JUNIOR SECONDARY CERTIFICATE

PHYSICAL SCIENCE   **1210/1**

PAPER - Written   2 hours 30 minutes

Marks 130   **2017**

Additional Materials: Soft pencil (HB type is recommended)
                          Non-programmable calculator

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Candidates answer on the Question Paper in the spaces provided.
- Write your Candidate Number and Name in the spaces at the top of this page.
- Write in dark blue or black pen.
- You may use a soft pencil for any rough work, diagrams or graphs.
- Do not use correction fluid.
- Do not write in the margin *For Examiner's Use*.

- Answer **all** questions.

- Make sure that you receive the multiple choice answer sheet with your Candidate Number on it to answer section **A**.
- The number of marks for section **B** is given in brackets [ ] at the end of each question or part question.
- The Periodic Table is printed on page 24.

This document consists of **24** printed pages.

**Republic of Namibia**
MINISTRY OF EDUCATION, ARTS AND CULTURE

SECTION A: MULTIPLE CHOICE QUESTIONS

- Answer this section on the multiple choice answer sheet provided.

- For each question there are four possible answers **A**, **B**, **C** and **D**.

- Choose the one you consider correct and mark your choice in **soft pencil**.

- Each question counts **one** mark.

- If you want to change an answer, erase the one you wish to delete completely.

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1 The diagram shows a thermometer.
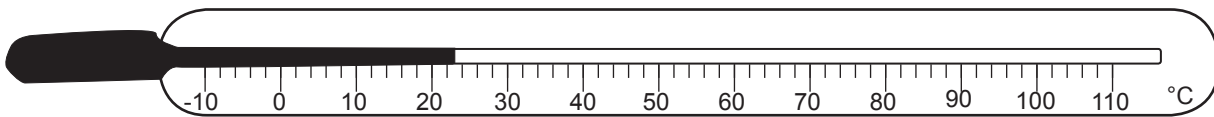
What is the reading shown on the thermometer?

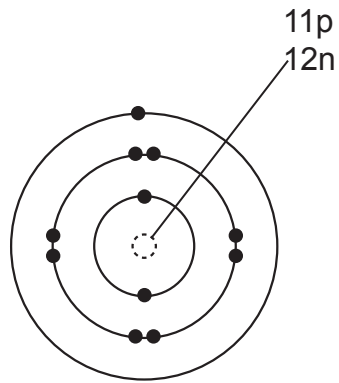**A** 20.3°C

B 21.5°C

C 23.0°C

D 25.0°C

2 The diagram shows the set up of an experiment.
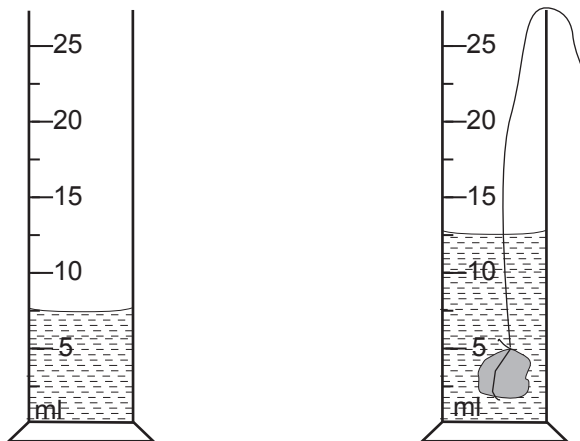
What is the main purpose of the experiment?

A To find the density of the stone.

B To find the mass of the stone.

C To find the temperature of the stone.

D To find the volume of the stone.

3   The diagram shows the electronic structure of sodium atom.

11p
12n

What is the nucleon number of sodium atom?

A   11

B   12

C   23

D   24

4   The diagram shows the type of bond.
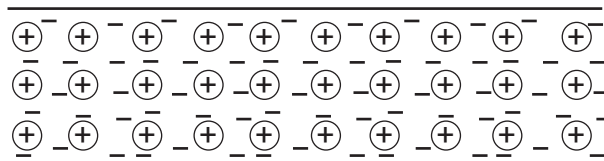
What type of bond is shown?

A   covalent

B   electrovalent

C   ionic

D   metallic

5   One of the carbon atom isotope is shown as $^{14}_{6}C$.

Which of the following is another isotope of carbon?

	electrons	neutrons	protons
A	6	7	6
B	6	6	7
C	7	8	6
D	8	6	8

[Turn over

6 Which group in the Periodic Table shows a trend in colour as you move down the group?

    A Group I

    B Group II

    C Group VII

    D Group VIII

7 Magnesium reacts with oxygen to form magnesium oxide.

    Which of the following is the correct balanced chemical equation for the reaction?

