



**KINROSS
COLLEGE**
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Name: _____

Year 9 Science Exam

Multiple Choice Answer Sheet

Circle the letter indicating the *best* answer.

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D
6	A	B	C	D
7	A	B	C	D
8	A	B	C	D
9	A	B	C	D
10	A	B	C	D
11	A	B	C	D
12	A	B	C	D
13	A	B	C	D
14	A	B	C	D
15	A	B	C	D
16	A	B	C	D
17	A	B	C	D
18	A	B	C	D
19	A	B	C	D
20	A	B	C	D

END OF PART A

YEAR 9 SCIENCE EXAMINATION
Semester 1, 2018
WRITTEN QUESTION AND ANSWER BOOKLET

STUDENT NAME:
TEACHER NAME:
DATE:

Mark Allocations

Topic	Section	Marks
Chemical Science	Multiple Choice	/10
	Short Answer questions	/45
Physical Science	Multiple Choice	/10
	Short Answer questions	/45
Total		/110

TIME ALLOWED FOR THIS PAPER:

Reading time **before** commencing work: 10 minutes

Working time for this paper: 1 hour 50 minutes

MATERIAL REQUIRED / RECOMMENDED FOR THIS PAPER:

To be provided by the supervisor:

- This question and answer booklets

To be provided by the candidate:

- Pens, pencils, ruler, eraser

IMPORTANT NOTE TO CANDIDATES

No other items may be taken into the examination room.

It is your responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor BEFORE reading any further. All iPads and mobile phones must be turned off and in your bag along with any other devices and notes. Bags are to be closed and placed under the desk.

INSTRUCTION TO CANDIDATES:

1. **Read** through the paper to familiarise yourself with all of the questions.
2. Use a **blue or black** ballpoint / ink pen for the written answers. Use pencil for drawing the graphs.
3. **Write** your answers in this booklet.
4. Should you require more space than you have been given please use **the spare sheet** (at the back of this booklet) and ensure that you include your name and the question / statement to which you are responding.

AT THE END OF THE EXAMINATION:

- Any planning sheets or other pieces of paper **MUST** be handed in with this booklet.
- At the end of the examination make sure that your name is on your booklet and any other pieces of paper used.

Instructions to candidates

1. Sitting this examination implies that you agree to abide by the examination rules set down by Kinross College.
2. Answer the questions in the space provided.
3. You must be careful to confine your responses to the specific questions asked and to follow any instructions that are specific to a particular question.
4. A spare page is included at the end of this booklet. It can be used for planning your responses and/or as additional space if required to continue an answer.
 - (a) Planning: If you use the spare page for planning, indicate this clearly at the top of the page. If you choose to use lined paper for planning, ensure your name and the title is clearly printed.
 - (b) Continuing an answer: If you need to use the space to continue an answer give the page number. Fill in the number of the question (s) that you are continuing to answer at the top of the page.
5. This examination contributes towards your report. If you have any questions, please ask them during the ten-minute reading time.

Manage your time wisely. Always provide substantiation (evidence). Make sure that what you have written makes sense.

Note: Do not turn the page until you are asked to do so.

Chemical Science Multiple Choice Questions

1. The mass number of an atom is the number of:
 - a. protons and electrons in an atom.
 - b. protons and neutrons in an atom.
 - c. protons in an atom.
 - d. electrons in an atom.

2. Butane is a hydrocarbon fuel. What would the products of the combustion of propane be?
 - a. Chloromethane and hydrogen chloride
 - b. Carbon dioxide and water
 - c. Carbon dioxide only
 - d. Hydrogen and water

3. Which one of the following can be found in the nucleus of an atom?
 - a. hydrogen
 - b. electron
 - c. isotope
 - d. proton

4. Which of the following shows a word equation for a neutralisation reaction?
 - a. acid + base \rightarrow salt + hydrogen + water
 - b. acid + base \rightarrow water
 - c. acid + base \rightarrow salt + water
 - d. acid + base \rightarrow salt + carbon dioxide + water

5. The 3 radio-active particles are:
 - a. Alpha Beta and Delta.
 - b. Alpha Beta and Omega.
 - c. Beta Delta and Omega.
 - d. Alpha Beta and Gamma.

