



OUNDLE

School

EXAMINATION PAPER
Non-Common Entrance 2023

Science

Time allowed: 1 hour

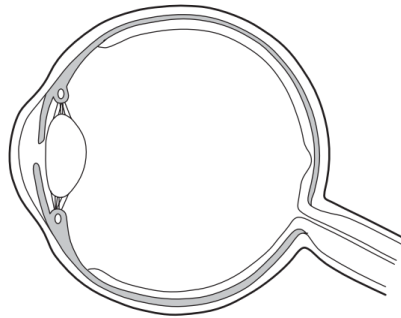
Name: _____

Instructions

- Write your name clearly in the space above
- Answer in this paper
- Calculators are allowed
- Answer ALL the questions in all sections. Each section carries the same number of marks
- You are expected to write clearly and accurately throughout each of your answers. You should leave some time towards the end of the examination to check your work carefully.
- Where there is a multiple choice question, answer by circling the letter you wish to choose. If you change your mind, place a line through it and then circle your new answer.
- The maximum number of marks for this paper is 60

Biology Section

1) The diagram shows a structure found in the human body.



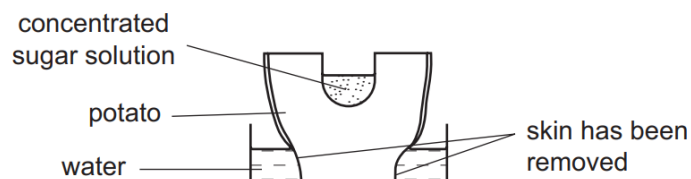
What is this structure an example of?

- An organ
 - An organism
 - An organ system
 - A tissue
- 2) The table shows some features of animals.

Which animal could be a bird?

	feature				key
	feathers	gills	hair	wings	
A	x	✓	✓	x	✓ = present x = not present
B	✓	✓	x	x	
C	✓	x	x	✓	
D	x	x	✓	✓	

3) The diagram shows an experiment using an uncooked potato. The skin of the potato was removed as shown.



Which diagram shows the result of the experiment after 24 hours?



4) A student draws a diagram of a plant cell.

The diagram is 40mm in width. The plant cell is 0.02mm in width.

What is the magnification of the student's drawing?

- a. x0.005
- b. x0.08
- c. x200
- d. x2000

5) In which order do organisms occur in the food chain?

- a. carnivore → herbivore → producer
- b. herbivore → carnivore → producer
- c. producer → carnivore → herbivore
- d. producer → herbivore → carnivore

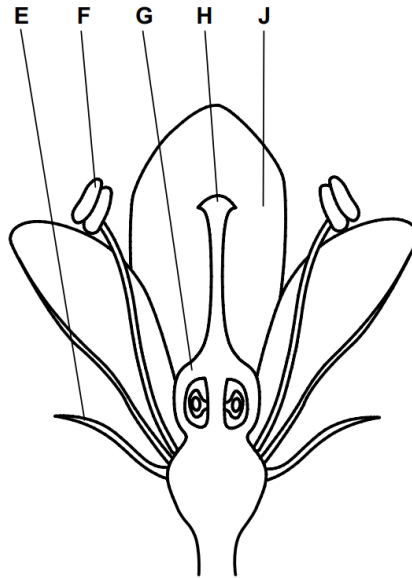
6) Which factors, if present, may cause a population of animals to decrease?

	predation	disease
A	✓	✓
B	✓	x
C	x	x
D	x	✓

7) How is energy transferred between organisms in a food chain?

- a. Combustion
- b. Ingestion
- c. Photosynthesis
- d. Respiration

8) The picture below shows a section through a flower.



Write **one** letter from the picture to identify each of the following.