    A $Mg + 2O_2 \rightarrow MgO$

    B $2Mg + O_2 \rightarrow 2MgO$

    C $2Mg + O_2 \rightarrow MgO$

    D $2Mg + O_2 \rightarrow 2MgO$

8 Concrete is made by using cement, crushed stones, substance **X**, and water.

    What is substance **X**?

    A clay

    B limestone

    C sand

    D soda

9 Which of the following shows the material and it's correct bonding?

	material	bonding
A	concrete	covalent
B	glass	ionic
C	metal	ionic
D	polythene	metallic

10 Due to its good insulation properties, wool is used to make fabrics for winter.

    Why is wool a good insulator?

    A It has ability to absorb moisture.

    B It has ability to dry quickly.

    C It has ability to stretch.

    D It has ability to trap air.

11 Which of the word equations outlines the preparation of soap?

    A   fat (oil) + hydrochloric acid $\xrightarrow{\text{heat}}$ soap + glycerol

    B   fat (oil) + sodium chloride $\xrightarrow{\text{heat}}$ soap + glycerol

    C   fat (oil) + sodium hydroxide $\xrightarrow{\text{heat}}$ soap + glycerol

    D   fat (oil) + water $\xrightarrow{\text{heat}}$ soap + glycerol

12 The pie chart shows the composition of gases in clean air.
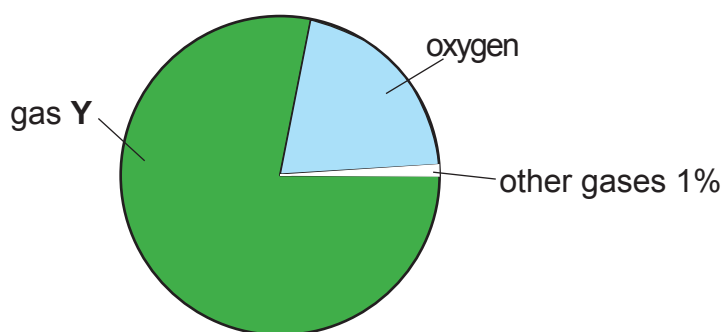
Which gas is represented by gas **Y**?

    A   argon

    B   carbon dioxide

    C   nitrogen

    D   xenon

13 A learner accidently spills an acid on the laboratory bench.

Which of the following substances can be used to neutralise the acid?

    A   baking soda

    B   table salt solution

    C   vinegar

    D   water

14 Sulfur dioxide is a pollutant gas.

What effect does sulfur dioxide have when it is dissolved in neutral rain water?

    A   It decreases the pH to 1.

    B   It decreases the pH to 5.

    C   It increases the pH to 9.

    D   It increases the pH to 14.

15 The table show the height of lather formed in four different water samples when soap is added.

Which water sample is the hardest?

water sample	height of lather formed/mm
A	0.5
B	2.0
C	5.5
D	12.5

16 Which of the following shows a correct word equation for the reaction between magnesium carbonate and hydrochloric acid?

A magnesium carbonate + hydrochloric acid → magnesium chloride + carbon dioxide + water

B magnesium carbonate + hydrochloric acid → magnesium chloride + water

C magnesium carbonate + hydrochloric acid → magnesium chloride + water + hydrogen

D magnesium carbonate + hydrochloric acid → magnesium chloride + hydrogen + carbon dioxide

17 Which of the following is the unit of pressure?

A Joule

B Newton

C Pascal

D Watt

18 Which of the following is non-renewable energy sourse?

A coal

B sun

C water

D wind

19 What energy conversion takes place when a candle is burning?

A chemical → electrical + heat

B chemical → light + heat

C electrical → light + heat

D light → electrical + heat

20 An athlete runs a 200 m race and completes it in 14 seconds.

What is the average speed of the athlete?

