



# HARROW SCHOOL

## English Scholarship Exam 2019

**90 minutes**

*Instructions:*

*This paper is in two sections worth equal marks; you are advised to divide your time evenly between the two.*

*In both responses you will be marked for the quality of your writing (spelling, grammar and punctuation).*

*Please begin your response to Section B on a new piece of paper.*

## **SECTION A: WRITING**

Imagine that your school has decided to ban all use of the internet and mobile phones at school. They say that the internet and phones are too much of a distraction from lessons and other activities.

Write an article for your school newspaper, arguing either for or against this new rule.

Marks will be awarded for clarity and accuracy of writing, imaginative and thoughtful use of English, originality of thought and evidence of an ability to think critically and reflectively.

**[25 marks]**

## SECTION B: READING

***Remember to start this response on a new sheet of paper!***

***Read the following excerpt from John Knowles' novel 'A Separate Peace' (the novel is set in a boys' boarding school in the USA) and answer the question that follows.***

The tree was tremendous, an irate, steely black steeple beside the river. I was damned if I'd climb it. The hell with it. No one but Phineas could think up such a crazy idea. He of course saw nothing the slightest bit intimidating about it. He wouldn't, or wouldn't admit it if he did. Not Phineas.

"What I like best about this tree," he said in that voice of his, the equivalent in sound of a hypnotist's eyes, "what I like is that it's such a cinch!" He opened his green eyes wider and gave us his maniac look, and only the smirk on his wide mouth with its droll, slightly protruding upper lip reassured us that he wasn't completely goofy.

"Is that what you like best?" I said sarcastically. I said a lot of things sarcastically that summer; that was my sarcastic summer, 1942.

"Aey-uh," he said. This weird New England affirmative—maybe it is spelled "aie-huh"—always made me laugh, as Finny knew, so I had to laugh, which made me feel less sarcastic and less scared.

There were three others with us—Phineas in those days almost always moved in groups the size of a hockey team—and they stood with me looking with masked apprehension from him to the tree. Its soaring black trunk was set with rough wooden pegs leading up to a substantial limb which extended farther toward the water. Standing on this limb, you could by a prodigious effort jump far enough out into the river for safety. So we had heard. At least the seventeen-year-old bunch could do it; but they had a crucial year's advantage over us. No Upper Middler, which was the name for our class in the Devon School, had ever tried. Naturally Finny was going to be the first to try, and just as naturally he was going to inveigle others, us, into trying it with him.

We stood looking up at it, four looks of consternation, one of excitement. "Do you want to go first?" Finny asked us, rhetorically. We just looked quietly back at him, and so he began taking off his clothes, stripping down to his underpants. For such an extraordinary athlete—even as a Lower Middler Phineas had been the best athlete in the school—he was not spectacularly built. He was my height—five feet eight and a half inches (I had been claiming five feet nine inches before he became my roommate, but he had said in public with that simple, shocking self-acceptance of his, "No, you're the same height I am, five-eight and a half. We're on the short side"). He weighed a hundred and fifty pounds, a galling ten pounds more than I did, which flowed from his legs to torso around shoulders to arms and full strong neck in an uninterrupted, unemphatic unity of strength.

Vocabulary:

Cinch = something easy to accomplish

Inveigle = to persuade

**Explore the thoughts and feelings of the narrator in this passage.**

*Be sure to use quotations from the passage in your response.*

**[25 marks]**



# HARROW SCHOOL

## French

60 Minutes

Instructions:

*Section 1: Translation into English*

*Section 2: Translation into French*

*Section 3: Essay in French*

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

On pense qu'il y a beaucoup d'autres planètes comme la Terre dans l'univers. On a découvert trois Super-Terres. Trois Super-Terres ont été identifiées par des astronomes français et suisses, avec un instrument sophistiqué connecté à un télescope énorme. On appelle ces trois planètes des « Super-Terres » car elles ressemblent beaucoup à notre planète.

Elles sont un petit peu plus grosses que la Terre et tournent autour d'une même grosse étoile (l'équivalent de notre Soleil). C'est la première fois que des chercheurs découvrent des planètes qui ressemblent autant à la Terre et si près de nous! Seul problème : elles ne sont pas habitables, car elles sont trop proches de leur « Soleil ». Il fait extrêmement chaud à leur surface : plus de 1 000 degrés ! Mais les astronomes pensent que l'Univers contient beaucoup de Super-Terres. Et peut-être un jour qu'on trouvera une sœur identique de notre planète!

*(30 marks)*

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

**2. Translate the following sentences into French:**

- a) I go to bed early
- b) We tidy the room
- c) They have seen the film
- d) He used to read the newspaper
- e) Marie and Anne went to the cinema
- f) They can stay at home
- g) My father had watched television
- h) Marc is going drink some wine
- i) I will not be happy
- j) The girl will work

*(30 marks)*

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

**3. Write an article for your school website talking about a recent excursion with your family or friends.**

**You should mention:**

- **Why you chose this excursion / activity**
- **Details about what you did (and didn't) do**
- **An unexpected or surprise event**
- **What you normally like doing in your free time**
- **What you intend to do next weekend**

*(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.**

Keep each section of a roughly even length (ie. approximately 30 words each)

You should concentrate on **accuracy** (quality rather than quantity).



# HARROW SCHOOL

## **Academic Scholarship Examination GEOGRAPHY**

**Time allowed: 90 minutes**

*Answer all questions in the space provided.*

*Answer all of Questions 1 and 2.*

*Answer one essay from a choice of four for Question 3. Take time to plan your answer in the space provided.*

*Use blue or black ink for text. You may use a pencil for diagrams.*

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

## QUESTION 1

Answer ALL of QUESTION 1

*[spend 25 minutes on this section]*

Use the Ordnance Survey map extract showing a stretch of coastline along the East Riding of Yorkshire in the north east of England to answer the following questions:

- a) Identify the **coastal landform** that stretches south from grid square 42 14. [1]

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- b) To the nearest kilometre, how long is this **coastal landform**? Measure from the Spurn Bird Observatory (419 150). [2]

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- c) This same coastal landform is shown in the picture below. In which **direction** was the photographer looking when they took this picture? [1]

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- d) In the space below, draw an **annotated** diagram to help explain the formation of this **coastal landform**. [6]

e) Using map evidence, explain why this stretch of coastline might be popular with **tourists**. [4]

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f) Grid square 40 11 shows evidence of **coastal management**. In the present day, these are no longer maintained. Discuss whether you agree with this decision. [6]

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[Total: 20 marks]

END OF QUESTION 1

## QUESTION 2

Answer ALL of QUESTION 2

*[spend 30 minutes on this section]*



The figure above shows the course of the River Wye, flowing south-east from its source in the Plynlimon Hills in mid-Wales to its mouth in Chepstow, where it joins the Severn Estuary.

The drainage basin in the upper course of the River Wye is characterised by steep slopes and impermeable rock.

- a) Define the term **drainage basin**. [2]

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- b) Suggest how **steep relief** might influence rates of **surface run-off**. [2]

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- c) Explain why there are low rates of **throughflow** in the upper course of the River Wye. [4]

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Much of the drainage basin was originally forested, however this has been largely cleared to make way for pasture and sheep grazing.

- d) Define the term **interception**. [2]

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- e) Discuss how removing trees from the drainage basin might affect the local **water cycle**. [6]

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In the Plynlimon Hills, annual rainfall can exceed 2500mm of rainfall. In the space provided, draw an **annotated** diagram to explain the formation of **relief rainfall**. [4]



[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**

- a) Is it possible to develop a housing or facilities project, such as the Queen Elizabeth Olympic Park, in an environmentally sensitive way? Justify your opinion. **[20]**

#### **OR**

- b) Using a case study that you have studied, evaluate the benefits and problems which economic activities can bring to an area. **[20]**

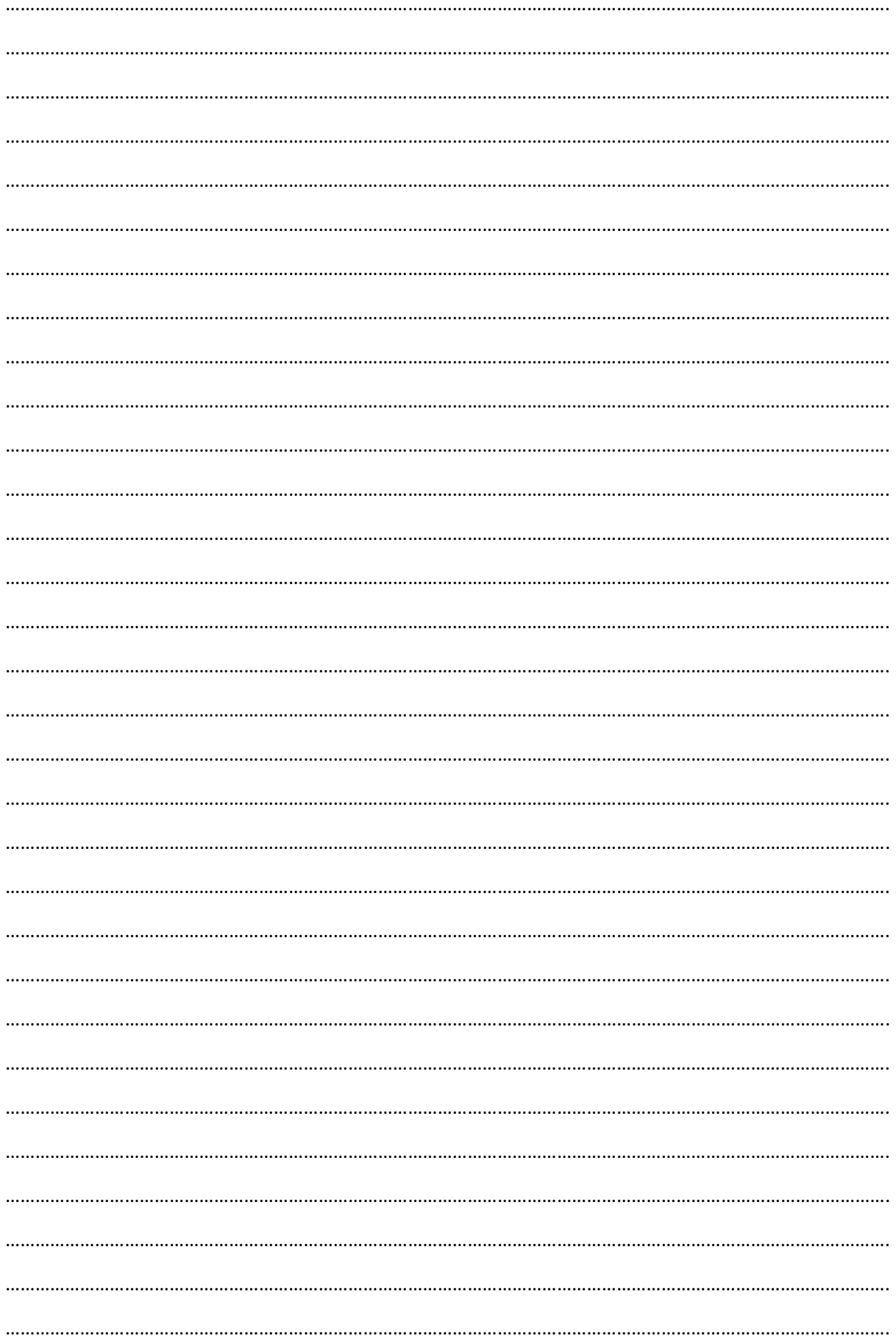
#### **OR**

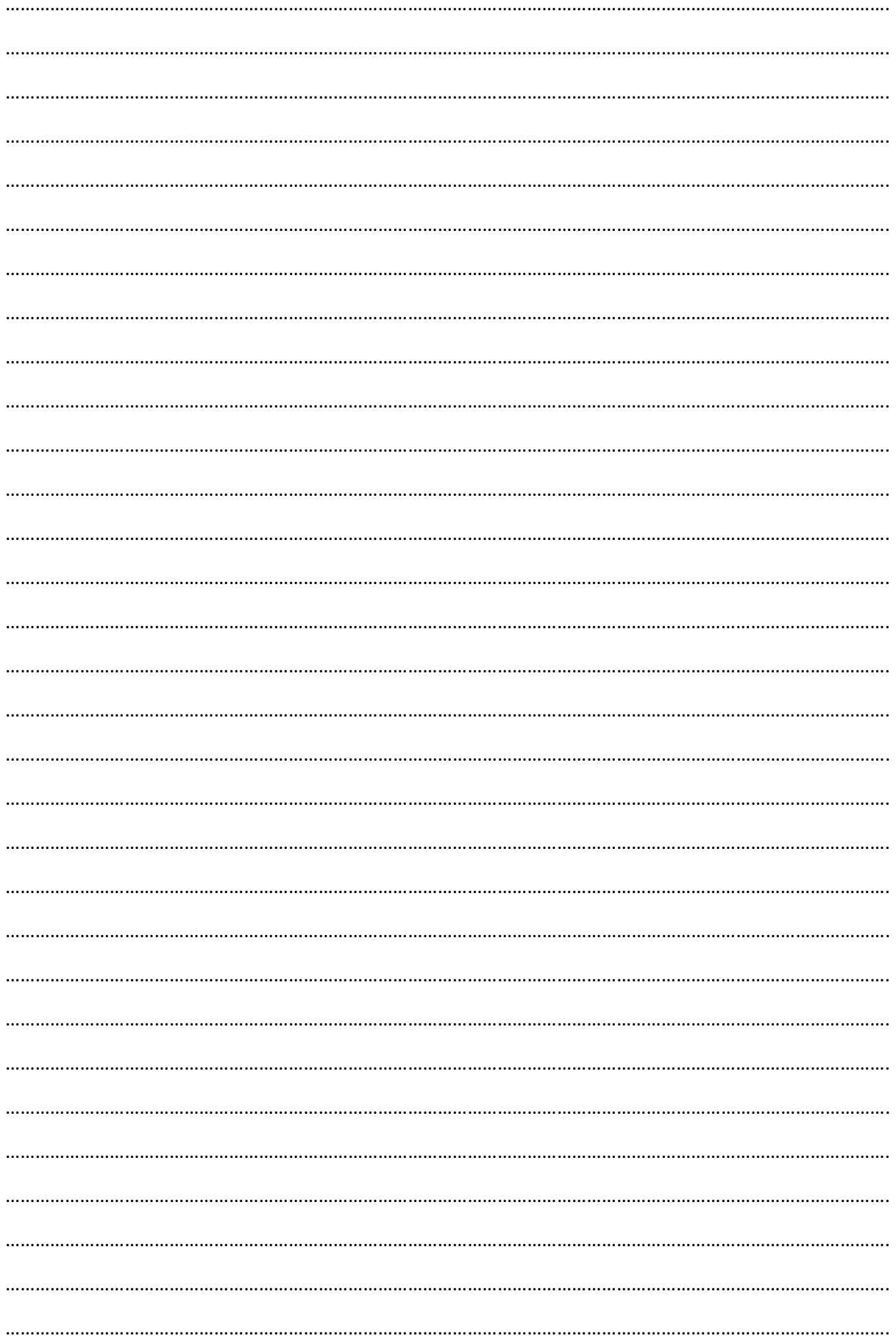
- c) To what extent is it possible to reduce the risk of flood events? Use a case study of either a river or coastal flood to support your answer. **[20]**

