



Coimisiún na Scrúduithe Stáit State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2018

SCIENCE – ORDINARY LEVEL

MONDAY, 11 JUNE – AFTERNOON, 2.00 to 4.00

INSTRUCTIONS

1. Write your **examination number** in the box provided on this page.
2. Answer **all** questions.
3. Answer the questions in the spaces provided in this booklet. If you require extra space, there is a blank page provided at the back of this booklet.
4. The use of the *Formulae and Tables* booklet approved for use in the State Examinations is permitted. A copy may be obtained from the examination superintendent.

Centre Number

**Examination
Number**

For examiner use only	
Section / Question	Mark
Biology	
Q.1 (52)	
Q.2 (39)	
Q.3 (39)	
Chemistry	
Q.4 (52)	
Q.5 (39)	
Q.6 (39)	
Physics	
Q.7 (52)	
Q.8 (39)	
Q.9 (39)	
Total (Paper)	
Bonus for Irish	
Grand Total (Paper) (390)	
Coursework A (60)	
Coursework B (150)	
Grand Total (600)	

Biology

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(1) (2)

Question 1

(52)

(a)(i) The diagram shows the skeleton of the Irish red deer.

Is this animal a vertebrate *or* an invertebrate?

(ii) Give a reason for your answer.



(b) Wholemeal bread is a good source of fibre and starch.

(i) Why is eating wholemeal bread good for you?



(ii) In the table, write the letter **X** beside the name of the chemical you would use to test for the presence of starch.

	Benedict's solution
	Iodine

(c) Seeds undergo germination to produce new plants. Choose the correct words from the list to complete the following statement.

To germinate, seeds need a suitable temperature,
_____ and _____.

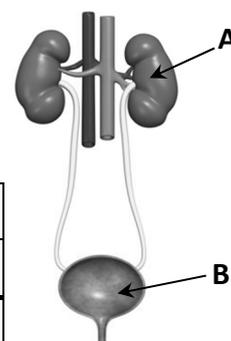
Oxygen
Carbon dioxide
Water

(d) The diagram shows the human urinary system.

(i) In the table, write the letter **A** beside the name of part **A**.

(ii) Write the letter **B** beside the function of part **B**.

	Kidney
	Liver
	To store urine
	To produce urine



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(e)



Maize



Rat



Owl

The diagram shows a food chain from a field.

(i) In the table, write the letter **Y** beside the name of a producer.

(ii) What would happen to the number of rats in the field if all the owls died? _____

	Maize
	Owl

(f) The photograph shows a human foetus during pregnancy.

(i) In the table, write the letter **C** beside the part of the reproductive system where fertilisation occurs.

(ii) Write the letter **D** beside the part of the reproductive system where the foetus develops during pregnancy.

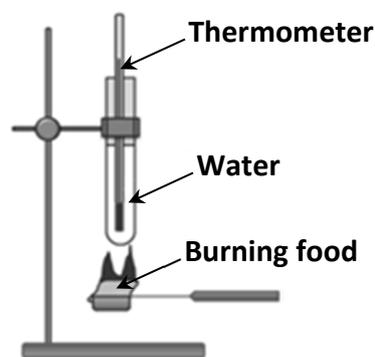


	Vagina
	Womb
	Fallopian tube

(g) A student investigated the conversion of chemical energy in food to heat energy.

(i) Name a food that the student could have used in the investigation. _____

(ii) Would the temperature of the water increase *or* decrease during this investigation? _____



(h) The photographs show some of the bones that make up the human skeleton.

Name each part of the skeleton.







(7 × 6 + 1 × 10)

Question 2

(39)

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(a) All living things are made of cells.