6. Oxidation reactions are any chemical reaction that:
 - a. absorbs energy from the surroundings
 - b. involves carbon dioxide.
 - c. Remove oxygen from a compound.
 - d. involves an element combining with oxygen

7. Which particle is the heaviest?
 - a. Beta.
 - b. Alpha.
 - c. Gamma.
 - d. Omega.

8. The law of conservation of mass explains why, in a chemical reaction:

- a. the reactants are heavier than the products.
- b. energy cannot be created nor destroyed, only transformed or transferred.
- c. the reactants weigh the same as the products.
- d. new atoms are created from the reactant atoms.

9. What is the electronic configuration (electron arrangement) of a chlorine atom? Hint: Chlorine has an atomic number of 17.

- a. 2,10,5
- b. 2,8,7
- c. 2,2,2,2,2,2,2,1
- d. 8,8,1

10. A chemical **word** equation only shows:

- a. the chemical formulas of the reactants and the products.
- b. the names of the reactants and the products in words.
- c. all the atoms in the compounds of the reactants, but not the products.
- d. all the atoms involved in the reaction and how they rearrange into the products.

Physical Science Multiple Choice Questions

11. What type of energy cannot travel across space?

- a. Sound energy
- b. Light energy
- c. Radio energy
- d. Heat energy

12. Sound is a longitudinal wave. This means that particles being moved by sound energy will:

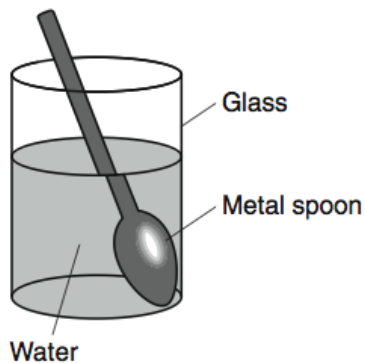
- a. vibrate up and down
- b. move along with the wave
- c. vibrate from side to side
- d. do not move at all

13. The structure in the human ear that changes sound energy into electrical energy is the:

- a. auditory nerve.
- b. eardrum
- c. cochlea
- d. middle ear

14. The spoon in the diagram appears distorted.

This can be explained by which property of light?

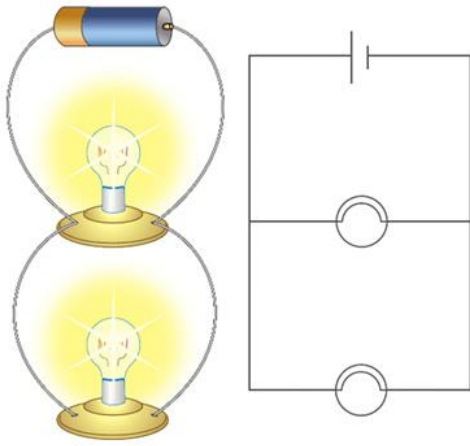


- a. total internal reflection
- b. refraction
- c. reflection
- d. dispersion

15. The role of the iris in the eye is to:

- a. convert light energy to electrical energy
- b. change the size of the pupil to let more or less light into the eye
- c. create an image
- d. focus the light entering the eye

16. Which one of the following does not correctly describe the circuits shown in the diagram?



- a. Both show globes connected in series.
- b. The image on the left is a circuit drawing; the image on the right is a circuit diagram.
- c. If one globe is removed from either circuit, the other will continue to glow.
- d. Both show globes connected in parallel.

17. In a series circuit, adding more globes without changing anything else would:

- a. increase the energy available for each globe and make all the globes dimmer.
- b. decrease the energy available for each globe and make all the globes brighter.
- c. increase the energy available for each globe and make all the globes brighter.
- d. decrease the energy available for each globe and make all the globes dimmer.