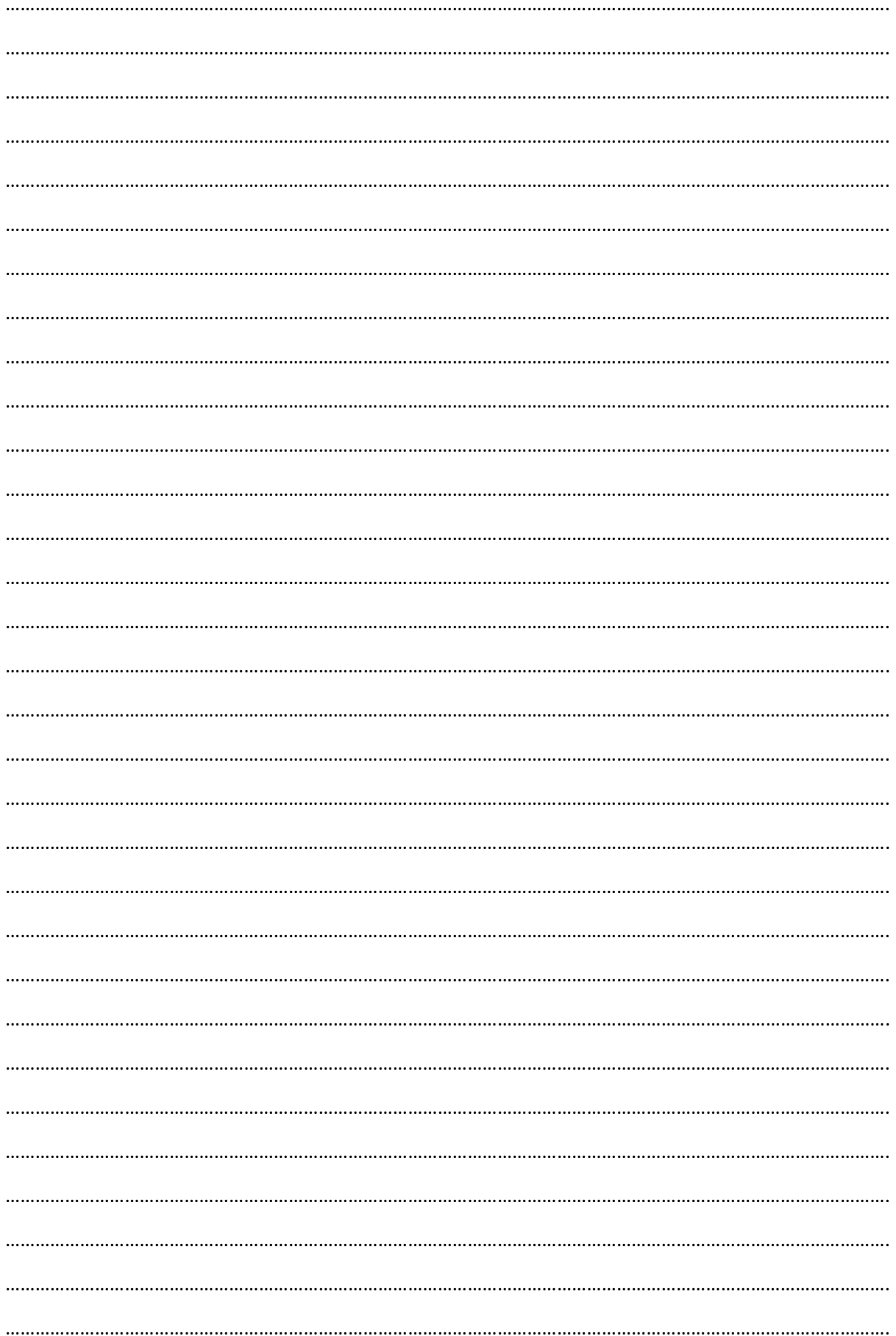
#### **OR**

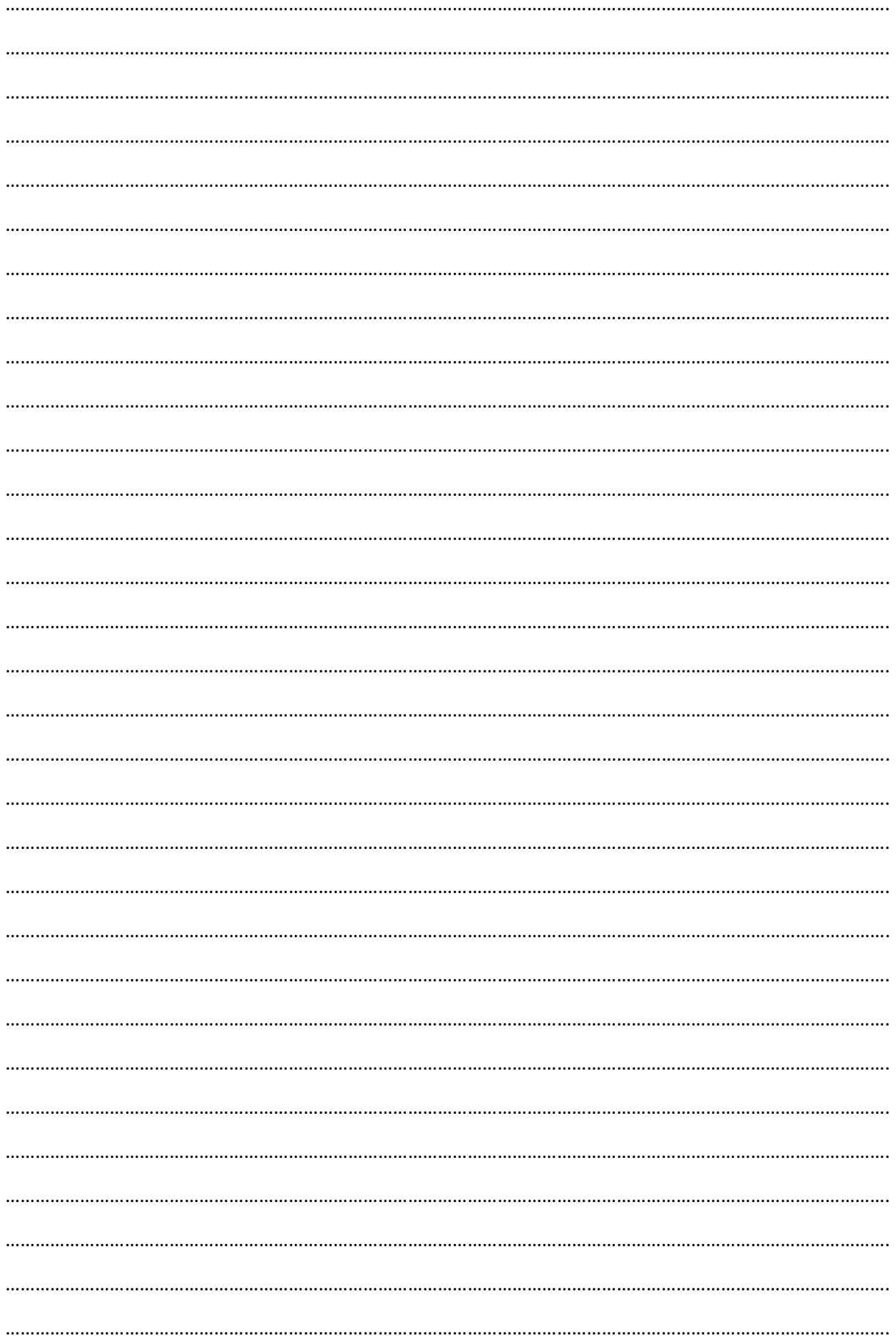
- d) In December 2018, an eruption of Anak Krakatoa in Indonesia triggered a tsunami that killed over 200 people. Why do people continue to live in tectonically active areas? **[20]**

Space to plan your answer:









[illegible]

**[Total: 20 marks]**

**[Exam Total: 60 marks]**

**END OF EXAMINATION**

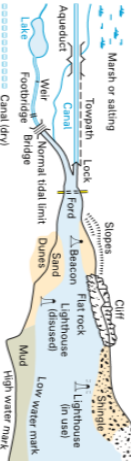
## ROADS AND PATHS

|   |   |   |
|---|---|---|
| Service area<br>Junction number<br>Unfenced<br>A 470<br>A 493<br>B 4518<br>B 855<br>B 885 | Elevated<br>Dual carriageway<br>Footbridge<br>Secondary road<br>Narrow road with passing places<br>Road generally more than 4m wide<br>Road generally less than 4m wide<br>Path / Other road, drive or track<br>Gradient steeper than 20% (1 in 5), 14% to 20% (1 in 7 to 1 in 5)<br>Gates, Road tunnel<br>Ferry (passenger), Ferry (vehicle) | Motorway (dual carriageway)<br>Primary Route (recommended through route)<br>Main road<br>Road under construction<br>Secondary road<br>Narrow road with passing places<br>Road generally more than 4m wide<br>Road generally less than 4m wide<br>Path / Other road, drive or track<br>Gradient steeper than 20% (1 in 5), 14% to 20% (1 in 7 to 1 in 5)<br>Gates, Road tunnel<br>Ferry (passenger), Ferry (vehicle) |
|---|---|---|

## RAILWAYS

|   |  |
|---|--|
| Track multiple or single<br>Track under construction<br>Siding<br>Tunnel, cuttings<br>Light rapid transit system, narrow gauge or tramway | Bridges, footbridge<br>Level crossing<br>Viaduct, embankment<br>Station, (a) principal<br>Light rapid transit system station |
|---|--|

## WATER FEATURES



## HEIGHTS

|  |                                     |
|--|-------------------------------------|
| Contours are at 10 metres<br>vertical interval<br>144<br>Where two heights are shown the first height is to the base of the triangulation pillar and the second (in brackets) to the highest natural point of the hill | Outcrop<br>Cliff<br>Slope<br>Screen |
|--|-------------------------------------|

## PUBLIC RIGHTS OF WAY

|  |  |
|--|--|
| Footpath<br>Bridleway<br>Restricted byway<br>Byway open to all traffic | Other route with public access<br>These routes are based on the best information available. These routes are not shown on maps of Scotland.<br>On-road cycle route<br>Traffic-free cycle route<br>National Cycle Network number<br>Regional Cycle Network number<br>National Trail, European Long Distance Path, Long Distance Route, selected Recreational Routes |
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## BOUNDARIES

|   |  |
|---|--|
| National<br>District<br>County, Unitary Authority, Metropolitan District or London Borough<br>National Park | Site of antiquity<br>Battlefield (with date)<br>Viable earthwork<br>Roman<br>Non-Roman |
|---|--|

## TOURIST INFORMATION

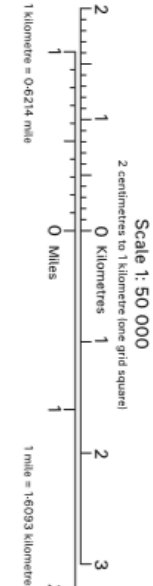
|  |  |
|--|--|
| Camp site / caravan site<br>Garden<br>God course or links<br>Information centre (all year / seasonal)<br>Nature reserve<br>Parking, (pink and blue all year / seasonal)<br>Picnic site<br>Recreation / leisure / sports centre<br>Selected places of tourist interest<br>Telephone, public / roadside assistance<br>Viewpoint<br>Visitor centre<br>Wicks / Trails<br>World Heritage site or area<br>Youth hostel |  |
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## LAND FEATURES

|  |  |
|--|--|
| Electricity transmission line (types shown at standard spacing)<br>Pip line (arrow indicates direction of flow)<br>Buildings<br>Important building (selected)<br>Bus or coach station<br>Current or former place of worship (with spire, minaret or dome)<br>Glass structure<br>Helipoint<br>Triangulation pillar<br>Mast<br>Wind pump, wind turbine<br>Windmill with or without sails<br>Graticule intersection at 5' intervals<br>Cutting, embankment<br>Landfill site or slag/spoil heap<br>Coniferous wood<br>Non-coniferous wood<br>Mixed wood<br>Orchard<br>Park or ornamental ground<br>Forestry Commission land<br>National Trust (always open / limited access, observe local signs)<br>National Trust for Scotland (always open / limited access, observe local signs) |  |
|--|--|

