

NAME: _____



HARROW SCHOOL

ENTRANCE SCHOLARSHIPS EXAMINATION 2013

Wednesday, February 27th, 9.00 a.m. to 9.30 a.m.

BIOLOGY

You have 30 minutes to answer all of the questions

You may use a calculator

The maximum mark for this paper is 35

Question 1

Answer the following multiple-choice questions. Underline the correct answer with a ruler and pencil as shown in the example below:

Example question: What is the maximum magnification that can be achieved using a standard light microscope when the magnification of the eyepiece lens is x10 and the magnification of the high power objective lens is x40?

- i. x40
- ii. x50
- iii. x400
- iv. x410

a) Which of the following diseases affects the lungs? (1)

- i. diabetes
- ii. bronchitis
- iii. cholera
- iv. hepatitis

b) Approximately what volume of urine can a human bladder hold? (1)

- i. 0.35 ml
- ii. 3.5 ml
- iii. 35 ml
- iv. 350 ml

c) The diameter of a human egg cell is approximately 120 μm (micrometres). What is the diameter of an egg cell in mm? (There are 1000 μm in 1 mm.) (1)

- i. 120 000 mm
- ii. 12 000 mm
- iii. 1.2 mm
- iv. 0.12 mm

d) Which is the smallest of the following biological structures? (1)

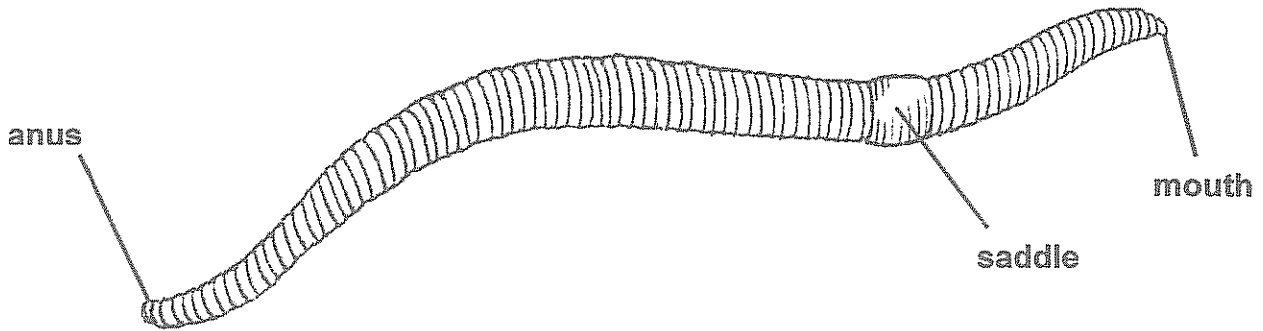
- i. glucose molecule
- ii. flu virus
- iii. sperm cell
- iv. bacterium

- e) Which structures are found in animal cells? (1)
- cell membrane, nucleus, mitochondria, cell wall
 - chloroplasts, vacuole, nucleus, cell membrane
 - cytoplasm, nucleus, vacuole, mitochondria
 - cell membrane, mitochondria, nucleus, cytoplasm
- f) On which island nation do lemurs live? (1)
- Madagascar
 - Australia
 - Sri Lanka
 - Japan
- g) Who published his theory of evolution in the book *On the Origin of Species* in 1859? (1)
- Louis Pasteur
 - Charles Darwin
 - Richard Dawkins
 - Alfred Russell Wallace
- h) At rest a person's breathing rate is 12 breaths per minute and the mean volume of each breath is 500 cm^3 . During intensive exercise the breathing rate increases to 30 breaths per minute and the mean volume of each breath increases to 2500 cm^3 . How many times greater is the volume of air inhaled per minute during exercise than at rest? (1)
- 12.5
 - 4.8
 - 2.5
 - 2.0
- i) Which of the following structures make up the carpel in a flower? (1)
- anther, filament, style
 - style, ovary, stigma
 - ovary, filament, stigma
 - ovary, style, anther

/ 9 marks

Question 2

Earthworms are invertebrate animals that live in the soil. They burrow through the soil, feeding on dead leaves and other organic matter. There are 26 species of earthworm in Britain although only 12 species are commonly found. Earthworms are eaten by a variety of organisms including moles and robins. The robins, in turn are caught and eaten by sparrowhawks.



a) What is an invertebrate? (1)

.....

b) Construct a food web in the space below to show the feeding relationships described in the introduction above. (2)

c) Earthworms do not have lungs or gills. Suggest how gas exchange occurs. (2)

.....
.....

d) The dead leaves and other organic matter that earthworms consume contain starch. Suggest how the starch is digested in the digestive system of the earthworm. (2)

.....
.....
.....

e) Suggest a method that you could use to estimate the number of earthworms living in a field. (3)

.....

.....

.....

.....

.....

.....

f) A scientist carried out such an investigation and collected the following results:

Species of earthworm	Description	Number
grey worm	pale colour	3200
lob worm	dark red colour, thick body	8000
black-headed worm	dark red colour, thin body	6500
blue-grey worm	pale colour, yellow tail	1200

Plot these results in a suitable graph or chart. (4)

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HARROW SCHOOL

ENTRANCE SCHOLARSHIPS EXAMINATION 2013

Wednesday, February 27th, 9.30 a.m. to 10.00 a.m.

CHEMISTRY

Answer ALL questions in the spaces provided.

You may use a calculator if you wish.

1. Crude oil is an essential resource for the world in which we live. Formed over millions of years from the remains of dead sea animals and plants, it is now extracted on an industrial scale around the world from the Earth's crust. It has many diverse uses ranging from plastics to road surfaces.

Chemists describe crude oil as "a mixture of hydrocarbons."

- a. Describe what the term "mixture" means.

_____ [1]

- b. The hydrocarbons that make up crude oil are compounds. Define the term "compound".

_____ [1]

- c. Crude oil is a liquid at room temperature and is most useful when it has been separated into its constituent components. Suggest an experimental technique that could be used to separate crude oil into its components.

_____ [1]

- d. What physical property of the components of crude oil does this separation technique rely on?

_____ [1]

- e. The products collected, following the separation of the crude oil and further processing, have varying numbers of carbon atoms contained within the molecules.

Describe what the term "molecule" means.

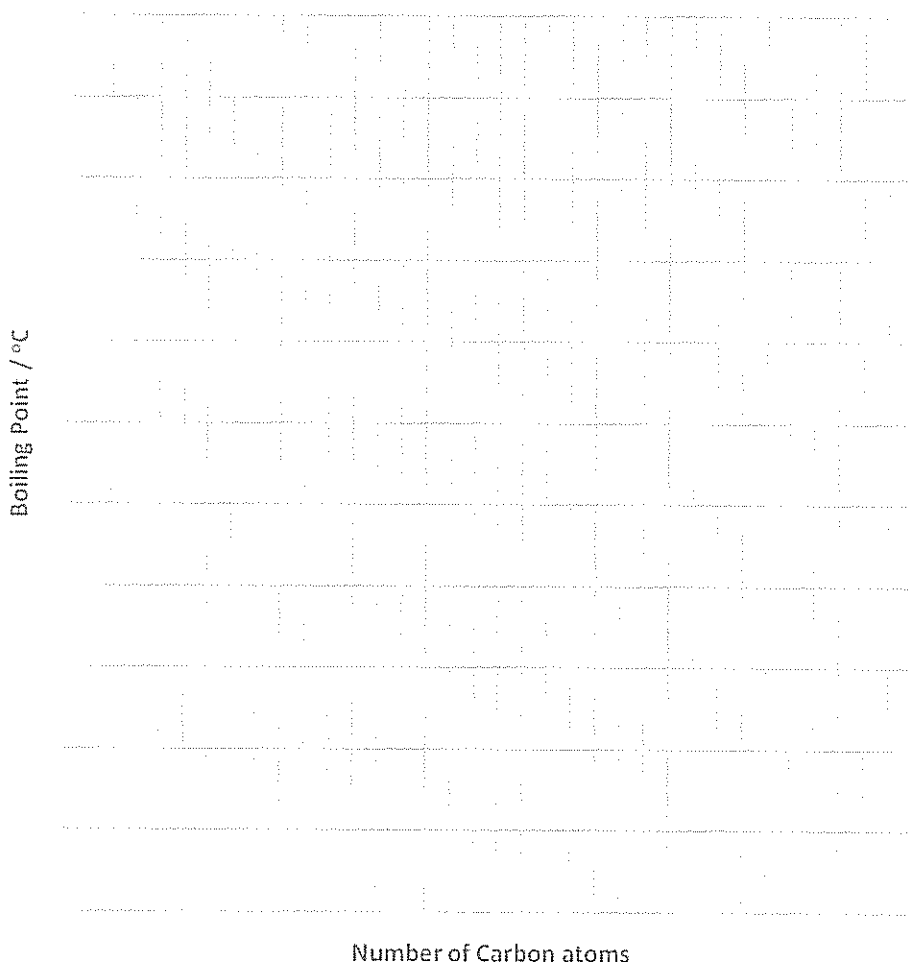
_____ [1]

- f. The table below shows how the boiling point of each of these molecules varies with the number of carbon atoms that they contain.

Product	Boiling point / °C	Number of Carbon atoms
Butane	0	4
Hexane	69	6
Octane	126	8
Decane	174	10
Dodecane	216	12

Using the information contained within the table, plot a graph on the axes below to show how boiling point varies with the number of carbon atoms.

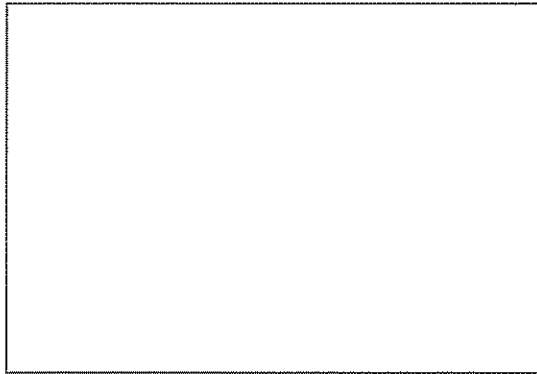
[3]



g. Describe the relationship between the number of carbon atoms and boiling point shown on your graph.