You may use each letter once, more than once, or not at all.

a. Petal _____

b. Anther _____

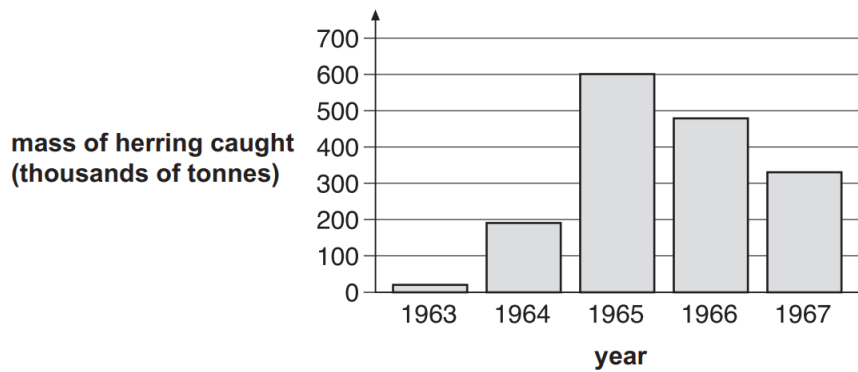
c. Stigma _____

[3]

- 9) The table below shows the number of boats used for catching herring fish in the Norwegian Sea between 1963 and 1967.

year	number of fishing boats
1963	16
1965	284
1967	326

The bar chart below shows the total mass of herring caught in the Norwegian Sea between 1963 and 1967.



- a. Use the information above to help you answer parts i., ii. and iii.

- i. Why did the mass of herring caught increase between 1963 and 1965?

[1]

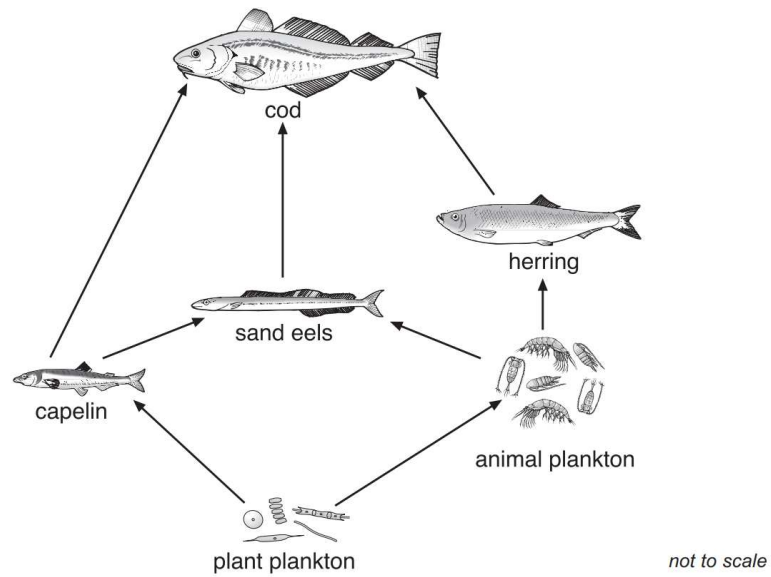
- ii. Suggest why the mass of herring caught decreased between 1965 and 1967.

[1]

- iii. Herring cannot breed until they are four years old. Fishing for herring was banned in the Norwegian Sea from 1972 to 1976. Suggest one reason why fishing for herring was banned for this period.

[1]

b. The diagram below shows a food web in the Norwegian Sea.



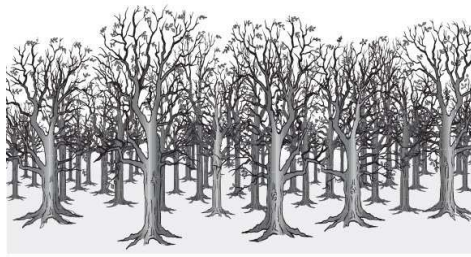
i. How could a decrease in the number of herring cause a decrease in the number of sand eels?

[1]

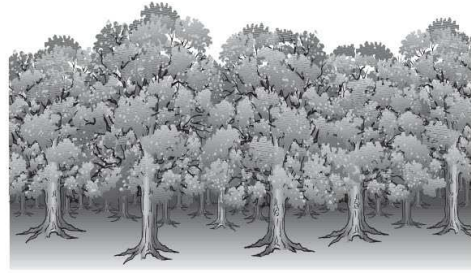
ii. How could a decrease in the number of herring cause an increase in the number of sand eels?