## ABBREVIATIONS

|   |  |
|---|--|
| Br Bridge<br>Cem Cemetery<br>CG Castle grid<br>CH Church<br>Fm Farm<br>Ho House<br>MP Milepost<br>MS Milestone<br>Mus Museum<br>P Post office<br>PC Public convenience (in rural areas)<br>PH Public house<br>Sch School<br>TH Town Hall, Guildhall or equivalent |  |
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# HARROW SCHOOL

ENTRANCE SCHOLARSHIPS EXAMINATION 2019

**CLASSICAL GREEK**

**1 hour**

*GENERAL INSTRUCTIONS:*

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

**Write your answers on A4 paper**

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

*Please write in blue or black pen.*

**SECTION A: Reading and Grammar (50 marks)**

**1 Identify the following Greek proper names.**

- (a) Ἀπόλλων
- (b) Ἀγαμεμνων
- (c) Πυθαγόρας
- (d) Κυκλωψ
- (e) Ἀλέξανδρος ὁ Μέγας [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) chronic
- (b) hydra
- (c) plasma
- (d) Aphroditē
- (e) Antigonē [5]

**3 Imagine that each letter of the Greek alphabet is represented by a number ( $\alpha = 1$ ,  $\beta = 2$ , etc.). Write down in Greek and translate the words represented by the following number sequences. Remember to add breathings where appropriate. [4]**

- (a) 2 – 1 – 11 – 11 – 24
- (b) 4 – 5 – 13 – 4 – 17 – 15 – 13
- (c) 1 – 3 – 1 – 8 – 15 – 18
- (d) 9 – 1 – 19 – 17 – 15 – 18 [4]

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

**Example:**        τους δουλους = τον δουλον (slave)

- (a) τους λογους
- (b) ταις νησοις
- (c) αί νῆες [6]

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

(a) τό ἄθλον

(b) τὴν ἡμέραν

(c) τοῦ πολέμου

**[6]**

**6 Change the following verbs from single to plural, keeping the same person and tense. Then translate your answer.**

(a) ἐστίν

(b) μένεις

(c) ἐδεξατο

(d) ἐσται

(e) ἔλυσα

**[10]**

**7 The following English words are derived from Greek words. What do they mean in English?**

**Write down any Greek word you might know related to the English word.**

(a) hypnosis

(b) strategy

(c) bibliography

(d) mythology

(e) telephone

(f) democracy

**[6]**

**8 Write out any TWO of the following:**

(a) The full future active of γράφω.

(b) 2<sup>nd</sup> declension noun τό ὕδωρ in all its cases (singular & plural).

(c) The strong aorist of λαμβάνω.

(d) The definite article in all genders and cases (singular & plural).

**[8]**

**SECTION B: Sentences and Composition (30 marks)**

**1 Translate into English:**

- (a) ὁ ταῦτα μαθὼν σοφώτερός ἐστι τῶν ἄλλων. [4]
- (b) οὗτοι οἱ δοῦλοι, οἱ ὑπὸ τῶν πολεμίων διωκόμενοι, οὐκ ἤκουσαν τοῦ τοῦ ἀγγέλου λόγους. [5]
- (c) τίνες εἰσὶν οἱ τῷ ποταμῷ κωλυόμενοι; [3]
- (d) οὐκ ἐθέλομεν ὑπὸ τῶν παίδων διώκεσθαι. [4]
- (e) ἄρα εἰσεδράμετε εἰς τὸ ἱερὸν τὸ τὴν μεγίστην θύραν ἔχον; [4]

**2 Translate into Greek:**

- (a) The old men ordered the young men to remain in the city. [4]
- (b) The slaves hide the food in the house. [3]
- (c) Release the horses, o slaves! [3]

### SECTION C: Translation (30 marks)

Translate the passage into good English. Write your translation on alternate lines. Vocabulary is given at the foot of the page. 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.

*The Athenians, after fighting the Spartans for a long time without success, hope to acquire new allies in Sicily, but instead suffer a huge disaster.*

οἱ δὲ Ἀθηναῖοι πολλὰ ἔτη ἐμάχοντο τοῖς Λακεδαιμονίοις, ἀλλὰ οὐπὼ αὐτοὺς ἐνίκησαν· αὐτοὶ μὲν γὰρ δυνατώτατοι ἦσαν κατὰ θάλασσαν, οἱ δὲ πολέμιοι κατὰ γῆν. ἐβούλοντο οὖν νέους συμμάχους ποιῆσθαι, ἵνα πλείονας ναῦς καὶ πλείονας στρατιώτας ἔχοιεν. ἤλπιζον γὰρ τούτοις χρώμενοι οἷοι τ' ἔσεσθαι νικῆσαι.

ἐπεὶ οὖν ἐπεκλήθησαν βοηθεῖν τοῖς ἐν Σικελίᾳ συμμάχοις, ἔδοξεν αὐτοῖς ἐκεῖσε πλεύσαι. ἐνόμιζον γὰρ ἐν τῇ νήσῳ ἄλλους συμμάχους εὐρήσειν. καὶ πρῶτον μὲν ἔπεμψαν ἐκατὸν τριήρεις καὶ πεντακισχίλους στρατιώτας. ἔπειτα δὲ μετὰ δύο ἔτη ἄλλην μεγάλην στρατείαν ἐκπέμψαι ἔδει, τῆς πρώτης πρὸς τῶν πολεμίων κακὰ παθούσης. τέλος δὲ πάντες οἱ ἐν Σικελίᾳ Ἀθηναῖοι ἢ ἀπέθανον ἢ ἐλήφθησαν, καὶ τοῖς Ἀθηναίοις μεγίστη ἦν ἡ ἀτιμία.

#### Vocabulary

|                                 |   |
|---------------------------------|---|
| οὐπὼ                            | not yet                                     |
| δυνατός, -η, -ον                | powerful                                    |
| ἐπικαλέω, aor. pass., ἐπεκλήθην | I invite, I call                            |
| ἐκεῖσε                          | there, to that place                        |
| ἐκατὸν                          | 100   |
| τριήρης, -ους, ἡ                | trireme (fast warship with 3 banks of oars) |
| πεντακισχίλιοι, -αι, -α         | 5000  |
| στρατεία, ἡ                     | expedition                                  |
| πρὸς + gen.                     | at the hands of (+gen)                      |
| ἀτιμία, ἡ                       | disgrace, dishonour                         |

Paper Total: 110 marks



# HARROW SCHOOL

## History

90 minutes

Instructions:

*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

*Read the background information, and study both sources. Then answer both questions.*

### **Background information**

On 2 August 1990 Iraq invaded Kuwait. Although the President of Iraq Saddam Hussein felt he had good reasons for this invasion it was met with general condemnation, including from most Arab countries. Saddam Hussein may have felt that the USA had indicated it would not interfere if he acted against Kuwait when, in July, the US Ambassador to Iraq had stated the USA had no interest in disputes between Arab nations. Within days President George Bush had announced he was sending troops to Saudi Arabia to protect it from an Iraqi attack. Later in the month the United Nations Security Council announced economic sanctions against Iraq. The USA then worked hard to create an international coalition and in November the UN Security Council gave Iraq until 15 January 1991 to withdraw from Kuwait, and authorised the use of force to make Iraq comply. On 17 January 1991 the Gulf War began, as the USA launched Operation Desert Storm. Some historians have claimed that the USA was not interested in a peaceful solution. They claim that it saw the Iraqi invasion of Kuwait as a chance to destroy the power of Iraq and gain more control over the oilfields in the Gulf. Others see Saddam Hussein's actions as plain aggression that had to be dealt with to prevent him from invading other parts of the Gulf area.

### **SOURCE A:**

**An extract from an article about the Gulf War, written by the Irish journalist Maggie O'Kane in *The Guardian* (a British newspaper) in 1995.**

The Gulf War was a fraud. Saddam was first given the green light by the US Ambassador in Baghdad to invade Kuwait. Later, that invasion (even when Saddam had agreed to withdraw and had already started to do so) was used to attack and cripple Iraq. The whole world was fooled to justify the US-British war which aimed at destroying Iraq's military capacity which the West itself had helped to build when Saddam was waging the West's war on Iran. Also the myth of US invincibility had to be brought home, just as the British did through the Falklands a decade earlier. We have no sympathy at all for Saddam Hussein. He has troubled everyone: his countrymen, the Kurds, and his neighbours and beyond. Yet the fact remains that the Gulf War was waged to destroy and humiliate Iraq and not Saddam who, strangely enough, was left to survive. Iraq invaded Kuwait on 3 August 1990. The US President and his chief advisers met the same day. At that point, war was no more than a possibility. General Colin Powell said at the time, 'I think we could go to war if they invaded Saudi Arabia. I doubt if we would go to war over Kuwait.' Within days the mood at the top had hardened. By the early weeks of September, America and Britain were leading the march towards war. Somehow, almost without anybody noticing, the agenda was changing. Iraqi withdrawal from Kuwait alone was no longer acceptable. New resolutions had been adopted by the UN Security Council. Bush and British Prime Minister Thatcher had made up their minds. Their task was to convince the rest of the world that Saddam was going to swallow up Saudi Arabia, as well as Kuwait. To Iraq watchers, it didn't add up. Although Saddam initially miscalculated the strength of Western reaction to an invasion of Kuwait, he soon realised his mistake. In July 1990 the US Ambassador had hinted that a small foray to snatch two oilfields would not cause too much trouble, but Saddam's capture of Kuwait would not be tolerated. He got the message that he had gone too far. A Baghdad newspaper published a photograph of Iraqi soldiers pulling out of Kuwait and Saddam informed the Security Council that he intended to withdraw his troops. It was too late. Thatcher and Bush were on a war footing. Even as late as January 1991, Iraq was involved in negotiations and was offering to withdraw from Kuwait.

**SOURCE B:**

**An extract from a speech made by President George Bush on 17 January 1991.**

Two hours ago, allied air forces began an attack on military targets in Iraq and Kuwait. Our dispute with Iraq started on 2 August when the dictator of Iraq invaded a helpless neighbour, Kuwait. This military action, taken in accord with United Nations resolutions, follows months of diplomatic activity by the United Nations, the United States and many other countries. Arab leaders sought an Arab solution, only to conclude that Saddam Hussein was unwilling to leave Kuwait. Others travelled to Baghdad in a variety of efforts to restore peace and justice. This past weekend, in a last-ditch effort, the Secretary-General of the United Nations went to the Middle East with peace in his heart. And he came back from Baghdad with no progress at all in getting Saddam Hussein to withdraw from Kuwait. Now the 28 countries with forces in the Gulf area have exhausted all reasonable efforts to reach a peaceful resolution and have no choice but to drive Saddam from Kuwait by force. We are determined to knock out Saddam Hussein's nuclear bomb potential. We will also destroy his chemical weapons. Much of Saddam's artillery and tanks will be destroyed. Our objectives are clear: Saddam Hussein's forces will leave Kuwait. The legitimate government of Kuwait will be restored to its rightful place, and Kuwait will once again be free. When peace is restored, it is our hope that Iraq will live as a peaceful and cooperative member of the family of nations. Why act now? The world could wait no longer. Sanctions, though having some effect, showed no signs of accomplishing their objective. The United States, together with the United Nations, exhausted every means at our disposal to bring this crisis to a peaceful end. However, Saddam clearly felt that by stalling and threatening and defying the United Nations, he could weaken the forces arrayed against him. While the world waited, Saddam Hussein met every offer of peace with open contempt and he tried to make this a dispute between Iraq and the United States of America. Well, he failed. Tonight, 28 nations have forces in the Gulf area standing shoulder to shoulder against Saddam Hussein. We have no argument with the people of Iraq. Our goal is not the conquest of Iraq. It is the liberation of Kuwait.