A   0.070 m/s

B   14.29 m/s

C   14.20 m/s

D   2 800 m/s

21 The diagram shows a forearm of a man picking up a load.
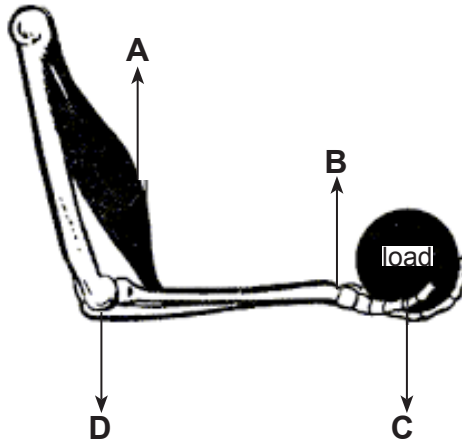
Identify the arrow that shows an effort.

22 Which of the following expressions can be used to calculate current?

A $Q \times t$

B $Q \div t$

C $t + Q$

D $t \div Q$

23 The diagram shows circuit's components W, X, Y and Z.
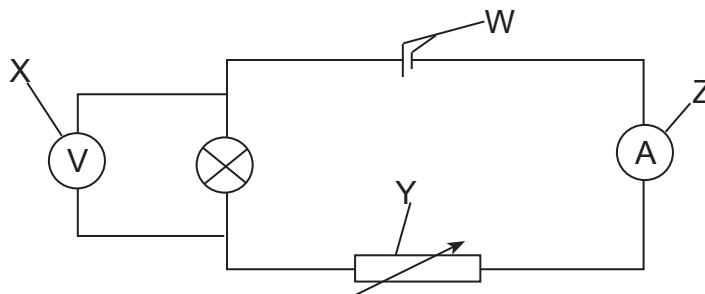
Which component varies the brightness of the bulb?

A   W

B   X

C   Y

D   Z

24 A student switched on four electrical appliances to the main supply for 0.5 hour.

Which electrical appliance consumed more energy?

	electrical appliance	electrical power/kW
A	bulb	0.12
B	heater	1.5
C	iron	1.8
D	stove	4.5

25 The diagram shows a piece of cobalt brought near the bar magnet.
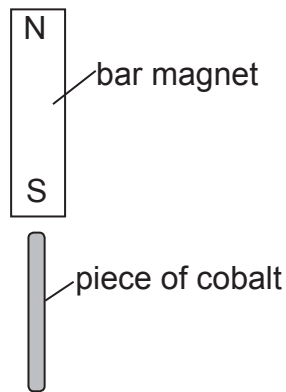
Which of the following describes what happens to the piece of cobalt and energy?

A Attracted because it is ferrous.

B Attracted because it is non-ferrous.

C Not attracted because it is ferrous.

D Not attracted because it is non-ferrous.

26 Which diagram shows the correct magnetic field around a bar magnet?

[Turn over
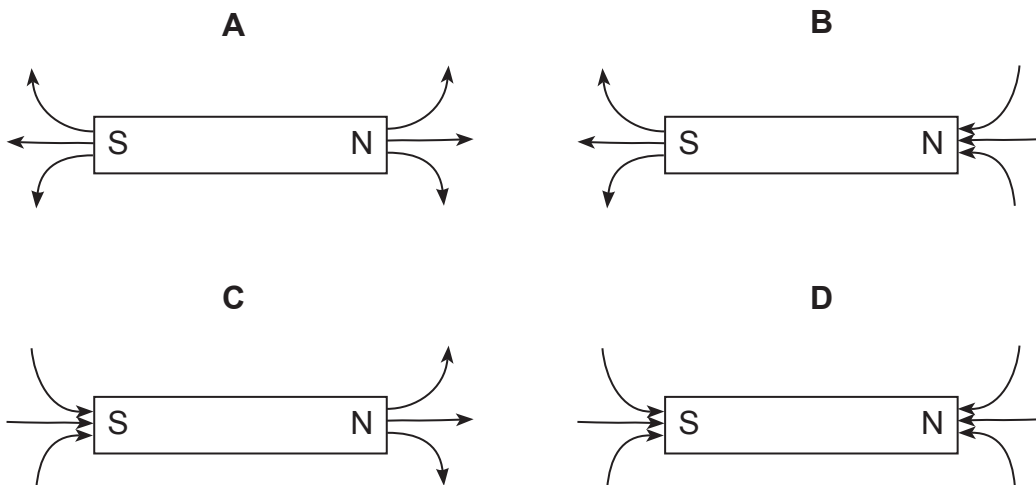
27 Which medium does sound travel the fastest?

