Eton College King's Scholarship Examination 2008

GENERAL 1   **(One and a half hours)**

NOTICE REGARDING PAST PAPERS

We have given some answer sheets where they are required with figures or words. Where the answer sheets were simply lined paper with question numbers printed on them, they have been omitted to save paper and postage.

Please note that the illustrations for the insert in Question 2 are not reproduced in colour for the purposes of past papers.

*Answer **all** the questions on the answer sheets provided. Each question is worth 25 marks.*

*You need not answer the questions in the order set, but you must start each one on the appropriate answer sheet. There are extra sheets at the back of the pack. If you have not finished a question after 20 minutes you are advised to leave it and go on to another. Return to any unfinished question if you have time left at the end of the paper. **Remember to write your candidate number on every answer sheet.***

You are permitted 15 minutes' reading time before starting this paper. It is recommended that you use this time to familiarize yourself with the outline of the questions rather than trying to work out any of the answers in detail. YOU MAY NOT WRITE ANYTHING DURING THIS PERIOD.

[Question 1 begins overleaf]

Question 1

Part A

A cipher is a way of making a word or message secret by changing or rearranging the letters. A 'shift' cipher works by shifting the alphabet a certain number of places to create a new alphabet. For example, a 'shift' of 6 means that A becomes the 7th letter of the alphabet, as illustrated below.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T

So using the 6 shift cipher the message COWS EAT GRASS would appear as WIQM YUN ALUMM.

Solve the ciphers below. Each one uses a different shift. The grids here are to help you with your working. **Write your answers in the answer booklet.**

a) shift of 9   JHLZIIVCJ ILE LG KIVVJ

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

b) shift of 14   YK XMPK AIZQD TMFQE OMFE

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

c) shift of 19   AOL MLTHSL KVN KYPURZ

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

d) shift of 2   AYPQ KMTC DYQR

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

e) shift of 7   B PTGM YHHW GHP

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

[5]

Part B

Your five answers to Part A are the *rough* English translations of five sentences from the canine language called *Wooflish* which appear in random order below. Match up the English and the *Wooflish*.

To do this you need to know the following facts about *Wooflish*.

- word order is the same as in English
- *Wooflish* has the same words for subject pronouns as for possessive pronouns (e.g. we = our, you = your, they = their etc)
- there is no difference between expressions of time and manner (e.g. in a long time = slowly)
- there are no prepositions (e.g. through, up)
- there are no articles (e.g. the, a)
- some words can be verbs, nouns and adjectives all at the same time (e.g. to burn = fire = burning = fiery)

Write the *Wooflish* under the English in the answer booklet.

a)   PUF WAH PAW PAH BOW
b)   WAH GAW WUF
c)   GAV YAP WOW
d)   BUF YAP GOV
e)   PUF WOF YUP GOV   [5]

Part C

You have now met fourteen words of *Wooflish* and have seen some examples of the language at work. Here are five more words of *Wooflish*. For each word give <u>two</u> more possible meanings. **Write your answers in the answer booklet.**

a)   DOH – stupid
b)   GRR – fight
c)   UAH – flea
d)   FAM – they
e)   MUF – yesterday

                                                                [5]

Now using the words you know of *Wooflish* and your imagination, make up five short sentences of your own in *Wooflish*. Each sentence should be at least three words long. Bearing in mind the various possible meanings for each word, translate the sentences into English. Credit will be given for accuracy and originality. **Write the *Wooflish* and the English in the answer booklet.**

                                                                [5]

                                                         [Total 25]

· **End of Question**

Question 2

Read the passage below by Henri Matisse and answer the questions which follow.
Write your answers in the answer booklet.

"What I am after above all, is expression ... Expression to my way of thinking does not consist of the emotion mirrored upon a human face or betrayed by a violent gesture. The whole arrangement of my picture is expressive. The place occupied by figures or objects, the empty spaces around them, the proportions, everything plays a part. Composition is the art of arranging in a decorative manner the various elements at the painter's disposal for the expression of his feelings. In a picture every part will be visible and will play the role conferred upon it, be it principal or secondary. All that is not useful in the picture is detrimental. A work of art must be harmonious in its entirety; for superfluous details would, in the mind of the beholder, encroach upon the essential elements."

Henri Matisse, *Notes of a painter*, 1908.

a) Matisse argues here that a painting does not have to *depict* emotion in order to *express* emotion. What does Matisse mean by expression in art? [6]

b) Study Matisse's painting *The Dance* (Illustrated in Figure A on the colour insert). How is Matisse's idea of expression reflected in *The Dance?* [7]

c) Study Francis Bacon's *Study after Velazquez's Portrait of Pope Innocent X* (Illustrated in Figure B on the colour insert). How far do you think Bacon would agree with Matisse's idea of expression? Discuss with reference to specific details of both paintings and the extract. [12]

[Total 25]

End of Question

Figure A Henri Matisse, *The Dance*, 1909-1910. Oil on Canvas 260x 391 cm (State Hermitage Museum, St Petersburg)

Figure B Francis Bacon: *Study after Velazquez's Portrait of Pope Innocent X*, 1953. Oil on canvas, 153 x 118.1 cm (Des Moines Art Center, Iowa).

Question 3

Theories regarding the nature of the Earth and Universe have
continually developed over the past 3000 years.

It was once believed that the Earth was a flat disc, as illustrated in
Figure 1. Simply observed, the Earth's surface is essentially a two-
dimensional region (albeit with surface features, such as hills and
mountains). It is natural to assume that such a two-dimensional region
is flat. However, it is more than 2000 years since evidence was
obtained to demonstrate that this region is actually curved around on
itself, as the surface of a sphere.
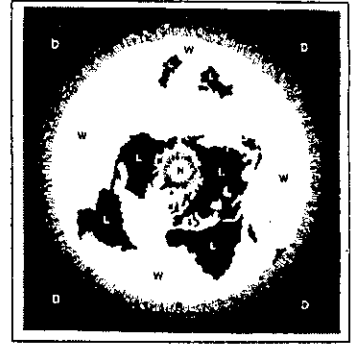
Figure 1: Map to illustrate
the 'Flat Earth'

Around 350 BC, Aristotle proposed that the spherical Earth is fixed at the centre of
the Universe. According to Aristotle's model, the Universe is a sphere. The
constellations of stars exist in a fixed arrangement, embedded in the surface of this
sphere. Against this backdrop of stars, planets (such as Mars and Venus) orbit the
Earth, as do the Sun and Moon. This is known as the **geocentric** theory of the
Universe.

a) Suggest a simple observation of the physical world that would have led
   Aristotle to conclude that the Sun orbits the Earth. Explain your answer.

[2]

b) According to Aristotle's model, how long does it take the Sun to complete one
   full orbit of the Earth? Explain your answer.

[2]

[Turn over]

One failing of Aristotle's model was the observed **retrograde motion** of planets such as Mars. As viewed from Earth, over an extended period, Mars does not always proceed in a uniform direction across the night sky. At regular intervals, Mars appears to travel in reverse for a short period of time, before resuming its original direction.

Ptolemy accounted for retrograde motion by modifying the geocentric theory. He suggested that Mars followed an orbit within another orbit around the Earth. According to Ptolemy, Mars is found in a small, fast circular orbit known as an **epicycle**. The centre of this epicycle then follows a much larger, slower circular orbit – known as the **deferent** – around the Earth. This system is illustrated in the diagram below.
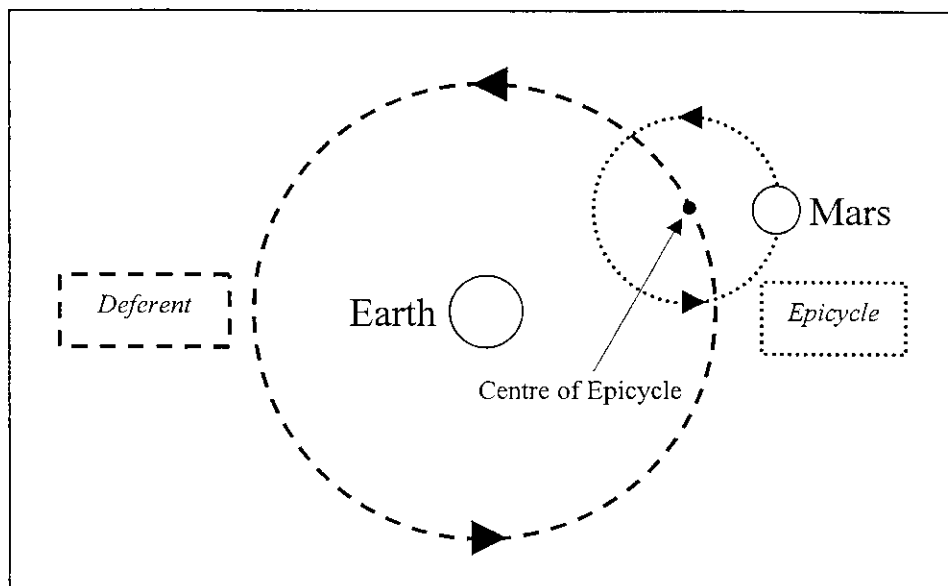
Figure 2: The Epicycle and Deferent of Mars

c) On the copy of Figure 3 **provided in the answer booklet**, show the complete path that Mars would take in its orbit around the Earth, according to Ptolemy's modified geocentric theory. [2]

d) Briefly explain how this model accounts for the retrograde motion of Mars as viewed from Earth. [2]
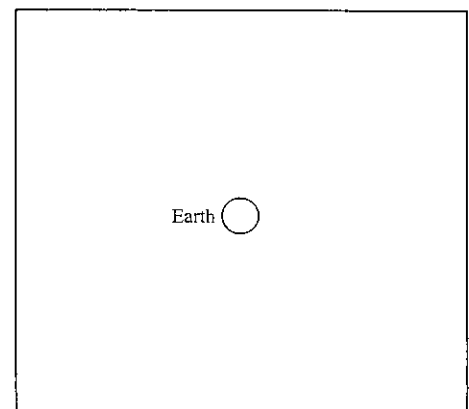
Figure 3

Around 500 years ago, Copernicus proposed the **heliocentric** theory of the Universe, in which the Universe is still a sphere but with the Sun, not the Earth, at its centre. The heliocentric model retains the orbit of the Moon around the Earth. However, the Earth and other planets are all in orbit around the Sun.

Figure 4 shows the corresponding positions of Earth and Mars, both in orbit around the Sun, at seven equally-spaced time intervals.
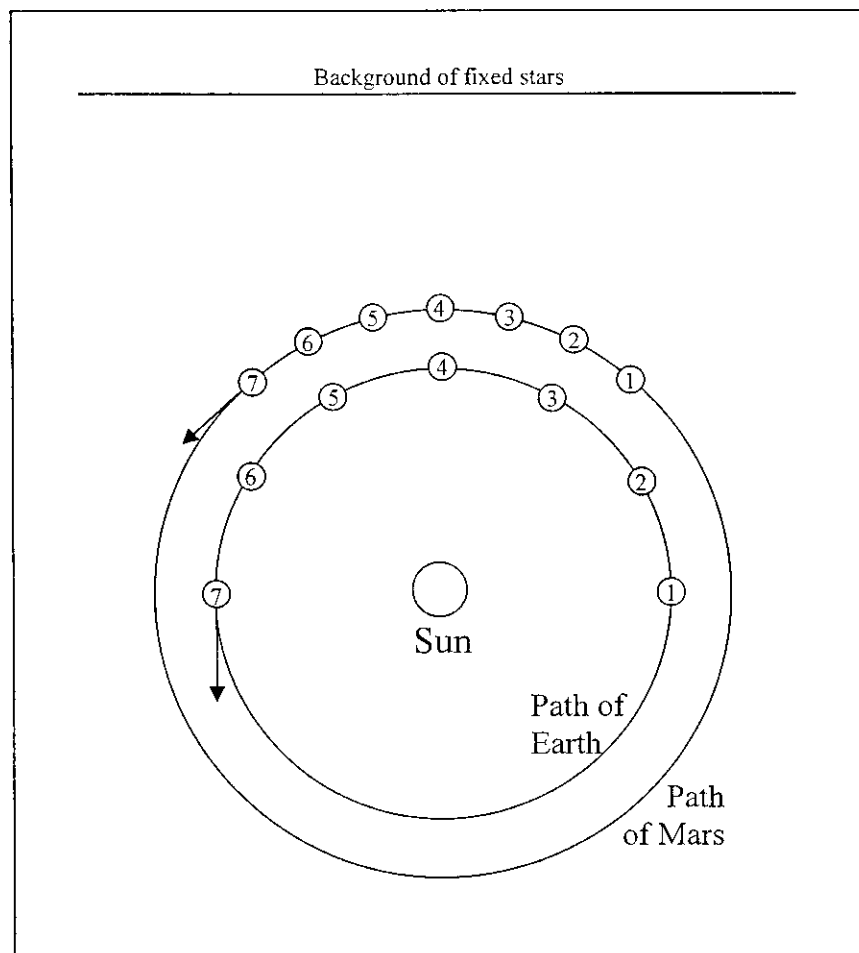

Figure 4

e) How long does it take each planet to move from position 1 to position 7?

