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EXAMINATION NUMBER

AN ROINN OIDEACHAIS

JUNIOR CERTIFICATE EXAMINATION, 1997

SCIENCE – HIGHER LEVEL

(N.B. Not for Science – Local Studies Candidates)

TUESDAY, JUNE 17 – AFTERNOON, 2.00 – 4.30

SECTION A – 120 marks – TO BE ANSWERED IN THIS BOOKLET

(See separate sheet for **Sections B, C, D and E.**)

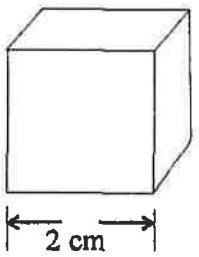
Answer *each* of the questions, 1, 2 and 3. There are **TEN** parts in each question. Answer any **EIGHT** parts. All questions carry equal marks. Answer the questions in the spaces provided.
Return this Section of the examination paper. Enclose it in the answer-book you use in answering the other Sections.

1. Answer **eight** of the following, (*a*), (*b*), (*c*), etc.

(*a*) State the unit of pressure. _____

(*b*) The metal cube in the diagram has a mass of 72 g.

Calculate its density.



_____

(*c*) What is meant by a source of renewable energy?

_____

Name **one** source of renewable energy. _____

(*d*) Give **two** advantages which a mercury thermometer has compared with an alcohol thermometer.

(i) _____

(ii) _____

(*e*) Complete the following.

When the pressure on ice is increased the melting point of the ice _____ .

(*f*) The change of a solid directly to a gas on being heated is called _____ .

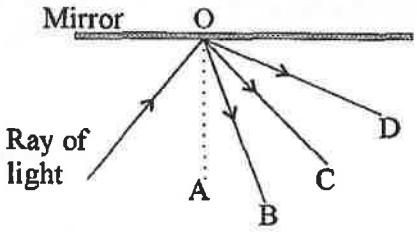
Name a substance which shows this property. _____

(*g*) What property of light is being shown in the diagram?

_____

Which of the lines B, C or D shows the path of the light ray from O?

_____



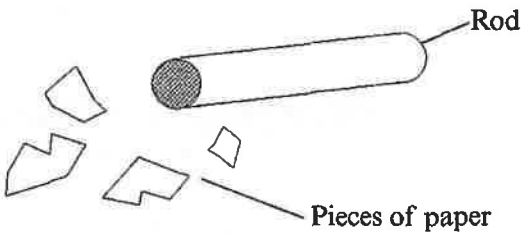
(*h*) State how you would charge the rod in the diagram.

_____

_____

Suggest what happens to the pieces of paper when the charged rod is brought near.

_____



(*i*) Name an element which can be magnetised. _____

What term is used to describe the two ends of a bar magnet? _____

(*j*) Underline the unit of <u>energy</u> in the following list.

ampere volt watt kilowatt-hour ohm

Name another unit of energy. _____

(8 × 6 marks)

2. Answer **eight** of the following, (*a*), (*b*), (*c*), etc.

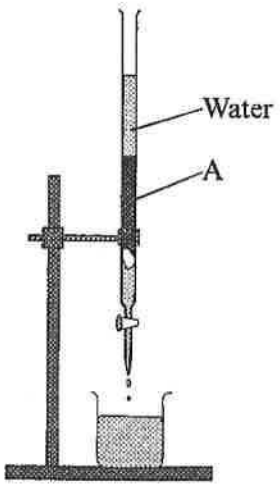
(*a*) Give **a** difference between a solid and a liquid.

_____

(*b*) Name both of the compounds whose chemical formulae are given below.

Formula	**Name**
NH_3	
H_2SO_4	

(*c*) The diagram shows apparatus which may be used to remove permanent hardness from water.



(i) Name substance A.

_____

(ii) Give **one** cause of permanent hardness in water.

_____

(*d*) Sketch the electronic structure of an atom of calcium. (See Mathematics Tables, page 44.)

(*e*) Balance the following chemical equation.

$$H_2O_2 \rightarrow \quad H_2O + \quad O_2$$

Name a catalyst for the reaction. _____

(*f*) What is meant by electrolysis? _____

_____

_____

(*g*) What treatment of water

(i) kills micro-organisms? _____

(ii) prevents tooth decay? _____

(*h*) What is meant by oxidation? _____

Underline the substance oxidised in the reaction:

$$Zn + Cu^{++} \rightarrow Zn^{++} + Cu$$

(*i*) State **two** methods by which corrosion of metals may be prevented.