(21)

(i) Name the instrument shown on the right, which is used to examine cells. _____

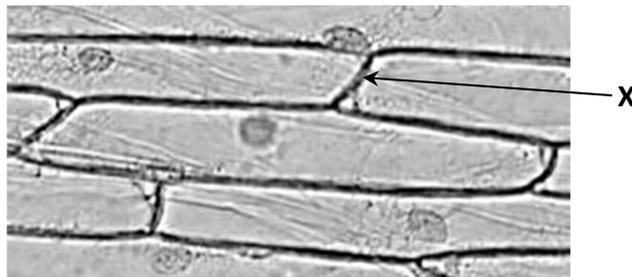
(ii) In the table, write the letter **A** beside the function of part **A**.



	Holds the slide
	Magnifies the image

(iii) Describe how you would prepare a slide from onion tissue for viewing using the instrument above.

The photograph shows the results obtained by a student after she had prepared and viewed onion cells under high power.



(iv) In the table, write the letter **X** beside the name of the part labelled **X**.

	Cell wall
	Nucleus

(v) Part **X** is found in all plant cells.

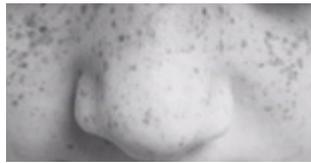
Is part **X** found in animal cells?

Answer "yes" or "no". _____

(1) (2)

(b) Freckles are an example of an inherited human characteristic.

(6)



(i) Choose the correct word from the list to complete the following statement:

Nerves
Genes

Inheritable characteristics are controlled by _____.

(ii) In the table, write the letter **Y** beside the name of a human characteristic which is not inherited.

	Ability to play the guitar
	Eye colour

(c) In humans, cells are organised into tissues, organs and systems.

(6)

(i) In the table, write the letter **W** beside the name of an organ found in the human body.

	Blood
	Eye
	Respiratory
	Digestive

(ii) Write the letter **Z** beside the name of the system involved in gas exchange.

(d) Complete the following sentences:

(6)

(i) The function of white blood cells is to _____
_____.

(ii) The name of the organ that pumps blood around the body is the _____.

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(1) (2)

Question 3

(39)

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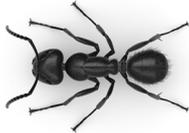
(a) Keys are used by biologists to identify organisms.

(1) (2)

Use the key below to identify the organisms shown.

(12)

Organism A



Organism B



Organism C



1	Organism has legs Organism has no legs	Go to 2 Go to 3
2	Organism has 6 legs Organism has 8 legs	Go to 4 Tick
3	Organism has a shell Organism has no shell	Snail Slug
4	Organism has no wings Organism has wings	Ant Blowfly

(i) Name of organism **A** _____

(ii) Name of organism **B** _____

(iii) Name of organism **C** _____

(iv) What questions did you answer in the table to help you identify organism **C**?

(b) A student set up the experiment shown to investigate photosynthesis.

(6)



(i) In the table, write the letter **X** beside the name of gas **X** which is produced during photosynthesis.

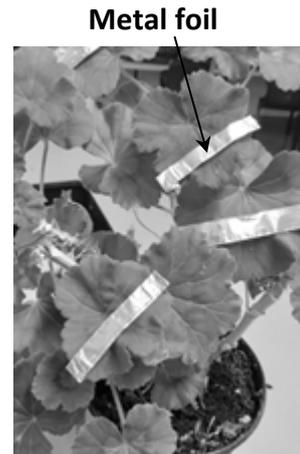
	Nitrogen
	Oxygen

(ii) Other than light, name one substance which a plant needs for photosynthesis. _____

(c) A student carried out an experiment to show that light is necessary for photosynthesis.

The plant was set up as shown in the photograph, with strips of metal foil placed on some of the leaves.

The plant was then left under a light for 48 hours. (15)



(i) Why were strips of metal foil placed on some of the leaves?

(ii) After 48 hours the student removed a leaf and placed it in a hot liquid to remove the green pigment.