[1]

f) By considering the position of Mars against the backdrop of fixed stars, as viewed from Earth, use the heliocentric model to explain the observed retrograde motion of Mars. **Do so by adding to the copy of Figure 4 provided in the answer booklet AND writing a supporting explanation.**

[3]

[Turn over]

About 300 years ago, Newton explained that gravity (being the force that causes objects to fall towards the Earth) is also responsible for holding planets and moons in astronomical orbits. He did so by imagining a cannon, placed at the top of a very high mountain, firing a ball horizontally. Figure 5 illustrates the trajectories of three cannon balls fired with progressively greater speeds.
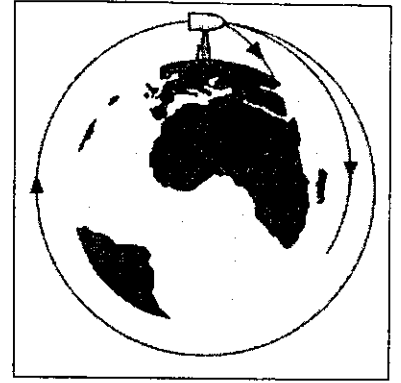

Figure 5: Newton's Cannon

g) With reference to the diagram, explain how the downward pull of gravity can cause an object to orbit a planet.

[3]

Newton believed that the Universe is infinite in extent, and therefore without a boundary. Approximately 200 years later, Einstein proposed that the Universe does not have a boundary, in agreement with Newton. However, unlike Newton, Einstein believed that the Universe was finite (*not* infinite) in size.

Analogies can be drawn between this issue and a comparison of the flat disc and spherical descriptions of the Earth.

h) For both the flat disc and spherical descriptions of the Earth, explain whether the Earth's surface can be said to:
   • be finite in size;
   • possess a boundary.

[3]

i) Explain how Einstein might have used these ideas to justify his hypothesis that the Universe is finite in size but without a boundary.

[3]

Despite the fact that the Earth's surface appears to be flat, we now know that it is curved.

j) Give one other example of an idea that was once widely believed but is now known to be incorrect. Explain how careful observations led to a change of opinion.

[4]

End of Question

[Total 25]

Question 4

Read the information below and answer the question which follows it.

In law, every owner of a property owes a duty to people who visit his property. This duty is as follows:

❖ A duty to take such care as in all the circumstances of the case is reasonable, in order to see that the visitor will be reasonably safe in using the property for the purposes for which he (the visitor) is invited or permitted by the occupier to be there.

Therefore, if a visitor is injured when visiting someone else's property and the owner has **not** carried out his duty, the owner will be held responsible for the injury and may have to give the visitor financial compensation.

However, there are some other rules which affect the owner of the property's duty:

❖ The owner of the property must take extra care when executing his duty if the visitors are children.
❖ The owner of the property can give a warning to his visitors of potential danger. If this warning was enough to make the visitor reasonably safe, then the owner of the property will not be held responsible if a visitor is injured.
❖ If the visitor knows that there may be risks at a property, accepts the risk and decides to go ahead and visit it anyway, the property owner no longer owes a duty of care to the visitor.

You are a judge. In the following two scenarios, decide whether, according to the information above, the owner of the property should give compensation to his visitor(s). Explain the reasons for your decisions, referring to the information above. Each explanation should be of approximately 200 words and should be written in the answer booklet.

a) Two children, Jack and Jill, decided to cross a field owned by Simple Simon. There were lots of bushes in the field with berries, which looked like large blackcurrants, on them. The berries were highly poisonous. On the gate at the entrance of the field Simple Simon had placed a very old sign, which read: 'Warning, do not pick the berries – poison'. The words on the sign were badly worn away and it was difficult to read. The sign had been left hanging at an angle. There were no further signs warning of danger. However, Simple Simon had chopped the lower branches of the bushes down, so that it was more difficult to pick the berries. Jack and Jill entered the field through the gate. On seeing the bushes, Jack and Jill walked over to them. Jack sat on Jill's shoulders so that he could reach the berries. He and Jill both ate the berries. Later that evening they became extremely ill and required hospital treatment.

[Turn over]

b)   A woman called Cinderella took a short cut to her local railway station across a field owned by Snow White. Members of the public had been crossing Snow White's field to get to the railway station for 35 years. Snow White had made attempts to prevent people from doing so but had never taken any serious action because some of the people stopped at her house to buy milk that she sold there and she was pleased to be able to sell it. One day, when crossing the field, Cinderella was attacked by a bull which had been placed in the field by Snow White. The bull had been in the field for many months. Cinderella knew that it was there and had regularly crossed the field before when it was present.

[Total 25]

End of Paper

Question 1.
Part A

a)

b)

c)

d)

e)

Part B

a) **English**

   Wooflish

b) **English**

   Wooflish

c) **English**

   Wooflish

d) **English**

   Wooflish

e) **English**

   Wooflish

Question 1 (cont'd)
Part C

a)

b)

c)

d)

e)

Sentences

i) Wooflish

  English

ii) Wooflish

  English

iii) Wooflish

  English

iv) Wooflish

  English

v) Wooflish

  English

Question 3

a) _____

_____

b) _____

_____

c) Please add to this diagram to provide your answer.

Earth ◯
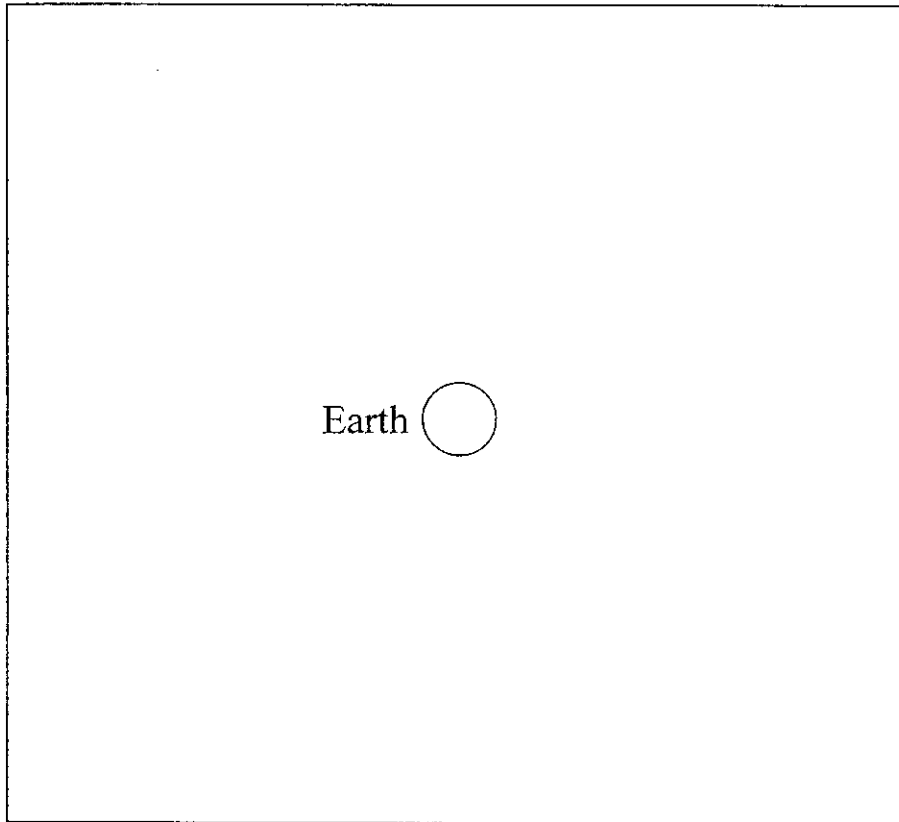
d) _____

_____

e) _____

Question 3. (cont'd)
f) Please add to this diagram. You must also write an appropriate explanation.

Background of fixed stars

Sun

Path of
Earth

Path
of Mars
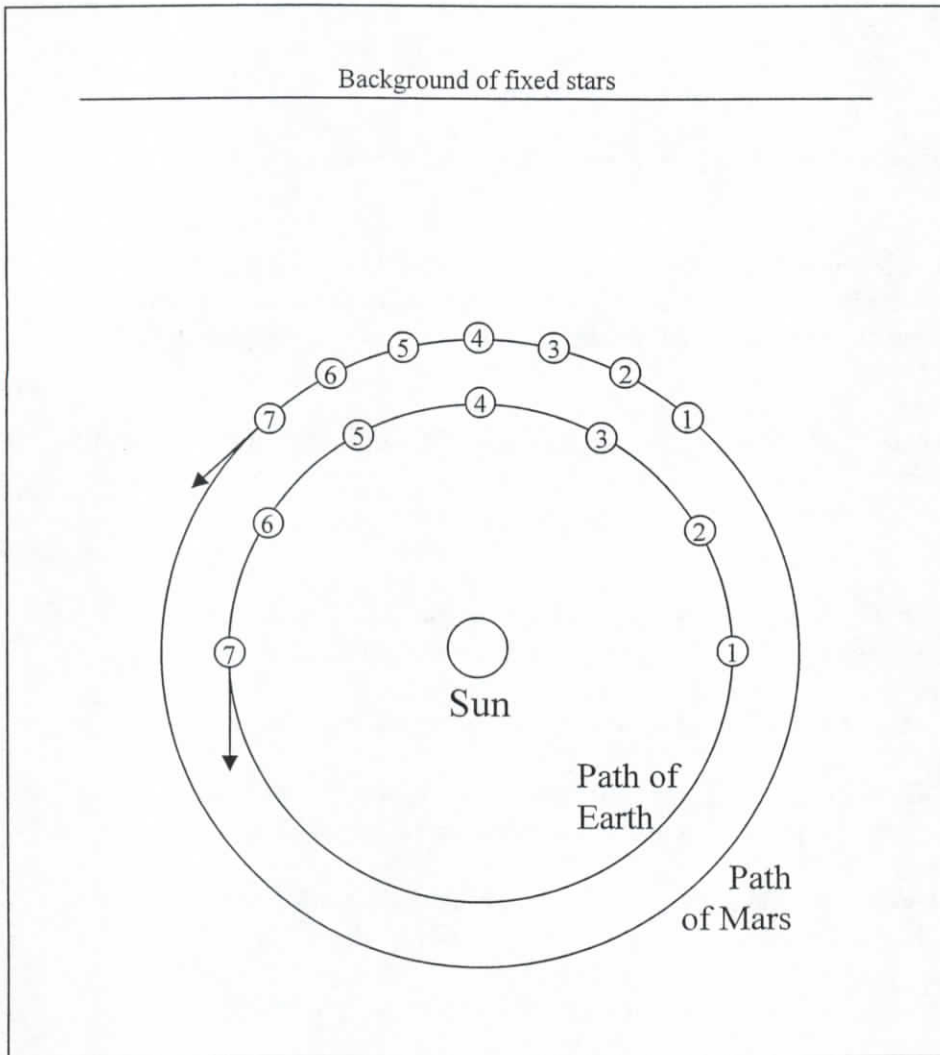
g) _____

_____

Eton College King's Scholarship Examination 2008

ENGLISH (One and a half hours)

You are advised to divide your time equally between all tasks. Attempt all questions.