[1]

h. In the box below, draw the arrangement of particles in butane at 25 °C. [1]



2. Crude oil is an example of a fossil fuel. Many of the compounds in crude oil can be burnt and used as fuels.

a. Write a word equation for the complete combustion of methane.

[2]

b. Is this an oxidation or reduction reaction? Explain your answer.

[2]

- c. Describe tests that one could use to identify the products of the combustion reaction above.

[3]

It is well documented that one of the products of the burning of fossil fuels is a greenhouse gas that contributes to global warming. The burning of fossil fuels can also produce particulates.

- d. Suggest the effect that large, black particulates might have on global warming.

Explain your answer fully.

[2]

- e. In dry, non-polluted air oxygen accounts for 21% by volume of the Earth's atmosphere. Complete the table below that describes the overall composition of air.

[1]

Gas	Percentage by volume
Oxygen	21
Nitrogen	
Argon	0.9
Carbon Dioxide	0.04
Other	0.06

f. In a room of dimensions 15 m x 10 m x 3 m, calculate the volume of carbon dioxide present.

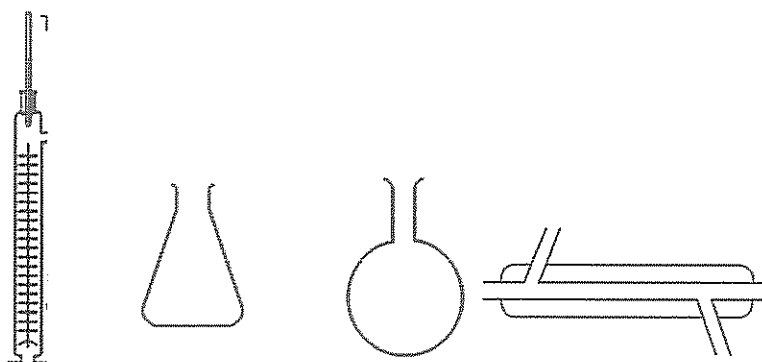
[2]

g. Using this value and the fact that the density of carbon dioxide is approximately 0.002 g/cm^3 , calculate the mass of carbon dioxide within the room.

[2]

3. Global warming is causing an increase in the mean temperature of the Earth's atmosphere. This increase is allowing many businesses to now produce wine in the UK. Many people believe the best conditions in which to grow grapes from which to produce wine, is a warm climate with plenty of sun and chalky soils.
- a. Like crude oil, wine is a mixture, mainly of alcohol and water. Using the apparatus shown below, construct an experimental set-up that would allow wine to be separated into its components. Label the reactants and products in the appropriate places they would be found, and name as much apparatus as possible.

[3]



4. Copper sulphate is a blue compound of copper. It is soluble in water and forms a blue solution. Some zinc was added to the copper sulphate solution.

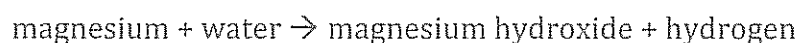
a. Describe what you would expect to observe.

[2]

b. What does this suggest about the reactivity of zinc compared to copper?

[1]

5. Magnesium reacts with water. The word equation for this reaction is given below:



This reaction was carried out in the laboratory. 25 cm³ of water was added to a 100cm³ beaker and then weighed. The mass of the magnesium strip used was also recorded. The total mass of the beaker, water and magnesium was 32.4 g. Following the reaction of the magnesium with the water, the mass of the beaker containing the resulting solution was recorded as 29.9 g.

a. Explain why the mass of the system decreased.

[1]

b. After the reaction, universal indicator was added to the resulting solution.

Suggest what colour the solution turned and estimate its pH.

[2]

c. Suggest a medical use for magnesium hydroxide and name the type of reaction occurring that makes it useful.

[2]

Total Marks = 35

NAME: _____



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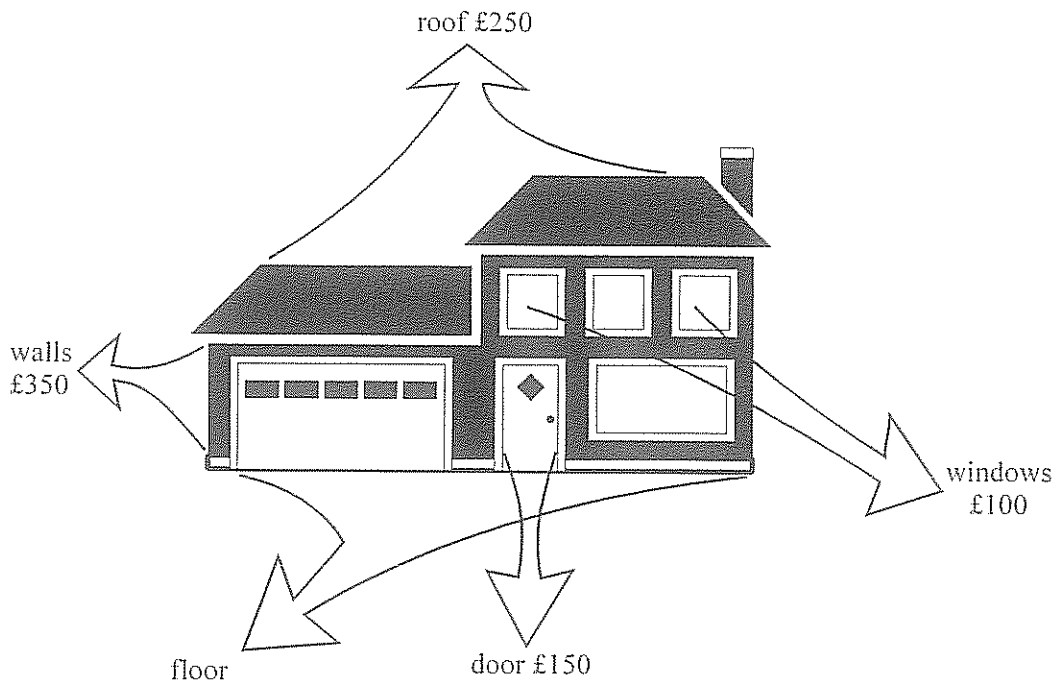
Wednesday, February 27th, 10.00 a.m. to 10.30 a.m.

PHYSICS

Answer ALL questions in the spaces provided. All working must be shown.

You may use a calculator if you wish.

1. The diagram below shows a house which has **not** been insulated. The cost of the energy lost from different parts of the house during one year is shown on the diagram.



- (a) The total cost of the energy lost during one year is £1000.

(i) What is the cost of the energy lost through the floor?

.....

(2)

(ii) Suggest one way of reducing this loss.

.....

(1)

- (b) The table below shows how some parts of the house may be insulated to reduce energy losses. The cost of each method of insulation is also given.

WHERE LOST	COST OF ENERGY LOST PER YEAR (£)	METHOD OF INSULATION	COST OF INSULATION (£)
roof	250	fibre-glass in loft	300
walls	350	foam filled cavity	800
windows	100	double glazing	4500
doors	150	draught proofing	5

(i) Which method of insulation would you install first? Explain why.

.....
.....
.....
.....

(3)

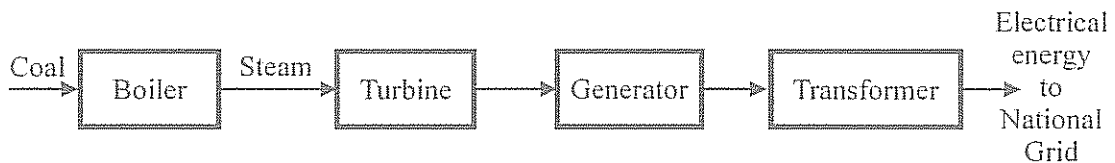
(ii) Which method of insulation would you install last? Explain why.

.....
.....
.....
.....

(3)

(Total 9 marks)

2. The diagram below shows four stages in the production of electricity by a coal-fired power station.



(a) (i) Write down **two** environmental problems which are caused by burning coal to generate electricity.

1

.....
.....
.....

2

.....
.....
.....

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Physics

(ii) How may these environmental problems be reduced?

1

.....
.....
.....

2

.....
.....
.....

(4)

(b) Some data for Didcot coal-fired power station is given below.

Number of generators	4
Maximum continuous power rating of a generator	500 MW
Energy content of coal used per tonne	2.66×10^{10} J
Total quantity of coal used each day	18 289 tonnes

Use the given data to calculate:

(i) the total electrical energy output each day.

(HINT: $1 \text{ MW} = 1 \times 10^6 \text{ J / s}$ (joules per second))

.....
.....
.....
.....

AnswerJ/day

(ii) the total input of coal energy each day.

.....
.....
.....

AnswerJ/day

(iii) the efficiency of the power station.

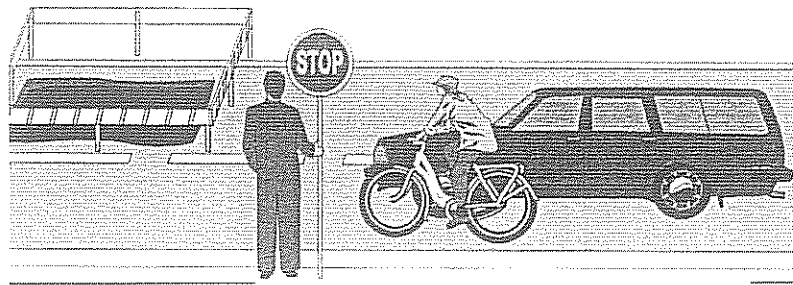
(HINT: efficiency = $\frac{\text{useful output energy}}{\text{total input energy}}$ expressed as a percentage)

.....