[1]

10) The drawings below show the trees in a woodland area at the beginning of May and at the end of May.

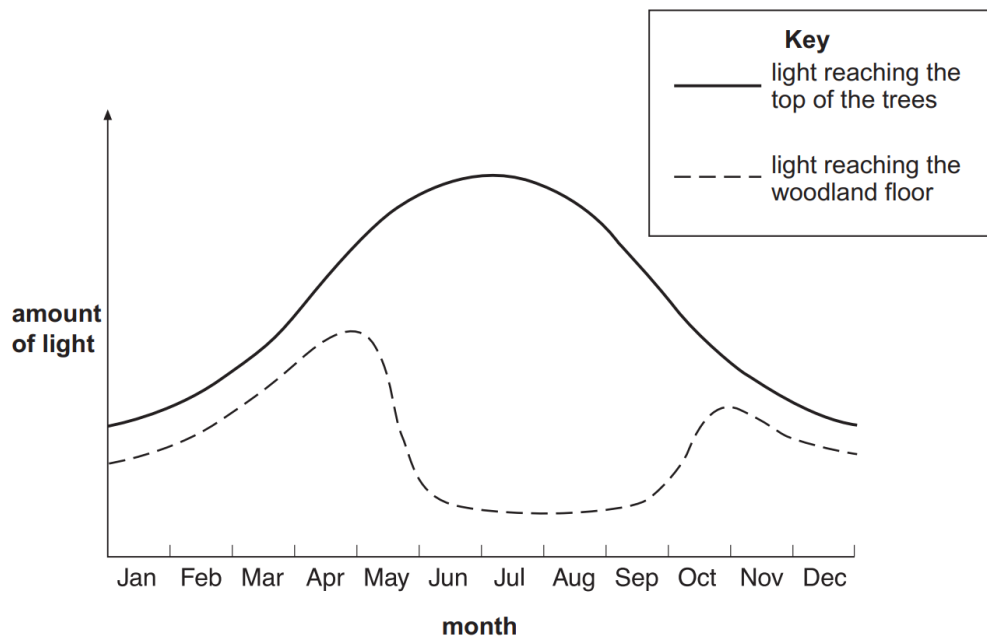


beginning of May



end of May

The graph below shows the amount of light reaching the top of the trees and the woodland floor over one year.



a. Why does the amount of light reaching the woodland floor decrease during May?

- b. Plants grow on the woodland floor. Explain why these plants grow bigger and faster when there is plenty of light

[2]

c. Respiration takes place in the cells of all plants. Complete the word equation for respiration.

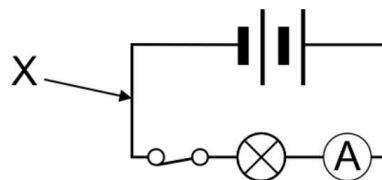
Oxygen + _____ → carbon dioxide + _____

[2]

[20 marks]

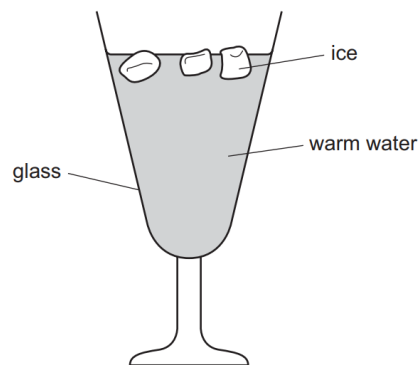
Physics Section

- 1) What is the name given to the force of friction that acts on an object moving through air?
 - a. Weight
 - b. Gravity
 - c. Drag
 - d. Wind
- 2) Which of these equations correctly links energy transferred, force and distance moved?
 - a. Energy transferred = force \times distance
 - b. Energy transferred = force \div distance
 - c. Energy transferred = distance \div force
- 3) Batteries provide the driving force to push charge around a circuit. What is this driving force called?
 - a. Potential difference
 - b. Current
 - c. Resistance
 - d. Electricity
- 4) A pair of 3D glasses is made using a red filter for one lens and a green filter for the other lens. What colour will a blue box appear to be when viewed through these glasses?
 - a. Black
 - b. White
 - c. Blue
 - d. Green
- 5) The ammeter in the circuit below reads 2 A. If you moved the bulb to point X, what would the current flowing through it be?