T H White was a schoolteacher-turned-writer who had a passionate interest in nature. In *The Goshawk*, he describes the sometimes painful process of training a hawk to the traditional art of falconry, where the will of the trainer must remain strong in order to break the will of the bird...

Read the passage from T H White's *The Goshawk* (1951) and then answer the five questions that follow.

I was standing outside the door when I noticed a rook cawing at a tree. A couple of hundred yards away down-wind, he circled the top, cursing. I ran at once, and there was Gos. Confused, obstinate, too wet to fly, he sat on the tip of the topmost branch and radiated indecision.

I stood in the sousing rain, hatless and coatless, for half an hour, holding out a piece of liver and a handkerchief as a lure. He would not come.

The tempestuous air came gustily, increasingly, until he was exasperated. Half thinking to come down to me, he shook out his wings but wheeled in a stream of wind which came just at that wrong moment, but swung, but was blown away. I ran, trying to mark him down, but the wet wind went too fast.

Three hours later, I was pretty sure of his position, having noticed the cursing of blackbirds, magpies and rooks in a certain quarter; but I could not see him. I came home to think and get help.

At six o'clock, I went back to the place at which I had last suspected him, knowing that he would still be there on account of the rain. Hawks did not like to fly when thoroughly wet. William came with me, my ever-present help in time of trouble. I left him at various key places which commanded a wide horizon, going round myself, whistling. Quite soon, we had marked him at the top of a tree in the middle of the wood. The wood was thick, almost impassable. I went in, leaving William to observe from outside in case the hawk should again swing out of the wood's restricted

purview. From then till eight o'clock, I knew where he was all the
time. William went back for the tame pigeon, and this I now used
as lure, in desperation making the poor creature flap its wings and
finally fly at the end of a creance. Gos began to stoop at the pigeon,
but turned aside as the creance checked it: a series of half-hearted
stoops, which carried him from tree to tree, like a swing. If only I
had gone with this, I should have had him. But the brutality was
too much. I had known this pigeon: it had sat on my finger. I
could not bear any longer to cast it in the air and to pluck it down,
terrified and exhausted.

T H White, *The Goshawk* (1951)

1. Imagine that you are Gos, the hawk. Describe your feelings and your thoughts
   as you resist the writer's attempt to recapture you.

   You may write either prose or verse (rhymed or free). Credit will be given for
   adventurous use of language and control of style. [20]

2. "I stood in the sousing rain, hatless and coatless . . . "

   Imagine that you are the hawker.
   Describe how you felt for this half hour. [20]

3. Imagine who William might have been and what he might have looked like.

   Write an extra section for the book in which you give a personal description of
   him. [20]

4. White might well have composed a short conversation between William and
   himself in which they discussed their tactics.

   Do this for him, punctuating correctly and clearly. [20]

5. Imagine how you might have gone about the task of capturing the bird.

   Write instructions, in your own words, of how you might go about this task.
   [20]

[End of paper]

Eton College King's Scholarship Examination 2008

(One and a half hours)

MATHEMATICS A

Answer Question 1 and as many of the other five questions as you can.
Question 1 is worth 50 marks. All other questions are worth 10 marks each.

Show all of your working. Calculators are allowed on this paper.

1. **Compulsory Question**

    (a) Find the positive value of v where $v^2 = u^2 + 2as$ and $u = 5$, $a = 3$ and $s = 4$. [2]

    (b) Solve the following inequalities :

    (i) $\dfrac{x+3}{2} > 11$

    (ii) $17 - 3x > 29$ [2, 2]

    (c) Calculate the following:
    (i) 25% of £36
    (ii) 17.5% of £3000 [1, 1]

    (d) Solve the following:

    (i) $\dfrac{1}{2}(x+5) = 3$

    (ii) $\dfrac{3}{2}(x-1) + \dfrac{1}{5}(x+2) = 4$ [1, 2]

    (e) (i) Find the 50th term of the sequence 3, 5, 7, 9…

    (ii) Which term of the sequence 3, 5, 7, 9… is equal to 249? [1, 2]

    (f) James decides that he wants to make a pudding.
    (i) If his recipe book tells him that he requires 40g of sugar for 6 people then how much sugar does James need for 9 people? [2]

    (ii) James buys the sugar from the supermarket, which was offering the sugar at a reduced price of 64p. If its original price was 80p then find the percentage discount for the sugar. [2]

   (iii) If the 40g of sugar needed for 6 people was 8% of the bag of sugar then how much did the bag hold? [2]

Please turn over

(g)   A triangle has angles of x, $2x-10$ and $3x+40$. Find the value of x.   [3]

(h)   (i)   A cuboid measures 5cm by 6cm by 10cm. A cylinder has radius 5cm and height 4cm. Which has the larger volume?   [3]

(ii)   A 15cm by 20cm rectangle forms the base of a box of height 8cm. If the box is filled up with water and the water then poured into containers measuring 3cm by 4cm by 2cm then how many such containers will be filled?   [2]

(i)   Solve the following simultaneous equations:
$$5x - 3y = 26$$
$$3x + 2y = 27$$
[4]

(j)   A set of 19 boys did a test (marked out of 50) in which the mean mark was 35. The 20th boy in the set then did the test.
(i)   What is the largest possible value of the mean mark for all 20 boys?
[2]
(ii)   Given that the mean mark for all 20 boys decreased to 34, find the score that the 20th boy got in the test.   [2]

(k)   Two dice, one red and one blue, are rolled. Find the probability that:
(i)   The red dice shows a 5.   [1]
(ii)   The sum of the scores is 12.   [2]
(iii)   The two dice show the same score.   [2]

(l)   A rectangular field is three times longer than it is wide. If it is 40m wide then find the greatest distance (to 3sf) between any two points in the field.   [2]

(m)   Calculate the following, <u>showing all your working</u>:
(i) $3\frac{2}{5} + 4\frac{1}{3}$
(ii) $2\frac{1}{4} + 3\frac{1}{9}$ [2, 2]

(n)   Evaluate the following:
$$\left(1+\tfrac{1}{2}\right) \times \left(1+\tfrac{1}{3}\right) \times \left(1+\tfrac{1}{4}\right) \times \left(1+\tfrac{1}{5}\right) \times .... \times \left(1+\tfrac{1}{19}\right)$$ [3]

2. A stationery shop sells a large roll of adhesive tape. The roll has 66m of tape on it. A boy is asked to find the thickness of the tape.
He uses a ruler to find that the cardboard disc around which the tape is wound has diameter 82mm and that the overall diameter (with the tape) is 102mm.
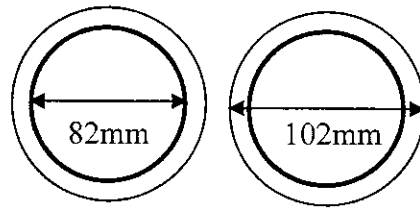
(a) Find (to 3sf) the cross sectional area (shaded above) of the tape (in mm^2). [2]

(b) Hence find (to 3sf) the thickness of the tape. [4]

The boy now wants to find the thickness of the tape when the roll has length lm, the diameter of the core is $d$mm and the overall diameter (with the tape) is Dmm.

(c) Find an expression for the thickness, T (in mm), of the tape. [4]

3. (a) Expand and simplify the following:
    (i) $(x+8)(x-8)$

    (ii) $\dfrac{(x^2+2x)}{x}$

    (iii) $(x-1)(x^2+x+1)$

    [1, 2, 2]

    (b) Without using a calculator and without any complicated calculations, use (a) to evaluate the following (showing all your working clearly):
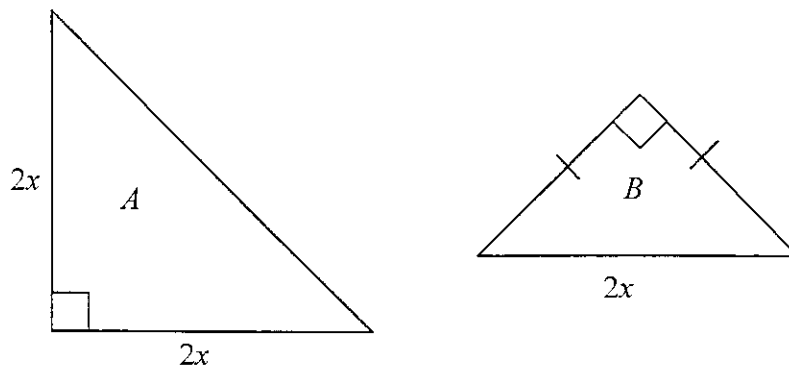   (i) 2008×1992
    (ii) $(2008^2 + 4016) \div 2008$
    (iii) $1999 \times (2000^2 + 2001)$

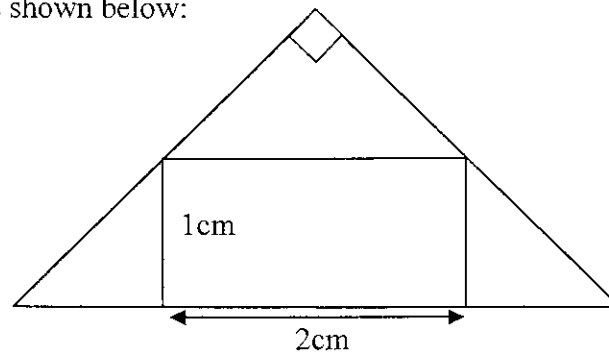   [2, 1, 2]

4. (a) Below are two right-angled <u>isosceles</u> triangles A and B:

Find the area of the two triangles A and B in terms of x.   [2, 3]

(b) A rectangle measuring 1cm by 2cm is put inside a right-angled isosceles triangle so that its 2cm base lies on the base of the triangle and so two of its corners touch the triangle, as shown below:
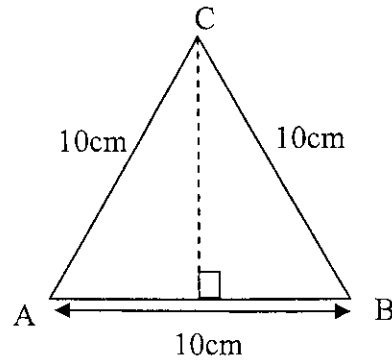

Find the area of the large triangle.   [5]

5. (a) Expand and simplify $\left(x + \dfrac{1}{x} \right)^2$ [2]

(b) x is now chosen in such a way that $x + \dfrac{1}{x} = 4$

(i) Find the value of $x^2 + \dfrac{1}{x^2}$ [2]

(ii) Simplify $\left(x^2 + \dfrac{1}{x^2} \right)^2$ to find the value of $x^4 + \dfrac{1}{x^4}$ [3]

(iii) Find the value of $x^{16} + \dfrac{1}{x^{16}}$ [3]

6.

(a) Show that the height of the equilateral triangle ABC shown above is $5\sqrt{3}$ cm. [2]

The diagram below shows two circular discs of diameter 10cm. The points P and Q are the centres of the two discs. P and Q are 20cm apart. A taut belt passes over both discs as shown below
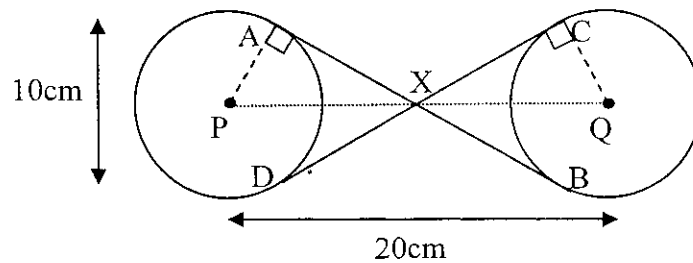
The points A, B, C and D above are the points at which the contact between the belt and the disc is lost.

