, **P** and **Q**, are arranged at 90° to each other as shown in the diagram below (not to scale). A ray of light strikes mirror **P** at an angle of 30°.



(i) Complete the diagram to show how the ray of light reflects from mirrors **P** and **Q**. [1]

(ii) State the incident angle of the light ray on mirror **P**.

incident angle = ……..° [1]

(iii) State the Law of Reflection of light.

……..

…….. [1]

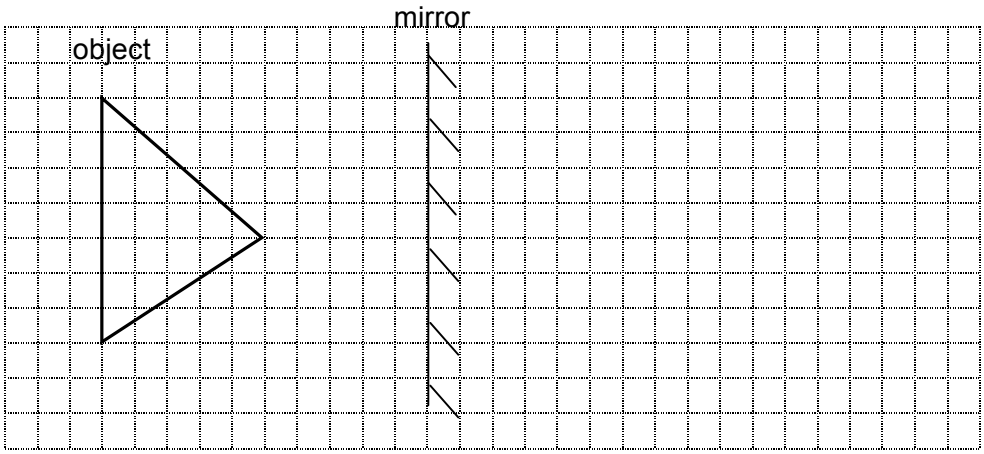
(iv) By using relevant angle properties, determine the angle of reflection of the light ray from mirror **Q**.

angle of reflection = ……..° [2]

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(b) The diagram below shows a triangular object in front of a plane mirror.

In the diagram, draw the image of the object behind the mirror. [3]



(c) The word **CORAL** has five letters.

(i) Write down how the image of the word **CORAL** will look like in a plane mirror.

……. [1]

(ii) How many letters in the word will appear to be the same in the mirror?

……. [1]

~ END OF PAPER ~

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Section A

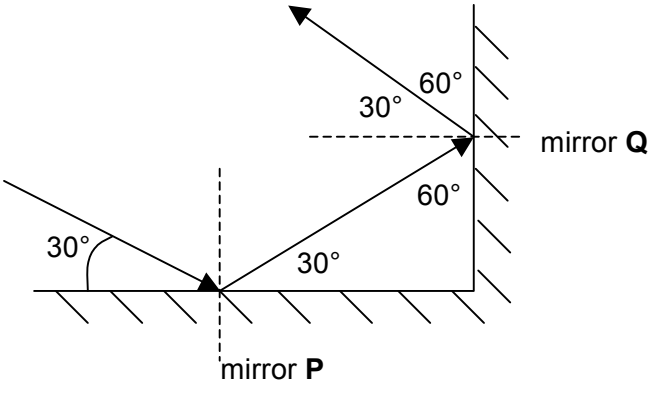
1	**D**	6	**D**
2	**C**	7	**A**
3	**A**	8	**C**
4	**B**	9	**C**
5	**C**	10	**C**

[10 m]

Section B

11	**(a)**	distance travelled = 3 x 800 = 2400 m average speed = 2400/(12 x 60) = 3.33 m s^{-1} *allow e.c.f.*	B1 A1
	b(i)	displacement = 0 m	B1
	b(ii)	Distance is total length regardless of path taken, while displacement is final distance in a straight line from starting point. OR Distance is a scalar, displacement is a vector / distance does not depend on direction while displacement depends on direction	B1
12	**(a)**	distance = speed x time = (70)(30/60) + (60)(40/60) = 75 km	C1 A1
	(b)	average speed = total distance / total time = 75 / [(30+40+60)/60] *allow e.c.f. from part (a)* = 34.6 km h^{-1}	C1 A1
13	**(a)**	rate of change of velocity	B1
	(b)	a = (v – u)/t t = (v – u)/a = (0 - 15)/ (-3) = 5 s	C1 A1
14	**(a)**	F = ma = (20)(0.5) = 10 N	C1 A1
	(b)	resultant force = 50 N – frictional force frictional force = 50 N – resultant force = 50 N – 10 N *allow e.c.f. from part (a)* = 40 N	C1 A1

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	(c)	Possible answers: lubricate the floor with oil, put wheels under the cupboard, use a trolley, empty the cupboard	B1
15	**(a)**	pressure = force/area = 900/400 = 2.25 N cm^{-2}	C1 A1
	(b)	Increase the contact area between his feet and the sand, so that he exerts less pressure on the sand.	B1 B1
16	**a(i)**	Diagram shows light ray reflecting from P onto Q and away from Q, with correct arrow direction.	B1
	a(ii)	incident angle = 60°	B1
	a(iii)	Angle of reflection is equal to angle of incidence.	B1
	a(iv)	 angle of reflection = 30° *Give 2 marks if final answer is correct, even without working.* *Give 1 mark if final answer is wrong but there is evidence of working that shows the angles are correct, but student mistakes 60° to be angle of reflection.*	B2
	(b)	*image drawn is* *- laterally inverted* *- same distance behind mirror as object is in front* *- drawn with dotted lines to show it's a virtual image*	 B1 B1 B1
	c(i)	*the word CORAL is laterally inverted with L as first letter and C as last letter, with C, R and L laterally inverted.*	A1
	c(ii)	2 letters	A1

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