18. The electromagnetic energy we sense as heat is called:

- a. ultraviolet.
- b. visible light.
- c. infrared.
- d. microwave.

19. Particles of matter are needed to transfer heat energy in the case of:

- a. radiation but **not** conduction or convection.
- b. radiation and conduction but **not** convection.
- c. conduction and convection but **not** radiation.
- d. conduction but **not** convection or radiation.

20. Conduction involves particles

- a. increasing in size but fixed in position.
- b. moving away from the area that is warmest.
- c. passing vibrations along to nearby particles.
- d. leaving the surface of the substance being heated.

END of Multiple choice questions.

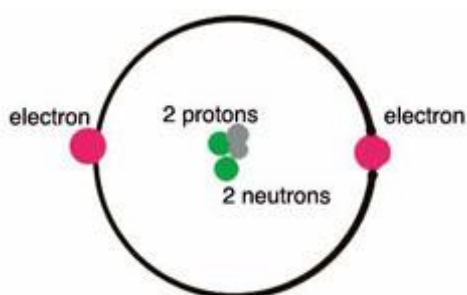
Suggested time to complete 90 minutes

Chemical Science Short Answer Questions

1. Atoms are made from smaller, sub-atomic, particles. Complete the table below with information on the 3 types of sub-atomic particle: (3 marks)

Sub-atomic particle	Charge	Mass (atomic mass)	Location
Proton			Inside the nucleus
Neutron	0		
Electron		1/1800	

2. Below is a diagram of a helium atom, showing the arrangement of its 2 protons, 2 neutrons and 2 electrons. Beryllium has 4 protons, 5 neutrons and 4 electrons. Draw a diagram of a beryllium atom, showing the correct arrangement of its sub-atomic particles. (4 marks)



Helium

Beryllium

3. An atom of magnesium contains 12 protons, 12 neutrons and 12 electrons.

a. What would be the overall electrical charge on a magnesium atom?

(1 mark)

b. Magnesium will often lose 2 of its electrons when reacting with other chemicals. What would be the overall charge on magnesium that has lost 2 electrons (called a magnesium ion)?

(1 mark)

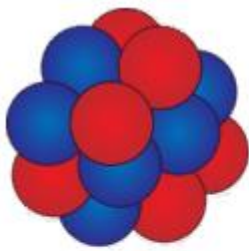
c. Explain your answer to part b

(2 marks)

4. A scientist has given you a box full of protons and a box full of electrons to look after. Unfortunately, the labels have fallen off. Without opening the boxes, describe 2 ways you could test the boxes to tell which one is which:

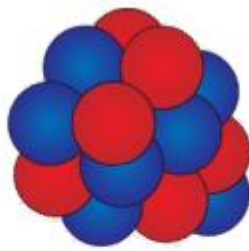
(4 marks)

5. Carbon (atomic number 6) has 3 isotopes.



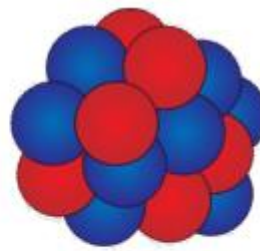
Carbon-12

98.9%
6 protons
6 neutrons



Carbon-13

1.1%
6 protons
7 neutrons



Carbon-14

<0.1%
6 protons
8 neutrons

a. Write a definition of “isotope”.

(1 mark)

b. What is the difference between these 3 isotopes of carbon?

(1 mark)

c. Why are they called Carbon 12, Carbon 13 and Carbon 14?

