NAME:

OUNDLE
School

2015 Junior Entrance and Scholarship Examinations

Science Theory Paper

Time allowed: **60 minutes**

- You have **10 minutes reading time**. In this time, you should look at the questions in the paper and choose which to do.
- Answer **only 3** of the 5 questions in the paper, the choice is up to you.
- You have **50 minutes to answer your 3 questions.**
- You will need a pen, pencil, ruler and calculator

This question is about solutions

1. A recipe calls for 2g of salt. Just as you measure 2g of salt into a cup, your cat knocks over a jar of sand, spilling it into your cup and creating a mixture of sand and salt. You need to find a way to obtain pure salt to use for your recipe.

   a. First you add 50cm^3 of water to the cup. A soluble substance will dissolve in the water while an insoluble substance will not. Circle the soluble substance in this mixture.

   Sand Salt

   (1)

   b. Is dissolving a physical or chemical change? (1 mark)

   c. Suggest two ways to increase the rate of the dissolving process.

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   (2)

   d. In your kitchen you have coffee filters, a funnel and several cups lying around. You decide to use a process called filtration to separate the insoluble substance from your solution. Draw a labelled diagram of the apparatus you would use for the filtration process.

   (2)

e. The substance left in the filter is called the residue. The substance that passes through the filter is called the filtrate. Circle which substance is the residue you are left with.

Sand Salt

(1)

f. Now you need to recover the salt in its pure form. You decide to heat the solution so that the water evaporates, leaving damp salt behind.

Evaporation is a state change in which a _____

turns into a _____.

(2)

g. After you wait for the salt to dry out, you find its mass to make sure you have the 2g the recipe calls for. You find that you only have 1g! Explain why your yield might be much lower than expected.

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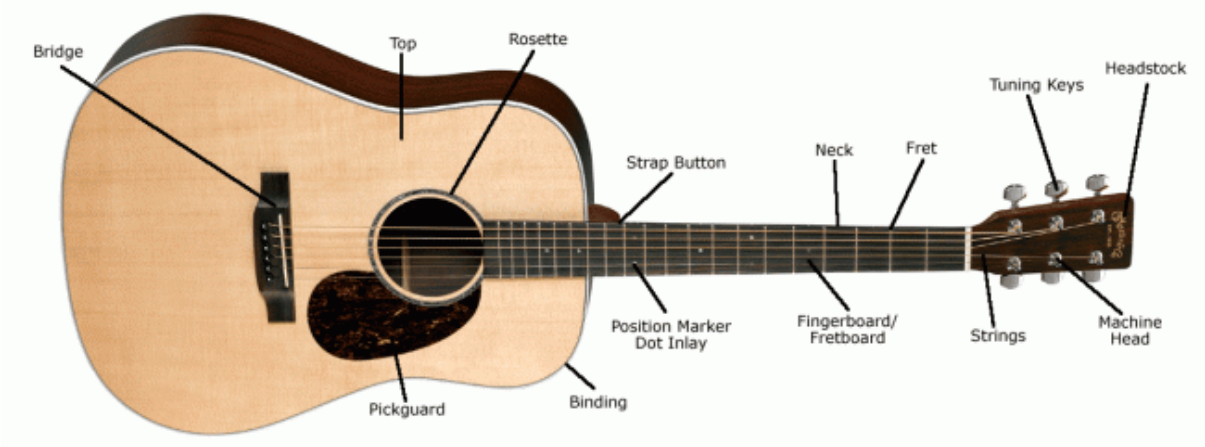
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(2)

[Question Total = 10 marks]

This question is about sound

2. This question is about an acoustic guitar.



There are six strings which have different thicknesses.

a. Which string produces the lowest note that we hear: the thickest or the thinnest?

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(1)

b. When you place your finger on the fingerboard behind a fret this shortens the length of the vibrating string. What does this do to the pitch of the note we hear?

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(1)

c. The guitar can be tuned by adjusting the tuning keys. What happens to the pitch of the note if the string is tightened?

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(1)

d. The body of the guitar is a hollow box. How does this help us hear the sound of the vibrating string?

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(2)

e. Why is there a hole in the body?

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(1)

f. How does the sound travel from the guitar to the listener's ear?