(i) _____

(ii) _____

[Turn over

(*j*) Name

(i) an element that is a liquid at room temperature. _____

(ii) an element that is stored in oil. _____

(8 × 6 marks)

3. Answer **eight** of the following, (*a*), (*b*), (*c*), etc.

(*a*) State **two** characteristics of living organisms.

(i) _____

(ii) _____

(*b*) The diagram shows a microscope.

Name part A.

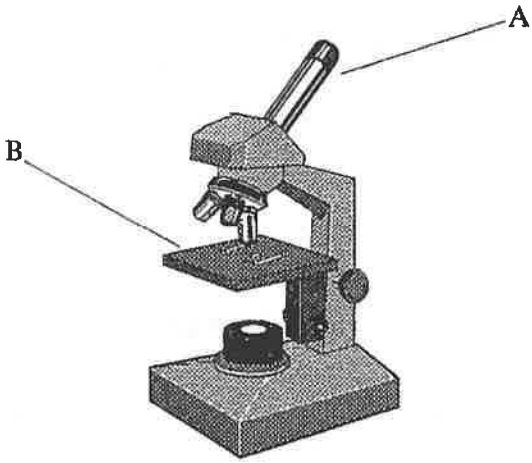
_____

What is the function of part B?

_____

_____

_____



(*c*) Blood vessels carrying blood away from the heart are called _____

(*d*) Name the type of joint found at the hip. _____

What is the function of cartilage in a joint? _____

_____

(*e*) Name an endocrine gland in the human body. _____

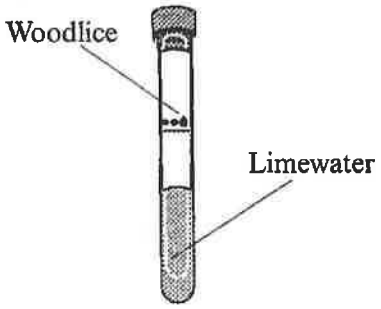
What hormone does this gland release? _____

(*f*) What will be observed to happen to the limewater in this test tube after an interval of time?

_____

Give a reason for this.

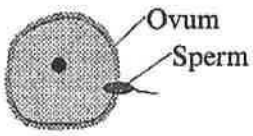
_____



(*g*) Give an example of the use of micro-organisms in medicine. _____

_____

(*h*) Name the process occurring in the diagram.



_____

Where in the human female reproductive system does the process shown usually occur?

_____

(*i*) Underline the human characteristics in the following list which are usually inherited.

accent eye colour length of fingernails shape of ear lobes

(*j*) Give **two** features of a flower which help in pollination by insects.

(i) _____

(ii) _____

(8 × 6 marks)

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SECTION A

Section A is on a separate sheet which provides spaces for your answers.
The completed sheet should be enclosed in your answer-book.

SECTIONS B, C, D, E

These sections should be answered in your answer-book.
Answer **ONE** question from each of the **Sections B, C and D.** All questions carry equal marks.
Answer **TWO** questions from **Section E.** All questions carry equal marks.

SECTION B – PHYSICS (60 marks)

Answer **either** question 4 **or** question 5.

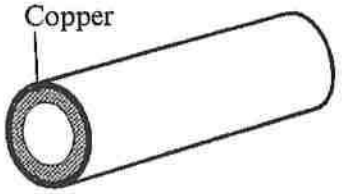
4. (*a*) Name an instrument used

(i) to measure the length of a curved line;

(ii) to measure the diameter of a copper pipe. (6)

Describe how you would use the instrument in (i) above to calculate the length of a river on a map. (9)

Explain how the instrument in (ii) above could be used to measure the thickness of the copper in the copper pipe shown in the diagram.