(2 marks)

6. There are 3 types of nuclear radiation – alpha, beta and gamma. They have their own specific properties. Some of these properties are described below. Write the correct name – alpha, beta or gamma, next to the property described. Some have been done for you:

Radiation	Property
alpha	2 protons and 2 neutrons
	1 electron
	Ray of electromagnetic radiation

Radiation	Property
	Stopped by thick lead
	Stopped by a sheet of paper
	Stopped by thin aluminium

Radiation	Property
	Very weakly ionising
	Strongly ionising
	Weakly ionising

Radiation	Property
	Infinite range
beta	Travels a few metres in air
	Travels a few centimetres in air

(5 marks)

7. Word equations are a simple way to describe what is happening in a chemical reaction. They provide the names of the **reactants** and **products** in a reaction.

a. Identify the reactants and products for each of the following reactions:

i. Methane + oxygen \rightarrow carbon dioxide + water

Reactants: _____

Products: _____

(2 marks)

ii. Nitric acid + magnesium \rightarrow magnesium nitrate + hydrogen

Reactants: _____

Products: _____

(2 marks)

b. Write word equations for each of the following reactions

i. Lithium reacts with water to produce lithium hydroxide and hydrogen

(2 marks)

- ii. Carbon reacts with oxygen to produce carbon dioxide

_____ (2 marks)

- c. Balanced symbol equations show the chemical formulae rather than the names of the reactants and products. They also allow us to show the number of each element present, in keeping with the law of conservation of mass. Balance the following equations:



8.

- a. How acidic or alkaline a solution is can be tested with Universal Indicator. A scientist tested 1 acid, 1 alkali and 1 neutral solution but left her results table incomplete. Fill in the blanks to complete it for her: (3 marks)

Colour of universal indicator	pH range of solution	Type of solution
Red		
	8-14	
		Neutral

- b. When an acid and an alkali react they cancel each other out:

i. What name is given to this type of reaction? _____ (1 mark)

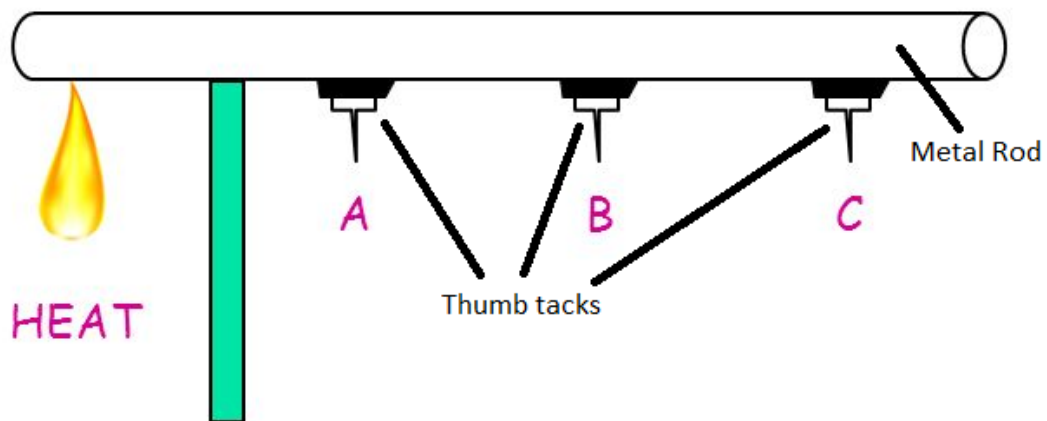
ii. What are the products of the reaction? _____ (2 marks)

9. 2 scientists are out for a walk when they spot a fire. Scientist 1 says "That's a combustion reaction", while Scientist 2 says "That's an oxidation reaction". Who is correct and why?

_____ (3 marks)

Physical Science Short Answer Questions

10. Heat can be transferred by **conduction**, **convection** or **radiation**. The experiment below is designed to demonstrate heat transfer:



a. In what order will the thumb tacks fall from the metal rod?