In the following, assume that the belt is infinitely thin and so ignore any problem of the belt crossing over itself at X.

(b) Write down the lengths AP and PX. [1]

(c) Use (a) to write down the values of the angle XPA and the length AX.

[2]

(d) Calculate the total length of the belt (leaving your answer in the form

$a\sqrt{b} + \dfrac{p}{q}\pi$ where a, b, p and q are all positive whole numbers). [5]

END OF PAPER

Eton College King's Scholarship Examination 2008

LATIN (One and a half hours)

Answer question 1 and ONE other question.

1. *Answer all the questions on the following passage.*

The African king Iuba, conquered in battle by Caesar, returns in flight to his home town of Zama but finds himself rejected by his own subjects.

1 interea rex Iuba, cum ex proelio effugisset, cum amico *quodam* nomine Petreio
   nocturnis itineribus in *regnum* suum contendit. ad oppidum Zamam tandem
   advenit, ubi ipse domum, coniuges et *liberos* habebat, *quo* etiam ex toto *regno*
   omnem pecuniam carissimasque res comportaverat, et quod muris ingentibus
5 *muniverat*. cives autem, *rumore* de Caesaris victoria iam audito, propter has
   causas eum portis appropinquare *prohibuerunt*, primo quod bello contra populum
   Romanum a rege gesto multi viri, patres, filii interfecti erant, deinde quod
   Caesarem maxime timebant, et tandem quod ipsi multas *iniurias* passi erant Iuba
   saeve regente. tum Iuba ante portas diu multumque eis *minatus est*. deinde eis
10 magna voce imperavit ut se sine mora admitterent. tandem, cum se numquam eis
   persuadere posse *intellexisset*, eos oravit ut sibi coniuges *liberos*que *redderent*.
   nulla re ab his *impetrata*, Zama profectus est atque *villam* suam cum Petreio
   paucisque *equitibus* petivit.

[CAESAR], *De Bello Africo* (adapted)

quidam, quaedam, quoddam	*a certain*	iniuria, -ae (f)	*injustice*
regnum, -i (n)	*kingdom*	minor, -ari, -atus sum + dative	*I threaten*
liberi, -orum (m pl)	*children*	intellego, -ere, intellexi, intellectum	*I realise*
quo	*to where*	reddo, -ere, reddidi, redditum	*I give back*
munio, -ire, -ivi, -itum	*I fortify*	nullus, -a, -um	*no, none*
rumor, -oris (m)	*rumour*	impetro, -are, -avi, -atum	*I obtain*
prohibeo, -ere, prohibui,		villa, -ae (f)	*country house*
prohibitum	*I prevent*	equites, -um (m pl)	*horsemen*

(a)   Translate the whole passage into English, writing your translation on alternate lines.   [40]

(b)   State and explain the tense and mood of *effugisset* (line 1).   [3]

(c)   State the tenses and moods of the following verbs:
      (i)   *habebat* (line 3);
      (ii) *muniverat* (line 5);
      (iii) *admitterent* (line 10).   [3]

(d)   *muris ingentibus* (line 4): put this phrase into the singular, leaving the case
      unchanged.   [2]

(e)   Make these nouns plural, leaving the cases unchanged:
           (i)   *rege* (line 7);
           (ii) *mora* (line 10);
           (iii) *villam* (line 12).   [3]

(f)   Give one example of an ablative absolute from the passage.   [2]

(g)   State *and explain* the cases of the following nouns and pronouns:
           (i)   *victoria* (line 5);
           (ii) *eis* (line 10);
           (iii) *Zama* (line 12).   [6]

(h)   *petivit* (line 13): put this verb into the passive, leaving the tense and person
      unchanged.   [1]

[Total for question 1: 60 marks]

NOW ANSWER <u>EITHER</u> QUESTION 2 <u>OR</u> QUESTION 3.

ANSWER EITHER QUESTION 2 OR QUESTION 3

2. *Read the following passage, then answer the questions which follow. DO NOT TRANSLATE unless you are specifically asked to do so. You should pay careful attention to the number of marks available for each question.*

The story from question 1 continues.

The people of Zama seek help from Caesar, currently encamped at Utica. Iuba, finding himself banished forever from his own city, takes his own life in an unusual way.

1   postea Zamenses *legatos* de his rebus ad Caesarem Uticam miserunt
    petiveruntque ab eo ut sibi auxilium mitteret, antequam rex manum militum
    colligeret seque oppugnaret. eum etiam *certiorem* fecerunt se paratos esse
    oppidum ei servare. *legatos* laudatos Caesar domum iubet redire et suum
5   adventum praenuntiare. ipse *postero* die Utica egressus cum exercitu in regnum
    ire contendit. in itinere ex regis copiis duces octo ad Caesarem venerunt
    oraveruntque ut sibi *ignosceret.* quibus rogantibus *venia* data Zamam pervenit.
    rumore interea lato de eius *lenitate clementia*que paene omnes regni equites
    Zamam perveniunt ad Caesarem, ab eoque sunt *metu* periculoque liberati. dum
10   haec geruntur, rex ab omnibus civibus exclusus, omni spe *salutis* abiecta, cum
    iam cenam cum Petreio consumpsisset, *consilium* mortis cepit. ut propter
    virtutem interfecti esse viderentur, gladiis inter se pugnaverunt sed fortior
    imbecilliorem Iuba Petreium facile interfecit. deinde ipse, cum conatus esset
    gladio transicere *pectus* nec posset, servum suum *precatus est* ut se interficeret
15   idque impetravit.

<div align="right">[CAESAR], <i>De Bello Africo</i> (adapted)</div>

legatus, -i (m)	*ambassador*	metus, -us (m)	*fear*
certus, -a, -um	*certain, sure*	salus, -utis (f)	*safety*
posterus, -a, -um	*next*	consilium capio	*I think of a plan*
ignosco, -ere, ignovi, ignotum +dat	*I forgive*	imbecillus, -a, -um	*weak*
venia, -ae (f)	*pardon*	pectus, -oris (n)	*chest, heart*
lenitas, -atis (f)	*gentleness*	precor, -ari, -atus sum	*I pray to*
clementia, -ae (f)	*mercy*		

(a)   Lines 1-3 (*postea...oppugnaret*): what do the people of Zama ask Caesar to do and why?   [4]

(b)   Lines 4-6 (*legatos...contendit*): how does Caesar react to their request?   [6]

(c)   Translate lines 6-7 (*in itinere...pervenit*).   [5]

(d)   Lines 8-9 (*rumore...Caesarem*): who comes to Zama to meet Caesar and why?   [3]

(e) How is the king's situation described in lines 9-10 (*dum haec...abiecta*)? [4]

(f) What do the king and Petreius then do and why (lines 11-12: *ut propter virtutem...pugnaverunt*)? [3]

(g) What is the outcome of the fight (lines 12-13: *fortior...interfecit*)? [2]

(h) How does the king eventually die (lines 13-15: *deinde ipse...impetravit*)? [4]

(i) Turn these indirectly reported words of the people of Zama back into direct speech: *eum etiam certiorem fecerunt se paratos esse oppidum ei servare* (lines 3-4). [3]

(j) State and explain the case of *postero die* (line 5). [2]

(k) Give from the passage one example of each of the following:
    (i) an ablative absolute;
    (ii) a purpose clause;
    (iii) an indirect command;
    (iv) a deponent participle. [4]

[Total for question 2: 40 marks]

3. *Translate this passage into Latin, writing your translation on alternate lines.*

The storm had forced the slaves to wait near the city walls. They were not happy after the long journey. Many of them had left home in the middle of the night. Some had left behind all their money; others had tried in vain to carry their children. They all wanted to reach the harbour. "Don't wait there! Come quickly or the guards will see you!", shouted their leader. They set out at once towards the sea. But one of the old men *fell* and, hearing his shout, the guards killed him with arrows. Then they declared loudly that without weapons the slaves could not escape and ordered them to return home as quickly as possible. When they heard these words, the *fugitives* realised that they had been led into a *trap*. A few died fighting bravely but most fled into the city.

l fall	*cado, -ere, cecidi, casum*
fugitive	*fugitivus, -i (m)*
trap	*insidiae, -arum (f pl)*

[Total for question 3: 40 marks]

END OF PAPER

Eton College King's Scholarship Examination 2008

FRENCH   **(One and a half hours)**

WRITE YOUR CANDIDATE NUMBER HERE: **CAND**

This paper consists of five questions. You must answer ALL the questions, and complete the first four in an hour. The time taken to read the passage for Question 5 is in addition to the one and a half hours given for the paper. Your answers to Questions 1 and 4 should be written ON THE QUESTION PAPER in the spaces provided. Your answers to Questions 2, 3 and 5 should be written on examination stationery.

1.   *USE OF FRENCH (10 marks). You are advised to spend no more than ten minutes on this question.* **Write your answers in the spaces provided.**

a)   *Translate the following verb forms into French, using the verb that is given in brackets:*

(*manger*) We eat :

(*croire*) Do you believe? (*2nd person singular*) :

(*jeter*) I am throwing :

(*appeler*) I will call :

(*venir*) He will come :

(*placer*) They used to put :

(*craindre*)You were afraid (*2nd person plural*)

(*redescendre*) She has come back down :

(*redécouvrir*) She has rediscovered :

(*arriver*) She had arrived :

b) *Fill each of the following ten gaps with a single French word, as in the examples set out below:*

Examples :   *Où est (le) parapluie ? Est-ce que je l'(ai) perdu ?*
         Elle (en) a pris deux dans (son) sac à main.

Il est entré (   ) mon bureau (   ) frapper.

Il m'(   ) a offert quelques-uns mais j'(   ) avais déjà assez.

La (   ) des garçons sont sages mais quelques-uns ne (   ) sont pas.

Il a déconseillé (   ) son père (   ) lire son bulletin scolaire

La maison vers (   ) il se dirigeait était celle (   ) je t'ai parlé.

c) *Look at the examples set out below:*

Quand je serai plus vieux, ... *je serai professeur.*
         (or)   . . . . *j'achèterai une Renault.*

Où sont les disques   . . . . *que j'ai mis sur la table ?*
         (or)   . . . . *que j'ai achetés hier ?*

Now use your imagination to complete the following sentences in French:

J'ai besoin...

S'il vient me voir..

Pourquoi as-tu pris .... ?

Si j'avais su...

Il aurait mieux valu ....

READING COMPREHENSION (25 marks) :

To be written on examination stationery.

*Read the following passage carefully and then answer questions (a) – (r) **IN ENGLISH**. Your answers must be based on the information contained in the text.*

JEUNES DIPLÔMÉS, FAITES VOS JEUX !

Danone vient de racheter une usine en Amérique latine. Vite, il faut concevoir un plan de développement, choisir un nouveau directeur parmi la pléthore de candidatures. Mais catastrophe ! Un puissant syndicat vilipende la multinationale et les salariés déclenchent une grève. Réunie au siège du groupe, la petite équipe d'urgence s'active. Elle n'a qu'une journée pour tout régler... Ce scénario aux allures de mission impossible est celui de *Trust*, le jeu d'entreprise imaginé par Danone en 2003 pour les élèves des grandes écoles, et réédité chaque année depuis. Dans le jargon des grosses entreprises, cela s'appelle des «business games». Le principe : proposer à des étudiants de se mettre, le temps d'un week-end ou sur plusieurs semaines, dans la peau d'**un cadre dirigeant (n)**, chargés d'une tâche précise: imaginer une campagne de publicité, lancer une nouvelle gamme de cosmétiques, faire bondir un cours en Bourse. Depuis quelques années, *L'Oréal, Shell, Carrefour, TBWA* et bien d'autres multiplient **ces exercices de simulation (o)**, qui débouchent souvent sur des contrats pas du tout virtuels pour les candidats les plus convaincants.