    A   gas

    B   liquid

    C   solid

    D   vacuum

28 Which diagram correctly shows what happened to the beam of light when they pass through a convex lens?

A

B

C

D
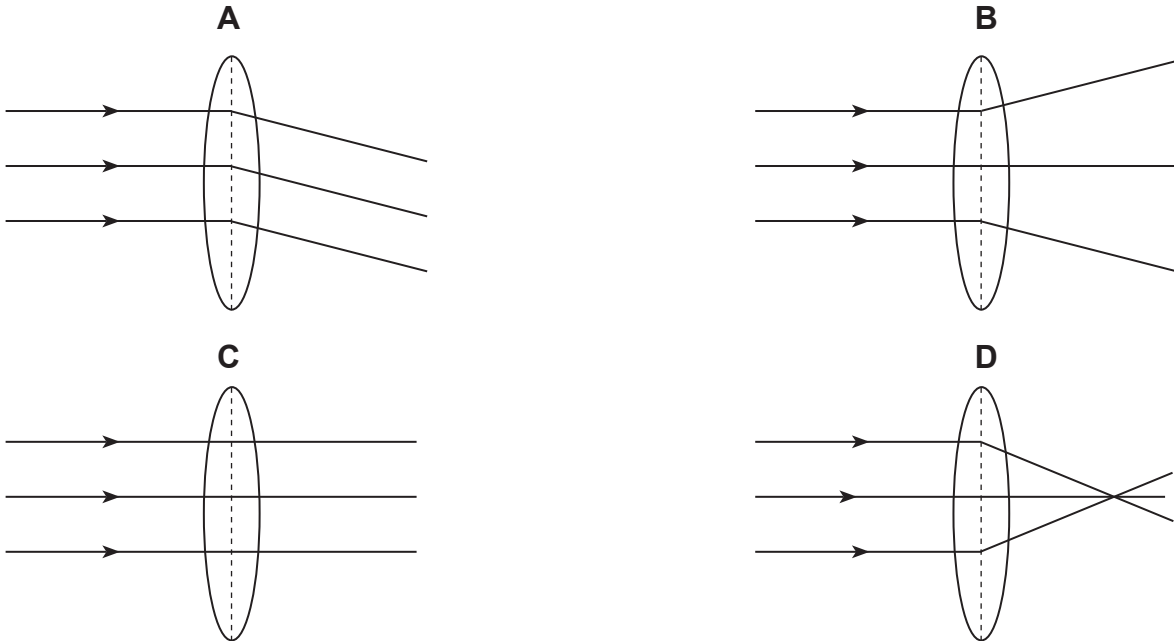
29 A light ray strikes a plane mirror at an angle of 40° with the normal.

What will be the angle of reflection?

    A   20°

    B   40°

    C   80°

    D   90°

30 Rainbow is a natural phenomenon.

Which of these statements best describe how a rainbow is formed?

    A   dispersion of white light

    B   internal reflection

    C   converging of light

    D   light travels in a straight line

SECTION B: STRUCTURED QUESTIONS

- Write your answers in the spaces provided on the question paper.
- Legible handwriting and **neat drawings in pencil**, where required, are essential.
- Answers to numerical calculations **must have the correct unit**.
- Symbols must be written/drawn correctly.
- Incorrect spelling of element names and scientific terminology will be penalised.

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1 A Grade 10 learner is supplied with the following pieces of apparatus.

burette, measuring cylinder, measuring tape, spring balance, thermometer, top-pan balance

 (a) Answer the questions by identifying the appropriate apparatus to

   (i) measure the length of the classroom.

   .... [1]

   (ii) measure the weight of an empty cup.

   .... [1]

   (iii) measure out 10 cm³ of water accurately.

   .... [1]

   (iv) determine the density of water.

   1...

   2.. [2]

 (b) Then the learner determine the density of water, she repeated the experiment three times.

   (i) Explain the importance of repeating the experiment.