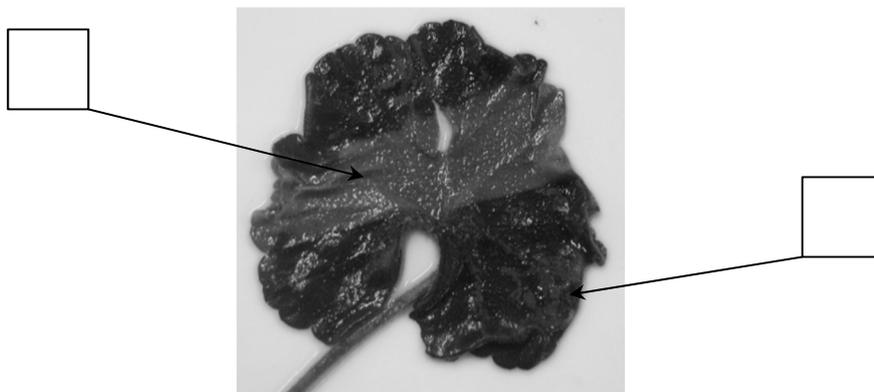
In the table, write the letter **L** beside the name of the liquid used.

	Water
	Alcohol

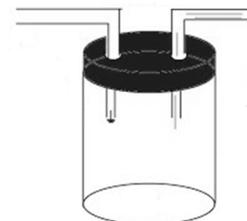
(iii) After testing for starch, the student obtained the results shown in the photograph below.

Write the letter **P** in the correct box to show where starch was present.

Write the letter **Q** in the correct box to show where starch was absent.



(d) The diagram shows a piece of equipment that is used during an habitat study to collect organisms. (6)



(i) Name an organism which could be captured using this piece of equipment. _____

(ii) In the table, write the letter **Y** beside the name of this piece of equipment.

	Pitfall trap
	Pooter

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(1) (2)

Chemistry

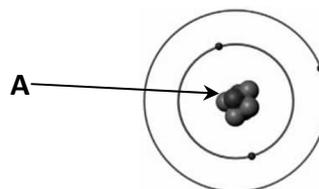
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(1) (2)

Question 4

(52)

(a) The diagram shows an atom of lithium.



(i) Name the part labelled **A**.

(ii) In the table, write the letter **B** beside the charge on an electron.

	Positive
	Negative

(b)(i) Name the piece of laboratory equipment shown on the right.

(ii) State one use for this piece of equipment.



(c) Rusting can occur when iron objects (such as iron nails) are exposed to water and oxygen.



(i) Name a substance commonly used to coat iron objects to prevent rusting. _____

(ii) Is rusting a physical process *or* a chemical process? _____

(d) There are several stages involved in the treatment of water for domestic use.

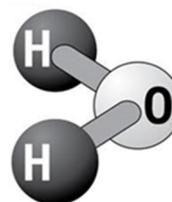


(i) Why is fluoride added to the domestic water supply in Ireland?

(ii) In the table, write the letter **C** beside the name of the chemical added to water to kill harmful bacteria.

	Chlorine
	Helium

(e) The diagram shows three atoms which are bonded together by sharing pairs of electrons.



(i) Name the compound shown in the diagram. _____

(ii) In the table, write the letter **D** beside the type of bonding involved when electrons are shared.

	Ionic
	Covalent

(f) (i) From the list, choose a substance which is a common household base. _____

(ii) From the list, choose a substance which is a common household acid. _____

Water
Toothpaste
Vinegar

(g) The Sam Maguire Cup is awarded to winners of the All-Ireland men's senior football championship. The cup is made from silver.

State two properties of silver that make it suitable for making trophies.



(h) When zinc metal reacts with hydrochloric acid, a colourless gas is produced.

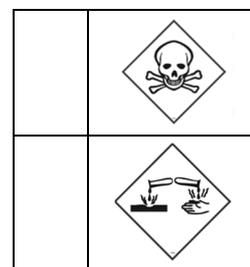
(i) In the table, write the letter **G** beside the name of this gas.