1st: _____

2nd: _____

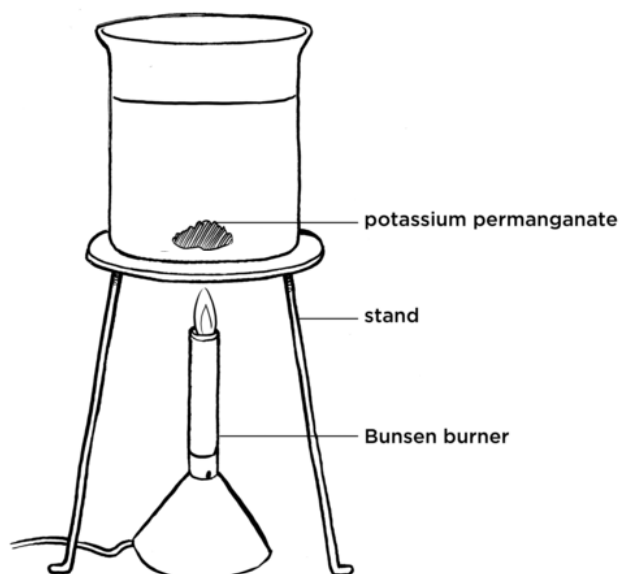
3rd: _____

(2 marks)

b. Which type of heat transfer does this demonstrate?

(1 mark)

11. This diagram shows an experiment demonstrating a different type of heat transfer

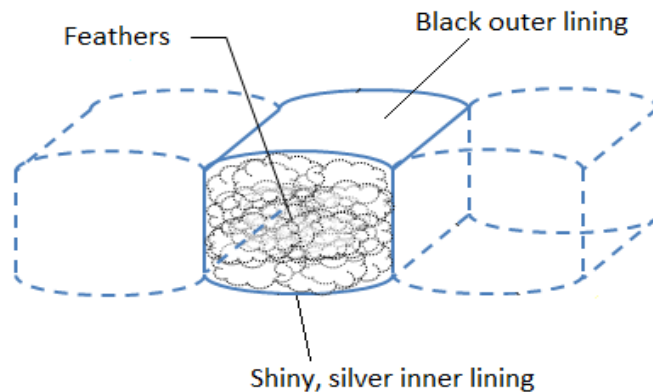


a. Potassium permanganate is a purple dye. **Draw arrows on the diagram** to show the direction(s) the dye moves through the water as it is heated. (3 marks)

b. What is the name given to this type of heat transfer?

_____ (1 mark)

12. Jim has bought a new winter jacket which incorporates design features that prevent heat loss to his surroundings. The jacket and its construction are shown below:



The jacket has a shiny inner lining and a dark outer lining. It is filled with small feathers, called down, that trap lots of little bubbles of air between their fibres. Identify which of these features will reduce heat transfer by conduction, convection and radiation and explain how they do this:

a. _____ will reduce heat transfer by conduction because _____

_____ (2 marks)

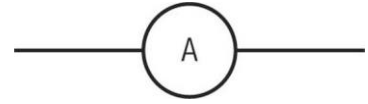
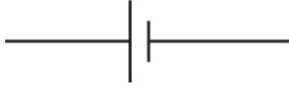
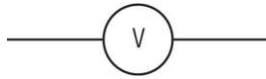
b. _____ will reduce heat transfer by convection because _____

_____ (2 marks)

c. _____ will reduce heat transfer by radiation because _____

_____ (2 marks)

13. Name each of the circuit symbols shown below:



(3 marks)

14. Complete the following sentences:

Electricity is generated by a flow of _____.

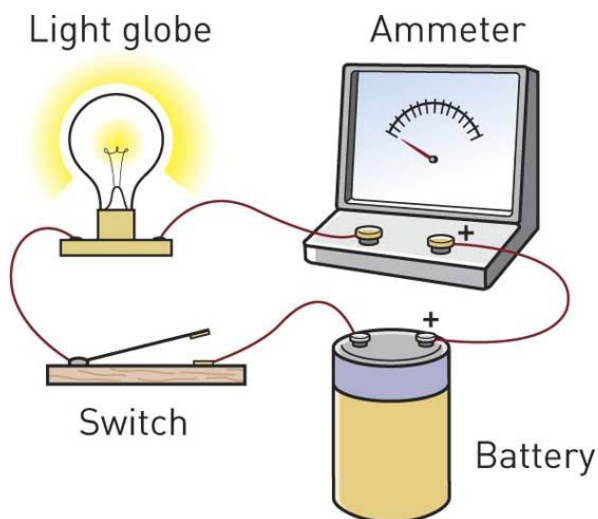
An electrical _____ is a material that allows charged particles to flow through it.