   .... [1]

   (ii) Write down the formula for calculating density.

   .... [1]

(iii) Calculate the density of water with mass of 200 g and volume of 200 cm^3. State the units. Show your working.

Density.........................unit .... [3]

[10]

2 The table shows information of elements **P**, **Q**, **R**, **S**, **T** and **U**.

element	group	period number	electron configuration
P	1	4	**(i)** ....
Q	2	3	2, 8, 2
R	4	2	2, 4
S	6	2	2, 6
T	7	3	2, 8, 7
U	8	**(ii)**	2, 8, 8

(a) Complete the table by filling in the missing information for **(i)** and **(ii)**. [2]

(b) Identify element **R**.

.... [1]

(c) Give the physical state at room temperature and pressure of element **T**.

.... [1]

(d) Write the correct formula for the compound formed from the reaction between element **Q** and element **T**.

.... [1]

(e) Name the type of bond formed when element **Q** and element **S** react.

.... [1]

(f) The diagram shows an incomplete structure of carbon dioxide molecule (outer shells only).
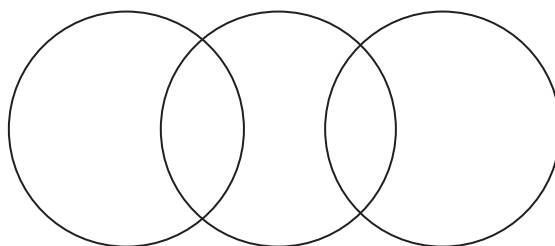
(i) Complete the structure. [3]

(ii) State **two** uses of carbon dioxide.

1...

2... [2]

[11]

3 Most items in the home are made from various materials. Some of these materials are polymers.

(a) Describe what is meant by the term *polymer*.

....

.... [2]

(b) The diagram shows polymers **P** and **Q**.

Q

P
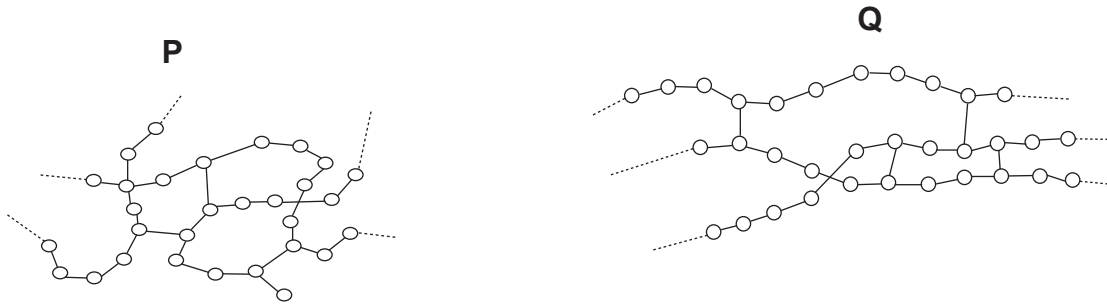
Identify polymer **P**.

.... [1]

(c) Polymer **Q** is nylon.

Give **one** use of polymer **Q** and state its physical property which is related to the mentioned use.

Use ....

Physical property .... [2]

(d) Cellulose is a natural polymer in wood. Wood can be used as a building material in the local environment.

(i) Draw a simplified structure of cellulose, show the cross linking chains.

[2]

(ii) Name **one** common building material for roofing other than wood and give its advantage.

Material ....

Advantage .... [2]

[Turn over

(e) Some polymers are used as surfaces of cupboards because they are easy to clean.

Soap and detergents are common cleaning materials.

(i) Describe the structure of soap.

....

....   [2]

(ii) Detergents are non-biodegradable.

State the meaning of the term *non-biodegradable*.

....

....   [1]

[12]

4 Acids and bases are some of the substances commonly used at home.

(a) With reference to the pH, distinguish between a weak base and a strong base.

Weak base ....

....

Strong base...

.... [2]

(b) Give **two** examples of weak bases used at home.

1 ....

2 .... [2]

(c) Some of the bases are soluble in water.

State the name given to soluble bases.

.... [1]

(d) Outline a test to confirm that a solution is basic.

Test ....

Result .... [2]

(e) Salts can be prepared by reacting a base with an acid.