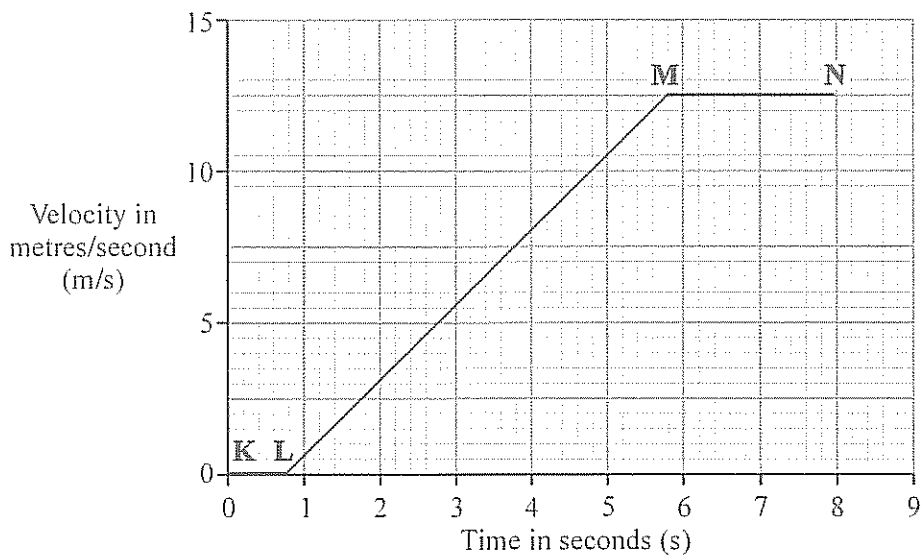
Answer %

(8)
(Total 12 marks)

3. A car and a bicycle are travelling along a straight road. They have stopped at road works.



The graph shows how the velocity of the car changes after the sign is changed to GO.



(a) Between which two points on the graph is the car moving at constant velocity?

.....

(1)

(b) Between which two points on the graph is the car accelerating?

..... (1)

(c) Between the sign changing to GO and the car starting to move, there is a time delay. This is called the reaction time.

(i) What is the reaction time of the car driver?

Reaction time = seconds (1)

(ii) Which **one** of the following could increase the reaction time of a car driver? Tick the box next to your choice.

- | | |
|------------------|--------------------------|
| Drinking alcohol | <input type="checkbox"/> |
| Wet roads | <input type="checkbox"/> |
| Worn car brakes | <input type="checkbox"/> |

(1)

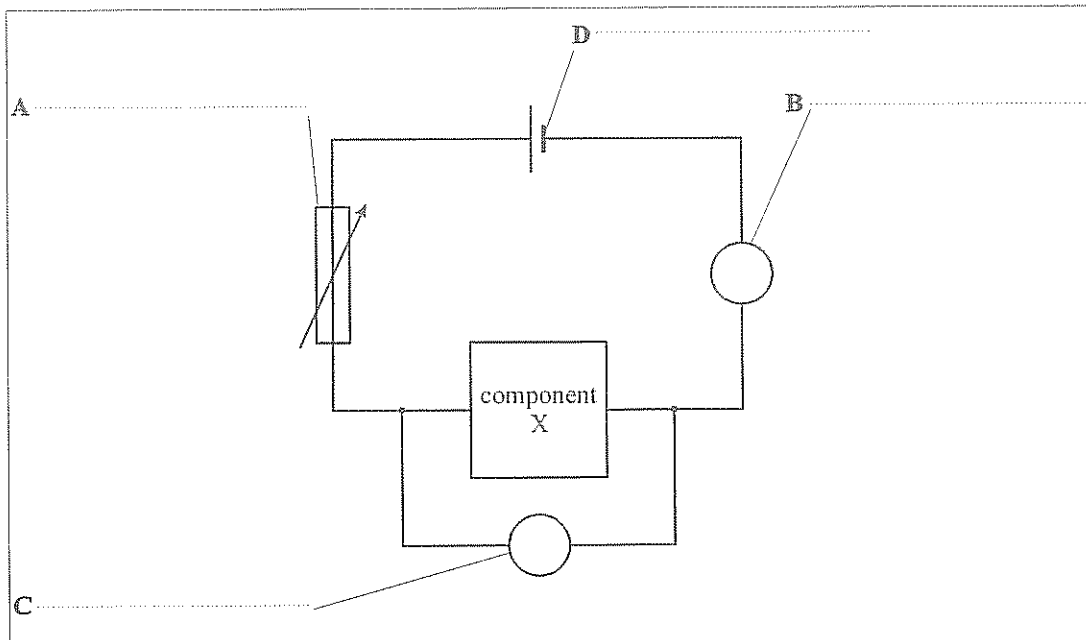
(d) The cyclist starts to move at the same time as the car. For the first 2 seconds the cyclist's acceleration is constant and is greater than that of the car.

Draw a line on the graph to show how the velocity of the cyclist might change during the first 2 seconds of its motion.

(2)

(Total 6 marks)

4. A student investigated how the current flowing through component X changes with the voltage across it.
The diagram shows the circuit used.



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Physics

- (a) On the diagram, use words or phrases from the list to label parts **A**, **B**, **C** and **D**.

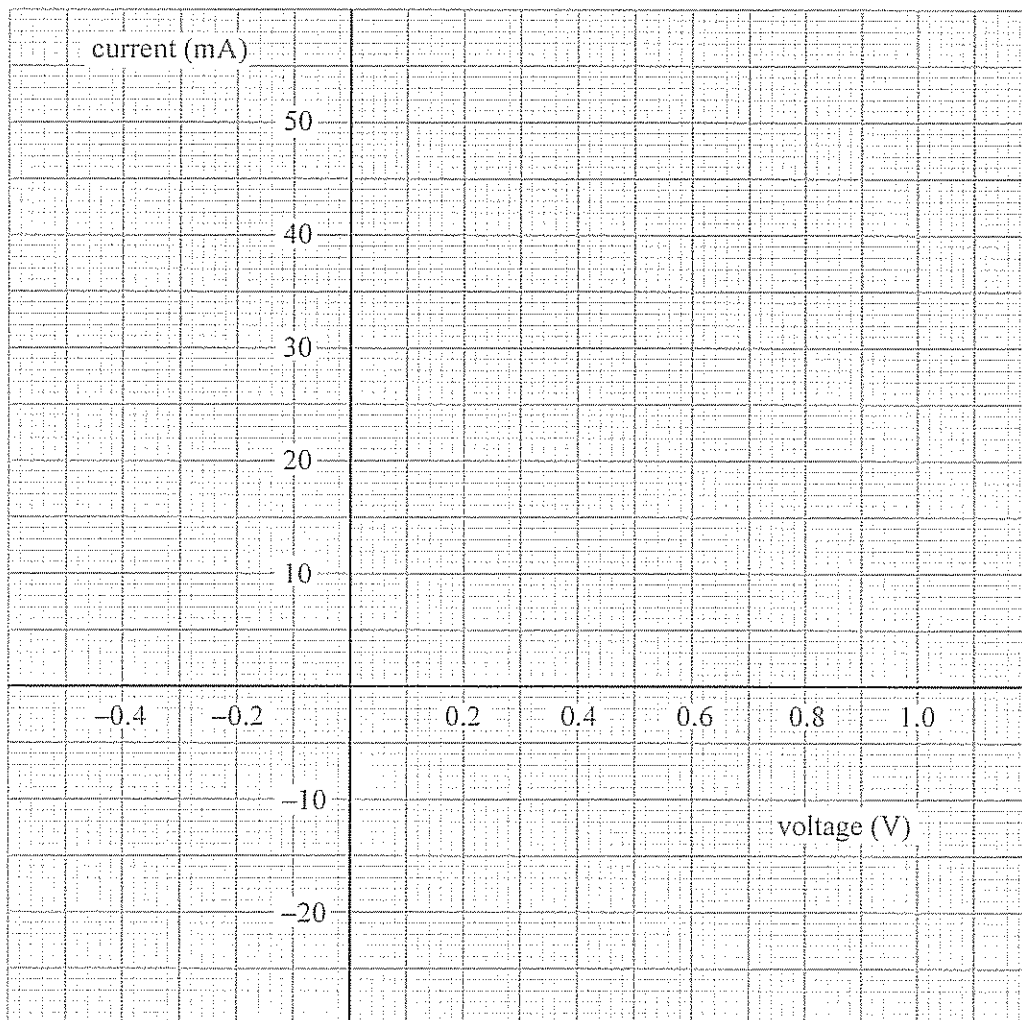
ammeter cell switch variable resistor voltmeter

(4)

- (b) The table shows the results obtained for component **X**.

VOLTAGE (V)	-0.4	-0.2	0.0	0.2	0.4	0.5	0.6	0.8	1.0
CURRENT (mA)	0	0	0	0	1	4	10	30	50

- (i) Draw a graph of current against voltage.



(3)

- (ii) Name component **X**

.....

(1)

(Total 8 marks)



HARROW SCHOOL

ENTRANCE SCHOLARSHIPS EXAMINATION 2013

Monday, February 25th, 4.30 p.m. to 6.15 p.m.

ENGLISH

ONE HOUR AND FORTY-FIVE MINUTES

GENERAL INSTRUCTIONS

*You should attempt both SECTIONS.
You are advised to spend 60 minutes on Section A (15 minutes reading and making notes and 45 minutes writing) and 45 minutes on Section B.*

SECTION A: Reading, comprehension and commentary – 60 minutes, 50 marks

Read the following poem by Seamus Heaney (you will want to read it more than once) and then answer the questions that follow.

Churning Day

A thick crust, coarse-grained as limestone rough-cast,
hardened gradually on top of the four crocks
that stood, large pottery bombs, in the small pantry.
After the hot brewery of gland, cud and udder,
cool porous earthenware fermented the butter milk 5
for churning day, when the hooped churn was scoured
with plumping kettles and the busy scrubber
echoed daintily on the seasoned wood.
It stood then, purified, on the flagged kitchen floor.

Out came the four crocks, spilled their heavy lip 10
of cream, their white insides, into the sterile churn.
The staff, like a great whiskey muddler fashioned
in deal wood, was plunged in, the lid fitted.
My mother took first turn, set up rhythms
that, slugged and thumped for hours. Arms ached. 15
Hands blistered. Cheeks and clothes were spattered
with flabby milk.