1. Study Source A. Explain in your own words what Maggie O'Kane meant when she wrote that 'the myth of US invincibility had to be brought home.' [10 marks]
2. Study Sources A and B. How and why do they differ in their interpretation of the reasons for the Gulf War? [20 marks]

## **SECTION B**

*Answer **ONE** of these questions.*

***Either***

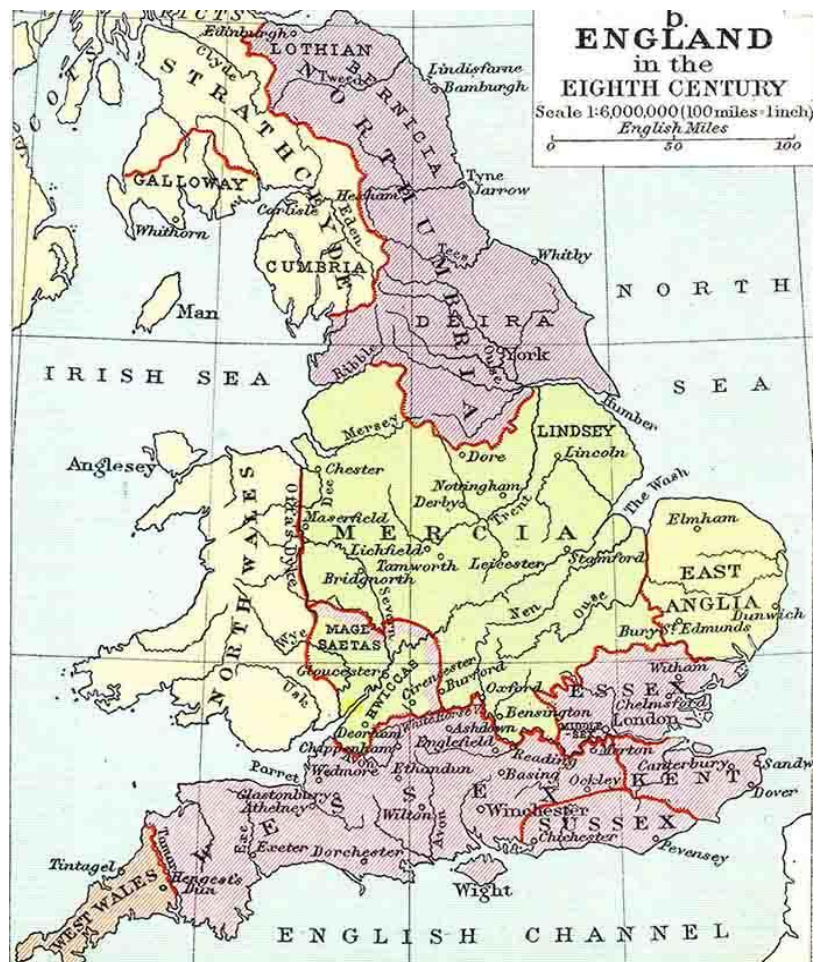
3. 'At school we spend too much time studying the actions of individuals.' How far do you agree with this statement? [30 marks]

***or***

4. What is the most important period of History you have studied or read about? Explain your reasons for choosing it as the most important. [30 marks]

## SECTION C

5. Study the two maps. What can you tell from them about Europe in the year 800? [30 marks]





# HARROW SCHOOL

## ENTRANCE SCHOLARSHIPS EXAMINATION 2019

### **LATIN**

**1 ½ hours**

#### *GENERAL INSTRUCTIONS:*

*You must attempt all questions in Section A: Comprehension, Section B: Grammar, and Section C: Translation.*

*If you have time at the end, you should attempt to answer the optional questions.*

*You should make an intelligent guess at words you do not know, using your knowledge of English vocabulary and the English introduction to each passage.*

*Try to base any guesses on elements in the sentence that you definitely DO know and make sure that they make sense in context.*

*Use blue or black ink.*

## Section 1: Comprehension

*In this passage, after Hannibal had suffered his final defeat at the hands of Publius Scipio, he went to the court of King Antiochus in Syria and recounted why he hates the Romans so much.*

Hannibal, filius Hamilcaris, Carthagine natus est. odium patris contra Romanos sic servavit ut numquam id deponeret. nam post bellum Punicum postremum, ubi ex patria in exsilium expulsus erat, non reliquit consilium belli cum Romanis gerendi. itaque, cum in Syriam venisset, Antiocho rege, haec dixit ut hunc quoque ad bellum cum Romanis inducere posset: “me novem annos nato, pater meus Hamilcar, ad Hispaniam imperator adveniens Carthagine, sacrificium deis fecit. eodem tempore, me rogavit utrum secum proficisci vellem. cum libenter audivissem et ab eo petivissem ne dubitaret me ducere, tum ille “faciam hoc,” inquit, “si mihi fidem, quam quaero dabis.” tum me ad aram duxit et me iurare iussit me numquam in amicitia cum Romanis futurum esse. hoc ius iurandum patri usque ad hoc tempus ita conservavi ut nemo esset qui plus odii contra Romanos habeat quam ego.”

### Names

|                      |                       |                                     |                     |
|----------------------|-----------------------|-------------------------------------|---------------------|
| Hannibal, -alis (m)  | Hannibal              | Scipio, -ionis (m)                  | Scipio              |
| Hamilcar, -aris (m)  | Hamilcar              | Etruria, -ae (f)                    | Etruria, modern day |
| Punicus, -a, -um     | Punic, = Carthaginian | Tuscany, district north of Rome     |                     |
| Syria, ae (f)        | Syria                 | Cannensis (f)                       | battle at Cannae,   |
| Antiochus, -i (m)    | Antiochus             | 216BC, Hannibal defeated the Romans |                     |
| Hispania, -ae (f)    | Spain                 | Zama, ae (f)                        | a city south of     |
| Hasdrubal, -alis (m) | Hasdrubal             | Carthage in North Africa            |                     |
| Alpici, -orum (f)    | men in the Alps       |                                     |                     |

### Vocabulary

|                         |                         |
|-------------------------|-------------------------|
| natus, -a, -um          | born                    |
| odium, ii (n)           | hatred                  |
| postremus, -a, -um      | final                   |
| gerendi                 | “of waging”             |
| induco, inducere        | to persuade             |
| proficiscor, proficisci | to travel               |
| fides, fides (f)        | a pledge, a promise     |
| ara, -ae (f)            | altar (for sacrificing) |
| iuro, iurare            | to swear an oath        |
| ius iurandum (n)        | an oath                 |
| usque ad                | right up to             |

### Comprehension Questions

1. *Hannibal* (line 1): what two things do we learn about Hannibal? [2]
2. *odium...deponeret* (lines 1-2): what could Hannibal never do? [2]
3. *natus... expulsus erat* (line 2): what happened to Hannibal after the first Punic war? [4]
4. *Antiocho rege... posset* (lines 3-4): what was Hannibal trying to convince the king to do? [2]
5. (lines 4-5): how old was Hannibal when his father arrived in Spain to fight the Romans? [1]
6. *eodem tempore... vellem* (lines 5-6): what did Hamilcar ask Hannibal after the sacrifice? [4]
7. *cum libenter, etc.*, line 6-7: What was Hannibal's reply to his father? [2]
8. *me iurare* (line 8): What was the oath that Hannibal made to his father? [4]
9. lines 9-10, *ita conservavi*: What does Hannibal say to show the intensity of his hatred towards the Romans? [4]

**Total = 25 marks**

## Section 2: Grammar

*Hannibal recounts his early years in Spain and how he became general.*

hac igitur aetate Hannibal cum patre in Hispaniam profectus est. post multos annos, Hamilcare et Hasdrubale interfectis, exercitus ei imperium tradidit. sic Hannibal, quinque et viginti annos natus, imperator factus est. tribus annis omnes gentes Hispaniae superavit et tres exercitus maximos paravit. ex his unum in Africam misit, alterum cum fratre in Hispania reliquit, tertium in Italiam secum duxit.

1. *aetate* (line 1): state and example the **case** of this word. [2]
2. Identify **two** examples of **prepositions** in line 1. [2]
3. *profectus est*: (line 1): identify the **tense** of this verb [1]
4. *Hamilcare et Hasdrubale interfectis*: translate this phrase into idiomatic English. [2]
5. *ei* (line 2): what **case** is this pronoun in [1]
6. *tradidit* (line 2): identify the **tense** of this verb [1]
7. *annos* (line 3): identify the **case** of this word and explain why it is that case [2]
8. *tribus* (line 4): identify the **case** of this word and what it refers to [2]
9. *his* (line 4): what case is this pronoun in and why? [2]

**Total = 15 marks**

### Section 3: Translation

Translate the following passage into English. Please write your translation on alternate lines. You should make an intelligent guess at words you do not know, using your knowledge of English vocabulary.

*A short report on Hannibal's crossing of the Alps, his victories in Italy, and his final defeat at Zama.*

ad Alpos venit, quas nemo umquam ante eum cum exercitu transierat. Alpico conantes eum prohibere occidit; loca itinera munivit; effecit ut elephanti ire posset qua antea unus homo vix poterat transire. sic in Italiam pervenit et, Scipione superato, Etruriam petivit. hoc in itinere tam gravi morbo oculorum affectus est ut postea numquam dextro oculo bene uteretur. multos duces exercitusque Romanos superavit; longum est omnia proelia numerare. post Cannensem autem pugnam nemo ei in acie in Italia restitit. cum autem P. Scipio tandem in Africam invasisset, Hannibal, ut patriam defenderet revocatus, Zamae victus est. sic post tot annos Romani se periculo Punico liberaverunt. (*from Nepos, Hannibal, excerpts*)

#### Names

|                                 |                     |                                     |                     |
|---------------------------------|---------------------|-------------------------------------|---------------------|
| Alpici, -orum (f)               | men in the Alps     | Cannensis (f)                       | battle at Cannae,   |
| Scipio, -ionis (m)              | Scipio              | 216BC, Hannibal defeated the Romans |                     |
| Etruria, -ae (f)                | Etruria, modern day | Punicus, -a, -um                    | Punic, Carthaginian |
| Tuscany, district north of Rome |                     | Zama, ae (f)                        | a city south of     |
|                                 |                     | Carthage in North Africa            |                     |

#### Vocabulary

|                     |                  |
|---------------------|------------------|
| morbus, -i (m)      | disease, illness |
| utor, uti, usus sum | to use + abl.    |

**Total = 35 marks**

**Paper total = 75 marks**

#### Section 4 (Optional): Composition

Translate the following sentences into Latin (make sure that you think very carefully about the role of each word *in English first* before you attempt to translate into Latin):

1. Those men had read the best books in order to learn much wisdom. [3]
2. They said that the bravest leader had come. [3]
3. At that time, he used to give much money to the citizens. [4]

#### Vocabulary

|                            |          |
|----------------------------|----------|
| disco, discere, didici, -- | to learn |
| sapientia, -ae (f)         | wisdom   |

**Total = 10 marks**

## Section 5 (Optional): Grammar

*Daedalus had built the famous maze which housed the dreaded Minotaur. Later his fellow Athenian, Theseus, would win eternal fame by killing this beast. Here Daedalus devises a strange plan to enable him to leave Crete.*

Daedalus erat artifex, qui multos annos in insula Creta habitabat. clarissimus erat quod labyrinthum aedificaverat in quo Minotaurus erat. postea Minotaurus a Theseo occisus est. iam Daedalus Athenas redire volebat, ubi natus erat. rex tamen Cretae eum iussit in Creta manere. 'rex' inquit Daedalus 'quamquam terram et mare regit, caelum non tenet.' his verbis dictis, Daedalus alas facere coepit. in terra multas pennas et parvas et longas posuit. has cera colligavit. ita Daedalus alas sibi confecit; alae optimae erant. ubi alae paratae erant, artifex volare conari constituit. se igitur in caelum iecit, corpus alis tollens. cum intellexisset alas se facile portare, alteras alas filio suo, Icaro nomine, fecit. nam sine filio effugere noluit.

### Vocabulary

artifex, artificis (m) = craftsman

natus-a-um = born

ala, alae (f) = wing

coepi = I began

penna, pennae (f) = feather

cera, cerae (f) = wax

colligo, colligare, colligavi, colligatum = I bind together

conficio, conficere, confeci, confectum = I finish, complete

volo, volare, volavi = I fly

tollo, tollere, sustuli, sublatum = I raise

intellego, intellegere, intellexi,

intellectum = I understand, realise

alter, altera, alterum = other, another, second, (other of two)

1. Identify an example of a **ablative absolute**. [1]
2. Identify an example of an **pluperfect subjunctive**. [1]
3. Identify an example of a **preposition with an ablative noun**. [1]
4. Identify an example of an **superlative adjective**. [1]
5. Identify an example of an **indirect speech**. [1]
6. Identify an example of a **verb in the passive voice**. [1]
7. Identify an example of an **adverb**. [1]
8. Identify an example of an **present active participle**. [1]
9. Identify an example of a **verb in the perfect tense**. [1]
10. Identify an example of an **infinitive**. [1]

**Total = 10 marks**



# HARROW SCHOOL

## Mathematics section B

**90 Minutes (for sections A and B)**

*Name:* \_\_\_\_\_

You should have both sections A and B.

Section A is out of 32 marks.

Section B is out of 28 marks.

You have 90 minutes to complete both sections.

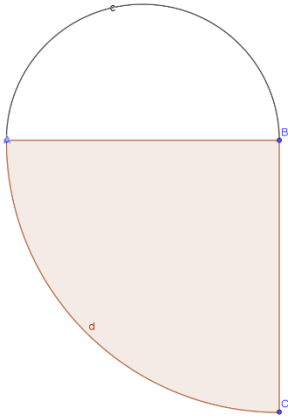
Please ensure you show full working.

Calculators and geometrical instruments are permitted.

Section B – 28 marks

1. The shape below is made up of a quarter circle and a semi-circle. The diameter of the semi-circle is 5cm. Calculate the area of this shape.

Give your answer to one decimal place.



\_\_\_\_\_ [3]

2. A map is drawn using a scale of 1:20,000.
- a. On the map, the distance between points A and B is 12.2cm. How far apart are A and B in real-life? Give your answer in km.

\_\_\_\_\_ [2]

- b. A river is 37km long. How long is it on the map?

\_\_\_\_\_ [2]

3. Katharine is making a square based pyramid out of paper. All the sides length will be 10cm. What is the total amount of paper she needs? Give your answer to one decimal place.

\_\_\_\_\_ [4]

4.

- a. Solve  $3(2 - x) < x$

\_\_\_\_\_ [2]

- b. What is the smallest positive integer that satisfies the inequality in a?