Copper(II)sulfate is a salt which can be prepared by reacting copper(II)oxide with acid **X**.

(i) Complete the equation for the reaction by filling in the missing information.
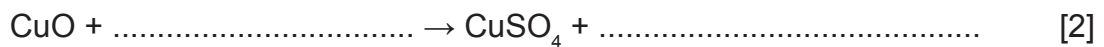
CuO + ... → $CuSO_4$ + ... [2]

(ii) State the type of reaction in **(e) (i)**.

.... [1]

[10]

5 The diagram shows a geyser heating element that was used to heat hard water.

geyser heating element
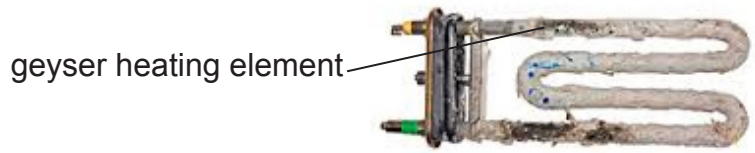
(a) Suggest the type of hardness in water used in the geyser.

.... [1]

(b) Give **one** substance that cause the hardness mentioned in **(a)**.

.... [1]

(c) Explain how the scale in the geyser is formed.

.... [1]

[3]

6 The list of some pollutants of the atmosphere is shown below.

carbon monoxide, carbon dioxide, sulfur dioxide, nitrogen oxides, lead compounds

(a) Identify **one** pollutant from the list that is gas.

.... [1]

(b) Explain how carbon monoxide is produced.

....

.... [2]

(c) State the effect of lead compounds on humans.

.... [1]

(d) One source of the pollutant gases is the vehicle exhaust.

Modern vehicles are fitted with catalyst converters, to reduce the emissions of these pollutant gases.

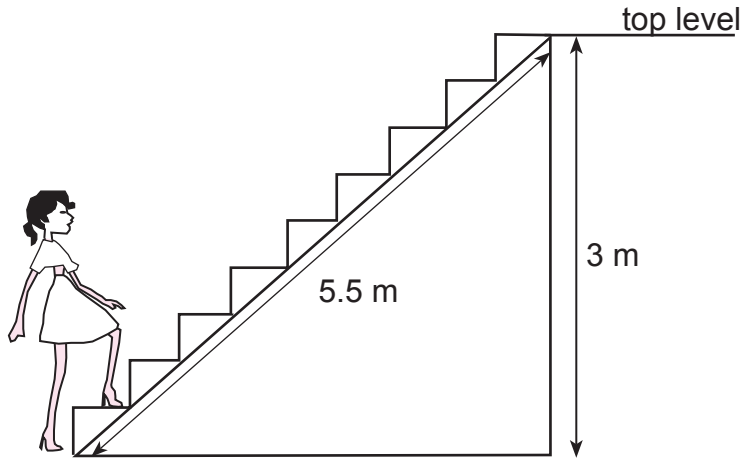Explain how a catalytic convertor reduces the emission of pollutant gases.

....

.... [2]

[6]

7 The diagram shows a girl of 45 kg walking up a stair case.

top level

3 m

5.5 m

(a) Calculate the weight of the girl. (g = 10 N/kg) Show your working.

Weight...N   [2]

(b) Calculate the work done by the girl to climb the 3 m stair case. State the unit. Show your working.
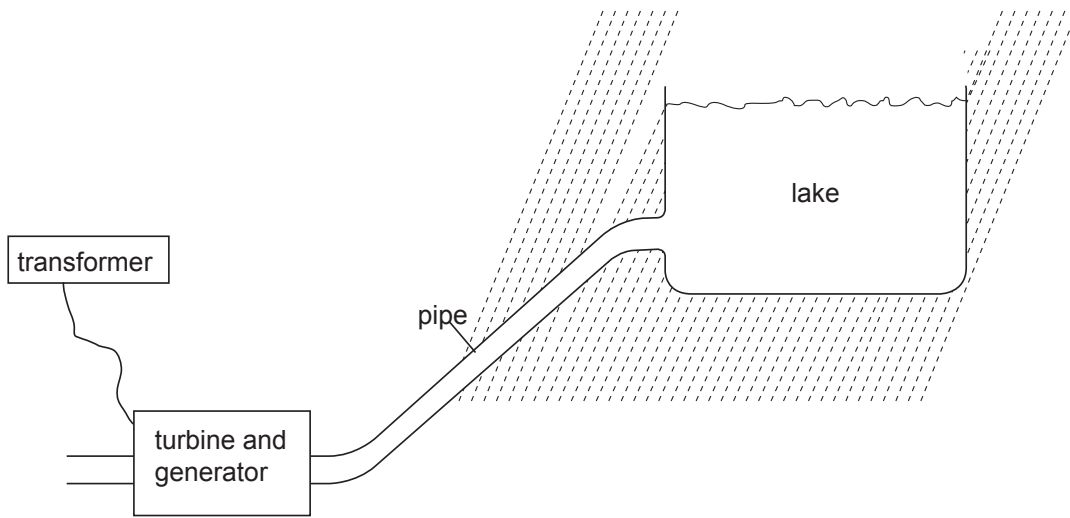
Work done.....................unit........   [3]