- a. 0 A
 - b. 2 A
 - c. 1 A
 - d. 4 A
- 6) A 700 W blender is used for 1.5 minutes. How much energy was transferred by the blender in this time?
 - a. 63 J
 - b. 1050 J
 - c. 63000 J
 - d. 1.05kJ

7) The diagram shows some ice being used to lower the temperature of some warm water.



What is the main process by which the water at the bottom of the glass becomes cool

- a. Condensation
- b. Conduction
- c. Convection
- d. Radiation

8) An aeroplane flies from London to Singapore, a total distance of 7000 miles. The flight lasts 14 hours. What is the average speed of the aeroplane?

Show your working.

[2]

9) The owner of a small factory suggests installing a wind turbine to generate some of the electricity needed by the factory.

a. Give one environmental reason for using a wind turbine.

[1]

b. Discuss **three** of the factors that the owner will need to consider when deciding whether to install a wind turbine.

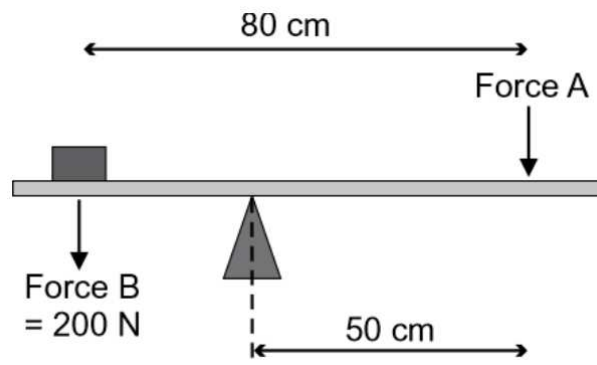
[4]

10) Brad and Lee are cycling in opposite directions. Brad is cycling at 24 mph and Lee is cycling at 33 mph. What is the speed of Brad relative to Lee?

Show your working.

[2]

11) What is the size of the moment created by force B in the diagram?



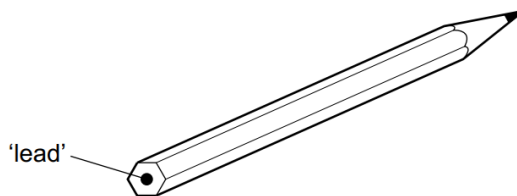
Show your working.

[4]

[20 marks]

Chemistry Section

- 1) Which statement about liquids and gases is correct?
- 1cm³ of gas contains more particles than 1cm³ of liquid.
 - A given mass of liquid has a fixed volume at room temperature.
 - Particles in a liquid can easily be forced closer together.
 - Particles in a liquid have fixed positions
- 2) The 'lead' in a pencil is made of a mixture of graphite and clay.



When the percentage of graphite is increased, the pencil moves across the paper more easily.

Which statement explains this observation?

- Clay is a lubricant.
 - Graphite is a form of carbon.
 - Graphite is a lubricant.
 - Graphite is a non-metal
- 3) Which changes are physical changes?
- Melting ice to form water
 - Burning hydrogen to form water
 - Adding sodium to water
 - Boiling water to form steam
- 1 and 2
 - 1 and 4
 - 2 and 3
 - 3 and 4
- 4) Four different solutions, J, K, L and M, are tested with universal indicator.

solution	J	K	L	M
colour with universal indicator	green	red	purple	orange

Which solutions are acidic?