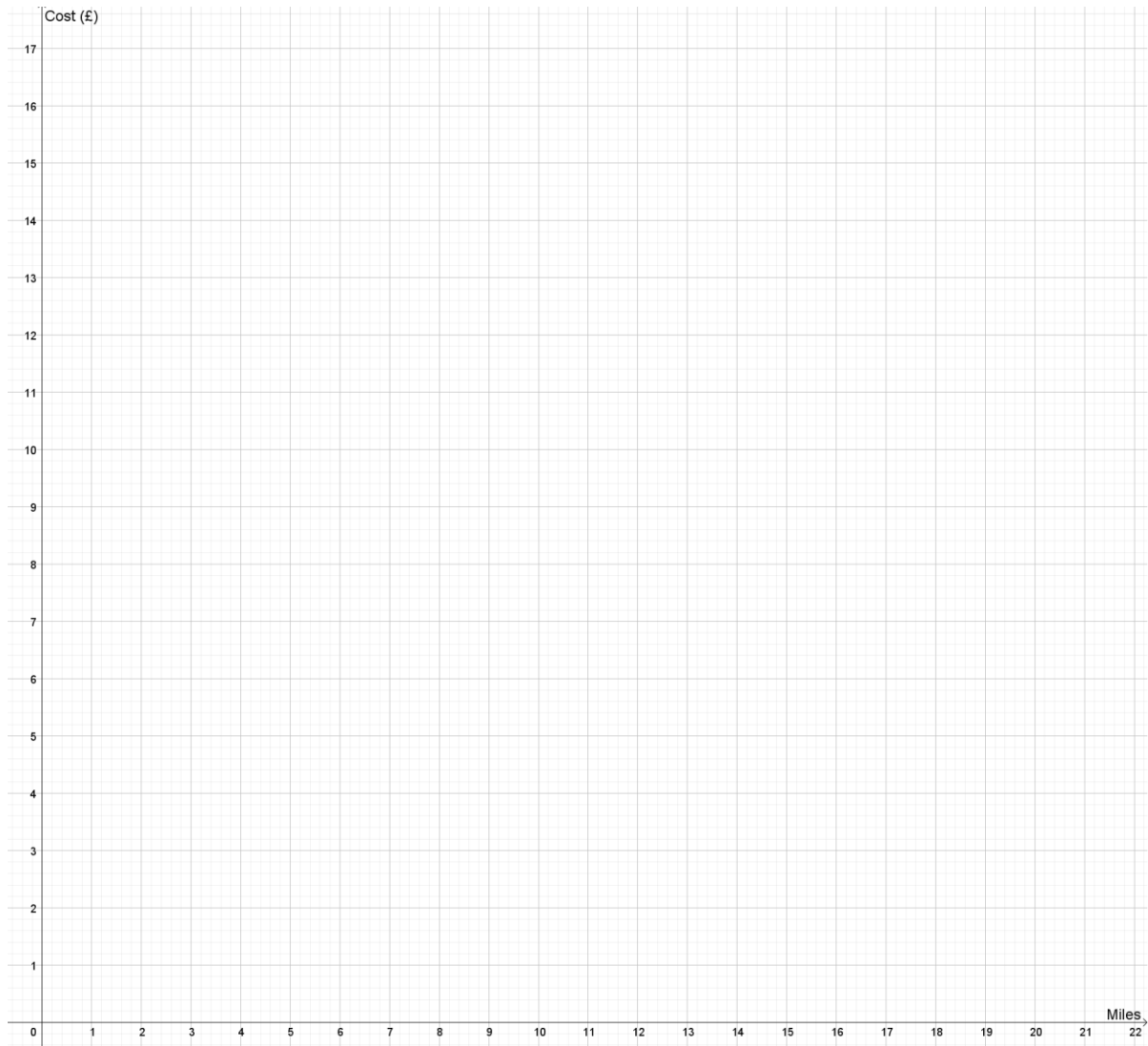
\_\_\_\_\_ [1]

- c. Find the lowest common multiple (LCM) of  $4ab$ ,  $6a^3$  and  $3a^2b^3c$ .

\_\_\_\_\_ [2]

5. ABC Taxis charge a fixed charge of £3 and then 60p for every mile travelled. 5\* Taxis charge £4 plus 45p for every mile travelled.
- a. Represent this information on the graph below

[2]



- b. Which taxi company would you recommend? Explain your answer.

[3]

6. FOR THIS QUESTION FULL MARKS WILL NOT BE AWARDED UNLESS ALGEBRA IS USED

- a. Natalya has 12 counters, some of which are yellow. If she adds 12 more yellow counters, the probability she picks a yellow is doubled. How many yellow counters did she have to start with?

\_\_\_\_\_ [3]

- b. Ian, Steven and Eugene decide to share some money in the ratio 1:2:5, but then change their minds and decide to use 1:3:5 instead. Using this new ratio, Steven receives £20 more than before. How much money do they share between them?

\_\_\_\_\_ [4]



# HARROW SCHOOL

## Mathematics section A

**90 Minutes (for sections A and B)**

*Name:* \_\_\_\_\_

You should have both sections A and B.

Section A is out of 32 marks.

Section B is out of 28 marks.

You have 90 minutes to complete both sections.

Please ensure you show full working.

Calculators and geometrical instruments are permitted.

Section A – 32 marks

1.

a. Expand and simplify fully

$$(2x)^2 + 3(2x + 3) - 2x(x - 5)$$

\_\_\_\_\_ [3]

b. Simplify fully

$$\frac{12x^3y}{16xy^4}$$

\_\_\_\_\_ [2]

c. Factorise fully  $6q^2p^3 - 2q^2p$

\_\_\_\_\_ [2]

2.

a. Find the nth term formula for the sequence that starts: 997, 995, 993, 991, ....

\_\_\_\_\_ [2]

b. How many terms of this sequence are positive?

\_\_\_\_\_ [2]

3. The operator  $*$  is given by  $a * b = ab - b + 1$

a. Evaluate  $3 * 7$

\_\_\_\_\_ [1]

b. Solve  $(x + 1) * x = 17$

\_\_\_\_\_ [3]

4. I travel at 20 mph for 25 mins. I then travel 20 miles at 50 mph. What is my average speed for the whole journey? Give your answer to the nearest whole number.

\_\_\_\_\_ [3]

5. Solve

$$y = 3x + 5$$

$$3x + 2y = 1$$

\_\_\_\_\_ [4]

6.

a. Find four numbers with mode 8, median 7 and mean 6.5.

\_\_\_\_\_ [3]

b. Is your set of four numbers the only possible one? Explain your reasoning.

\_\_\_\_\_ [1]

7.

- a. In a sale, everything is marked as 22.5% off. Tina buys a shirt for £66.65. How much money did she save?

\_\_\_\_\_ [3]

8. David wants to plant some seeds in his garden. The seeds need to be closer to point A than point B, but less than 24m from B. The scale below is 1cm:2m.

Shade on the diagram below the region he can plant the seeds.

A



B



\_\_\_\_\_ [3]



# HARROW SCHOOL

## Philosophy and Applied Ethics

**75 minutes**

*30 minutes reading and 45 minutes writing*

*Spend 30 minutes reading through the three sources provided.  
You will not be allowed to start writing your answer to the question in this time.  
You are, however, allowed to highlight/underline information in the sources.  
Do take time to plan and draft your answer.*

### Source 1

The National Post, October 1, 2013

## Canadian woman hired surrogate at controversial 'baby factory' in India



A 54-year-old Canadian woman recently returned home with a baby birthed for a fee by an Indian surrogate arranged through a controversial doctor who is building the world's first "baby factory," according to a new BBC documentary.

The Canadian, identified as "Barbara," paid a woman in Gujarat, India, identified as Edan, to be a surrogate of her son, according to the documentary, which ran Tuesday on BBC4.

The film, *House of Surrogates*, tells the story of Dr. Nayna Patel, who is building a clinic to house hundreds of poverty-stricken Indian women making babies for childless Westerners.

The one-stop surrogacy shop — complete with a gift shop and hotel rooms — is under construction as part of India's multi-billion-dollar commercial surrogacy industry.

Dr. Patel already runs the Akanksha clinic, which currently accommodates around 100 pregnant women in a single house.

The film shows Barbara forced to stay in India for four months with her newborn son, Ceron, before she got the paperwork she needed to take him home. She paid Edan to give birth to her baby, and also gave her cash to visit her hotel twice a day to continue breast feeding her new son before she returned to Canada.

"Infertility is a medical problem," said Barbara, who tried for 30 years to become a mother.

"If people born with bad eyesight get corrective eye glasses, and diabetics get insulin, why can't we get medical treatment for our problem?"

According to the documentary, hopeful parents send sperm or embryos to the clinic via courier, often only visiting India to pick up their new son or daughter.

Dr. Patel pays surrogates US\$8,000, and receives US\$28,000 from hopeful parents.

"According to many, I am controversial. There have been allegations of baby selling, baby making factory," said Dr. Patel.

"The surrogates are doing the physical work agreed and they are being compensated for it."

Currently under construction, her new clinic will have apartments for the visiting Western couples, a floor for the surrogate mothers to live, offices, delivery rooms, an IVF department and even a collection of restaurants and a gift shop.

Dr. Patel's program has already produced almost 600 babies in a decade. She has received death threats and faced accusations of exploiting the poor for profit, but she insists her work is a "feminist mission" bringing equally needy women together.

Speaking in Tuesday's documentary, she said: "These women know there is no gain without pain. I definitely see myself as a feminist. Surrogacy is one woman helping another."

Among the hopeful couples is British doctor Michael, 62, and his Russian wife Veronica, 33. She was born with one fallopian tube and one ovary, leaving her unable to carry a child. A surrogate has been implanted with two embryos.

"My last chance of trying to have my own child is to use a surrogate," Veronica said.

"The embryos for me are already alive, they are waiting for that moment where they can grow and be taken out and say 'Hello mommy'... it's like my whole future starts today, right now."

'According to many, I am controversial. There have been allegations of baby selling, baby making factory'

Husband Michael said the clinic looks ordinary from the outside, but it is professional and sterile, and no different from what he was used to in the West.

The documentary shows Dr. Patel praying as she places the embryos inside the uterus of a surrogate. In two weeks a blood test will reveal if she is pregnant.

Surrogate mum-to-be Papiya is expecting twins for an American couple and plans to spend the cash on a house for her family.

"Having twins means we get a bigger fee," she said. "Last time I was a surrogate I bought white goods, a car and lent some to my sister in law. This time I will buy a house."

Mother Vasanti and her husband Ashok have been able to send daughter Mansi to an esteemed English-speaking school thanks to the cash she has earned from surrogacy.

They currently all live in one room — shared with four more family members — but are building a new house with surrogacy fees.

Vasanti told the film makers: "Things are getting more expensive we can't afford them."

## Source 2

The Times, May 29, 2009

# Should we impose an age limit on IVF?

## **A woman who has given birth at 66 has reignited the medical and ethical debate on fertility treatment**

**Yes**

**Dr Peter Bowen-Simpkins**

Spokesman, Royal College of Obstetrics and Gynaecology

The maximum age at which a woman can receive IVF treatment varies from about 40 in NHS clinics to 50 in private clinics. It is normally accepted among fertility doctors that women over 50 should not be treated unless they are still having their periods. After that, they should not receive IVF unless there are very exceptional circumstances, such as a woman who had had a serious disease that had left her infertile.

The Human Fertilisation and Embryology Authority issues a code of practice, which we are expected to abide by. They look at our decisions when deciding whether to renew our licence. One of the primary things that we have to consider when deciding whether to offer IVF is the welfare of the child. The age of the mother is a very significant factor in their welfare.

When women are in their fifties and sixties, there are important medical risks to both mother and baby before the baby is born, even if the woman feels well. The most important risk is the likelihood of hypertension (high blood pressure). Normally this is not a huge problem, but in pregnancy it has a much more important place.

If the blood pressure is raised, women can develop preeclampsia, which can lead to growth retardation in the baby. Depending on how well the baby is doing, there may be other dangers. Women have an increased risk of getting late onset diabetes into their fifties and being pregnant can tip the balance. If they develop Type 2 diabetes, it can cause problems with the pregnancy.

The other problem that can occur is a higher incidence of antepartum haemorrhage (bleeding from the birth canal) before the baby is born. It can endanger the baby's life and the mother's. Most women over 45 end up with a Caesarean section because the bones of the pelvis don't stretch. This may lead to problems such as deep vein thrombosis which are more likely the older you get.

After the baby is born, the main concern is looking after it. A young baby is very time-consuming and older women don't adapt so easily.

Clinics abroad that treat older women perhaps do it for financial gain, rather than for the sake of the baby. The mother is intent on having a child and there is a view in society that a woman has a right to do so. But nature precludes it in later life for good reason.

People say, "Men have babies much older so why shouldn't women?". But the woman is the prime carer and is usually considerably younger than these older fathers. The 66-year-old is a single woman with no children of her own and no dependants. Who is to look after this child when she dies? Who is to look after her? When the

child is 15 and doing its GCSEs, she will be 82. Is that fair? It is easy to see why the general view is that this is selfish.

A 45-year-old is very different from a 65-year-old. You can't stop people from going abroad to have IVF treatment. But it is the NHS that has to pick up the bill if things go wrong.

**No**

**Dr Gillian Lockwood**

Medical director, Midland Fertility Services

To impose an age limit on IVF is arbitrary and unkind and does not reflect underlying health issues. It is true that the older a woman gets, risks associated with pregnancy go up. But they are still relatively low compared with the very strong desire for motherhood in later years. To assume that women can't recognise the risks and weigh up the decision is woefully paternalistic.

The medical view in countries where IVF is regularly given to women in their fifties is that as long as the woman is in good health at the outset – doesn't smoke, has normal blood pressure and is a healthy weight – she is likely to come through without significant problems. Donor eggs come from women under 35, so the risks of a pregnancy miscarrying are very low. It is vital that only one embryo is transferred, though, as more can be very dangerous.

By contrast we are often keen to help young women with very serious health problems to conceive. I have done IVF with women who have had kidney transplants or have very severe diabetes, even though they may have a curtailed life expectancy.

A fit 55-year-old can expect at least 25 years of healthy active life; a woman in her sixties might look and feel very young. It depends entirely on the individual case. It is vital to assess psychological state and find out what the motivation is. Do they have a support network – a partner, extended family and any experience of looking after children? The vision of the beautiful baby asleep in the Moses basket is not the reality. They need to be able to cope with looking after a teenager.

A lot of women see education, career and financial stability as a prerequisite for having a baby. By the time they get there, biological time has run out. Often they have held off, desperately hoping the right man was just around the corner. There are often very good reasons for waiting – they may have been caring for elderly parents.

In all cases the child's welfare is paramount. But lots of children conceived the old-fashioned way grow up as carers for elderly or disabled parents. Half of babies are made by accident. In my experience, a woman willing to put herself through the difficulties of IVF has made a very considered decision.