Where finally gold flecks
began to dance. They poured hot water then,
sterilized a birchwood bowl
and little corrugated butter-spades. 20
Their short stroke quickened, suddenly
a yellow curd was weighting the churned-up white,
heavy and rich, coagulated sunlight
that they fished, dripping, in a wide tin strainer,
heaped up like gilded gravel in the bowl. 25

The house would stink long after churning day,
acid as a sulphur mine. The empty crocks
were ranged along the wall again, the butter
in soft printed slabs was piled on pantry shelves.
And in the house we moved with gravid ease, 30
our brains turned crystals full of clean deal churns,
the plash and gurgle of the sour-breathed milk,
the pat and slap of small spades on wet lumps.

Glossary

Crock – earthenware pot

Cud – food that a ruminant (e.g. a cow) brings back from its first stomach into its mouth to chew at its leisure

Churning – the act of agitating and mixing milk until butter forms

Scrubber – scrubbing brush

Seasoned – hardened, long-used wood

Flagged – a stone floor, made of flagstones

Churn – the wooden tub hooped in iron in which the milk is churned into butter

Staff – the paddle used to mix the milk, at this time worked by hand

Whiskey muddler – a large paddle-shaped object used to help whiskey ferment

Corrugated – ridged to better hold and mould the pats of butter

Curd – coagulated by-product of the butter making process formed by the action of acids on milk

Strainer – to separate the butter from the milk remains

Gravid – slow and heavy, as though pregnant

1. In the rural Irish community in which Heaney grew up in the 1940s, churning butter was a commonplace and routine activity. In what ways does Heaney make his description of this childhood memory so vivid and engaging for the modern reader? Please use examples from the poem to support your views.

(10 points)

2. How does Heaney use sound, pace and rhythm to good effect in this poem? Pick out several examples and discuss them in some detail.

(10 points)

3. What do you think is most interesting about the third stanza (which begins, 'Where finally gold flecks'...)?

(10 points)

4. We often associate poetry with beautiful language and images. How does Heaney successfully use less-than-beautiful and unromantic language and imagery in this poem and what is its effect within the poem as a whole?

(10 points)

5. Overall, what do you find most interesting or effective about this poem?

(10 points)

NOW START A NEW PIECE OF PAPER

SECTION B: Composition – 45 minutes, 50 marks.

Choose **one** of the following titles or themes for a composition. You may choose to write a piece of description, a story, a discussion or a poem. Spend some time planning before you start to write.

EITHER:

- OR:** *A Strange Place*
- OR:** *'Some do and some do not'*
- OR:** *The Imagination*
- OR:** *The Problem with Cars*
- OR:** *The Unexpected*
- OR:** *'All that glitters is not gold'*



H A R R O W
S C H O O L

SCHOLARSHIP ENTRANCE EXAMINATION

FRENCH

Tuesday 28th February 2012

15:45 – 16:45

GENERAL INSTRUCTIONS:

*You should start a new sheet of paper for each exercise.
Please write all of your answers ON ALTERNATE LINES.*

The marks are shown at the end of each exercise. Use your time accordingly.

1. Translate into English. You should write ON ALTERNATE LINES.

Cet été, Martine et sa maman vont passer leurs vacances à l'étranger.

Sur les murs de l'agence de voyages, il y avait des affiches touristiques avec des avions, des bateaux et de jolis paysages.

- Que désirez-vous ? a demandé l'employée.
- Nous voudrions aller en Italie.
- Eh bien, prenez l'avion. C'est tellement agréable ! En quelques heures vous serez arrivées.
- C'est une excellente idée !

Comme il restait encore quelques places dans le prochain avion, la maman de Martine s'est décidée tout de suite. Elle a réservé les billets pour le voyage et les chambres à l'hôtel.

À l'aéroport, un tapis roulant a emporté leurs valises et les haut-parleurs ont annoncé les départs pour toutes les grandes villes du monde. Il restait encore vingt minutes pour aller faire un tour sur la terrasse. On voyait les valises s'empiler dans la soute aux bagages et la mise en place de la passerelle qui conduisait à la cabine. Puis, l'avion était enfin prêt pour le départ.

- J'espère que tu feras un bon voyage, dit l'hôtesse de l'air en souriant à Martine.

C'était le moment de monter à bord et une porte s'est ouverte sous la queue de l'appareil. Les voyageurs ont pris place dans l'avion et l'avion a roulé sur le tarmac. Il a pris de la vitesse et l'avion a décollé. Le voyage de Martine ne venait que de commencer.

(30 marks)

*PLEASE START ANOTHER SHEET OF PAPER AND WRITE ON
ALTERNATE LINES*

2. Translate the following sentences into French:

- a) I am called Alice
- b) We eat the meat
- c) The children write a letter
- d) She was buying sweets
- e) The teacher used to sing
- f) I was writing my name
- g) She went to the shops
- h) The shower does not work
- i) We have seen the book
- j) I had wanted to try
- k) He had put on his shoes
- l) We are going to cry
- m) She will work a lot
- n) It is going to rain tomorrow
- o) The girls will be intelligent

(30 marks)

PLEASE START ANOTHER SHEET OF PAPER AND WRITE ON ALTERNATE LINES

3. You recently saw a fantastic film at the cinema. Write an article for your school magazine to encourage others to watch it.

You should include details about:

- *When* you went to the cinema
- *Where* the cinema was
- *Who* went with you to the cinema

- The main plot / story line of the film

- Why you enjoyed it so much

(40 marks)

The account may be true or imaginary.

No credit will be given for pre-learnt but irrelevant material.

You should write using any tenses you consider appropriate. When you have finished, you should CHECK YOUR WORK VERY CAREFULLY, looking especially at verb forms, genders, adjectives and spelling.

Please do not write more than 150 words. You should concentrate on accuracy (and quality rather than quantity).



HARROW SCHOOL

ENTRANCE SCHOLARSHIP EXAMINATION 2013

GEOGRAPHY

February, 2013

Duration: 1 hour 30 minutes

*Questions **one** and **two** are compulsory and must be answered.
Answer **one** essay title from question three.*

An O.S. map extract is included with this examination.

QUESTION 1

Answer ALL of Question 1
[Spend 25 minutes on this section]

Use the OS map extract of Scarborough and the surrounding area and the map key provided to answer the following questions.

- 1 (a) (i) What is the four figure grid reference of the bus station in Scarborough?
[1]
- (ii) What is located at grid reference 026903?
[1]
- (iii) What place of worship is located at 037876?
[1]
- 1 (b) (i) What is the six figure grid reference of the rail station in Seamer?
[1]
- (ii) If you were to travel by train from Seamer rail station to the rail station in Scarborough, in grid square 0388, what distance would you have travelled?
[2]
- 1 (c) Locate the viewpoint 039869.
- (i) Using map evidence, explain why the viewpoint was located here.
[2]
- (ii) How many metres lower is The Mere, in grid square 0386, than this viewpoint?
[1]
- 1 (d) Locate the 'park and ride' in grid square 0387.
- (i) What is the straight line distance from the park and ride to Scarborough's Town Hall, located in grid square 0488?
[2]
- (ii) What benefits does the park and ride scheme bring to the centre of Scarborough?
[3]
- 1 (e) What evidence is there that Scarborough might be an attractive location for tourists?
[6]

[Total: 20 marks]

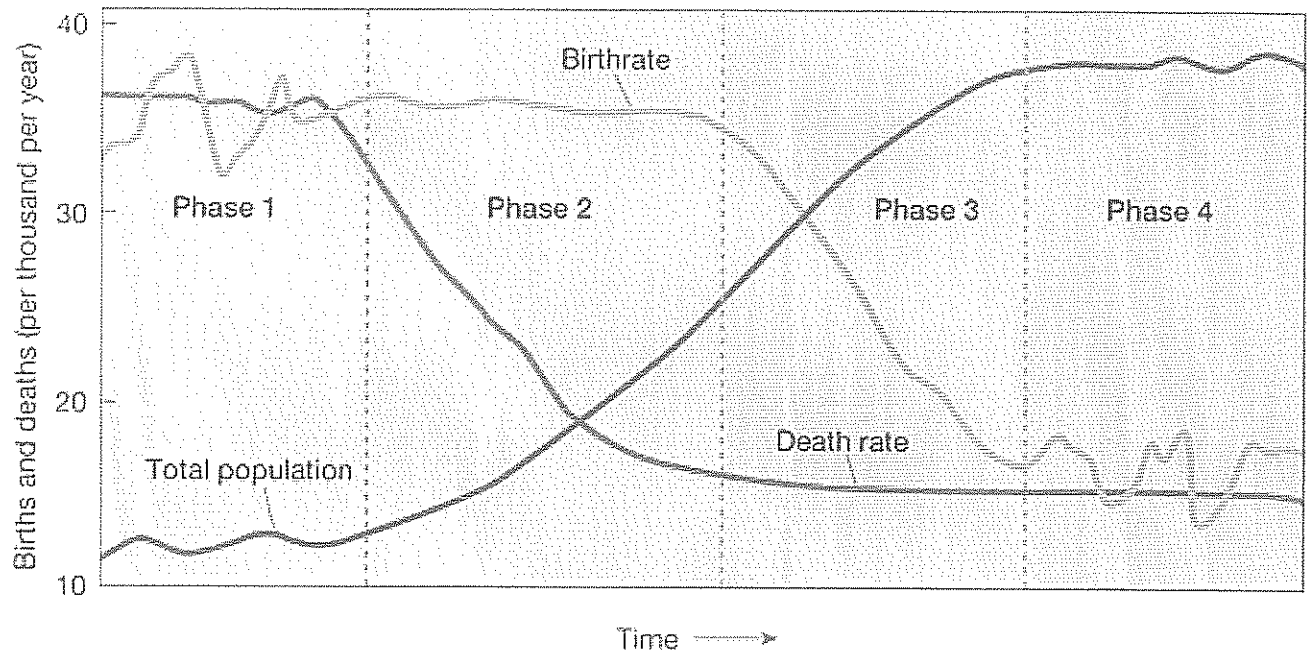
END OF QUESTION 1

QUESTION 2

Answer ALL of Question 2
[Spend 30 minutes on this section]

Study **Figure 2** below showing the demographic transition model which shows changes in birth rate, death rate and total population for a country over time.