Finie la lettre de motivation ? Fini l'entretien d'embauché classique ? **Il faut reconnaître que (p)** la méthode du jeu est excellente pour repérer les jeunes talents. Au fil des étapes, ils révèlent qualités et défauts : mis en situation, un élève au CV irréprochable peut s'effondrer sous la pression. Tandis qu'un autre, dont le profil attirerait moins l'attention, se démarquera par sa débrouillardise, son sens de l'improvisation. «C'est un vrai laboratoire d'observation», admet Monsieur David Charbonnier chez *L'Oréal*, **qui embauche 150 personnes (q)** à chaque édition de Brandstorm, son jeu de marketing. Cette année, les candidats se transformeront en chefs de marque. Mission : **créer une nouvelle gamme (r)** de crèmes solaires pour adolescents. Les équipes auront un quart d'heure, le jour de la finale, pour présenter leur projet au jury.

(a)	What has Danone just done?	[1]
(b)	What is the next stage for Danone?	[2]
(c)	What problem has the company just run into?	[2]
(d)	What must the "emergency team" do in just one day?	[1]
(e)	What exactly is *"Trust"* ?	[2]
(f)	What time-scale are the student participants working on?	[2]
(g)	When the students are role-playing, who do they have to pretend to be?	[1]
(h)	What are the 3 examples of the kind of task they have to fulfil?	[3]
(i)	What kind of reward can the best participants expect to gain?	[1]
(j)	What might this kind of recruitment method spell the end of?	[2]
(k)	But what is this method particularly good at doing?	[1]
(l)	What, for example, might a student with a brilliant CV do?	[1]
(m)	And what might a student with a less impressive CV do?	[1]
(n-r)	What do you think the words or phrases in **bold italics** mean? You may translate them or explain them.	[5]

To be written on examination stationery.

Translate into English, paying attention to the style as well as the accuracy of your translation.

LES BAIGNEURS FONT DES HEURES SUPPLÉMENTAIRES

Le soleil va bientôt se coucher et la baie des Citrons est encore remplie de monde, dont une foule d'enfants, sur la plage et dans l'eau. Effet exceptionnel de la canicule ou conséquence classique d'une période estivale, de vacances où les touristes sont les plus nombreux ? « La chaleur n'a pas du tout changé nos habitudes », affirment Antonia et Fabrice. Mais ce dernier, amateur de la plage, a bien remarqué que, ces temps-ci, « les gens restent plus longtemps, jusqu'au coucher du soleil ».

Sur le sable, Jean-Paul Dubois observe son épouse et son enfant barboter dans la mer. « Comme il fait chaud, c'est bien que la petite puisse s'éclater pendant deux heures le soir, jusqu'à 18h30 environ. En fait, c'est le soleil qui nous guide. Dès qu'il est trop bas, on s'en va. »

Après la baignade, le pique-nique.

Patrick et Corinne restent « sous le parasol toute la journée. C'est la seule solution car on a des enfants. Et en fin d'après-midi, on va à la plage. » Rien d'exceptionnel toutefois : « On le fait depuis toujours, dès qu'on le peut et pas seulement quand il fait chaud. » Même tonalité pour Colette, qui vient, avec son mari, tous les soirs de l'année, « qu'il pleuve, qu'il vente... ». « Plutôt en fin d'après-midi et jusqu'à 19 heures. » Et après : « On va boire une bière en face ! » C'est rafraîchissant aussi.

4.   TRANSLATION INTO FRENCH (10 marks)

Write your answer in the space provided.

(Remember that the Reading Comprehension and the Translation provide almost all the words and structures that you will need.)

a) The children have just returned from the beach where they stayed longer than yesterday.

b) "Nothing unusual has happened at the factory today," the man said to his wife.

c) "Children, you will have half-an-hour to tell me why you stayed there until sunset."

d) It is good that we are able to spend our holidays in South America this year.

e) "Whether it rains or not I propose going to the beach," said the man who used to work for the trade-union.

REPRODUCTION STORY (30 marks)

To be written on examination stationery.

The story will be read to you twice. You may not take notes during the reading. You should aim to reproduce the story in about 120-130 words of French, and you will be marked for the style as well as the accuracy of your version.

POINTLESS POST

industriel américain – aller en Europe – voyage d'affaires – départ d'un jour à
l'autre – sa femme – l'accompagner – sites historiques – leur fils, Martin –
vacances dans quinze jours – camp de montagne – demander à des amis – une
lettre – une carte – un voyage très réussi – sans nouvelles – en pleine forme – sacs
remplis – un seul gros sac – courrier.

Eton College King's Scholarship Examination 2008

FRENCH (Supervisor's Copy)

5.   *REPRODUCTION STORY. The time taken to read the passage twice is in addition to the one and a half hours given for the paper.*

POINTLESS POST

Monsieur Farman était un industriel américain, qui travaillait pour une compagnie qui fabriquait des tracteurs et toutes sortes de matériel agricole. Un jour il a tout à coup été obligé d'aller en Europe pour un voyage d'affaires dans plusieurs pays, y compris la France, l'Allemagne, l'Espagne et l'Italie. Il fallait partir d'un jour à l'autre alors il y avait très peu de temps pour faire des préparatifs et puisque c'était un voyage d'une extrême importance pour sa compagnie il devait partir quand on lui a dit de partir

Sa femme, qui avait peu voyagé, avait très envie de l'accompagner, surtout parce qu'elle avait entendu dire qu'il serait possible de visiter Le Louvre et beaucoup d'autres sites historiques. Leur fils, Martin, âgé de neuf ans, ne pouvait pas faire ce voyage car il n'était pas encore en vacances scolaires et ils devaient trouver une autre solution pour ses vacances qui allaient commencer dans quinze jours.

On a finalement décidé de l'envoyer avec d'autres enfants dans un camp de montagne, et pensant qu'il serait peut-être malheureux, sa mère, avant de partir pour l'Europe, a demandé à un certain nombre d'amis d'écrire régulièrement à l'enfant afin qu'il reçoive une lettre ou au moins une carte tous les jours. De cette façon il ne se sentirait pas seul.

Au bout de cinq semaines environ, après un voyage très réussi et très agréable, Monsieur et Madame Farman sont rentrés chez eux, se réjouissant de trouver leur fils, dont ils étaient sans nouvelles depuis plus de cinq semaines.

Le lendemain il est arrivé, en pleine forme, car il avait fait beaucoup de randonnées à la montagne avec ses nouveaux amis, et ils avaient même fait du camping sauvage. Ses bagages étaient remplis de choses qu'il était impatient de montrer à ses parents et il a mis plus d'une heure pour leur expliquer tout ce qu'il avait rapporté des montagnes.

A la fin il n'y avait plus qu'un seul sac gros et lourd à ouvrir. Aux questions qu'on lui a posées Martin a répondu : «Oh, c'est juste mon courrier. Je n'avais jamais le temps de lire les lettres et les cartes quand elles arrivaient tous les jours.»

[30 marks]

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GREEK (One and a half hours)

Candidates should attempt ALL the questions on this paper.

1.

(a) Give the appropriate forms of the following articles and nouns:

    (i)   ὁ δοῦλος   dative singular
    (ii)   τὸ δῶρον   dative plural
    (iii) ἡ σοφία   accusative singular
    (iv) ἡ τιμή   genitive singular
    (v)   ὁ ναύτης   nominative plural   [5]

(b) Convert these articles and nouns into their opposite numbers, keeping them in the same case (i.e. if they are singular, make them plural; if they are plural make them singular):

    (i)   ὁ παῖς
    (ii)   τῶν χωρῶν   [2]

(c) Translate into English:

    (i)   λύσεις
    (ii)   ἐλύσαμεν
    (iii) ἐλύετε
    (iv) λύεται
    (v)   ἐστέ   [5]

(d) Translate into Greek:

    from λύω: (i)   they loosed
               (ii)   I was loosing
               (iii)   they are loosed

    from φιλέω: (iv)   you (pl.) love
               (v)   we were loving

    from εἰμί: (vi)   to be   [6]

[Total for Question 1: 18]

2. Translate the following passage into English: **write your translation on alternate lines.**

Ariadne and Theseus

Ἀριάδνη ἐστι καλὴ παρθένος. Μίνως δέ, ὁ πατήρ αὐτῆς, βασίλευει τῆς μεγάλης νήσου ὀνόματι Κρήτης. οὗτος δὲ οὐ μόνον τὴν Κρήτην κατέχει, ἀλλὰ καὶ ὅλην τὴν θάλατταν καὶ τὰς μικρὰς νήσους· τὸ γὰρ ναυτικὸν αὐτῷ ἐστι μέγιστον. νικᾷ οὖν ποτε ὁ Μίνως τοὺς Ἀθηναίους τῷ ναυτικῷ, καὶ ἔπειτα κελεύει αὐτοὺς πέμπειν εἰς Κρήτην δέκα νεανίας καὶ δέκα παρθένους. τῶν δὲ νεανιῶν τίς ἐστι Θησεύς, ὁ τοῦ Αἰγέως υἱός. ὁ δὲ Θησεὺς ἐθέλει ἀποκτείνειν τὸν Μινώταυρον καὶ σώζειν πάντας τοὺς Ἀθηναίους. ἐπεὶ οὖν Ἀριάδνη ὁρᾷ τὸν Θησέα εὐθὺς φιλεῖ αὐτὸν καὶ αὐτῷ βοηθεῖ. Θησεὺς οὖν εἰσέρχεται εἰς τὸν Λαβύρινθον καὶ ἀποκτείνει τὸν Μινώταυρον. ἔπειτα δὲ Ἀριάδνη ἐκφεύγει ἐκ τῆς Κρήτης σὺν Θησεῖ καὶ τοῖς ἄλλοις Ἀθηναίοις.

Vocabulary

κατέχω	I possess, occupy
τὸ ναυτικόν	fleet
βοηθέω + dative	I help, come to the rescue of

[Total for Question 2: 22]

3. Answer the questions on the following passage. **Do not translate unless specifically asked to do so.**

An animal's devotion to its keeper

ἐλέφαντα λευκὸν ηὗρεν Ἰνδός τις, καὶ παραλαβὼν <u>ἔτρεφεν</u> ἔτι
νέον ὄντα, καὶ δι᾽ ὀλίγου ἐποίησε <u>χειροήθη</u>, καὶ <u>ἐπωχεῖτο</u> αὐτῷ,
καὶ ἐφίλει τὸ ζῷον καὶ ἐφιλεῖτο ὑπ᾽ αὐτοῦ. ὁ δὲ βασιλεὺς τῶν
Ἰνδῶν πυθόμενος ᾔτει λαβεῖν τὸν ἐλέφαντα. ὁ δὲ <u>περιαλγῶν</u> εἰ
5   ἔμελλε δεσπότης εἶναι αὐτοῦ ἄλλος, οὐδένα λόγον ἔλεγεν καὶ
ἀπῆλθε εἰς ἄλλην χώραν, ἀναβὰς τὸν ἐλέφαντα. ὀργίζεται δὲ ὁ
βασιλεύς, καὶ πέμπει ἐπ᾽ αὐτὸν στρατιώτας ἀφαιρησομένους
τὸν ἐλέφαντα καὶ ἅμα τὸν Ἰνδὸν ἐπὶ τὴν δίκην ἄξοντας. ἐπεὶ δὲ
ἧκον, <u>ἐπειρῶντο</u> <u>βίαν</u> προσφέρειν. ὁ μὲν οὖν ἄνθρωπος ἔβαλλεν
10   λίθους ἐπ᾽ αὐτοὺς <u>ἄνωθεν</u>, τὸ δὲ ζῷον <u>συνημύνετο</u>. ἐπεὶ δὲ ὁ
Ἰνδὸς καταπίπτει, πολλοῖς τόξοις τραυματισθείς, περιβαίνει
τὸν <u>τροφέα</u> ὁ ἐλέφας, <u>ὥσπερ</u> οἱ <u>ὑπερασπίζοντες</u> τοὺς ἐν μάχῃ
πεσόντας, καὶ τῶν στρατιωτῶν πολλοὺς μὲν ἀπέκτεινε, τοὺς
δ᾽ ἄλλους <u>ἔτρεψε·</u> περιβαλὼν δὲ τῷ <u>τροφεῖ</u> τὴν προβοσκίδα,
15   <u>αἴρει</u> τε αὐτὸν καὶ κατὰ τὴν ὁδὸν κομίζει.