An insulator does not allow the _____ of particles through it.

A closed electrical pathway that allows electrons to flow through it is called a _____.

(2 marks)

15. Draw a circuit diagram for the electrical circuit picture shown below.



Circuit picture

Circuit diagram

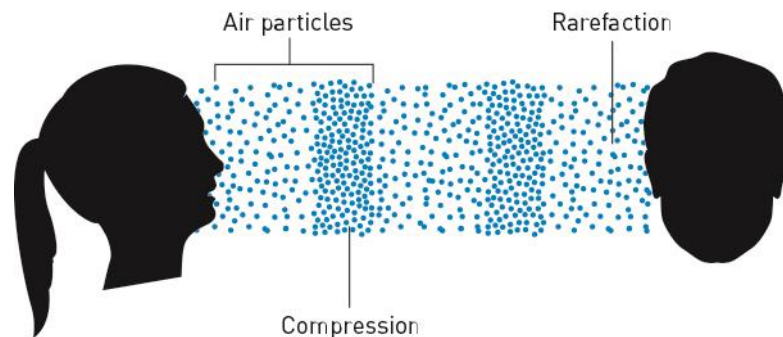
(3 marks)

16. Draw a circuit diagram with the following components:

- three bulbs in parallel
- a battery
- a switch that is able to turn one bulb off while the others are still glowing

(3 marks)

17. The diagram shows energy travelling in a wave when one person speaks to another.



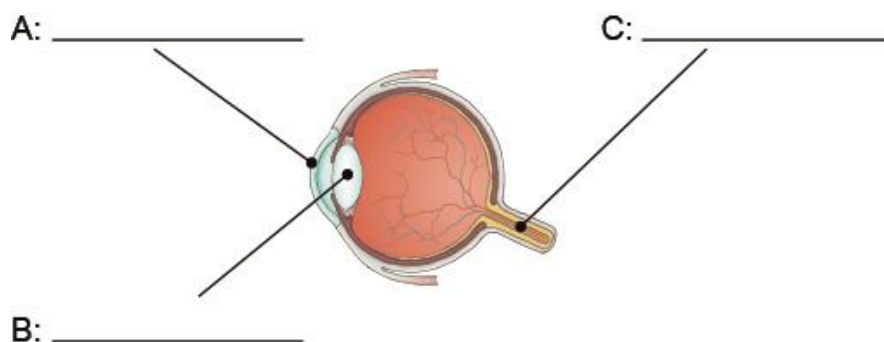
a. Underline the correct answers to describe the wave shown:

Type of wave: **longitudinal / transverse** Type of energy: **sound / light** (2 marks)

b. Underline the correct answers in the following paragraph:

In a transverse wave particles move **up and down / backwards and forwards**, while in a longitudinal wave the particles move **up and down / backwards and forwards**. However, both types of wave carry **energy / heat**. In both wave types the particles of the material the wave is moving through **move around a fixed point / get carried along with the flow of energy**. (2 marks)