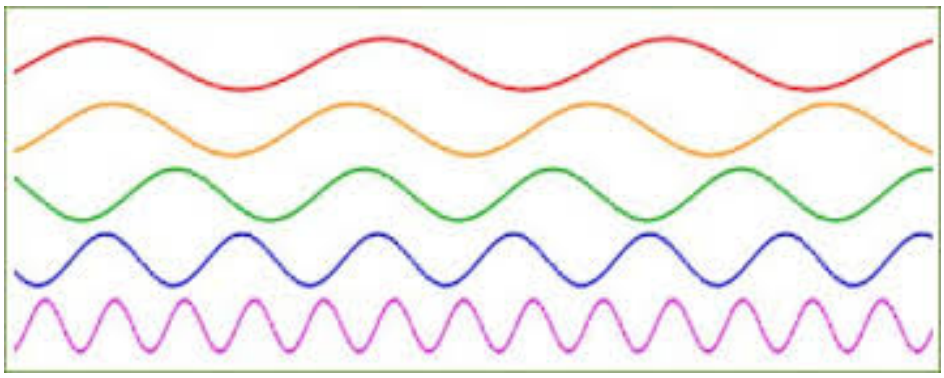
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(1)

Sound waves can be displayed on a computer by connecting a microphone to it and running a program which converts the sound into a trace on the screen.

Here are some typical traces



g. Which trace has the highest frequency?

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(1)

h. Which would be heard as the highest pitch?

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(1)

i. What do you notice about the amplitude of the traces?

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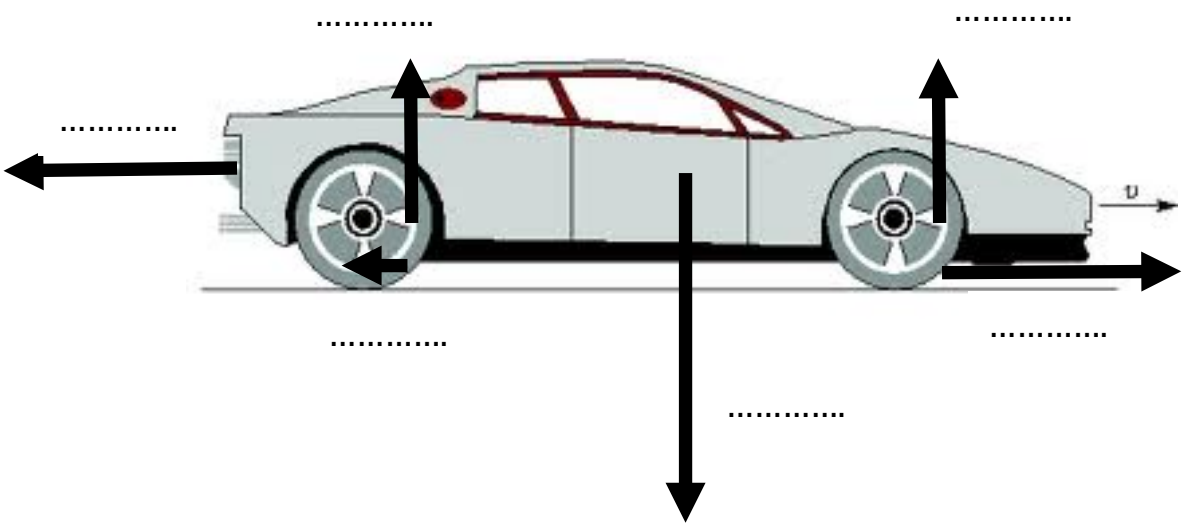
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(1)

[Question Total = 10 marks]

This question is about forces

3. This question is about the forces acting on a car as it travels along a straight, level road. It is a front–wheel drive car.



a. On the diagram label these forces

T the Thrust due to the engine

D the Drag

W the Weight

F the Friction

R the contact force of the road on the car

(5)

b. What can you say about these forces when it is moving at a constant speed?

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(1)

c. The driver wants to accelerate. Which force must be increased to make the car go faster?

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(1)

d. How do we know that the up and down forces are always balanced?

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(1)

e. The driver takes his foot off the accelerator. Explain what happens to forces as the car slows down.

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(2)

[Question Total = 10 marks]

This question is about the body

4. Diagram 1 shows a section through the heart.

Diagram 1



a. Draw and label two arrows on **Diagram 1** to show where blood leaves the heart to go to the lungs (arrow **A**) and where blood enters the heart from the lungs (arrow **B**).

(2)

b. The tissue in the wall of the heart contracts.

i. What type of tissue is this?