Figure 2



2 (a) (i) Describe the changing pattern of death rate over time.

[4]

2 (a) (ii) Explain why a country's death rate may decrease over time.

[6]

2 (b) (i) Natural increase in population occurs when the birth rate is higher than the death rate. During which phase of the demographic transition model is natural increase at its highest?

[1]

2 (b) (ii) Many of the poorer countries of the world are currently in phase 2 of the demographic transition model. Why might birth rates remain high in the poorer countries of the world?

[4]

2 (c) Study **Figure 3** below showing a news headline from the BBC website.

Figure 3



The image shows a screenshot of a BBC News article. At the top left is the BBC NEWS logo. Below it is the date '1 October 2012'. The main headline is 'UN warns over impact of rapidly ageing populations'. Below the headline is a short paragraph: 'The world needs to do more to prepare for the impact of a rapidly ageing population, the UN has warned - particularly in developing countries.' Below that is another paragraph: 'Within 10 years the number of people aged over 60 will pass one billion, a report by the UN Population Fund said.'

2 (c) Some richer countries of the world, such as Japan and Italy, have ageing populations. This means that the proportion of the population aged 65+ years old is growing at a greater rate than children are being born.

What are the potential impacts for a country of an ageing population? Consider both social and economic impacts. [5]

[Total: 20 marks]

END OF QUESTION 2

QUESTION 3

[Spend 35 minutes on this section]

Answer any one of the following essay questions and in each case refer to specific examples, places and processes.

Credit will be given for the use of named and located examples and the use of well-labelled sketch maps and diagrams where appropriate.

EITHER

1. How important is water in creating **different** natural environments or landscapes? [20]

OR

2. Why is fieldwork important in the study of Geography? [20]

OR

3. 'We can predict hurricanes, but we cannot predict earthquakes.' To what extent does this mean that earthquakes pose a greater hazard than hurricanes? [20]

OR

4. More than half of the world's population now live in cities. What opportunities and problems does this create? [20]

OR

5. 'Sustainable development is the only way the planet can solve its environmental and economic problems.' Discuss with reference to specific examples, places and processes. [20]

[Total: 20 marks]

[Exam Total: 60 marks]

END OF EXAMINATION



HARROW SCHOOL

ENTRANCE SCHOLARSHIPS EXAMINATION 2013

date & time

GREEK

GENERAL INSTRUCTIONS:

Before you begin, state at the top of your answer sheet how long you have been studying Greek and for how many lessons per week.

Answer as many questions as you can. Use the whole paper for help with vocabulary.

Write your answers on A4 paper

NB. New words in this paper are only given in footnotes the first time they appear.

You should make an intelligent guess at words you do not know.

SECTION A (65 marks)

1 Identify the following characters; some are real, some are fictional.

- (a) Perseuj
- (b) Nikolaj Kleg
- (c) 'Rijnna
- (d) Priam
- (e) Brutoj

[5]

2 Transliterate the following (i.e. write them in Greek letters). Long vowels are indicated with a macron (e.g. 'ē' or 'ō'). Remember to add breathings where appropriate:

- (a) idea
- (b) critic
- (c) plastic
- (d) myth
- (e) Rēmus
- (f) Sparta
- (g) Hectōr

[7]

3 Imagine that each letter of the Greek alphabet is represented by a number (a = 1, b = 2, etc.). Write down in Greek and translate the words represented by the following number sequences. Remember to add breathings where appropriate:

- (a) 1 - 3 - 15 - 17 - 1
- (b) 4 - 15 - 20 - 11 - 15 - 18
- (c) 6 - 24 - 1 - 8 - 15 - 18
9
- (d) 8 - 20 - 15 - 12 - 5 - 13

[8]

4 Translate into English:

- (a) ta dwra ἄν τῷ γῶ ἴσθιν. [4]
- (b) ta tw̄n polemīwn zJa megala ἴσθιν. [5]
- (c) of 'Aqhnaioi φ̄ndreioteroi e,si tw̄n barbarwn. [5]
- (d) of summacoi dia thj cwraj pasan thn ἴmeran ἴstrateuon. [6]

[20]

5 Change the following nouns from plural to singular, keeping the same case. Write out the Greek form and give the basic meaning of each word.

Example: touj khrukaj = ton khruka (= messenger)

(a) twn "pistolwn

(b) of 'gemonej

(c) twn biblwn

[6]

6 What do the following words literally mean (i.e. based on the Greek words from which they are derived)?

(a) democracy

(b) hippopotamus

(c) geography

(d) telephone

(e) paediatrician

[10]

7 Write out any THREE of the following:

(a) The strong aorist active of lambanw.

(b) to ødwr in all its cases (singular & plural).

(c) Ø krithj in all its cases (singular & plural).

(d) The Definite Article in all genders and cases (singular & plural). [9]

BONUS QUESTION:

Have a go at translating the following passage of modern Greek, bearing in mind that modern Greek has no 'j', or 'h' and that their 'b' sounds like our 'v', meaning they have to find another way of creating a 'b' sound. Also, the breathings are missing!

TZ.R.R. TOLKIN

O Compit

O Compit einai h istoria tou Mpilmpo Mpagkinj

[2]

SECTION B (10 marks)

Translate into Greek:

(a) Wait here, sons!

[3]

(b) War is evil.

[3]

(c) The slaves hid the money.

[4]

[10]

SECTION C (25 marks)

Translate the passage into good English. Write your translation on alternate lines. Remember, unfamiliar words are only underlined the first time they are used. You are strongly advised to write a translation in rough, and not to write out your neat copy translation until you have considered the whole story. Some of the **names** in this story are mentioned in the description below the title (see below), and you should use the English description of the story to help you work out the Greek.

The Greeks prepare to defend themselves at Thermopylae

In 480BC the Persian King Xerxes launched a massive invasion of Greece. The leaders of the Greek cities met at Corinth to discuss the best way of defending themselves, and decided that Thermopylae was the best place to mount a defence. This passage explains the reasons for this choice.

Ἰππεὶ δὲ Ξερξῆς, βασιλεὺς ἄνω τῶν Περσῶν, τὸν στόλον¹ παρεσκευάζεν, ἴσμεν δὲ ἴσμεν² πᾶσαν τὴν Ἑλλάδα καταστρεφόμεναι,³ ὅτι τῶν Ἑλλήνων⁴ στρατηγοὶ ἦλθον εἰς τὴν Κορινθὸν καὶ σκοπεύουσιν⁵ τὸν πορθῶσιν.

πολλοὺς δὲ χρόνον ἔπειτα⁶ μετὰ τὸν πόλεμον εἰς τὸν Ξερξῆς ἦν πᾶσι τοῖς Ἑλλησίν, καὶ πλεονεξία.

τελευτῶν⁷ δὲ τῶν ἀποστόλων τῶν βαρβάρων ἐμνησθῆναι⁸ ἴσμεν τὰς Θερμοπύλας: ἴσμεν γὰρ τὰ Ἰσθμῶν⁹ οὕτως¹⁰ προσκειταὶ¹¹ τῷ στενῷ¹² δὲ στρατοῦ Ἰσθμῶν¹³ τοῦ μακροῦς ὁδοῦ οἰκιστῶν. καὶ καταστενῶν ὅτι πορθῶσιν¹⁴ ἴσμεν. ἀφ' οὗ τῶν Περσῶν νῆες οὕτως οἰκιστῶν τῶν τε Ξερξῶν καὶ τῶν ἀποστόλων βοηθῶν.¹⁵

μαχητῶν οὗ τῶν Ἑλλήνων ἐπὶ¹⁶ δὲ Ξερξῆς ἔσθ' ὁ πόλεμος τῶν Ἑλλήνων στρατευομένων, τὸν Λεωνίδα¹⁷ ἴσμεν, βασιλεὺς Ἰσθμῶν τῶν Λακεδαιμονίων,¹⁸ μετὰ ἑπτακίσιον¹⁹ ἐπιπέτα.²⁰

οὗτοι δὲ βοηθῶν εἰς τὰς Θερμοπύλας παρεσκευάζοντο ἐμνησθῆναι τοῖς βαρβάρων τῶν Ἑλλήνων.

¹ στόλος-ου (m) = expedition

² ἴσμεν ἴσμεν = I intend, have it in mind

³ καταστρεφόμεναι = I subdue

⁴ Ἑλλησίν -ων = Greeks (a related, but different, proper name occurs twice in this passage – take care!)

⁵ σκοπεῖν = I ponder, consider

⁶ ἔπειτα = I am at a loss

⁷ τελευτῶν (adverb) = at last

⁸ ἐμνησθῆναι = I ward (something – accusative) off from (something – dative)

⁹ Ἰσθμῶν, Ἰσθμῶν (m) = mountain

¹⁰ οὕτως = in such a way

¹¹ προσκειταὶ = I lie close to (+ dative)

¹² ἔσθ' = that, with the result that (introducing a result clause)

¹³ πορθῶσιν, πορθῶσιν = strait, channel

¹⁴ στενῶν-ων = narrow

¹⁵ βοηθῶν = I bring help (to) (+ dative)

¹⁶ ἐπὶ = (here means:) that

¹⁷ Λεωνίδα, Λεωνίδης (m) = Leonidas (a Spartan)

¹⁸ Λακεδαιμόνιοι, Λακεδαιμονίων (m.pl) = Spartans

¹⁹ ἑπτακίσιον = 7,000

²⁰ ἐπιπέτα, ἐπιπέτου (m) = heavy-armed soldier (plural: heavy-armed troops)

HARROW SCHOOL

ENTRANCE SCHOLARSHIPS EXAMINATION

2013

1 ½ hours

HISTORY

There are three sections.

You are advised to spend approximately 30 minutes on each.

The quality of your answers is more important than the quantity, so spend 5-10 minutes thinking and 20-25 minutes writing for each section.

Each section is worth 30 marks in total.