(9)

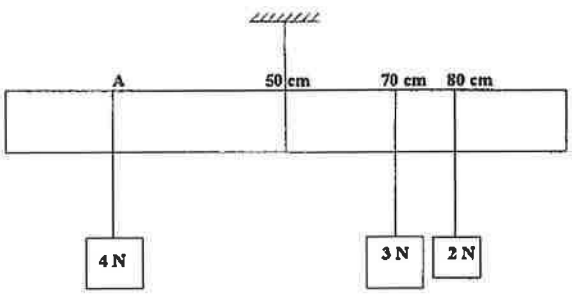
(*b*) State the law of the lever. (3)

Describe an experiment to verify the law of the lever. (9)

Give two examples of levers. (6)

The centre of gravity of the metre rule shown in the diagram is at the 50 cm mark. The metre rule is balanced under the forces shown.

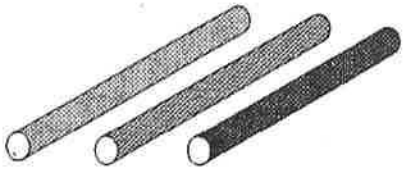
Calculate the **position** of the 4 N force. (6)



5. (*a*) What is meant by convection? (3)

Draw a diagram of an apparatus used to show convection in a liquid. Label your diagram. (9)

You are given three metal rods made of aluminium, brass and copper respectively. They are each of the same length and diameter as shown in the diagram.



Outline a laboratory experiment to show which metal is the best conductor of heat. (9)

In cold winter weather birds often fluff up their feathers. Explain how this helps the birds to keep warm. (3)

(*b*) What is meant by the **frequency** of a wave? (6)

Give an example to show that sound travels more slowly than light. (3)

Describe, using a labelled diagram, an experiment to demonstrate that sound does not travel through a vacuum. (9)

Standing in front of a cliff face, a boy shouts and 4 seconds later he hears an echo of his voice. If the speed of sound in air is 340 metres per second, calculate the boy's distance from the cliff. (6)

Answer **either** question 6 **or** question 7.

6. (*a*) State two differences between a mixture and a compound. (6)

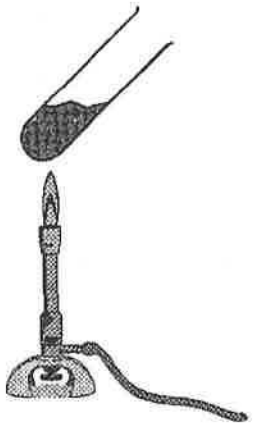
You are given a mixture of sulphur and iron filings.

(i) What colour would you expect the mixture to be? (3)

(ii) How you would separate the mixture of sulphur and iron filings? (3)

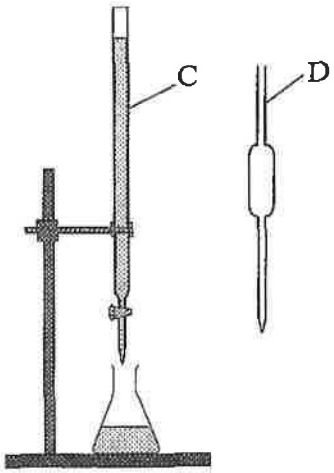
Name another method of separating a mixture. (3)

The diagram shows the mixture of iron filings and sulphur being heated. Write a chemical equation for the reaction which takes place in the test tube. Name the compound which is formed as a result of the reaction of iron and sulphur. (6)



Give a precaution which should be taken when heating a test-tube in the laboratory. (3)

(b) The diagram shows the items of apparatus which could be used in an experiment to prepare a salt.



(i) Name the items of apparatus labelled C and D. (6)

(ii) Name a salt which could be prepared using this apparatus. (3)

(iii) Name the two substances which would be used to prepare this salt. (6)

(iv) State the term used to describe this type of reaction. (3)

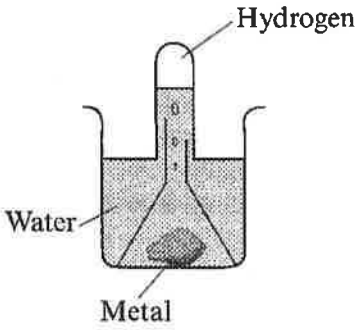
(v) How would you make sure that you accurately read the level of the liquid in C? (3)

(vi) What is the function of an indicator in this experiment? (3)

7. (*a*) Arrange the following metals in order of **increasing** reactivity:

iron silver sodium calcium (6)

The diagram shows one of the above metals in water.