Tick (✓) **one** box.

muscular ☐

glandular ☐

nervous ☐

(1)

ii. What does the heart do when this tissue contracts?

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(1)

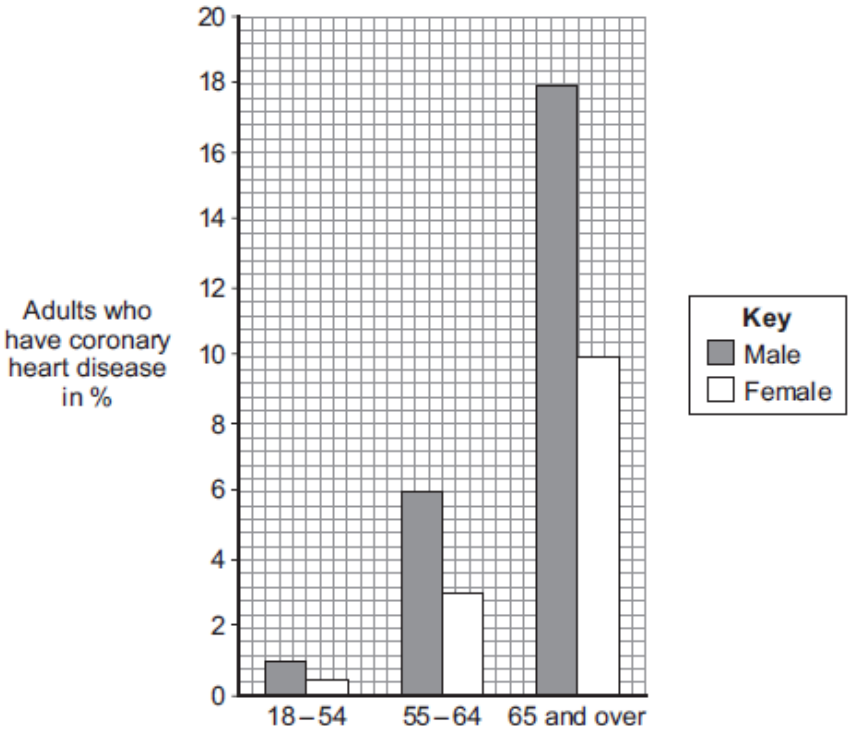
c. Draw arrows on Diagram 2 to complete the route taken by deoxygenated blood through the heart.

Diagram 2



(2)

d. Coronary heart disease (CHD) can be caused by eating too many fatty foods, smoking, drinking too much alcohol and a lack of exercise and this results in changes in the walls of arteries supplying the heart with oxygen.The graph shows the percentage (%) of adults in the UK who have coronary heart disease.



Age group

i. Look at the graph.
Which group of people is **most** at risk of having CHD in the UK?

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(2)

ii. People suffering from CHD can improve the health of their heart by taking up regular exercise; among other things this brings down their heart rate and means that the heart doesn't have to work so hard. Describe a simple classroom method which would allow you to measure your own heart rate in beats per minute.

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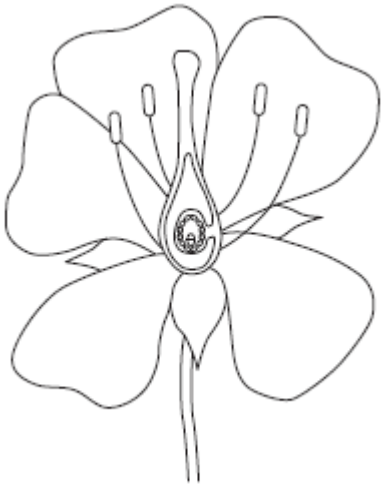
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(2)

[Question Total = 10 marks]

This question is about flowers

5. The diagram shows the reproductive parts of a flower.



a. Draw one line from each function to the correct structure.

Function	**Structure**
	anthers
where female gametes are formed	
	ovules
where pollen grains are produced	
	stigma
where pollen grains land during pollination	
	style

(3)

b. Suggest **one** way in which flowers attract pollinating insects.

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(1)

c. The pollen grains land on the female part of the flower.
Describe the next stages in the process which results in seed formation.

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(3)

d. Once the seed has formed it remains in the ovary which becomes the fruit.
Some fruits are edible while others are not but they are all intended to help plants disperse their seeds effectively. Name three seed dispersal methods and give one example of each (do not include edible fruits!).

1. .....

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2. .....

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3. .....

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(3)

[Question Total = 10 marks]

END OF PAPER