Evidence suggests that children born into unusual circumstances tend to receive better-quality parenting. Older people tend to be financially and emotionally more secure. The 66-year-old is independently wealthy and would be able to afford a nursery nurse.

I don't believe that older women should be a priority for donor eggs on the NHS when a shortage means that some women who have had chemotherapy can't get them. But if a woman can afford to go abroad for treatment, why not? Motivations for having babies down the centuries have been mixed.

It worries me that it is so difficult for older women to get support on IVF. If a man becomes a father in his sixties, it is "cigars all round", although women have a much longer life expectancy.

### **Source 3**

#### **Genesis 1:27-29 King James Version (KJV)**

<sup>27</sup>So God created man in his own image, in the image of God created he him; male and female created he them.

<sup>28</sup>And God blessed them, and God said unto them, Be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth.

#### **Question**

'It is the right of every woman to have a child.' Discuss this statement with reference to both sides of the argument.



# HARROW SCHOOL

## Science

**90 Minutes**

Instructions:

*Section A consists of 32 multiple choice questions.  
You must select the best answer, A-D, for each question and mark your answers on  
the separate Multiple Choice Answer grid provided.*

*Sections B, C and D are to be answered on the examination paper in the spaces  
provided.*

*Use blue or black ink for text.*

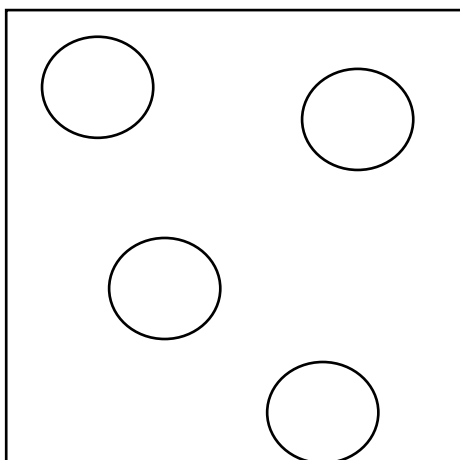
*You may use a pencil for diagrams.*

*You may use a calculator*

### SECTION A: Science Multiple Choice Questions

For each of the questions in this section, identify which one of the answers A, B, C or D is correct and then indicate your answer on the separate *Multiple Choice Answer Sheet*.

1. Which of the following statements best describes diffusion?
  - A. The movement of sugar across a cell membrane
  - B. The spreading out of salt particles in solution
  - C. The movement of hot air particles in a room
  - D. The boiling of water from a kettle
  
2. Which of the following compounds contains three atoms and two different elements?
  - A.  $\text{H}_2\text{O}$
  - B.  $\text{O}_2$
  - C.  $\text{HCl}$
  - D.  $\text{NaOH}$
  
3. The following diagram describes the arrangement of four particles in a container.



Which of the following states of matter would best describe this arrangement.

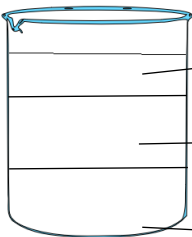
- A. Solid
- B. Liquid
- C. Gas
- D. Ice

4. The following table describes the densities of three different liquids commonly found in kitchens.

| Liquid      | Density (g/cm <sup>3</sup> ) |
|-------------|------------------------------|
| Maple syrup | 1.37                         |
| Water       | 1.00                         |
| Olive Oil   | 0.918                        |

The three liquids are combined in a beaker and the result is observed. Which of the following diagrams best describe the observations made?

A

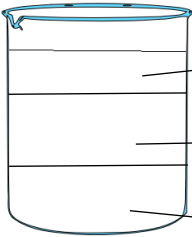


A layer of water

A layer of olive oil

A layer of maple syrup

B

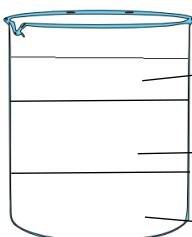


A layer of olive oil

A layer of water

A layer of maple syrup

C

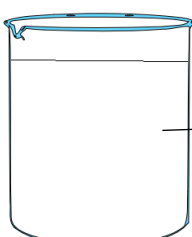


A layer of maple syrup

A layer of olive oil

A layer of water

D



A mixture of water, olive oil and maple syrup

5. Which of the following rows contains the correct numbers of atoms and elements for the compound  $\text{H}_2\text{SO}_4$ ?

|   | Number of atoms | Number of elements |
|---|-----------------|--------------------|
| A | 3               | 3                  |
| B | 7               | 3                  |
| C | 3               | 7                  |
| D | 7               | 7                  |

6. Which of the following rows correctly describes the properties of iron, a metal?

|   | Conductivity | Malleability | Magnetic properties |
|---|--------------|--------------|---------------------|
| A | Conductor    | Brittle      | Not magnetic        |
| B | Conductor    | Malleable    | Magnetic            |
| C | Insulator    | Brittle      | Not magnetic        |
| D | Insulator    | Malleable    | Not magnetic        |

7. A mixture of salt (which is soluble in water) and sand (which is insoluble in water) are added to excess water in a beaker. Which of the following describes the correct procedure to obtain pure, dry salt from the mixture?

- A. Filter the mixture, and salt will be obtained as residue on the filter paper.
- B. Evaporate the mixture, and salt will remain in the beaker.
- C. Filter the mixture and evaporate the filtrate, and salt will remain.
- D. Use chromatography to separate the mixture by solubility.

8. One molecule of water has a mass of  $2.992 \times 10^{-23}$  g. How many water molecules are there in 1 g of water?

- A.  $3.344 \times 10^{-23}$
- B.  $2.992 \times 10^{23}$
- C.  $3.344 \times 10^{22}$
- D.  $2.992 \times 10^{-23}$

9. The mass of one atom of three elements are given below.

| Element  | Mass (u) |
|----------|----------|
| Hydrogen | 1        |
| Nitrogen | 14       |
| Oxygen   | 16       |

What proportion by mass of  $\text{HNO}_3$  is nitrogen?

- A. 22 %
- B. 45 %
- C. 14 %
- D. 76%

10. A series of experiments were used to determine the order of reactivity of three unknown metals, X, Y and Z. Each metal was reacted with a solution of either  $\text{XCl}$ ,  $\text{YCl}$  or  $\text{ZCl}$ . The results are summarised in the following table; a tick indicates that a displacement was observed.

| Metal                   | Salt solution              |                            |                            |
|-------------------------|----------------------------|----------------------------|----------------------------|
|                         | $\text{XCl}_{(\text{aq})}$ | $\text{YCl}_{(\text{aq})}$ | $\text{ZCl}_{(\text{aq})}$ |
| $\text{X}_{(\text{s})}$ |                            |                            |                            |
| $\text{Y}_{(\text{s})}$ | ✓                          |                            | ✓                          |
| $\text{Z}_{(\text{s})}$ | ✓                          |                            |                            |

Which of the following gives the correct reactivity series for the following metals, in increasing order (least reactive first, most reactive last).

- A. X, Z, Y
- B. Y, X, Z
- C. Z, Y, X
- D. X, Y, Z

11. The mass of a new born baby is 7 pounds and 3 ounces. How much does the baby weigh in kg? (1 pound = 16 ounces; 1 kg = 2.2 pounds)

- A. 3.27
- B. 3.32
- C. 15.82
- D. 16.06

- 12.** What would happen to the colour of Benedict's reagent if it was added to mashed potato?
- A. turn blue-black
  - B. turn orange
  - C. turn brick red
  - D. stay the same
- 13.** If the population of blue whales in the Southern Ocean stands at 2300 in 2018 and the population continues to grow at the rate of 7% a year, what will be the size of the population in 2050?
- A. 2461
  - B. 7452
  - C. 20045
  - D. 125120
- 14.** Which is the longest section of the human gut?
- A. oesophagus
  - B. stomach
  - C. small intestine
  - D. large intestine
- 15.** Which of the following events is associated with breathing in?
- A. diaphragm moves up
  - B. intercostal muscles relax
  - C. ribcage moves upwards and outwards
  - D. diaphragm relaxes
- 16.** Which is the correct order of events in the life cycle of a flowering plant?
- A. germination → fertilisation → pollination → seed dispersal
  - B. pollination → fertilisation → seed dispersal → germination
  - C. fertilisation → pollination → germination → seed dispersal
  - D. seed dispersal → fertilisation → germination → pollination
- 17.** Amongst the different groups of vertebrates, which of the following features is only found in birds?
- A. beak
  - B. feathers
  - C. egg production
  - D. ability to fly

**18.** The weight of an average apple is about:

- A. 1 N
- B. 1 kg
- C. 100 g
- D. 1 ounce

**19.**

An experiment is carried out to measure the extension of a rubber band for different loads.

The results are shown below.

|                |      |      |     |      |
|----------------|------|------|-----|------|
| load / N       | 0    | 1.0  | 2.0 | 3.0  |
| length / cm    | 15.2 | 16.2 |     | 18.6 |
| extension / cm | 0    | 1.0  | 2.1 | 3.4  |

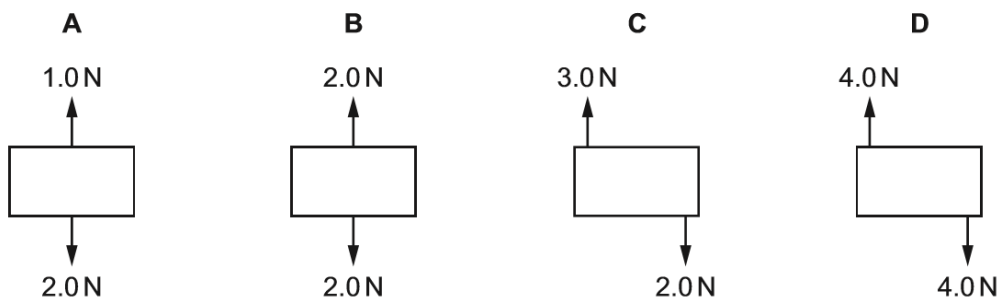
Which figure is missing from the table?

- A** 17.2                      **B** 17.3                      **C** 17.4                      **D** 17.6

**20.**

Four objects are each acted on by only two forces, as shown.

Which object is in equilibrium?



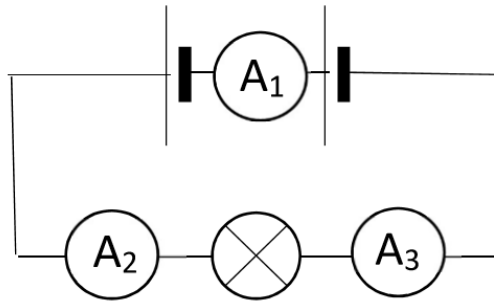
**21.** A brick of mass 3 kg is dropped from a height of 80 cm on to your foot. It takes 0.4 s to travel this distance. At what speed does it reach your foot? (The acceleration of free-fall,  $g = 10 \text{ m/s}^2$ )

- A. 2 m/s
- B. 3 m/s
- C. 4 m/s
- D. 5 m/s

**22.** Referring back to question 21, how long would it take for a 6 kg brick to fall the same distance?

- A. 0.4 s
- B. 0.8 s
- C. 0.2 s
- D. 0.1 s

23.



There are three identical ammeters in this circuit, labelled  $A_1$ ,  $A_2$ ,  $A_3$ . Which is the correct statement about the readings on the ammeters?

- A.  $A_2$  and  $A_3$  are equal, but  $A_1$  is less
- B.  $A_1$ ,  $A_2$ ,  $A_3$  are all the same
- C.  $A_1 = A_2 + A_3$
- D.  $A_2$  is less than  $A_3$

24.

In an experiment to investigate static electricity, two objects were found to attract each other.

One possible explanation for this is:

- A. Both objects were positively charged
- B. Both objects were negatively charged
- C. Both objects were uncharged
- D. One object was positively charged and the other was uncharged.

25.

A swimmer dives into a completely calm 25 m long swimming pool. The ripple from the dive travels across the surface of the pool at 2.5 m/s, reflects off the far end and travels back down the pool to meet the swimmer. After diving in at the end, the swimmer swims at a steady speed that would take him 20 seconds to swim the length of the pool. The swimmer and the returning ripple meet when the swimmer has travelled approximately:

- A. 10 m
- B. 12.5 m
- C. 17 m
- D. 20 m

26.

The masses and dimensions of four samples of metal were measured. The results are shown below:

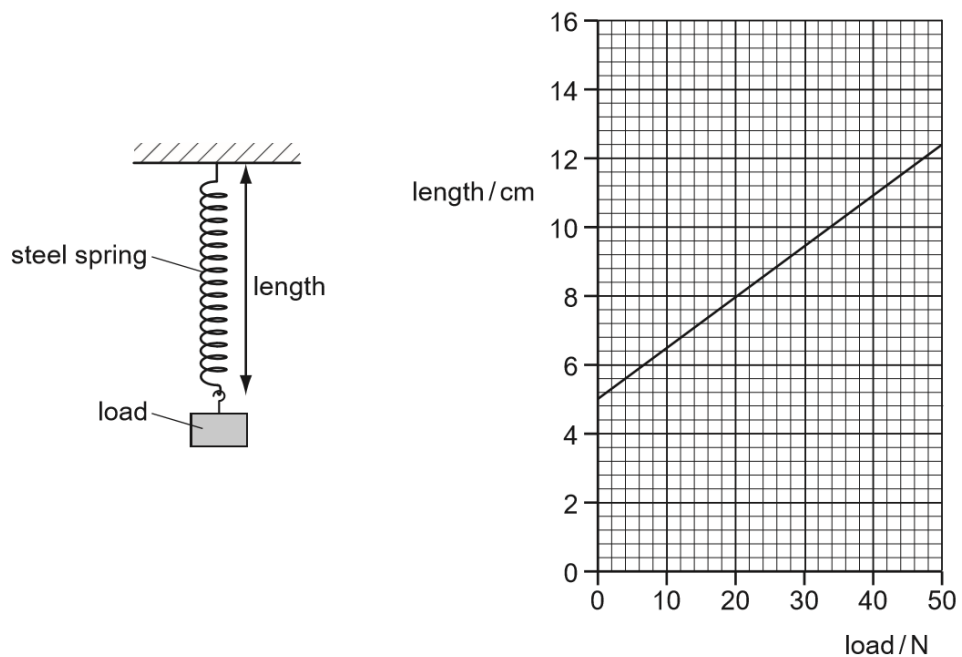
|      | Sample Dimensions (cm) | Mass (g) |
|------|------------------------|----------|
| i.   | 2.0 x 2.0 x 2.0        | 40       |
| ii.  | 2.0 x 2.0 x 4.0        | 160      |
| iii. | 2.0 x 4.0 x 4.0        | 160      |
| iv.  | 4.0 x 4.0 x 4.0        | 80       |

The two samples that could be the same material are:

- A. i and ii
- B. i and iii
- C. i and iv
- D. ii and iii

27.