Aelian (adapted)

(a) Describe the discovery that is made in line 1.   [1]
(b) In line 2 pick out and translate the word that says how old the animal was.   [1]
(c) What happens next (line 2: καὶ δι᾽ ὀλίγου ... αὐτῷ)?   [1]
(d) Describe the relationship that develops between animal and keeper (line 3).   [2]
(e) Who found out about the animal and what did this person demand (lines 3-4)?   [2]
(f) Give a detailed description of the keeper's reaction (lines 4-6).   [6]
(g) Pick out and translate the word that describes the reaction of the other man (lines 6-7).   [2]
(h) Whom does this man send and with what purpose (lines 7-8)?   [5]
(i) What does the keeper then do (lines 9-10: ὁ μὲν...ἄνωθεν)?   [2]
(j) Translate from ἐπεὶ δὲ ὁ Ἰνδός to κομίζει (lines 10-15).   [18]

[Total for Question 3: 40]

Glossary

ὁ Ἰνδός	the Indian

Vocabulary

τρέφω	I nurture, bring up
χειροήθης	accustomed to being handled, tame
ἐποχέομαι (+ dat.)	I ride
περιαλγέω	I am very distressed
πειράομαι	I try
ἡ βία	force, might
ἄνωθεν	from above
συναμύνομαι	I help to defend
ὁ τροφεύς, –έως	the keeper
ὑπερασπίζω	I cover x (accusative) with a shield
ὥσπερ	just as
τρέπω	I turn to flight, rout
αἴρω	I lift

4. Translate the following sentences into Greek. Some of the words from **questions 2 and 3** may help you.

a) The wise girl does not want to hear the words of the slave. [4]

b) The brave soldiers were waiting on the island for ten days. [4]

c) The general ordered the horses to go to the river. [4]

d) The guards, being very distressed, arrived at the gates of the city. [4]

e) When the messenger was set free during the night, the bad men fell down. [4]

[Total for Question 4: 20]

Eton College King's Scholarship Examination 2008

SCIENCE (SECTION 1) (60 minutes)

*Candidate Number:*_____

INSTRUCTIONS

*Write your candidate number, **not your name**, in the space provided above.*

You should attempt ALL the questions. Write your answers in the spaces provided: continue on a separate sheet of paper if you need more space to complete your answer to any question.

Allow yourself about 12 minutes for each question.

The maximum mark for each question or part of a question is shown in square brackets.

In questions involving calculations, all your working must be shown.

For examiners' use only.

1	2	3	4	5	TOTAL

1. A strip of calcium was added to excess dilute hydrochloric acid in the apparatus shown below, and the time taken for 10 cm^3 of hydrogen to be collected was measured. The experiment was then repeated using the same mass of other metals. The results are shown in the table below.

gas syringe
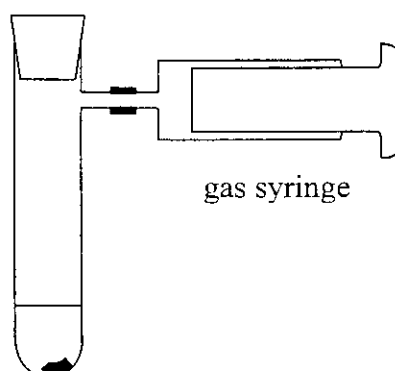
Metal	Time taken in seconds
calcium	10
iron	30
magnesium	12
zinc	25

(a) (i) On the evidence provided by these results, state and explain which metal is **least** reactive.

_____

_____ [2]

(ii) Explain what other factor has to be controlled to allow a fair comparison of the reactivity of the four metals.

_____

_____ [2]

(b) Once the experiment had been modified to ensure that it was a fair test, a strip of aluminium produced very little hydrogen in the hydrochloric acid unless the surface was first rubbed with emery paper (an abrasive paper like sandpaper). Aluminium is much more reactive than zinc. Suggest an explanation for this unexpected result.

_____

_____

_____

_____ [3]

(c)   Explain why painting iron articles helps to prevent rusting.

_____

_____ [2]

(d)   Galvanizing involves coating iron articles with zinc. Use information from the
        table to help you to explain why galvanizing iron protects it from rusting more
        effectively than painting does.

_____

_____

_____

_____ [3]

2. 25.0 cm^3 of hydrochloric acid was placed in a polystyrene cup.

thermometer

polystyrene cup
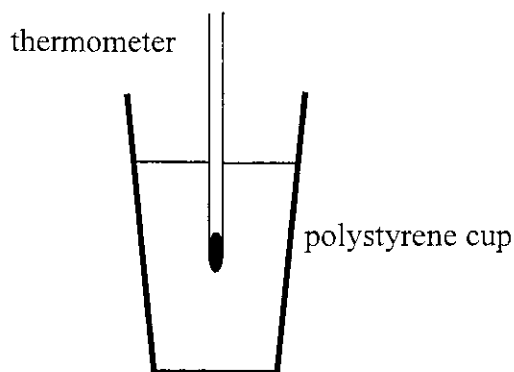
50 cm^3 of sodium hydroxide was added in 5.0 cm^3 portions, the mixture was stirred and the temperature noted after each addition. A graph of the results is shown below.

temperature (°C)

volume of sodium hydroxide added (cm^3)
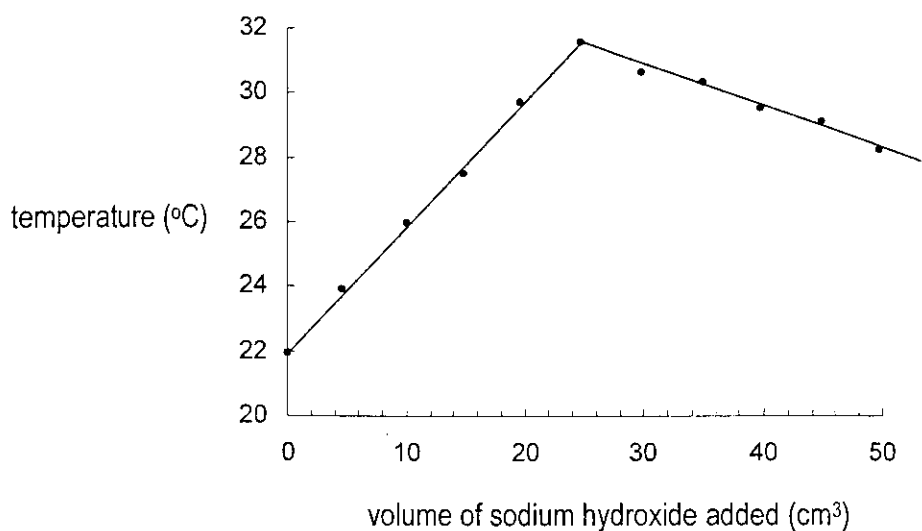
(a) (i) Was the reaction exothermic or endothermic? Explain your answer.

_____

_____ **[1]**

(ii) What **type** of reaction took place between the hydrochloric acid and the sodium hydroxide?

_____ **[1]**

(b) Explain the shape of the graph.

_____

_____

_____

_____ [3]

(c) (i) How can you tell from the graph that 25.0 cm³ of sodium hydroxide was required to react completely with the hydrochloric acid?

_____

_____ [1]

(ii) Given that hydrochloric acid and sodium hydroxide react according to the equation

$$HCl + NaOH \rightarrow NaCl + H_2O$$
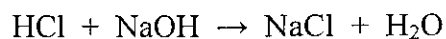
was the concentration of the sodium hydroxide greater than, less than, or the same as the concentration of the hydrochloric acid? Explain your answer.

_____

_____

_____ [2]

(d) The experiment was repeated, but with the polystyrene cup replaced by a cup of the same size made of copper. The temperature readings obtained were all several degrees less than in the first experiment. Explain this observation as fully as you can.

_____

_____

_____

_____

_____ [4]

3. The Weddell seal (*Leptonychotes weddellii*) is a mammal that lives in the Antarctic Circle, where air temperatures are usually around -10°C and the sea temperature is typically around -2°C. The photograph below shows a mother seal and her recently-born seal pup.

(Image from http://www.rosssea.info/marine-mammals.html)

(a) Seals are mammals. One characteristic feature of mammals is that the females lactate (produce milk) and suckle their young. State **two** other characteristic features of mammals.

(i) _____

(ii) _____ **[2]**

(b) A pup had a mass of 20kg at birth. 28 days later this pup had grown to 80kg. During this period of growth, the seal pup consumed an average of 2.6kg of food per day.

(i) Calculate the percentage of consumed food that is converted into new body tissues ('assimilated') during the 28-day period.

_____

_____

_____ **[2]**

(ii) Suggest **two** things that could happen to the food that is not assimilated.

_____

_____

_____ **[2]**

(c) Weddell seal pups have a mass of around 20kg at birth. Juveniles reach about 100kg, whereas an adult may reach a mass of 400kg. At all stages of life, the body shape is virtually the same. Underneath their skin surface is a thick layer of blubber. The bar chart below shows how the thickness of this blubber varies as the seals grow and mature:
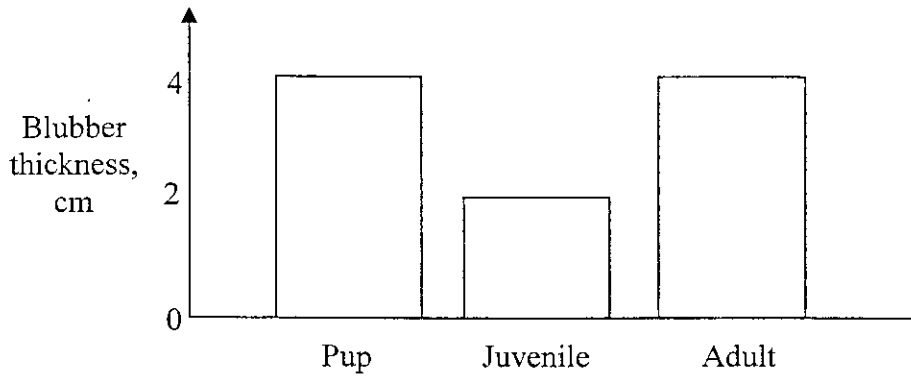
(i) Suggest one reason why the blubber thickness decreases between the pup and the juvenile stage.

_____

_____ **[1]**

(ii) Suggest one reason why the blubber thickness then increases as the juveniles develop into adults.

_____

_____ **[1]**

(iii) One role of the blubber layer is insulation, important in the freezing conditions of the Antarctic. Suggest another role for the blubber.

_____

_____

_____ **[1]**

(d) The pie charts below show the composition of human milk and Weddell seal milk.

Human   Weddell Seal

☐ Water
☐ Fat
▨ Protein
■ Carbohydrate

(Data from 'Animal Physiology', 5ᵗʰ Edition, by Knut Schmidt-Nielsen)

Discuss possible reasons for the difference in composition of human and seal milk. You should refer to the specific components of the milk in your answer.

_____

_____

_____

_____

_____

_____

_____

_____

_____ [3]

4. The table below shows how the volume of blood pumped by the human heart depends upon the number of beats per minute (the heart rate). [1 dm^3 = 1000 cm^3.]