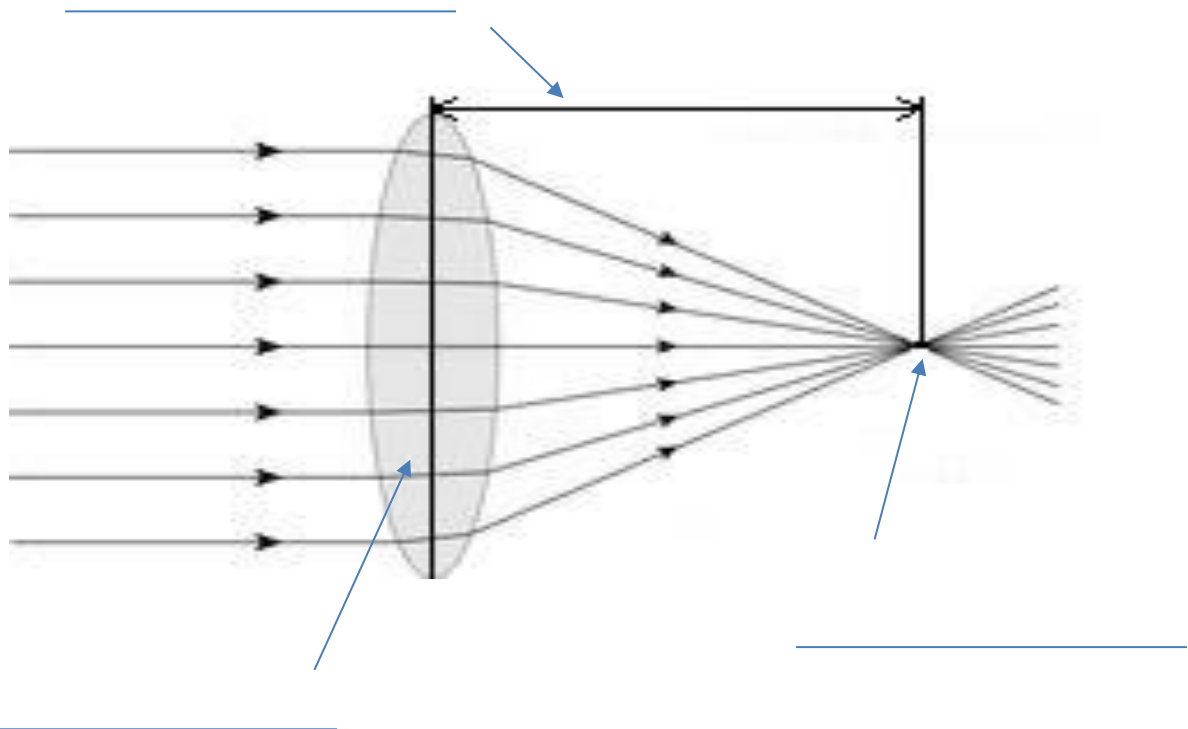
18. Name the parts of the eye labelled A–C on the diagram below:



(3 marks)

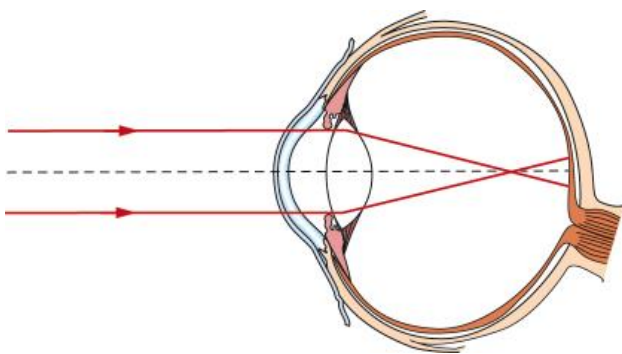
19. The diagram below shows the path of light through a lens. Use the correct terms from the list provided to label the diagram:

Concave lens; convex lens; refractive index; focal length; cross over; focal point



(3 marks)

20. The diagram below shows the eye of a shortsighted person. The light entering the eye is bent too far and doesn't focus on the retina. This problem is corrected by wearing glasses with a lens shaped to compensate for this.



What type of lens would be used and how does it work? (You may draw a labelled diagram if you wish)