(ii) What is observed when a lighted splint is placed in a test tube of this gas? _____

	Hydrogen
	Oxygen

(iii) Hydrochloric acid is corrosive.

Write the letter **F** beside the laboratory safety symbol for "corrosive".



(7 × 6 + 1 × 10)

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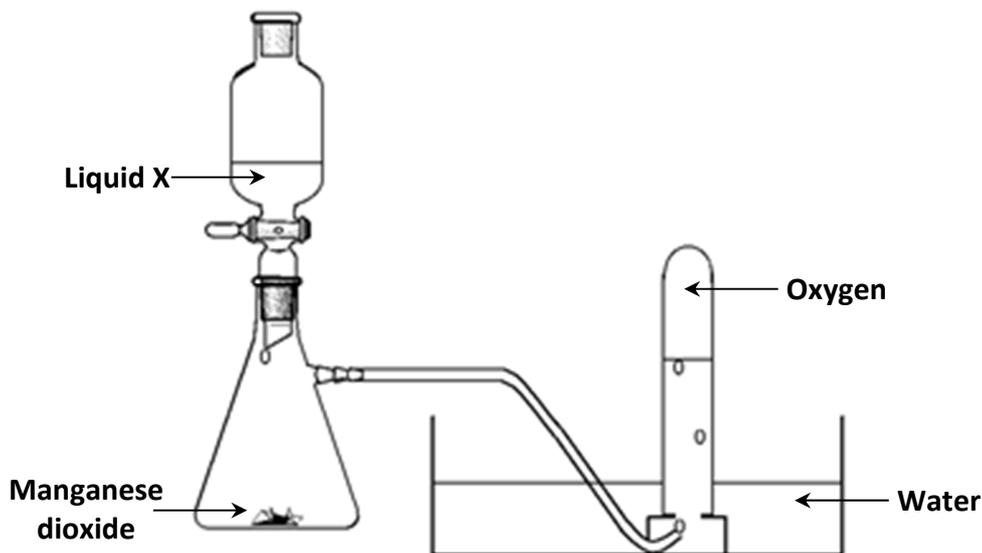
(1) | (2)

Question 5

(39)

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- (a) A student prepared oxygen gas using the apparatus shown in the diagram. (15)



- (i) In the table, write the letter **X** beside the name of the liquid used to produce oxygen gas.

	Limewater
	Hydrogen peroxide

- (ii) Manganese dioxide, a black solid, was used by the student during this preparation. What name is given to a substance (such as manganese dioxide) which speeds up a chemical reaction but is not used up during the reaction?

- (iii) One of the products of this reaction is water.

Write the letter **Y** beside the name of a chemical which could be used in the laboratory to test for the presence of water.

	Anhydrous copper sulfate
	Sodium hydroxide
	Cobalt chloride

- (iv) What is the colour of this chemical when water is present?

- (b) All the known elements are listed in the Periodic Table. A portion of the table from page 79 of the *Formulae and Tables* booklet is shown in the diagram. (12)

1 H 1.008											2 He 4.003						
3 Li 6.941	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 22.99	12 Mg 24.31	3	4	5	6	7	8	9	10	11	12	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.95
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.55	30 Zn 65.41	31 Ga 69.72	32 Ge 72.64	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80

- (i) On the diagram shade in an element that belongs to Group II (Group 2).
(ii) What is the chemical symbol for iron? _____
(iii) What is the chemical symbol for sulfur? _____
(iv) Is sulfur a metal or a non-metal? _____

- (c) Acids and bases are commonly used in school laboratories. (12)

- (i) State one safety precaution which a student should take when handling acids and bases. _____

- (ii) In the table, write the letter **A** beside the formula for sulfuric acid.

- (iii) Write the letter **B** beside the formula for sodium hydroxide.

- (iv) What name is given to the reaction between an acid and a base?