- J and M
- K and M
- K only
- L only

5) What is a property of all metals?

- 1 They conduct electricity
- 2 They conduct heat
- 3 They are solid at room temperature
- 4 They react with water

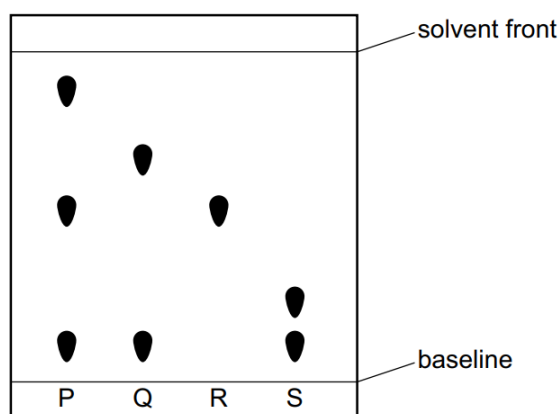
- a) 1 and 2
- b) 1 and 3
- c) 1, 2 and 3
- d) All of them

6) Limestone fizzes and dissolves in dilute hydrochloric acid.

What is the word equation for this reaction?

- a) calcium carbonate + hydrochloric acid \rightarrow calcium chloride + carbon dioxide
- b) calcium hydroxide + hydrochloric acid \rightarrow calcium chloride + hydrogen
- c) calcium oxide + hydrochloric acid \rightarrow calcium chloride + water
- d) calcium carbonate + hydrochloric acid \rightarrow calcium chloride + water + carbon dioxide

7) The chromatogram obtained from four mixtures of dyes, P, Q, R and S, is shown.



What is the total number of different dyes identified in the four mixtures?

- a) 3
- b) 4
- c) 5
- d) 8

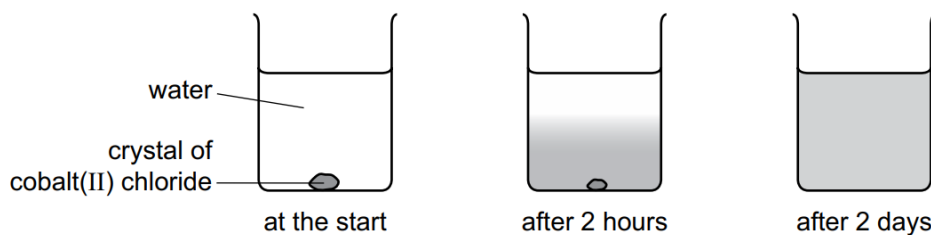
8) The picture below shows the periodic table.

1		2																		3	4	5	6	7	0							
				Key relative atomic mass atomic symbol name atomic (proton) number																1 H hydrogen 1												4 He helium 2
7 Li lithium 3		9 Be beryllium 4																		11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10							
23 Na sodium 11		24 Mg magnesium 12																		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							
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	63.5 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	[98] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54														
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	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86														
[223] Fr francium 87		[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112 – 116 have been reported but not fully authenticated																				

Which statement is correct?

- The elements are organised in increasing relative atomic mass
- The symbol for the element in Group 1 and Period 3 is K
- Chlorine is a non-metal solid that is yellow
- An element that is used in the manufacture of steel is carbon

- 9) A coloured crystal of cobalt(II) chloride is placed at the bottom of a beaker containing water. Colour spreads throughout the water over time. The picture below shows the spread of colour after two days.



- a) Explain these observations

[3]

- b) The table of data below compares the reactivity of cobalt with that of three other metals.

metal	reactivity with cold water	reactivity with steam
barium	reacts rapidly	
cobalt	no reaction	reacts slowly when heated
magnesium	reacts very slowly	reacts rapidly
zinc	no reaction	reacts easily when heated

Use this information to put the four metals in order of their reactivity. Put the least reactive metal first.

least reactive \longrightarrow most reactive

[2]

c) State the boiling point of pure water at room temperature and pressure.