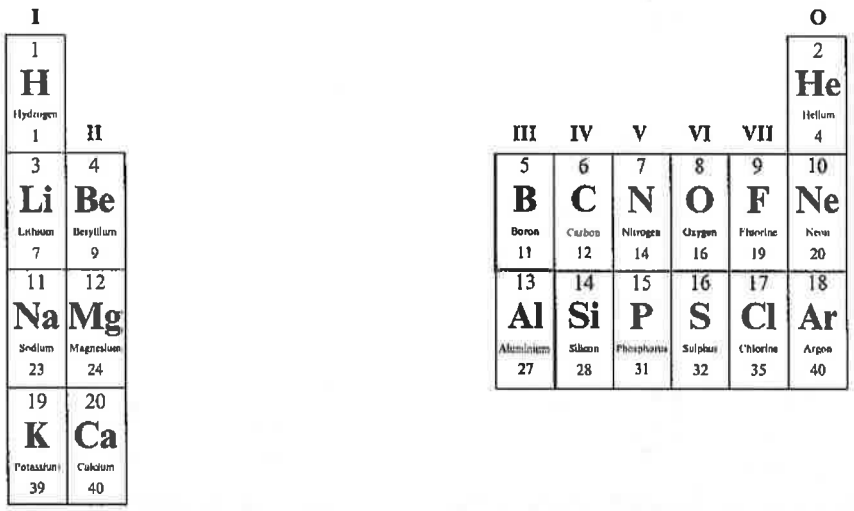
(i) Name the metal. (3)

(ii) Write an equation for the reaction of the metal with water. (3)

Which one of the metals above does **not** react with dilute hydrochloric acid? (3)

State how you would test the oxides of the four metals above to see whether they are acidic or basic. In the case of any **two** of the metals above state the result you would expect to obtain. (9)

(*b*)



The diagram shows part of the Periodic Table of the Elements. Study the diagram and answer the following questions.

(i) Name the group of elements in each case, the atoms of which

(*a*) have a full outer electron shell; (3)

(*b*) have 7 electrons in their outer shell. (3)

(ii) Name an element which generally forms ions with a charge of +2. Explain why this happens. (6)

(iii) Name an element which generally forms ions with a charge of –1. Explain why this happens. (6)

(iv) What information is given by the number above each atomic symbol? (3)

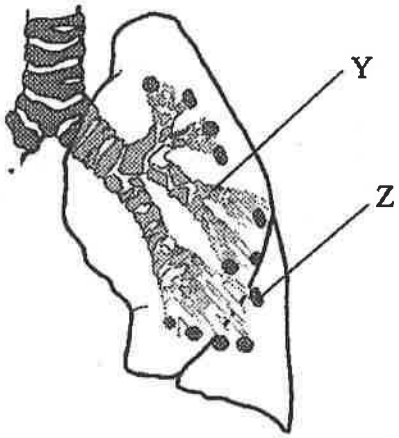
(v) What information is given by the number below each atomic symbol? (3)

SECTION B - BIOLOGY (48 marks)

Answer **either** question 8 **or** question 9.

8. (*a*) State the function of the lungs. (3)

The diagram shows a human lung.



Name the parts labelled Y and Z. (6)

State the function of Y. (3)

Explain what happens at Z. (6)

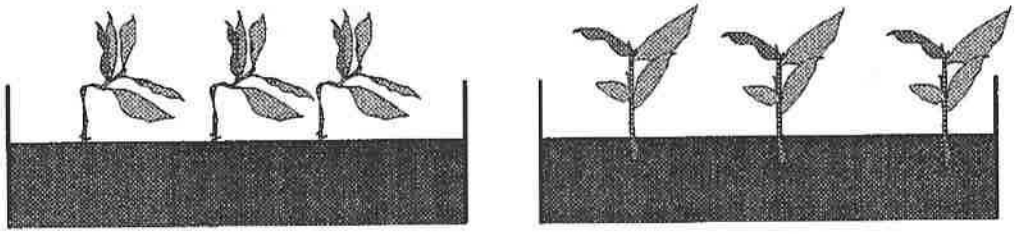
Name an animal which does not have lungs. (3)

How does the animal which you have named receive its oxygen? (3)