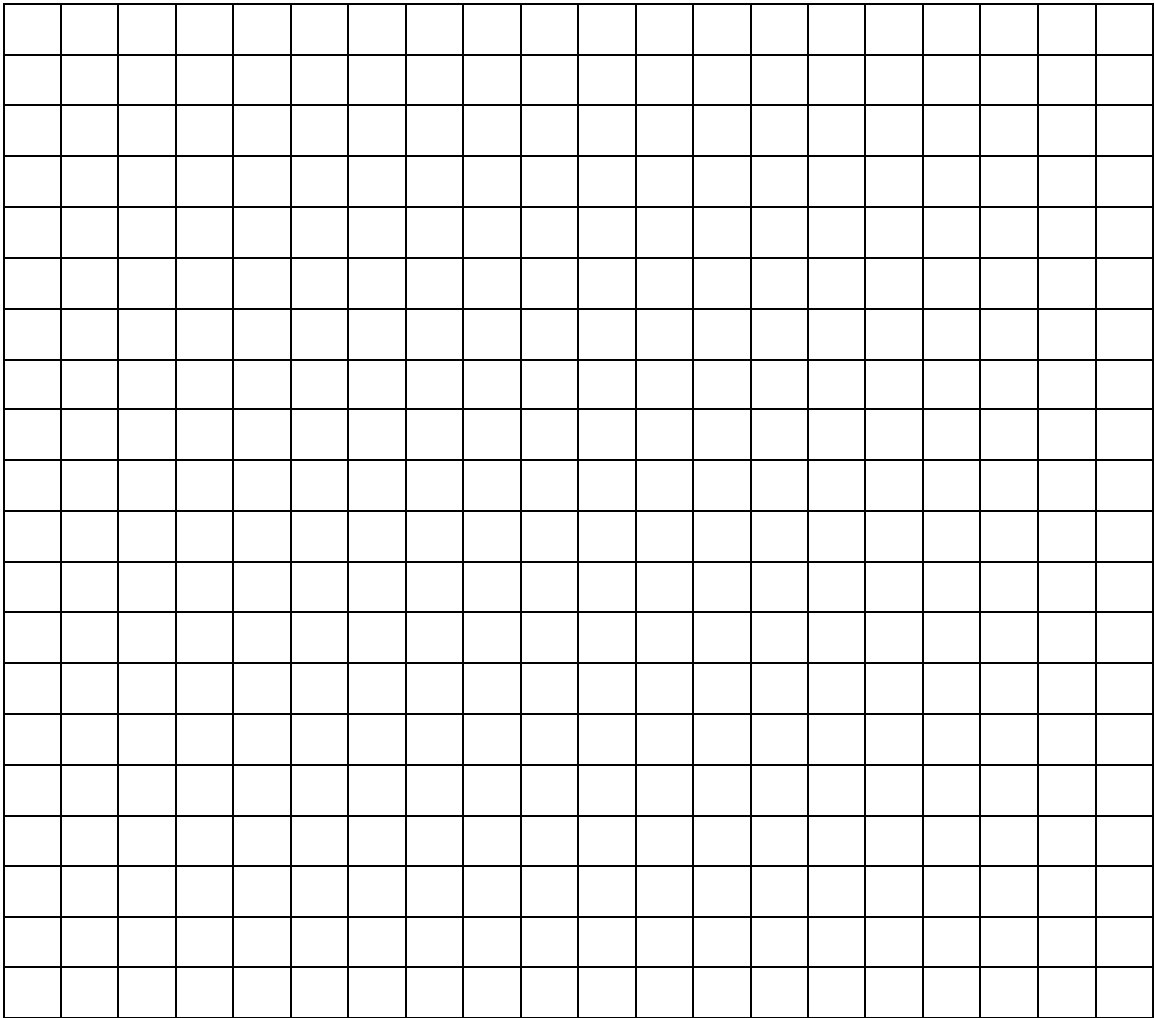
(3 marks)

21. The table shows the speed of sound at different temperatures.

Speed of sound (m/s)	Air Temperature (° C)
330	0
336	10
342	20
348	30
354	40

Make a line Graph using information from the table – comparing the speed of sound to the temperature with title, labels units and the correct scale

(hint- independent variable on x axis, dependent variable on y axis) (4 marks)



- a. What is the speed of sound at 5 ° C? _____ (1 mark)
- b. What is the temperature of the air if the speed of sound is 351 m/s? _____ (1 mark)
- c. Describe the relationship between the two variables shown on the graph (2 marks)

END OF EXAM