SECTION A

In the years after the Second World War (1939-45) most of eastern Europe fell under the influence of the Soviet Union, a communist state ruled since 1928 by the ruthless dictator Josef Stalin, which kept a military presence in the eastern European countries it had liberated from German occupation. By 1948 Poland, Romania, Bulgaria, East Germany, Czechoslovakia and Hungary all had governments controlled or dominated by communist politicians who took their orders from the Soviet government in Moscow. By the end of the 1940s the wartime alliance between the Soviet Union and the capitalist and democratic USA had broken down, and relations between the two countries were so bad that they were described as a 'cold war'. Two military alliances had emerged: the USA and her western allies (including Britain) formed NATO (the North Atlantic Treaty Organisation), while the Soviet Union led an alliance of eastern European countries known as the Warsaw Pact. However, when Stalin died in 1953, he was succeeded by the seemingly more moderate Nikita Khrushchev, and people in eastern Europe hoped for greater freedom. In Hungary in 1956 Moscow allowed the communist leader Ernő Gerő to be replaced as Prime Minister by the well-respected Imre Nagy. Nagy planned to introduce reforms, such as holding free elections, introducing greater freedom of speech, creating impartial courts, getting the Soviet army entirely out of Hungary, leaving the Warsaw Pact and declaring Hungary a neutral country. He hoped that the new US President, Dwight Eisenhower, would support a new independent Hungary. However, while Khrushchev was ready to accept some of the reforms, he would not allow Hungary to leave the Warsaw Pact. In November 1956 Khrushchev sent thousands of Soviet troops and tanks into Budapest, the capital of Hungary, and after two weeks of bitter fighting, the Hungarian uprising was crushed. About 3000 Hungarians and 7000 Russians were dead; 200,000 Hungarians fled into Austria to escape Communist forces. The USA and other western powers protested to the USSR, but took no action. At the same time as events in Hungary were becoming violent, the eyes of the world turned to the Middle East, where Britain, France and Israel had launched an unsuccessful invasion of Egypt in order to regain control of the Suez Canal, a vital link between the Mediterranean and the Red Sea.

Study the two sources and then answer this question

- (1) How useful are these two sources to a historian studying the Hungarian uprising of 1956? Think both what they say (or don't say) and how reliable they are.

[30 marks]

Source A: The text of a telegram from the Hungarian Prime Minister Imre Nagy to the United Nations in New York, 1 October 1956.

UNITED NATIONS NEW YORK ARE YOU THERE ?

THE HUNGARIAN GOVERNMENT HAS WITHDRAWN IMMEDIATELY

FROM THE WARSAW TREATY AND DECLARED HUNGARY

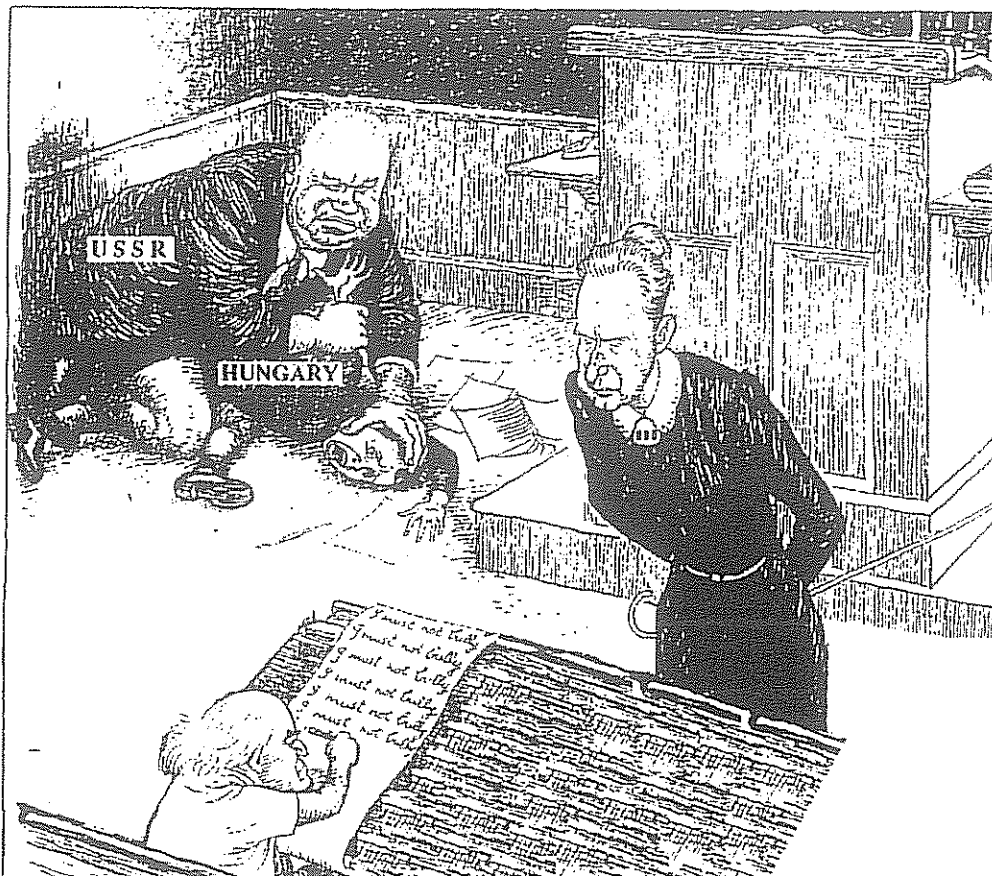
A NEUTRAL COUNTRY.

WE TURN TO THE UNITED NATIONS AND ASK THE HELP

OF THE GREAT POWERS IN DEFENDING OUR NEUTRALITY

IMRE NAGY

Source B: A cartoon from a British magazine, published in 1956. The teacher represents the United Nations and the figure writing lines ('I must not bully') represents Israel.



SECTION B

Answer **ONE** of these questions. Each question is worth 30 marks.

Either

(2) 'The people are usually more important than the leaders.' How far do you agree with this judgement? Use any period or periods of History you have studied to answer this question.

or

(3) How important is luck as an explanation for historical events? Use any period or periods of History you have studied to answer this question.

SECTION C

(4) Read the background information below on King Richard III, and then answer the question at the end.

Richard III was king of England from 1483 until his death in 1485, aged 32. When his brother Edward IV died in April 1483, Richard was named Lord Protector of the realm for Edward's son and successor, the 12-year-old King Edward V. As the young Edward travelled to London, Richard met and escorted him to lodgings in the Tower of London, where Edward's younger brother joined him. Arrangements were made for Edward V's coronation on 22 June, but before the young king could be crowned, his father's marriage to his mother was declared invalid, making their children illegitimate and therefore ineligible for the throne. Richard was declared king instead and was crowned on 6 July 1483. The young princes were not seen in public after August and a number of accusations circulated that the boys had been murdered by Richard. In August 1485 a rebellion against Richard was led by Henry Tudor, who landed in Pembrokeshire on the Welsh coast with a small contingent of French troops, and marched through Wales, recruiting soldiers on the way. On 22 August 1485 at the Battle of Bosworth Field in Leicestershire Richard III was killed and Henry Tudor now became King Henry VII. Richard was the last king of the House of York, the last king of the Plantagenet dynasty and the last king to die in battle. After his death, his image was tarnished by propaganda fostered by his Tudor successors who sought to legitimise their claim to the throne, culminating in the famous portrayal of him in Shakespeare's play *Richard III* as a hunchbacked wicked villain, who murdered the princes in the Tower. Richard's remains received only a hurried battlefield burial and were lost for more than five centuries. However, in 2012 an archaeological excavation was conducted on a car park in Leicester, where a human skeleton was uncovered with a severe curvature of the spine which would have resulted in the right shoulder being higher than the left. Scientific analysis by the University of Leicester showed that the man had probably been killed either by a blow from a large bladed weapon which cut off the back of his skull, or by a sword thrust which penetrated his brain. There were signs of other wounds on the body which had probably been inflicted as 'humiliation injuries' on a corpse that had been stripped of its armour. The bones matched Richard's age when he died, were dated to approximately the period of his death and were mostly consistent with physical descriptions of him. DNA analysis also showed that mitochondrial DNA extracted from the bones matched that of descendants of Richard's sister. Therefore, the University of Leicester announced on 4 February 2013 (the day this scholarship paper was set) that the skeleton had been positively identified as that of Richard III. The bones will eventually be reburied in Leicester Cathedral.

Here's your question: How significant is this discovery by Leicester University?



HARROW SCHOOL

ENTRANCE SCHOLARSHIPS EXAMINATION 2013

date & time

LATIN

GENERAL INSTRUCTIONS:

You must attempt questions one (30 marks), two (30 marks), three (25 marks), which all cover the same story, split into three passages.

You must then do either question four (harder passages of Latin on the same story) or question five (English to Latin sentences).

If you have time, you may attempt both questions four and five. If you do this, the higher mark will be counted, but a strong performance on both optional questions will be taken into consideration.

You are not permitted to write anything down for the first 10 minutes of the examination. This time should be spent reading the examination paper.

It will help if you study the Latin passages and the English introduction to each passage during the first 10 minutes. You are also advised to read all the footnotes carefully, as they contain helpful information.

New words in this paper are only given in footnotes the first time they appear. You should make an intelligent guess at words you do not know, using any hints in the footnotes or in the English introduction to each passage.

Question One

Please note that the Latin passages in Questions 1-3 form a continuous story.

Read the following passage and answer the questions on the facing page.

Echo & Narcissus (1) : The fate of Narcissus is prophesied; Echo falls in love.

This story was originally told by the Roman poet Ovid in his poem the Metamorphoses in which he tells many stories from Greek and Roman mythology.