(*b*) State the term used to describe the response of a plant (i) to gravity, (ii) to light. (6)

Describe, using a labelled diagram, an experiment to show the response of a plant to gravity. (9)

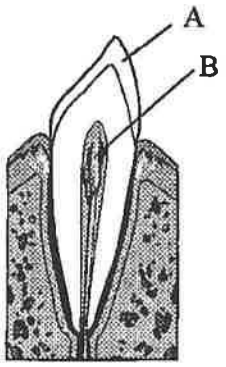
How does a plant benefit from its response to gravity? (6)



A B

The diagram shows two Petri dishes containing green cress plants. Suggest a reason why the plants in A are not upright as in B. (3)

9. (*a*) The diagram shows the structure of a canine tooth.



Name the parts labelled A and B. What is the principal function of a canine tooth? (9)

How do teeth help in the digestion of food? (3)

Name any **two** of the stages of human nutrition other than digestion. (6)

State what happens during **each** of the stages you name. (6)

(*b*) Give **two** causes of soil pollution. (6)

Leaching is more likely to occur in sandy soil than in loamy soil.

(i) What is leaching? (3)

(ii) How does leaching affect the soil? (3)

Describe, using a labelled diagram, an experiment you would carry out to measure the amount of air in a soil sample. (12)

Answer **TWO** questions from this Section.

10. EARTH SCIENCE. Answer any **two** of the following, (*a*), (*b*), (*c*).

(*a*) Describe the solar system with the aid of a diagram. (12)

What is a galaxy? Give an example of a galaxy. (6)

(*b*) Explain the terms (i) evaporation, (ii) condensation. (6)

Describe how clouds are formed. (6)

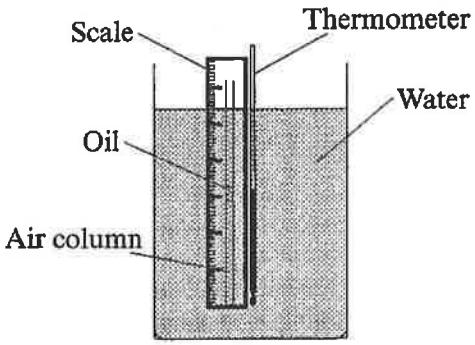
Name a type of cloud and state the kind of weather which you would expect to have with this type of cloud. (6)

(*c*) State Charles' law. (6)

The apparatus shown in the diagram was used in a laboratory experiment to verify Charles' law.

What will you observe happening as the beaker of water is heated? (3)

Explain how the apparatus could be used to verify Charles' law. (9)



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11. HORTICULTURE. Answer any **two** of the following (*a*), (*b*), (*c*).

(*a*) Name **two** methods for the vegetative (asexual) propagation of plants. (6)

Give an advantage of vegetative propagation of plants. (3)

Describe how you would carry out vegetative propagation using one of the methods you have given above. (9)

(*b*) Explain the following terms in relation to growing plants from seeds:

(i) dormancy
(ii) germination
(iii) pricking out (9)

State **three** conditions which are necessary for the successful germination of a seed. (9)

(*c*) Name **two** nutrients essential for healthy plant growth. (6)

Describe an experiment to show how a lack of one of the nutrients you have named affects plant growth. (6)

What are the components of a potting compost? (6)

12. MATERIALS SCIENCE. Answer both parts.

(*a*) The following are types of material commonly used in manufacturing.

plastics metals

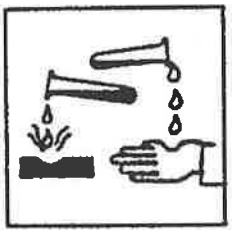
(i) In the case of **each** of the above materials name a product which can be manufactured from it. (6)

(ii) State why each of the materials is suitable for the use indicated in (i) above. (6)

State how (i) timber, (ii) fabric, may be protected. (6)

(*b*) Identify each of the following hazard symbols. (6)

A



B

Describe, with the aid of a diagram, how you would carry out **one** of the following experiments.

(i) To compare the insulation properties of two different plastics.

(ii) To demonstrate the extraction of a metal from its ore.

(iii) To compare the absorbancy of two different types of fabrics.