	CaCO₃
	H₂SO₄
	CO₂
	NaOH

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(1) (2)

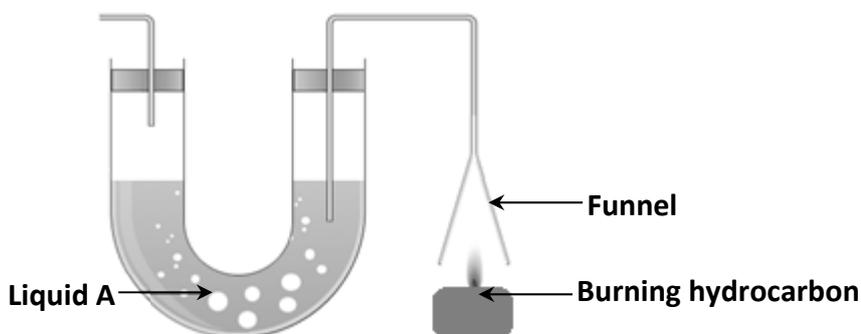
Question 6

(39)

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- (a) The apparatus shown below was used to investigate the products of burning a hydrocarbon.

(18)



A gas was produced when the hydrocarbon was burned.

This gas passed through liquid **A** and turned it a milky colour.

- (i) In the table, write the letter **G** beside the name of the gas produced.
- (ii) Write the letter **A** beside the name of the liquid used to show to presence of this gas.
- (iii) Name one element found in all hydrocarbons.

	Oxygen
	Carbon dioxide
	Limewater
	Hydrochloric acid

Fossil fuels are sources of hydrocarbons.

Crude oil is an example of a fossil fuel.

- (iv) State one other example of a fossil fuel.

- (v) Crude oil is the raw material for the production of plastics.
State one property of plastics that makes them suitable for everyday use.



(b) Classification of substances is important in chemistry.

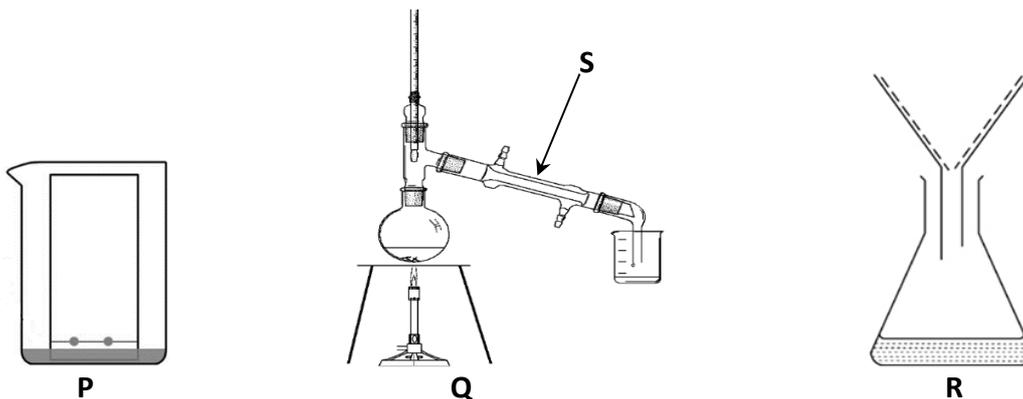
(21)

(i) In the table, write the letter **X** beside an example of a compound.

(ii) Write the letter **Y** beside an example of a mixture.

	Carbon dioxide
	Aluminium
	Sea water

The diagrams show the arrangement of apparatus used to separate a variety of mixtures in a school laboratory.



(iii) In the table, write the letter **P** beside the name of the technique labelled **P**.

(iv) Write the letter **Q** beside the name of the technique labelled **Q**.

(v) Write the letter **R** beside the name of the technique labelled **R**.

	Filtration
	Chromatography
	Distillation

(vi) Name one substance that could be separated using technique **P**.

(vii) Name the piece of equipment labelled **S**.