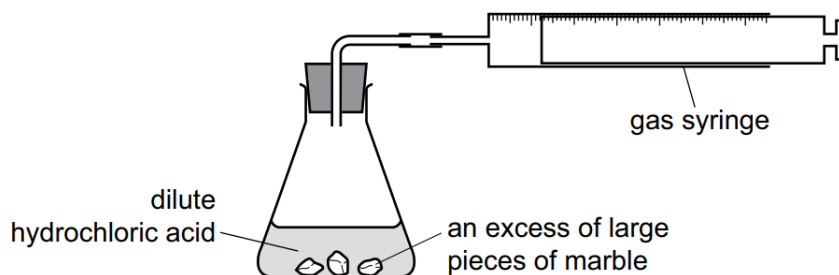
[1]

d) When cobalt(II) oxide, CoO , is heated in air an oxide with the formula Co_3O_4 is formed.
Balance the equation for this reaction.

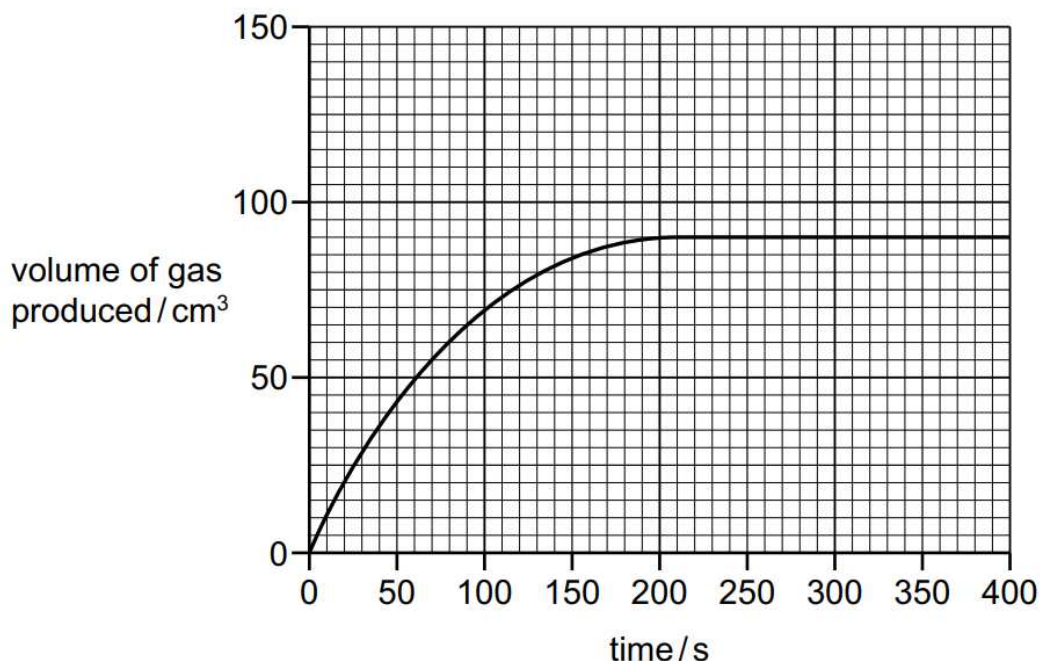


[1]

10) A student investigates the progress of the reaction between dilute hydrochloric acid, HCl , and an excess of large pieces of marble, CaCO_3 , using the apparatus shown in the picture below.



A graph of the volume of gas produced against time is shown in below



The rate of reaction is how much gas is produced in a given amount of time.

a) State how the shape of the graph shows that the rate of reaction decreases as the reaction progresses.

[1]

b) Suggest why the rate of reaction decreases as the reaction progresses

[1]

c) Deduce the time at which the reaction finishes

[1]

d) The experiment is repeated using the same mass of smaller pieces of marble.

All other conditions are kept the same.

Using smaller pieces of marble increases the rate of reaction.

Draw on the graph to show the progress of the reaction using the smaller pieces of marble.

[2]

[20 marks]

End of Paper