Heart rate (beats/min)	50	60	70	90	110	130	150	170
Volume per beat (cm^3)	75	72		65	61	56	42	28
Volume each minute (dm^3)	3.75	4.32	4.90		6.71	7.28	6.30	4.76

(a) Fill in the blanks in the table above.   [2]

(b) Even when involved in vigorous exercise, it seems that it may not be advantageous for heart rates to rise above 140 beats per minute. Referring to the data in the table, explain why.

_____

_____

_____   [1]

(c) Successful long-distance runners often pump a larger blood volume per heartbeat. Explain why this might be advantageous.

_____

_____

_____

_____   [2]

(d) The heart beat consists of a rapid period of contraction followed by a period when the heart muscle must relax whilst the heart slowly fills up again ready for the next beat. Use this information to explain the relationship between heart rate and blood volume per beat.

_____

_____

_____   [1]

(e) A commonly held view is that exercise reduces the risk of heart attacks. In the days before one-man-operated buses became the norm, London double-decker buses had both a driver and a conductor. The conductor gathered the fares and sold tickets to those upstairs and downstairs. A famous old (1953) research study compared the incidence of heart attacks in London bus drivers compared to bus conductors. The study looked at over 30 000 men between the ages of 35 and 64. Over the period of the study, conductors had 50% fewer heart attacks than the drivers.

(i) State **two** advantages of basing the research on such a large sample of workers?

_____

_____

_____ **[2]**

(ii) One researcher thought that these data clearly supported the hypothesis that regular exercise reduces the risk of heart attacks. Others thought that, before coming to a conclusion, the research team needed more information about the kind of people who did these jobs and what the jobs themselves involved. What sorts of information do you think they had in mind so that the study could come to a firmer conclusion regarding the hypothesis? In your answer, give at least **four** things they should investigate and briefly explain the importance of each one.

_____

_____

_____

_____

_____

_____

_____

_____ **[4]**

5. (a) What is meant by an electric current?

_____ **[1]**

(b) Charge is measured in coulomb (given the symbol C). A current of 1 ampere (or 1A) means that 1C of charged particles is passing a point in a circuit each second.

(i) If 32C pass a point in 6s, what is the current?

_____

_____ **[1]**

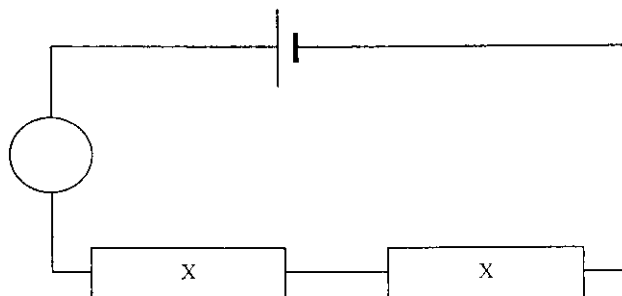(ii) An ammeter in a circuit reads 3A. How much charge passes in 1 minute?

_____

_____ **[1]**

(c) Two ammeters are shown in the circuit below. The current in one is shown. Fill in the current in the other.
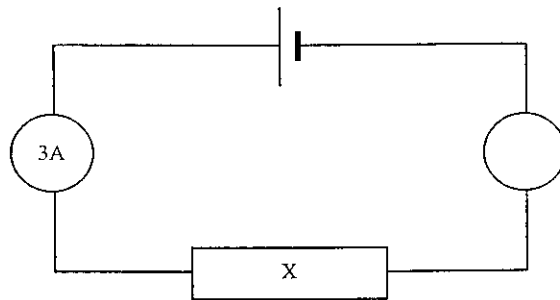
[1]

(d) The cells and the resistors in the circuits below and on the next page are all the same as those in part (c). Fill in the ammeter readings.

[1]
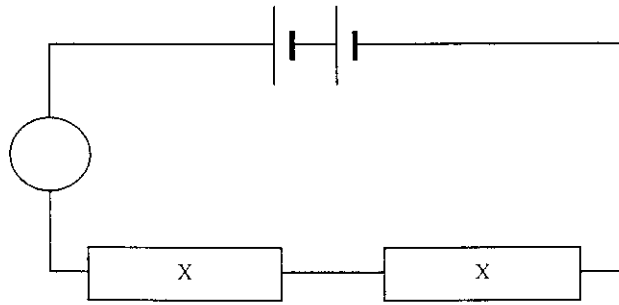
[1]
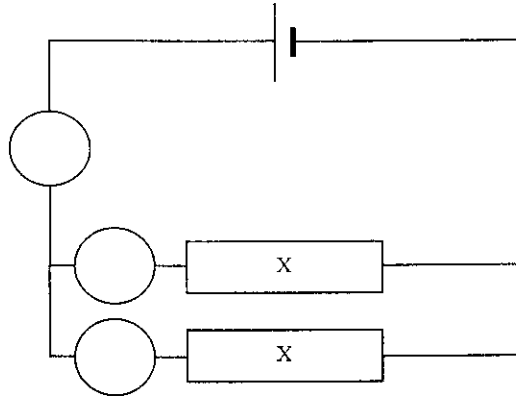
[3]

(e)   The circuit diagram below shows a variable resistor. One of the connections (shown as an arrow) can be moved along the length of the resistor to include more or less resistance in the circuit.
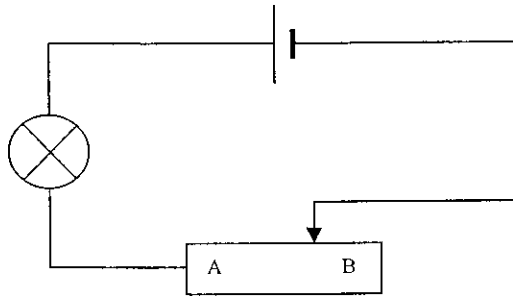
State and explain what you would expect to see happen to the brightness of the lamp as the connection is slid from end A to end B.

_____

_____

_____

_____ **[3]**

[End of Paper]

Eton College King's Scholarship Examination 2008

SCIENCE (SECTION 2 - DATA ANALYSIS)   (30 minutes)

Candidate Number:_____

This paper describes the results of some experiments. Read the information and answer the questions in the spaces provided.

Additional materials required: Inserts Photograph 1 and Photograph 2, Graph Paper.

For examiners' use only.

Total	

1. Look at the insert called Photograph 1. This is the photographic result of an experiment to measure the movement of a ball being dropped. A ball was dropped in a darkened room. A light flashed at regular time intervals and illuminated the ball. The position of the ball at each flash was captured as a series of ghostly images on the photograph.

(a) (i) Using a ruler, measure from the photograph the distance between positions A and B and then record this distance in the left hand column of Table 1 below. It is important to measure from the same point on the ball in the two images, e.g. from the centre of the image at A to the centre of the image at B. Why?

_____

_____ [1]

(ii) Now measure the distances between successive images. Record these distances in the left hand column of Table 1 below.

[3]

Table 1

	Distance measured from the photograph	Actual or True Distance	Average Speed
	cm	cm	cm/s
A to B			
B to C			
C to D			
D to E			
E to F			
F to G			
G to H			

(b) (i) The actual distances the ball falls are obviously larger than those you have measured with your ruler. The measured distance from A to H is 13.8cm. If the actual distance from A to H was 125cm, calculate how many times larger the actual apparatus was than the photograph.

_____

_____ [1]

(ii) Now complete the Actual Distance column in Table 1.   [3]

(c)   The light flashes 1200 times per minute. What is the time between successive flashes? Give your answer in seconds.

_____

_____ [1]

(d)   (i)   Calculate the average speed of the ball as it falls from A to B. Show your working below.

_____

_____ [2]

        (ii)   Now complete the Average Speed column in Table 1.   [3]

(e)   Assume that a stopwatch was started when the ball was at position A. Complete table 2 below to show the time as the ball reached each position.

                                                                                [2]

Table 2

Position	Time (s)
A	0.00
B	
C	
D	
E	
F	
G	
H	

(f)   (i)   Using the graph paper provided, plot a graph of average speed (y-axis) against time (x-axis). Join the points with an appropriate straight line or curve.   [4]

        (ii)   Explain any assumptions you have made when plotting your graph.

_____

_____ [2]

(g) (i) Describe as fully as you can what is happening to the speed of the falling ball.

_____

_____

_____

_____ [3]

(ii) Why does the speed of the ball change in this way?

_____

_____ [1]

2. Now look at the insert called Photograph 2. This is also the photographic record of an experiment. A ball was fired horizontally. In the same manner as Photograph 1 the image of the ball at various positions was captured. The ball can be seen to move from left to right, whilst also falling. The photograph shows 20 images of the ball, some of the images have been numbered.

(a) It takes 0.95s for the ball to travel from position 1 to position 20. What is the time between light flashes?

_____ [1]

(b) Look at the **vertical** distance dropped between successive images. What is happening to the **vertical** speed? Explain your answer.

_____

_____

_____ [3]

(c) It has been suggested that the **horizontal** speed of the ball is constant.
(i) What measurements would you need to take to see if this was true?

_____

_____ [1]

(ii)   Now take these measurements and record them below.

_____

_____

_____

_____ [2]

(iii)   Do you believe the **horizontal** speed of the ball is constant? Use the evidence collected above to support your answer.
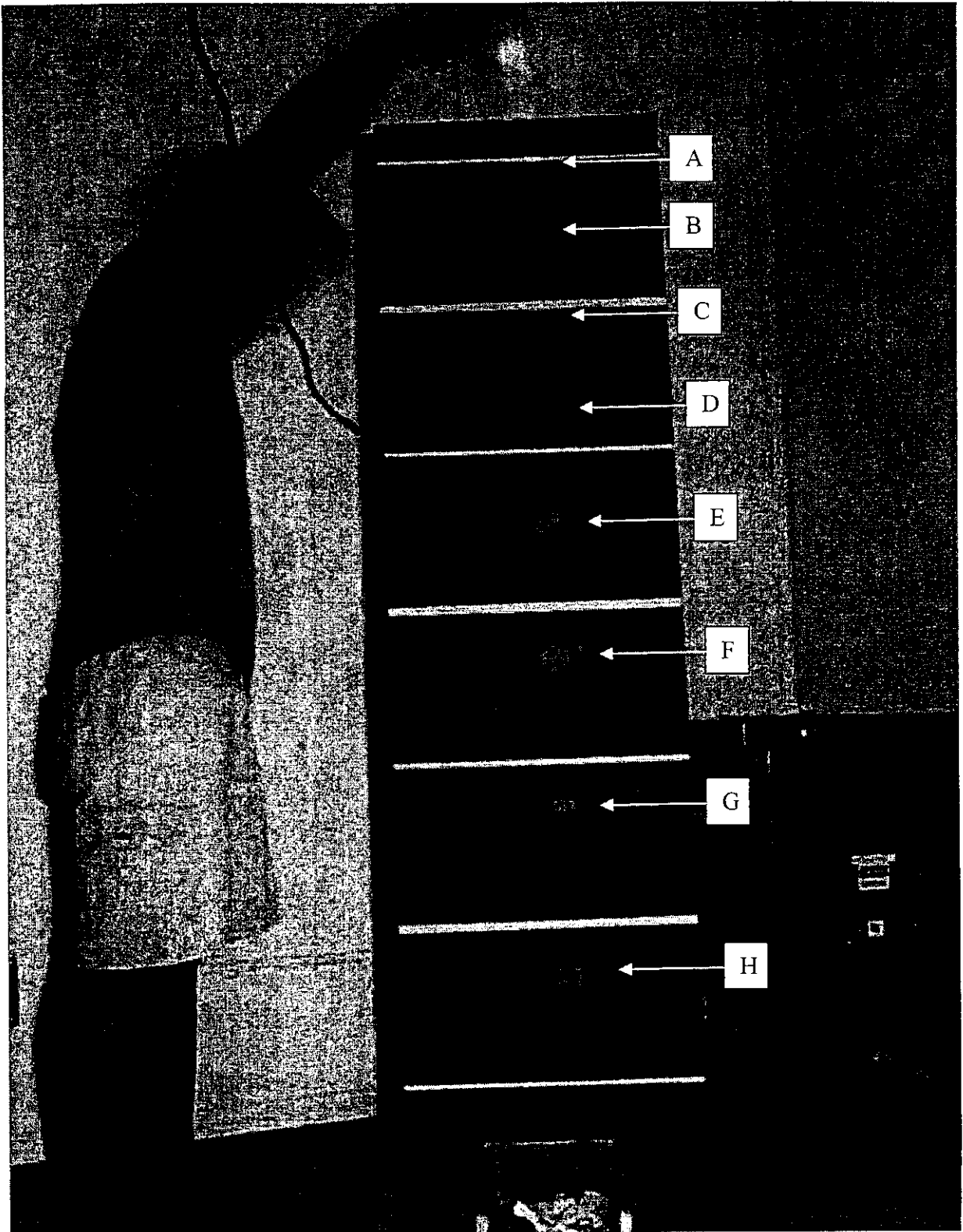
_____