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(1) (2)

Physics

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(1) (2)

Question 7 (52)

- (a) The following is a list of household electrical appliances. Underline two appliances that use the heating effect of an electric current.

HAIRDRYER TELEVISION TOASTER IRON DOORBELL

- (b)(i) Name the device shown in the photograph, which is from a standard electrical plug. _____



- (ii) What is the function of this device?

- (c) Complete the following sentence:

The principle of conservation of energy states that energy cannot be

_____ or _____.

- (d) Electricity is used in the home for lighting, heating and powering appliances.

- (i) In the table, write the letter **A** beside the voltage of the mains electricity supply in Ireland.

	12 V
	230 V
	Kilowatt-hour
	Ampere

- (ii) Write the letter **B** beside the unit of electrical energy used by electricity supply companies.

- (e) Street-lights are controlled by an LDR.

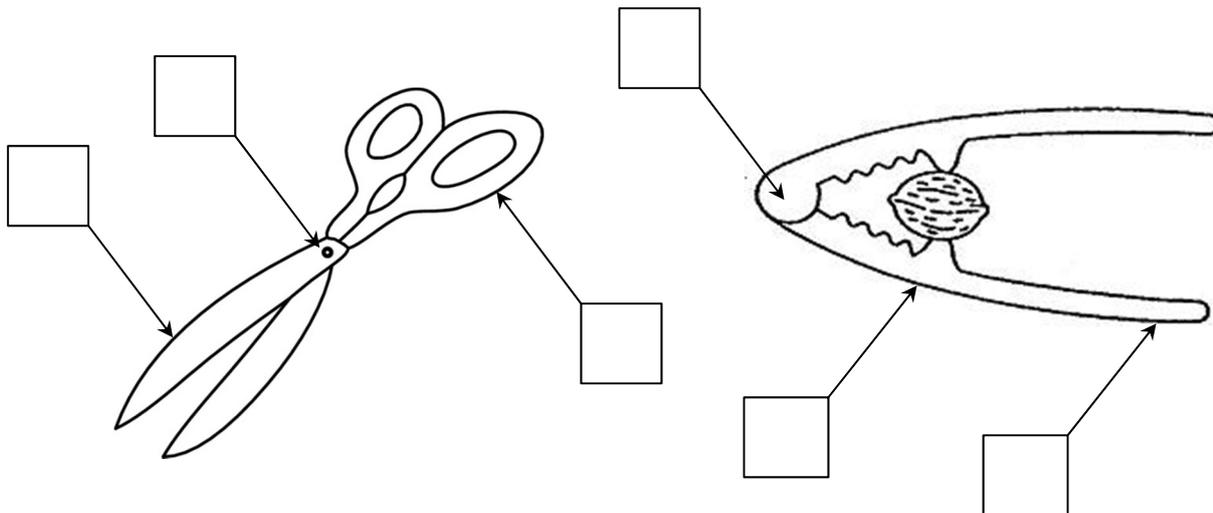
- (i) What do the letters LDR stand for?

- (ii) When the light shining on an LDR decreases, does its resistance increase *or* decrease?



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(f) The diagrams show two everyday examples of levers. In each case, write the letter **C** in the correct box to show the position of the fulcrum (turning point).



(1) (2)

(g)(i) In the table, write the letter **D** in the box beside the phrase that correctly finishes the following statement.

Sound waves travel through the air by...

	vibrating the particles of matter in the air.
	the force between charged objects.

(ii) In a stadium, a spectator can see a hurler hit the sliotar before hearing the sound.

What does this indicate to you?



Sulfur Copper Paper Plastic
--

(h) Choose a material from the list that would be most suitable for the following uses.