The diagrams show a steel spring and a graph of its length against the load applied to it.



What is the extension of the spring when a load of 20 N is applied to it?

- A** 3.0 cm
- B** 4.5 cm
- C** 5.0 cm
- D** 8.0 cm

28.

A circular metal disc is heated.

Which quantity decreases?

- A its density
- B its diameter
- C its thickness
- D its volume

29.

The diagram shows a mercury-in-glass thermometer. The scale of the thermometer has not been marked.



The length  $l$  increases uniformly with temperature.

The length  $l$  is measured when the thermometer bulb is placed in water at  $0^{\circ}\text{C}$ , and also when it is in water at  $100^{\circ}\text{C}$ . The table shows the results.

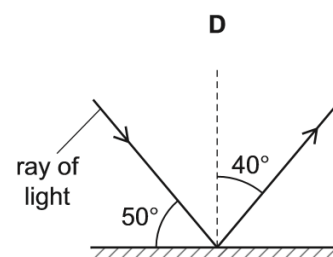
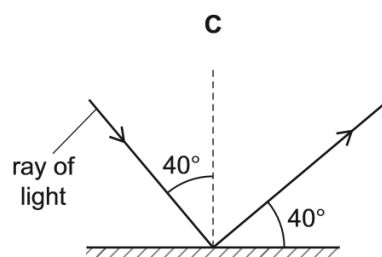
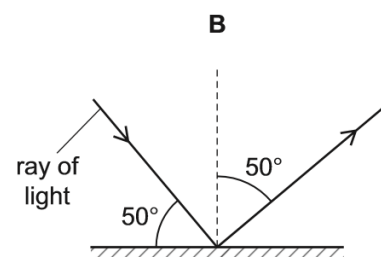
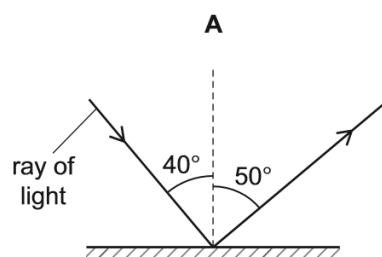
| temperature / $^{\circ}\text{C}$ | length $l$ / cm |
|----------------------------------|-----------------|
| 0                                | 2.0             |
| 100                              | 26.0            |

What is the value of  $l$  when the bulb is placed in water at  $50^{\circ}\text{C}$ ?

- A 12.0 cm
- B 13.0 cm
- C 14.0 cm
- D 16.0 cm

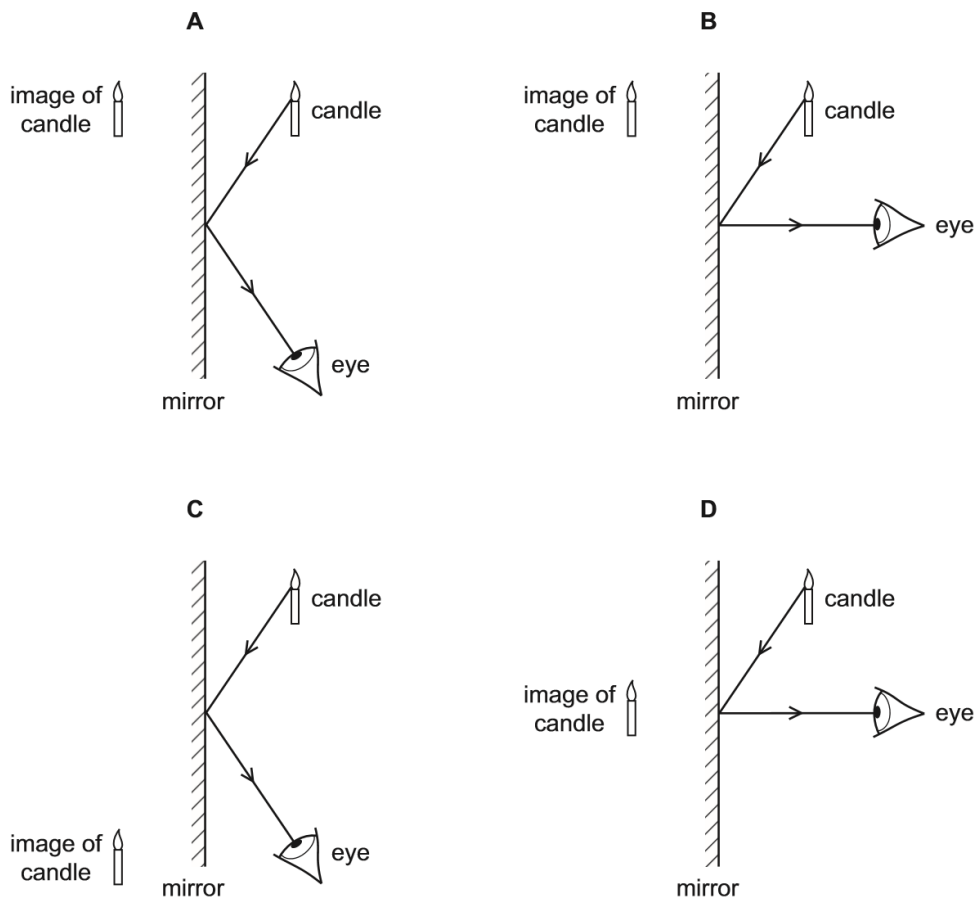
30.

Which diagram correctly shows a ray of light reflected by a plane mirror?

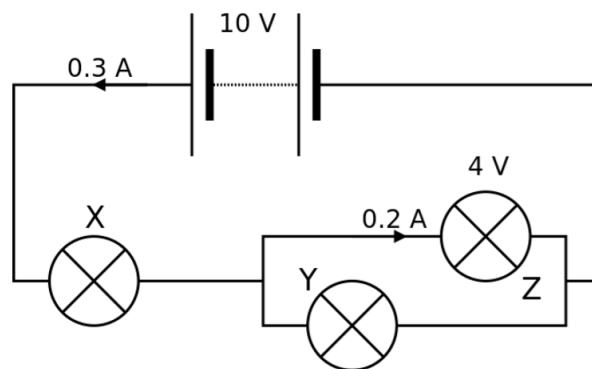


31.

Which diagram shows how the light from a candle is reflected by a mirror, and shows the position of the image formed?



32.



In the circuit above, which bulb is the least bright?

- A. X only
- B. Y only
- C. Z only
- D. Y and Z equally dim

Section A: TOTAL =  / 32

## SECTION B: Biology *Data Analysis and Experimental Design*

Duckweed is a tiny aquatic plant that grows on the surface of ponds, rivers and lakes. The plant is made up of one or more leaf-like structures called fronds connected to simple roots.



1. In the space below, draw and label a duckweed plant.

(2)

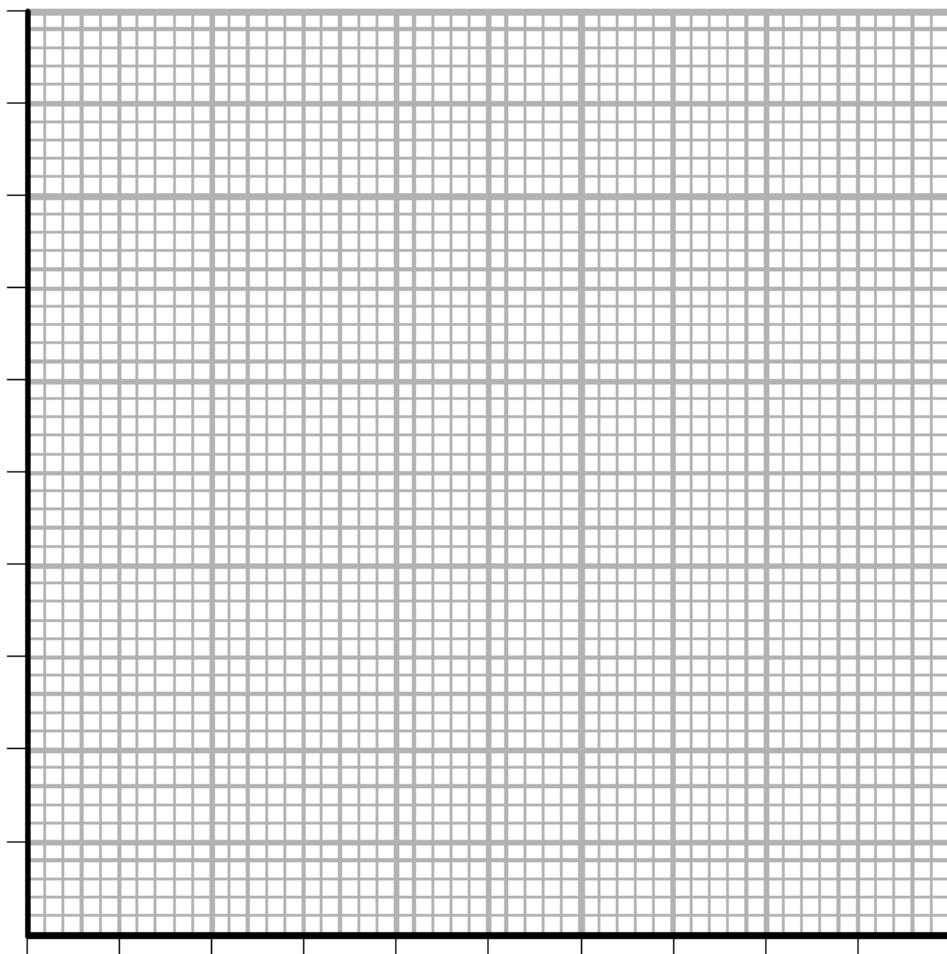
When duckweed grows it produces new fronds. Therefore, it is possible to measure the growth of duckweed by counting the number of fronds.

A student placed 4 duckweed plants with a total of 10 fronds into a beaker of pond water. She counted the total number of fronds every other day for the next 18 days. The table shows her results.

| Time (days) | Total number of fronds |
|-------------|------------------------|
| 0           | 10                     |
| 2           | 13                     |
| 4           | 19                     |
| 6           | 28                     |
| 8           | 40                     |
| 10          | 56                     |
| 12          | 68                     |
| 14          | 77                     |
| 16          | 84                     |
| 18          | 89                     |

2. Plot a line graph on the grid below to show the results of her investigation. Use a ruler to join the points with straight lines.

(5)



3. Between which two days was the greatest increase in the total number of fronds?

(1)

.....

4. Between which two days was the greatest percentage increase in the total number of fronds? Show your working.

(2)

Answer: .....days

5. Suggest an explanation for the shape of the graph.

(2)

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

The student wanted to adapt this investigation to find out the effect of magnesium ions on the growth of duckweed. She set up five beakers, each containing a mineral ion solution with a different concentration of magnesium ions. She then placed duckweed in each beaker.

6. Describe three variables that she would need to control in this investigation. (3)

.....

.....

.....

7. Explain why the concentration of magnesium ions might affect duckweed growth. (2)

.....

.....

.....

8. Suggest why counting fronds is not a very accurate method of measuring the growth of duckweed. (1)

.....

.....

9. Suggest a more accurate method of measuring the growth of duckweed. (2)

.....

.....

.....

**Section B: TOTAL =**  **/ 20**

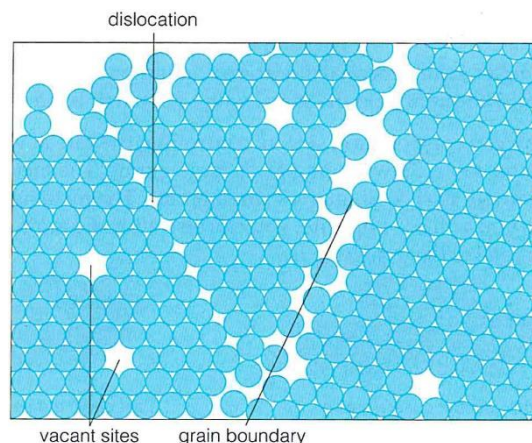
## SECTION C: Chemistry Comprehension

This question is about metals and alloys

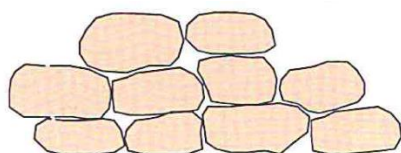
*Use ideas, phrases and words from the text below to help you understand the questions that follow, but also draw from your understanding of the Chemistry taught to you at prep school.*

### Metallic structure

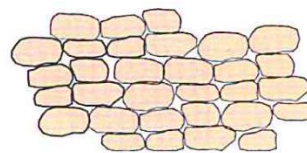
Manufacturers use metals because they are malleable and ductile, but also need to make them hard and strong for other uses. The particles of a solid metal are densely packed in regular rows, but the grains in the structure are not perfect. If you could slice through a metal and look at the grains, you would see all of them stacked at slightly different angles. Note that the atoms inside grains are all packed in the same way, but at a grain boundary (the edges of the grain) atoms are disorderly.