(iv) To compare the bending strength of two woods. (12)

13. FOOD. Answer any **two** of the following, (*a*), (*b*), (*c*).

(*a*) State a function of carbohydrate in the human diet. (3)

Name the elements present in a carbohydrate molecule. (6)

Describe a laboratory experiment to test a food sample for glucose. (6)

Name **one** other food type. (3)

(*b*) What is the purpose of pasteurisation? (3)

Describe how milk is pasteurised. (6)

Pasteurised milk is used to make cheese.

Give the other steps involved in the production of cheese. (9)

(*c*) What is silage? (3)

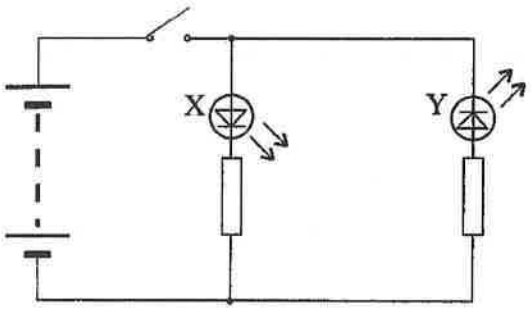
Give an advantage of silage over hay as feed for animals. (3)

Describe, using a diagram, a laboratory experiment to make silage. (12)

14. ELECTRONICS. Answer both parts.

(*a*) Name the components labelled A and B in the diagram. (6)

Study the circuit diagram and answer the following questions.

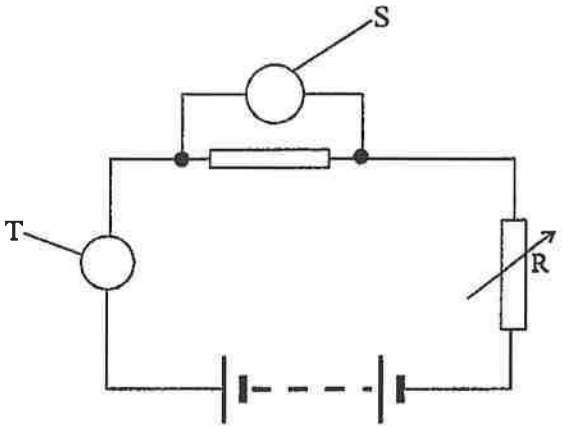


(i) What are the items labelled X and Y? (3)

(ii) What will happen (a) to X and (b) to Y when the circuit is switched on? (6)

(iii) Explain your answer in (ii). (3)

(*b*) Name and give the function of the meters S and T in the circuit diagram. (12)



What is the function of R? (3)

How does R work? (3)

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15. ENERGY CONVERSIONS. Answer both parts.

(*a*) What is nuclear energy? (3)

State an energy change that occurs in each of the following.

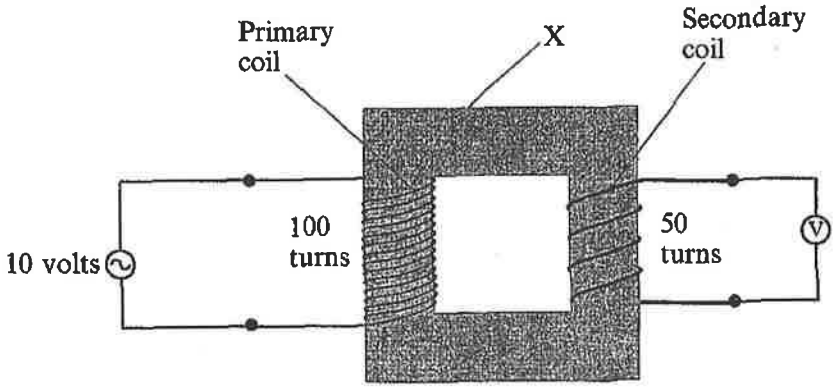
(i) Water is being released from a dam.

(ii) A nuclear power station is in operation.

(iii) An electric motor is running. (9)

Explain, using a diagram, how you would make a simple electric motor. (9)

(*b*) The diagram shows a transformer.



Name the part labelled X. (3)

The primary coil in the transformer is connected to a 10 volt a.c. supply as shown. What reading would you get on the voltmeter connected to the secondary coil? (6)

Name the type of transformer shown in the diagram. (3)

Give an example of the use of a transformer in the home. (3)