(i) The material used for the wire in an electrical cable. _____

(ii) The material used to cover the wire in the cable. _____

(iii) Explain why the material you have chosen in part (ii) is suitable for covering the wire in the cable. _____

(7 × 6 + 1 × 10)

Question 8

(39)

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- (a) The photographs show instruments that are commonly used to take measurements in a school laboratory. (9)







- (i) Write the letter **P** in the box under the instrument which can be used to measure the mass of a substance.
- (ii) Write the letter **Q** under the instrument which could be used to measure the length of a curved line.
- (iii) Write the letter **R** under the instrument which could be used to measure time.

- (b) The diagrams show pairs of magnets being brought close together. (12)



Diagram X



Diagram Y

- (i) Write the letter **X** beside the outcome you would expect if the magnets in diagram **X** were brought close together.
- (ii) Write the letter **Y** beside the outcome you would expect if the magnets in diagram **Y** were brought close together.
- (iii) What does the label **N** on the bar magnet stand for?

	Attract
	Repel

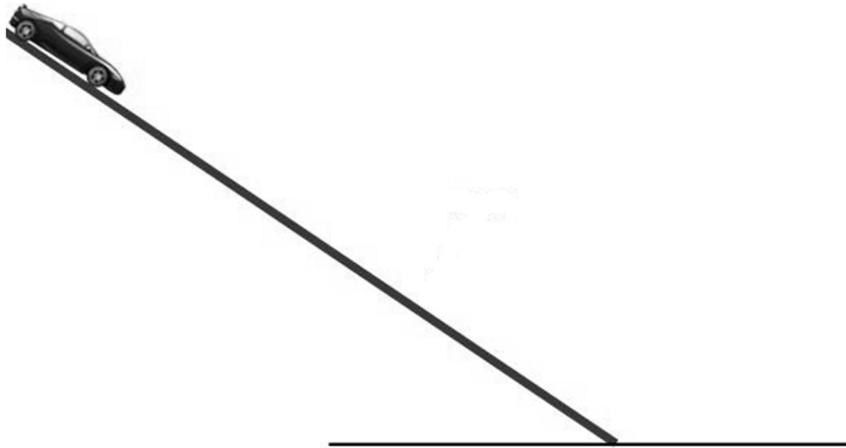
	Attract
	Repel

- (iv) Name the instrument shown on the right, which can be used to demonstrate that the Earth has a magnetic field.



(1) (2)

- (c) The diagram shows a toy car being released down a ramp of length 10 m. (9)



- (i) Name the force acting on the car which pulls it towards the Earth.

- (ii) It takes the car 2 seconds to reach the end of the ramp.

Calculate the average speed.

Calculation

- (d) Energy exists in many forms. (9)

- (i) In the table, write the letter **A** beside the type of energy in a stretched elastic band.
- (ii) Write the letter **B** beside the type of energy stored in a battery.
- (iii) Write the letter **C** beside the type of energy in a rolling ball.

	Light
	Kinetic
	Potential
	Chemical
	Heat

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(1) (2)

Question 9

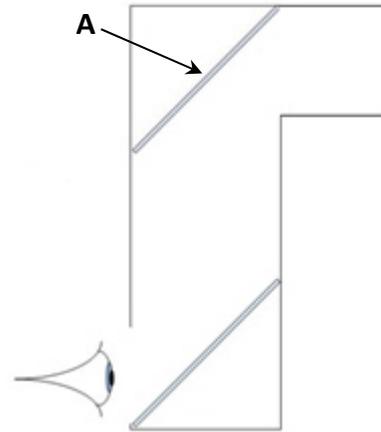
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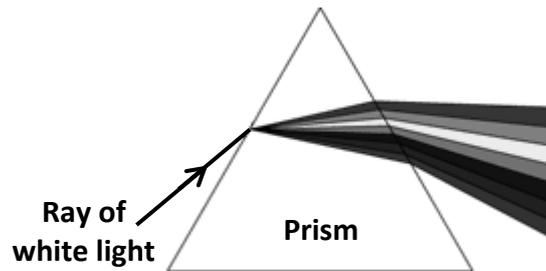
(a) The instrument shown in the diagram is a periscope. (9)

(i) Name the part of the periscope labelled **A**.