1 Liriopei¹ Cephisoque² est natus³ filius pulcherrimus, nomine Narcissus. dum infans est,
2 parentes eum Tiresiae⁴ ostenderunt ut fatum eius cognoscerent. cum de vita⁵ pueri
3 rogavissent, vates⁶ dixit eum senectutem⁷ uberrimam⁸ visurum esse;⁹ 'necesse tamen
4 est,' inquit, 'ne¹⁰ puer unquam se cognoscat aut etiam videat. Tiresia locuto, parentes
5 abierunt laeti quod putabant filium nihil detrimenti¹¹ accepturum esse.
6 olim Narcisso, iam sedecim annos natus, feras¹² in silvis petenti, occurrit nympa
7 quaedam, nomine Echo.
8 haec puella, quae Iunonem¹³ antea fefellerat,¹⁴ nunc usum brevissimum vocis
9 habebat. nam Iuno irata eam puniverat, dicens: 'lingua tua non dices, sed modo¹⁵
10 ultima verba audita reportabis!
11 Echo, ubi Narcissum per silvas ruentem vidit, incaluit;¹⁶ vestigia¹⁷ furtim sequitur;
12 iuveni appropinquare vult.

¹ Liriope, Liriopis (f) = Liriope, a river nymph

² Cephisus, Cephisi (m) = Cephisus, a river god

³ nascor, nasci, natus sum (deponent verb) = I am born (*natus-a-um* x *annos* = 'x years old')

⁴ Tiresias, Tiresiae (m, 1st Declension) = Tiresias, a blind prophet of the Greek city Thebes

⁵ vita, vitae (f) = life

⁶ vates, vatis (m) = prophet

⁷ senectus, senectutis (f) = old age

⁸ uber, ubera, uberum = rich, prosperous

⁹ visurum esse *is the future infinitive active of video*; here: eum... visurum esse = 'that he would see...'; *there is one further future infinitive active in this passage!*

¹⁰ necesse... est ne puer = 'the boy must not....'

¹¹ detrimentum, detrimenti (n) = harm, damage

¹² fera, ferae (f) = wild beast

¹³ Iuno, Iunonis (f) = Juno, jealous wife of Jupiter. Echo used to detain Juno with endless talk, to enable the nymphs that lay with Jupiter to escape her notice.

¹⁴ fallo, fallere, fefelli, falsus = I trick, deceive

¹⁵ modo (adverb) = only

¹⁶ incalresco, incallescere, incalui = to grow passionate

¹⁷ vestigium, vestigii (n) = footprint

Questions on Passage One:

- a) Why did Liriope and Cephisus show Narcissus to Tiresias? [2]
- b) What did they ask about? [1]
- c) (i) What prediction did Tiresias make about Narcissus' life? [2]
(ii) What did he say must never happen, if this prediction were to be fulfilled? [3]
- d) Why did Liriope and Cephisus leave in good spirits? [3]
- e) Lines 6-7 (*olim... Echo*):
(i) How old is Narcissus at this point in the story? [1]
(ii) What was he doing? [2]
- f) In what way did Echo's punishment fit her crime? [2]
- g) As best you can, translate Juno's words, uttered as she punished Echo. [5]
- h) Describe in as much detail as you can what Echo does in lines 11-12. [3]
- i) How many of each of the following are there in this passage? :
(i) Nouns in the dative case [1]
(ii) Superlative adjectives [1]
(iii) Verbs in the pluperfect tense (in any voice/mood) [1]
(iv) Present participles [1]
(vii) Deponent verbs [1]
- j) There is one ablative absolute in this passage. Write it out in Latin. [1]

[30 marks]

Question Two

Translate the following passage into good English. Write your translation on alternate lines.

Echo & Narcissus (2) : Narcissus rejects Echo.

statim post arborem se celavit¹ Echo. propter poenam² Iunonis non primum dicere sed verba
Narcissi remittere poterat. cum igitur Narcissus, qui forte ab agmine³ comitum erraverat,⁴
'ecquisne⁵ adest?' dixisset,
'adest' respondit Echo.
ille constitit⁶ perterritus, et iterum iterumque clamavit;
iterum iterumque sua verba remissa sunt.
tandem 'nunc in his silvis coeamus!'⁷ inquit.
'coeamus,' rettulit⁸ Echo et, suis verbis persuasa, de arbore apparuit et iuvenem amatum fortiter
amplexa est.⁹
ille autem refugit,¹⁰ vocans 'moriar antequam ego te cupio!'
'ego te cupio,' illa triste rettulit et, sic spreta,¹¹ os¹² frondibus¹³ protegit, in silvas refugit et ex
illo¹⁴ in antro¹⁵ remoto habitavit.
sine corpore vox eius, sola pars quae superest,¹⁶ adhuc¹⁷ in montibus auditur.

[30 marks]

¹ celo, celare, celavi, celatus = I hide

² poena, poenae (f) = punishment

³ agmen, agminis (n) = company, crowd

⁴ erro, errare, erravi, erratus = I stray, wander

⁵ ecquis = anyone

⁶ consisto, consistere, constiti = I halt, stop

⁷ coeamus = 'let us meet!'

⁸ refero, referre, rettuli, relatus = I report, reply, relate

⁹ amplector, amplecti, amplexus sum (deponent) = I embrace

¹⁰ refugio, refugere, refugi = I retreat, recoil

¹¹ sperno, spernere, sprevi, spretus = I reject

¹² os, oris (n) = face

¹³ frondes, frondium (f, plural) = leaves

¹⁴ ex illo = 'from this time forth'

¹⁵ antrum, antri (n) = cave

¹⁶ supersum, superesse, superfui = I survive, remain

¹⁷ adhuc (adverb) = still

Question Three

Read the following passage and answer the questions below.

Echo & Narcissus (3) : Narcissus' fate.

1 Narcissum, qui saepe spreverat eos qui eum amabant, tandem Nemesis¹
2 punivit. fons erat, argenteus et splendidus, intactus² pastoribus aut pecoribus,
3 umbrosus et semper frigidus. ad hunc locum puer, post venationem³ fessus,
4 advenit ut requiesceret⁴ et aquam biberet.
5 dum sitim⁵ exstinguit,⁶ sitis altera crevit;⁷ dum bibit, os in aqua videt et amat.
6 imaginem⁸ amplecti conatur, sed dum eam petit, ipse petitur; dum loquitur
7 puer, imago quoque loquitur; dum oscula⁹ dat, sibi oscula imago dat.
8 per multos annos in eodem loco manebat, quod imaginem frustra desiderabat.¹⁰
9 tabuit¹¹ et antequam periit hoc verbum ultimum imagini dixit: 'vale!'
10 'vale!' e montibus redditum est.

Questions on Passage Three:

- a) What people did Narcissus often reject? [2]
- b) Lines 2-3 (*fons...frigidus*) describe the spring in the woods that Narcissus goes to.
- This place is described as untouched. Untouched by what? Give one of the two available words in Latin *and* suggest a translation for it. [2]
 - Guess the meaning of any *two* of the remaining four adjectives used to describe the spring (nb. *splendidus* does *not* mean 'splendid'). [2]
- c) What two things does Narcissus hope to do when he arrives at the spring? [2]
- d) Translate lines 5-7 (*dum sitim...imago dat*). Write your translation on alternate lines. [8]
- e) How long did Narcissus remain by the spring, and why? [2]
- f) Translate the last word he ever spoke. [1]
- g) Who speaks the final spoken word of the passage? [1]
- h) In the myth told by the poet Ovid, one lover who had been rejected by Narcissus prayed to Nemesis asking her to curse Narcissus. What might the wording of this curse have been? [2]
- i) Explain in your own words how Tiresias' prediction was fulfilled. [2]
- j) Modern psychologists refer to an illness of the mind called 'narcissism' – what do you think this might be? [1]

[25 Marks]
P.T.O.

¹ Nemesis (f) = Nemesis, the goddess of divine punishment.

² intactus-a-um: *the perfect passive participle of tango is 'tactus'.* The prefix 'in' gives the opposite meaning.

³ venatio, venationis (f) = hunt

⁴ requiesco, requiescere, requievi, requietum = I rest

⁵ sitis, sitis (f) {accusative singular = sitim} = thirst

⁶ exstinguo-ere, exstinxi, exstinctus: *there is an obvious meaning to this word – try to think of a different way of translating the word that goes better with 'sitim'.*

⁷ cresco-ere, crevi, cretus = I grow

⁸ imago, imaginis (f) = reflection, image

⁹ osculum, osculi (n) = kiss

¹⁰ desidero, desiderare = I yearn for, long for

¹¹ tabesco, tabescere, tabui = I waste away

Remember, you can attempt either question four or question five. If you attempt both, the higher mark will be counted, but additional credit may be given if both are completed well.

Question Four

Read the following passages from Ovid. They cover the story of Echo and Narcissus which is featured in Passages One, Two and Three. Then answer the questions that follow.

A:

et neque iam color est mixto candore rubori
nec vigor et vires et quae modo visa placebant,
nec corpus remanet, quondam quod amaverat Echo.

B:

dixit et ad faciem rediit male sanus eandem
et lacrimis turbavit aquas, obscuraque moto
reddita forma lacu est;

C:

ille fugit fugiensque 'manus complexibus aufer;
ante' ait 'emoriar, quam sit tibi copia nostri.'
rettulit illa nihil nisi 'sit tibi copia nostri.'

D:

de quo consultus, an esset
tempora maturae visurus longa senectae,
fatidicus vates 'si se non noverit' inquit.

- a) Put the four passages into the correct sequence. [4]
- b) Give the name of the speaker in Passage D. [1]
- c) Guess the meaning of *fatidicus* in Passage D. [1]
- d) Who is the subject in the first line and a half of Passage B? [1]
- e) Attempt a translation of passages A and C. You will be given credit for intelligent guesswork, based on your understanding of the story of Echo and Narcissus [4+4]

[15 Marks]

Question Five

Translate the following sentences into Latin. Use the vocabulary given earlier in the paper.

- a) Narcissus was a young man who was loved by many nymphs. [5]
- b) Narcissus went into the woods in order to hunt wild beasts. [5]
- c) When Narcissus ran away, Echo knew that he did not love her. [5]

[15 Marks]



Total Marks: 100



HARROW SCHOOL

ENTRANCE SCHOLARSHIPS EXAMINATION 2013

Tuesday, February 26th, 9.00 a.m. to 10.30 a.m.