(c) The contract area of the girl's shoes is 0.4 m² on the ground.

Calculate the pressure the girl exerts on the ground. Show your working.

Pressure ....Pa   [2]

[7]

8 The diagram shows a system of how energy is converted at a hydro-electric power station.

(a) State the form of energy the water has

    (i) at the lake.

    .... [1]

    (ii) as it flows down the pipe.

    .... [1]

(b) The energy converted in the generator is 6 000 kJ and 5 580 kJ was successfully transferred to a transformer.

This shows that the system was not 100% efficient.

    (i) State the formula for calculating efficiency.

    .... [1]

    (ii) Calculate the efficiency of the system. Show your working.

Efficiency .... %   [2]

(iii) Give a reason why the system was not 100% efficient.

....

.... [2]

(iv) Give an advantage of generating energy using a hydro-electric power station.

.... [1]

[8]

[Turn over

9 The circuit diagram shows two resistors R_1 and R_2 of different resistance connected to a 9 V battery.
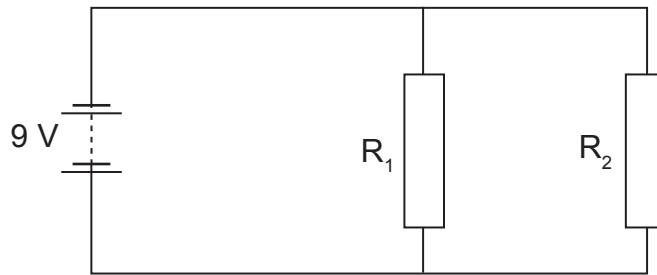
(a) State the type of connection between R_1 and R_2 in the circuit.

.... [1]

(b) The resistance of R_1 is 5 Ω and R_2 is 15 Ω.

Calculate

(i) the current folowing in R_1. State the unit and show your answer.

Current....................unit.............. [3]

(ii) the total resistance for a combination of resistors R_1 and R_2. Show your working.

Total resistance.........................Ω [2]

(c) On the diagram, draw a circuit symbol of the voltmeter to show how it can be connected to measure the voltage across the battery. [2]

(d) Another resistor R_3 is connected to the circuit in the same way as R_1 and R_2.

Complete the table below using the word **increase**, **decrease** or **no change** to state what happens to the current, voltage and resistance of the circuit.

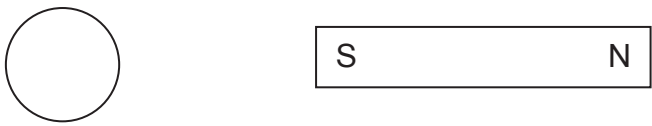| current	
voltage	
resistance	

[3]

[11]

10 The diagrams show a plotting compass.

plotting
compass

(a) State the use of a plotting compass.

.... [1]

(b) Draw the arrow in the circle to show what happens when a plotting compass is brought closer to the south pole of the magnet.

| S   N |

[1]

(c) (i) Distinguish between a ferrous and a nonferrous material.

....

.... [1]

(ii) Give **two** examples of a ferrous material.

1 ....

2 .... [2]

(d) Describe how to make a temporary magnet.

....

.... [2]

(e) State **two** uses of permanent magnets.

1 ....