The size of the grains can be controlled by the rate at which molten (liquid) metal is cooled. A coarse-grain metal, in which the grains are large, forms with slow cooling. Fast cooling results in fine-grain metals, in which the grains are small.



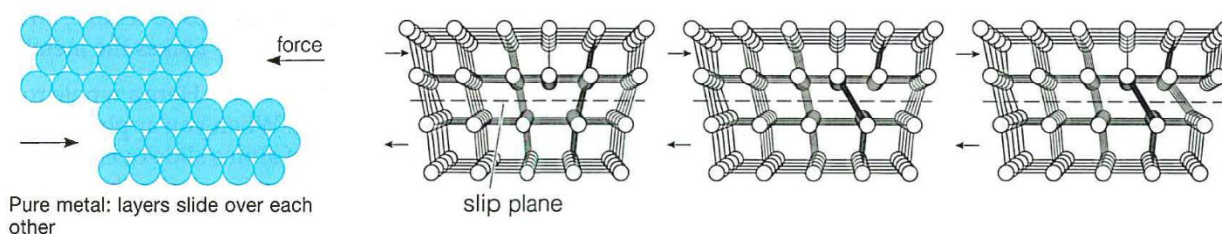
Slow cooling: coarse grains



Fast cooling: fine grains

Neighbouring atoms can move into a 'vacant site' – the spaces caused by a missing atom. The metal atoms can effectively 'diffuse' along a row; this happens more easily when the metal is warmed. The movement of atoms in the structure helps to remove strains in the metal, which makes it more malleable.

When a force is applied to a metal, the layers of atoms slide over each other at dislocations. A 'dislocation' is the name given to a whole row of missing atoms. A dislocation is likely to move to the edge of the grain as shown in the top diagram. (A dislocation can sometimes be transferred into another grain, but this would require a much greater force.) In effect, the grain boundary acts as a barrier. The result of having smaller grains is that dislocations can't move so far before they hit a grain boundary so the metal won't stretch or bend so easily.

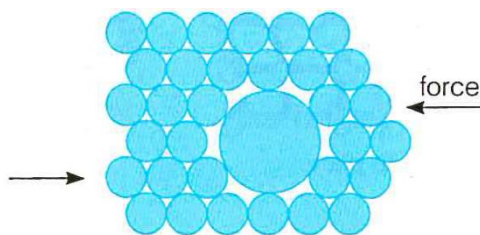


Gold occurs principally as a native metal, usually alloyed with silver or sometimes mercury. Native gold can occur as sizeable nuggets, as fine grains or flakes in alluvial deposits, or as grains embedded in rock minerals. Ores of gold are comparatively rare. Electrum is a naturally occurring alloy of silver and gold.

## Alloys

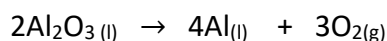
An alloy is a combination of metals that is usually harder than each pure metal individually. Alloys are made by dissolving metals and occasionally other substances into a molten metal and then allowing the mixture to cool and solidify. Just like trying to mix oil and water, one metal may not always dissolve into another metal. For example, pure iron is almost completely insoluble in copper. Even when the constituents

are soluble, each will usually have a saturation point. When making steel, iron can only hold a maximum of 6.67 % carbon; varying the proportion of carbon will change the alloys from soft (such as mild steel) to hard alloys. Although the elements of an alloy usually must be soluble in each other as a liquid, they may not always be soluble in each other in the solid state. One of the first alloys made by humans was bronze, which is a mixture of the metals tin and copper. Bronze was an extremely useful alloy to the ancients, because it is much stronger and harder than either of its components.

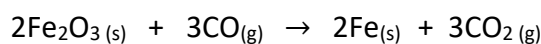


## Extracting metals from their ores; selected methods

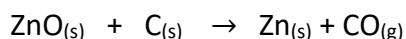
- A. Electrolysis is used to obtain metal from bauxite ore. This is a type of decomposition reaction.



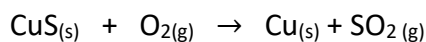
- B. Haematite ore is heated in a blast furnace.



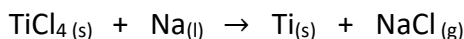
- C. Zinc blende is first converted to ZnO then heated in a blast furnace.



- D. Roasting in air is used to obtain the metal from chalcopryite.



- E. Rutile ore is first converted to  $\text{TiCl}_4$  before it is reduced by heating with a very reactive metal to obtain titanium metal.



**Now use the text above and your own knowledge to answer the following questions**

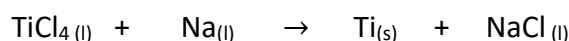
1. Explain what you understand by the term metal grain. (1)
  
  
  
  
  
  
  
  
  
  
2. The text describes diffusion along a row of metal atoms happening more easily when warmed. Explain what is meant by 'diffusion' by referring to an example you have met previously in your studies. (2)
  
  
  
  
  
  
  
  
  
  
3. Vacant sites help to make the metal more malleable. What is the opposite of malleable? (1)
  
  
  
  
  
  
  
  
  
  
4. Which is a stronger metal structure (circle the correct answer). (1)  
  
coarse grain metal                      fine grain metal
  
  
  
  
  
  
  
  
  
  
5. The text says that metals are malleable (bendy) because the layers of atoms can slide over each other. Using words/ a phrase or ideas from the text, explain why alloys are harder than the pure metal. (1)
  
  
  
  
  
  
  
  
  
  
6. The text describes a solution of iron and copper; you may be more familiar with a solution of salt and water. What do you understand by 'saturation point'? (1)

There are several pollutants in the products of these reactions.

7. Choose one of the products and, from your own knowledge, state why it is a pollutant. (1)

8. The equation for reaction E is not balanced. Balance it now.

(1)



9. Write the word equations for reactions A & E.

(3)

10. With reference to reaction B or C, explain the meaning of the terms 'oxidation' and 'reduction'.

(2)

11. Reaction e is a different type of reaction. State another type of reaction it can be classified as.

(1)

12. 160kg of zinc oxide is reacted with 24kg of carbon as in reaction C. This produced 56kg of carbon monoxide gas. What mass of zinc would be expected from this process?

(1)

Reactions are never 100% efficient. Scientists use a term called "percentage yield" to express the amount they can actually produce as a percentage of the amount they would expect under perfect, theoretical conditions.

13. Calculate the percentage yield of reaction A, if 5 tonnes of aluminium were calculated to be the theoretical maximum amount, but only 2.83 tonnes were made.

(1)

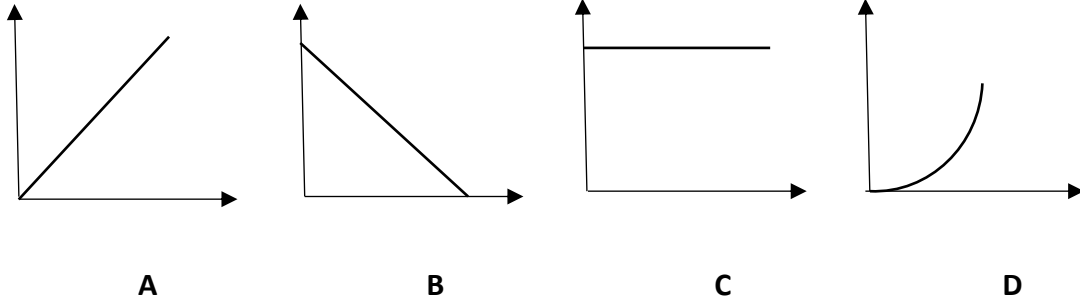
Section C: TOTAL =  / 17

## SECTION D: *Physics Problems*

### 1. GRAPHS

Questions a - d all relate to the 4 graphs below.

For each of the questions a - d, select which of the graphs A, B, C or D best represents the physical relationship described. In each question the first variable mentioned is on the y-axis (vertical axis).



- a. Distance travelled against time by a basketball dropped from the top of a 10m high wall (assuming air resistance is small enough to be ignored).

Answer: \_\_\_\_\_

- b. Speed against time for a basketball which is thrown vertically into the air.

Answer: \_\_\_\_\_

- c. Acceleration against time for an object which is subjected to a constant resultant force.

Answer: \_\_\_\_\_

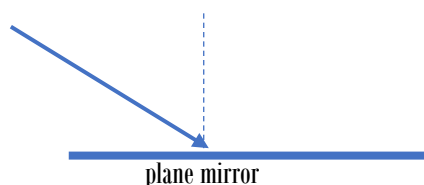
- d. The pressure exerted on a fixed area against the force applied on that area.

Answer: \_\_\_\_\_

(4)

## 2. LIGHT

- a. The *Law of Reflection* states that the *angle of incidence* ( $i$ ) of a ray of light striking a plane mirror is equal to the *angle of reflection* ( $R$ ).
- i. Complete the diagram below to illustrate the law. Draw in the path of the reflected ray and then label the angles  $i$  and  $R$ .



(3)

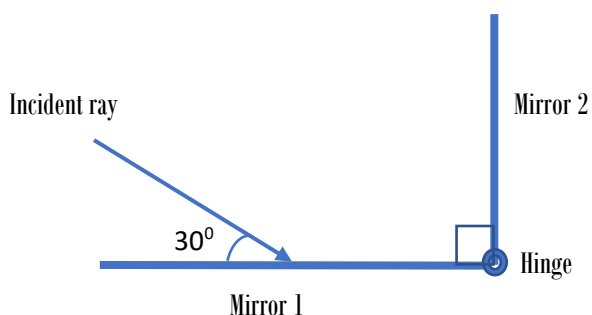
- ii. What is the name of the dashed line in the diagram?

\_\_\_\_\_

(1)

Another plane mirror is now attached on a hinge to one end of the plane mirror above and this second mirror can be swung through different angles.

In the first instance, the mirror is rotated about the hinge until it makes an angle of  $90^\circ$  with the other mirror. An incident ray of light strikes the first mirror as shown in the diagram below (which is **not** drawn accurately to scale!).



- iii. Complete the path of the incident ray as it reflects off both mirrors and emerges from the mirror set.
- iv. Show by *calculating* angles along its path (and NOT by scale drawing!) that the ray that emerges from the mirror set has been turned through  $180^\circ$  from the original direction of the incident ray. Labelling angles clearly on your completed diagram above will be a good way to show your reasoning here.

(2)

(2)

- v. Mirror 2 is now rotated anticlockwise about the hinge until it makes an angle of  $60^\circ$  with Mirror 1. Show, by drawing a suitable diagram below, that the same incident ray as above would also have been turned through  $180^\circ$  by the time it emerges from the mirror set.

(2)

- vi. Mirror 2 is now rotated about the hinge in a clockwise direction until it makes an angle of  $120^\circ$  with Mirror 1. Calculate the angle through which the same incident ray will be turned from its original direction by the time it emerges from the mirror-set.  
(*You may find drawing a diagram useful*).

(3)

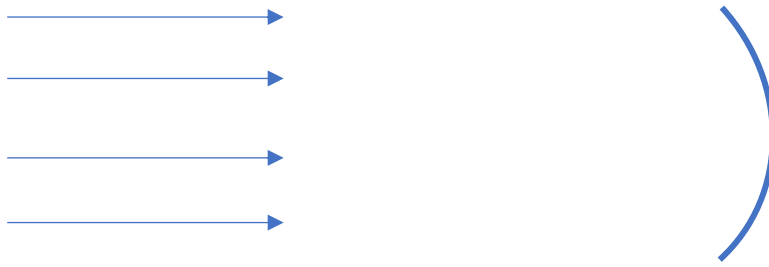
- b. The photograph shows the telescopes in Harrow School's *Rayleigh Observatory*.



There are three telescopes altogether, the principle instrument being a 400 mm reflecting telescope: that is, its main (*objective*) mirror has a diameter of 400 mm.

This objective mirror is a concave mirror. Such mirrors are often called *converging* mirrors because they *converge*, or focus, parallel rays of light which reflect off them.

- i. Complete the ray diagram below to show how the converging mirror focuses the 4 incoming parallel light rays.

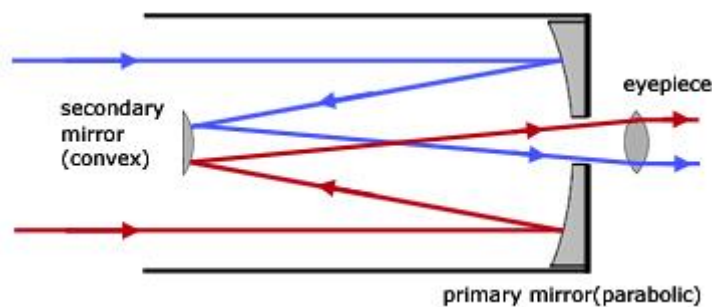


(2)

- ii. A convex mirror is sometime called a *diverging* mirror because it *diverges* incoming parallel rays after they have reflected off it. Sketch a diagram in the space below to illustrate this.

(2)

The Rayleigh Observatory's 400 mm telescope is a particular type of reflecting telescope called a Cassegrain. It uses both a large concave mirror (the primary) and a smaller convex mirror (secondary) to focus light through a hole in the middle of the primary mirror to an eyepiece. This eyepiece can be replaced by a camera when we want to take photographs. The diagram below shows what happens to the light from a distant object as it enters (from the left) and then passes through the telescope:



- iii. Will the image of the object observed when looking at it through the eyepiece be the right way up or upside down? With reference to the diagram, explain your answer.

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(2)

- iv. Some of the objects we photograph are very distant and so are extremely faint. State two things one can do to maximise the detail that can be captured in photographs of extremely faint objects when using cameras attached to telescopes.

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(2)

**Section D: TOTAL =**  **/ 25**