(ii) What happens to light when it shines on **A**?



(b) The apparatus shown in the diagram was set up by a student to investigate light. (6)



(i) In the table, write the letter **B** beside the name of the array of colours produced when a ray of white light was shone through the prism.

	Venn diagram
	Spectrum

(ii) Name any colour the student observed in this array. _____

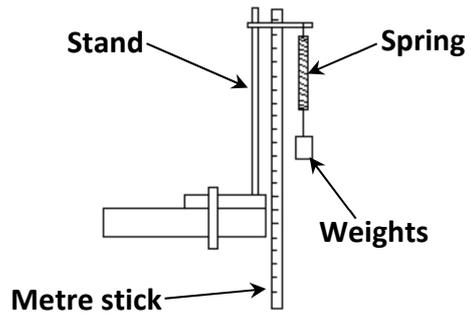
(c) From the list, choose two methods of transferring heat energy. (6)

- | |
|---|
| Lubrication
Radiation
Expansion
Convection |
|---|

(1) (2)

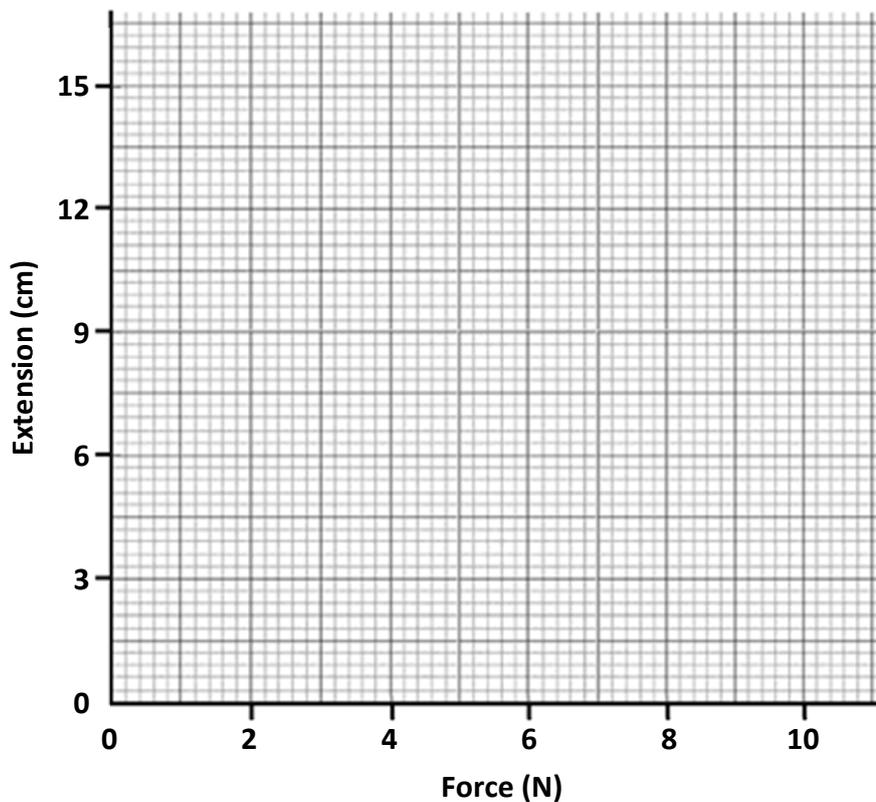
- (d) A student carried out an investigation to examine the relationship between the extension of a spring and the force applied to it. (18)

The table below shows the data collected by the student.



Force (N)	0	2	4	6	8	10
Extension (cm)	0	3	6	9	12	15

- (i) Draw a graph of the extension of the spring against the force applied.



- (ii) Use your graph to determine the extension when a force of 5 N is applied to the spring. _____

- (iii) What is the relationship between force and extension?

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use only

(1) (2)