2 .... [2]

[9]

[Turn over

11 A person claps his hands 102 m away from a wall, after sometimes he hears an echo.
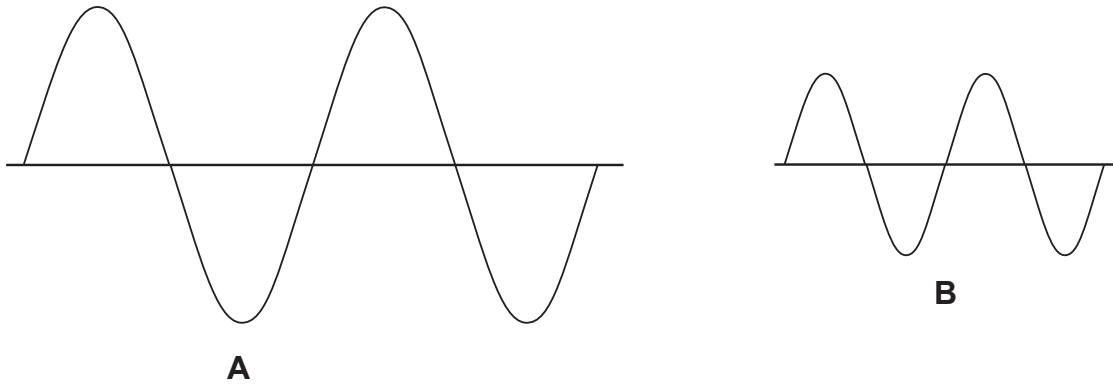
(a) (i) State the meaning of *echo*.

.... [1]

(ii) State what type of wave is sound waves.

.... [1]

(iii) Calculate the time taken to hear the echo if the speed of sound in the air that day was 340 m/s.

Time..s [3]

(b) The diagrams represent the displacement of sound wave when he repeated the clapping at different times.

A

B

(i) On diagram **A,** draw **two** lines with arrows at the end to indicate the wavelength and the amplitude of the wave. **Label your lines accordingly**. [2]

(ii) State with a reason which diagram shows a wave with a higher pitch.
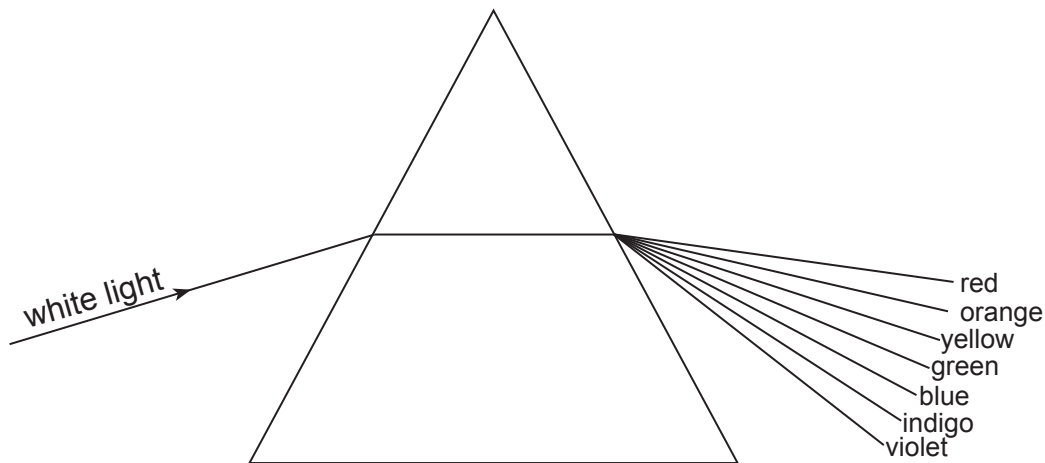
Diagram..

Reason ....

.... [2]

[9]

12 The diagram below shows a white light passing through a triangular prism.

(a) State the property of light that cause the formation of different colours.

.... [1]

(b) State the name given to the process of separating white light into different colours.

.... [1]

(c) Explain how mirages are formed.

....

.... [2]

[4]

[Turn over

DATA SHEET
The Periodic Table of the Elements

Group

I	II												III	IV	V	VI	VII	0
							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	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	**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	**Po** Polonium 84	**At** Astatine 85	**Rn** Radon 86
Fr Francium 87	226 **Ra** Radium 88	227 **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
X
b

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.).