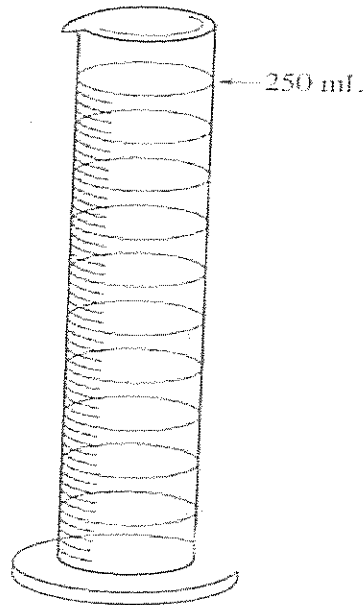
MATHEMATICS I

GENERAL INSTRUCTIONS:

You may attempt all the questions if you have time, but greater credit will be given for complete solutions. Show all your working. Calculators may be used.

1. A pharmacist measured out an amount of liquid using the measuring cylinder below. Showing your working clearly explain which of the following **cannot** be the amount of liquid the pharmacist measured out:

- (a) 0.05 L (b) 0.2 L (c) 12 mL (d) 15 mL



2. Solve the following equations

(a) $3(x - 2) = 4(2x - 9)$

(b) $\frac{2}{3}x + \frac{1}{4}x = \frac{5}{6}$

(c) $\frac{2x-1}{5} = \frac{4x^2-7}{10x}$

3. Gas is stored in a tank. The volume of gas can be increased or decreased by pressing buttons P , Q , R , S or T . Button P increases the volume of the gas in the tank by 15%, button Q decreases the volume of the gas in the tank by 15%. Initially there are 300 litres of gas in the tank.

(a) Calculate the volume of gas in the tank after buttons P followed by Q are pressed?

(b) When the tank contains 120 litres of gas button R is pressed to decrease the gas to 78 litres. By what percentage does button R decrease the gas?

(c) When the tank contains 200 litres of gas button S is pressed twice to increase the quantity of gas to 338 litres. By what percentage does button S increase the gas?

(d) On one occasion the tank contains 100 litres of gas. If the buttons are pressed in the following order, $PPQT$ the tank would still contain 100 litres. To the nearest percent, what does button T do?

4. On squared paper draw x and y axes from -10 to 10 on both axes using a scale of 1 square for 1 unit. Plot the points $A(4,1)$, $B(8,1)$, $C(8,3)$ and $D(4,6)$ and join them to form a quadrilateral. Label the quadrilateral T .
- What is the mathematical name of the quadrilateral T
 - Reflect T in the x axis and label it U
 - Rotate T 90° anti-clockwise about the origin and label it V
 - Describe the single transformation that transforms U to V .

5. A group of friends have the following masses:

George = 72kg,	Harry = 68kg,	Tom = 69kg,
Sarab = 74kg,	Freddie = 61kg,	Lewis = 53kg,
Sam = 48kg,	David = 68kg,	Krishan = 54kg

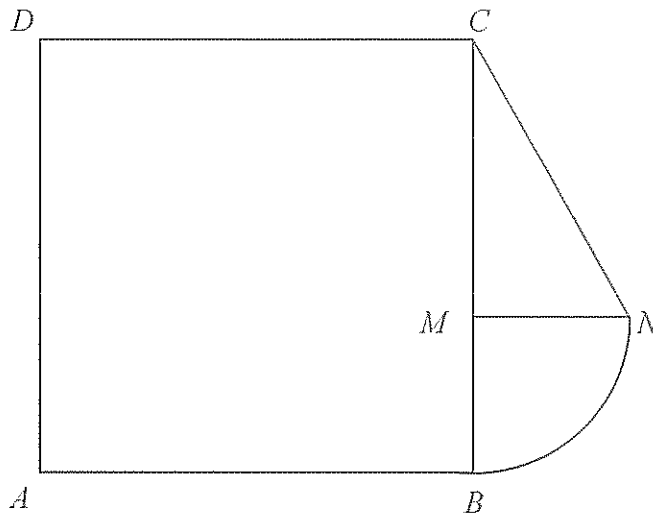
- Calculate the mean, mode and median mass of this group.
 - Shravan is added to the group but the mean does not change. What is Shravan's mass?
 - Simon is now added to the group (which includes Shravan). The median mass is now 68kg, what can you say about Simon's mass?
6. The operation $*$ doubles the first number, adds 2 and then divides the result by the second number.

For example: $3 * 4 = \frac{2 \times 3 + 2}{4} = 2$

Showing your working clearly and simplifying your answers, work out the following

- $1.2 * 5$
- $-107 * -4$
- $\frac{7}{8} * \frac{3}{11}$
- $p * q$
- $x * 2$
- $y * (y + 1)$
- $b * (b * b)$

7. ABCD is a square with sides 15cm.
 CMN is a triangle with side CM twice as long as MN and MBN is a quarter circle.
 Calculate the area of the shape below, giving your answer to 1 decimal place.



8. In the “Land of the Witches” the local currency is frogs, toads, newts and eyeballs.
 The exchange rates are as follows:

$$1 \text{ eyeball} = 12 \text{ frogs}, \quad 8 \text{ newts} = 1 \text{ toad}, \quad 3 \text{ toads} = 1 \text{ frog}.$$

- (a) A vanishing spell costs 2 eyeballs, 7 frogs and 3 newts.
 Winnie the witch pays for the spell with newts. How many newts does the spell cost?
- (b) A stink bomb spell costs 5 frogs and 2 toads. Wanda the witch pays with 1 eyeball.
 She receives the change in toads, how much change does she get?

9. Copy and complete the table below

x	0	0.5	1	1.5	2	2.5	3
$y = x^3 - 4x$							

- (a) On squared paper plot the graph of $y = x^3 - 4x$ for $x=0$ to $x=3$.
- (b) Describe, giving reasons (with the aid of a sketch but do NOT replot the graph) what the graph of $y = x^3 - 4x + 3$ would look like.
- (c) Describe, giving reasons (with the aid of a sketch but do NOT replot the graph) what the graph of $y = 4x - x^3$ would look like.



HARROW SCHOOL

ENTRANCE SCHOLARSHIPS EXAMINATION 2013

Thursday, February 18th, 9.00 a.m. to 10.30 a.m.

MATHEMATICS II

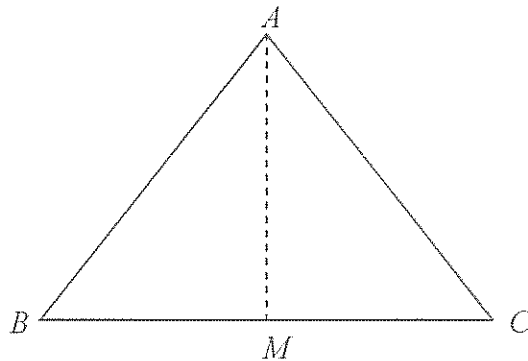
GENERAL INSTRUCTIONS:

You may attempt all the questions if you have time, but greater credit will be given for complete solutions. Show all your working. Calculators may NOT be used.

1. (a) (i) Evaluate $\frac{5}{7} + \frac{7}{5}$
- (ii) Simplify $\frac{p}{q} + \frac{q}{p}$
- (iii) Find values of p and q such that $\frac{p}{q} + \frac{q}{p} = \frac{73}{24}$

- (b) If $\frac{x+y}{x-y} = \frac{4}{3}$
- then find the value of $\frac{2x-y}{3x-2y}$.

2. (a) Given that the equilateral triangle shown below has sides of length 2cm. Find
- (i) the height of the triangle, giving your answer as a square root;
- (ii) the angle BAM .



- (b) Fifteen coins just fit into a box in the shape of an equilateral triangle when lying flat in one layer on the bottom of the box. Find the length of a side of the box if each coin is 2cm in diameter.
3. A normal duck has two legs, a lame duck has one leg and a sitting duck has no legs. Ninety-nine ducks have a total of a hundred legs. Given that there are half as many sitting ducks as normal and lame ducks put together, find the number of lame ducks.
4. I drive through a tunnel, 1.25 miles long, at a constant speed of 45mph. Another car enters the tunnel, on an adjacent lane, at the same time as me but travelling quicker. If I exit the tunnel 40 seconds behind the other car then what was the average speed of the other car through the tunnel?

5. $ABCD$ is a rectangle with side AB twice as long as side BC . E is a point such that ABE is an equilateral triangle that overlaps with the rectangle. M is the midpoint of the side BE . Find the size of the angle CMB .
6. (a) Write down the mean of the first nine positive whole numbers, 1, 2, 3, ..., 9, and hence calculate their sum?
 (b) Hence, find the sum of the even numbers, 2, 4, 6, ..., 18.
 (c) What is the sum of the first 99 positive whole numbers, 1, 2, 3, ..., 99?
 (d) Find the sum of the first 99 positive whole numbers but in which multiples of 5 have been left out.
 (e) Find the sum of the positive whole numbers from 100 to 999 inclusive.
7. (a) A circle, of radius r cm, fits exactly inside a square so that it just touches each of the sides of the square. Using an approximation of $\pi \approx \frac{22}{7}$, find the fraction of the square that is inside the circle.
 (b) A square fits exactly inside a circle, of radius r cm, so that each of the four corners of the square touches the circle. Using an approximation of $\pi \approx \frac{22}{7}$, find the fraction of the circle that is inside the square.
 (c) Working entirely in fractions, find which of these two fractions is the greater?
8. (a) Giving your answers as whole numbers, or square roots, or a mixture of the two then simplify the following,
 (i) $(\sqrt{2})^2$, (ii) $(\sqrt{2})^3$, (iii) $(\sqrt{2})^4$,
 (iv) $(\sqrt{2})^5$, (v) $(2\sqrt{2})^3$ (vi) $\sqrt{2}(1+\sqrt{2})$
- (b) Find the value of $x^3 - 6x$ when $x = 2\sqrt{2}$,
- (c) Find the value of $x^5 - 3x - \frac{2}{x}$ when $x = \sqrt{2}$.