_____

_____ [2]

(d)   Take appropriate measurements from Photograph 2 and then calculate the **horizontal** speed as the ball travels from position 14 to position 15. Show your working.
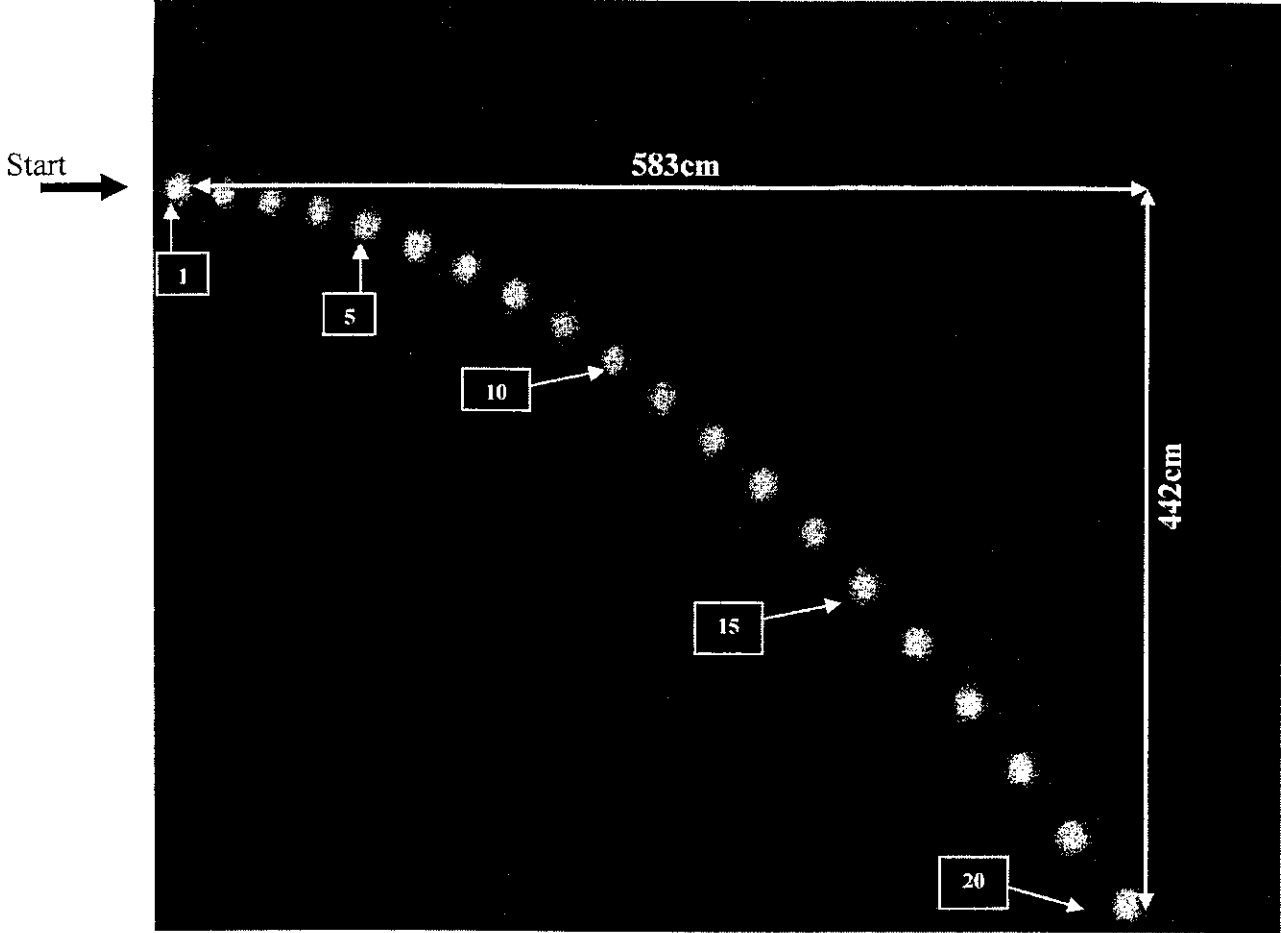
_____

_____

_____

_____

_____

_____ [5]

[End of Paper]

Photograph 1

Photograph 2

Start

583cm

442cm

1

5

10

15

20

Adapted from http://www.vk2zay.net/article.php/27

Eton College King's Scholarship Examination 2008

MATHEMATICS B   **(One and a half hours)**

Answer as many questions as you can. Each of the ten questions carries ten marks. Show all your working. Calculators are not allowed.

1.   a)   Calculate the angle x in the isosceles triangle shown with an exterior angle of 80°.
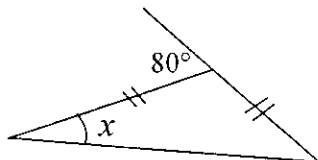
       b)   The vertices of a regular nonagon are labelled A, B, C, D, E, F, G, H and I, in consecutive order. Calculate each of the angles in the triangle ACF.

2.   a)   Solve the simultaneous equations $198x - 202y = 3212$ and $202x - 198y = 3188$.

       b)   Hence solve the simultaneous equations
$$198p^2 + \frac{202}{q} = 3212 \quad \text{and} \quad 202p^2 + \frac{198}{q} = 3188.$$

3.   a)   A $4 \times 4 \times 4$ cube is made up of unit cubes. The outside of the cube is then painted by dipping it in paint. How many of the unit cubes will have exactly
     i) 3 faces painted?   ii) 2 faces painted?   iii) 1 face painted?   iv) 0 faces painted?

       b)   Repeat part (a) with an $x \times x \times x$ cube.

       c)   What would be each of your answers to part (b) if the eight unit corner cubes were removed and discarded and then the large *altered* cube was dipped?

4.   This question refers to the diagram opposite.

       a)   If AX=BX=BC and angle BAX $= x$, prove angle BCX $= 2x$.

   b)   If instead AX=BX=CX, prove that angle ABC is a right angle.
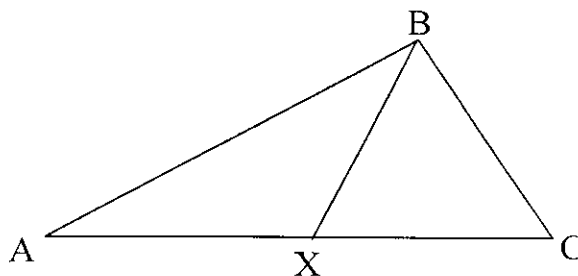
5.   a)   Solve the equation $\frac{1}{3}x = x - \left(5 - \frac{1}{6}x\right)$.

       b)   A ship is twice as old as its boiler was when the ship was the age the boiler is now. The present combined age of the ship and boiler is 49 years. How old is the ship now?

6.   a)   A car travels from Eton to Ascot with an average speed of 50 km/hour on the outward journey and with an average speed of 75 km/hour on the return journey. Show that the average speed for the whole journey is 60 km/hour.

       b)   Normally, the train between Windsor and Feltham travells at an average speed of 90 km/hour. If it is delayed and arrives 4 minutes late, its average speed drops to 70 km/hour. What is the distance between the stations of Windsor and Feltham?

7. Two common Pythagorean triples are (3, 4, 5) and (5, 12, 13) because $3^2 + 4^2 = 5^2$ and $5^2 + 12^2 = 13^2$. We will now find other whole number solutions of Pythagoras' theorem, $x^2 + y^2 = z^2$, in the special case that $z = y + 1$.

   a) Substitute $z = y + 1$ into Pythagoras' theorem, to eliminate z. Rearranging your new equation, show that $y = \frac{1}{2}(x^2 - 1)$.

   b) Using this formula, explain why x must be an *odd* whole number.

   c) Hence calculate the first seven Pythagorean triples, of this type, starting with $x = 3$.

8. We know that $\dfrac{1}{2} - \dfrac{1}{3} = \dfrac{1}{6}$ and $\dfrac{1}{12} + \dfrac{1}{12} = \dfrac{1}{6}$.

   We wish to solve $\dfrac{1}{m} + \dfrac{1}{n} = \dfrac{1}{6}$, for m and n whole numbers with $m \geq n$.

   a) Show that the above equation can be rearranged into the form $(m - 6)(n - 6) = 36$.

   b) Hence solve for all whole number pairs of values m and n with $m \geq n$.

9. a) Suppose $xy = 16$ and $x + y = 11$, evaluate $x^2 + y^2$.

   b) A rectangle is inscribed in a circle of radius 7cm. If the perimeter of the rectangle is 36cm, calculate the area of the rectangle.
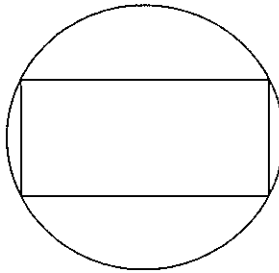
10. a) Calculate the exact perpendicular height, h, of the isosceles triangle shown
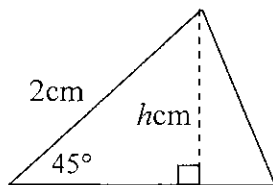
   b) A regular octagon is inscribed inside a circle of radius 2cm. Calculate the area of the octagon.
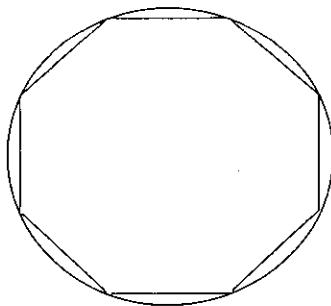
(End of paper)

Eton College King's Scholarship Examination 2008

HISTORY, GEOGRAPHY AND DIVINITY   **(One and a half hours)**

The paper is divided into THREE sections. Candidates should answer THREE questions from at least TWO sections. Start each question on a NEW sheet of paper.

SECTION 1: HISTORY

1. Study the four sources on the insert provided. They are army recruitment posters published by the government of the day and used in Britain during World War I. What do they tell us about how the government sought to persuade people to join the army? Use details from the sources to support your answer. No prior knowledge of either the sources or of World War I is required to answer this question.

2. Why did so many people join the First Crusade?

3. To what extent does Mary I deserve her nickname 'Bloody Mary'?

4. How great was the Great Reform Act of 1832?

5. Choose any leader that you have studied and explain the extent to which he/she was successful in achieving his/her aims.

6. 'Political power comes ultimately from the barrel of a gun' [Mao]. Do you agree? Refer to historical examples in your answer.

Source A

Source B

Are YOU in this?

Source C

Source D – In 1914 the German navy had shelled the coastal town of Scarborough. Women and children were among those killed.

These images are taken from the 'GCSE Modern World History' textbook by Ben Walsh

SECTION 2: GEOGRAPHY

1. Discuss the ways in which the development of plate tectonic theory revolutionised our understanding of the geography of the Earth's surface.

2. With reference to examples, explain why the position and shape of coastlines change over time.

3. Describe and explain the pattern of mean annual rainfall across the British Isles.

4. With reference to one or more settlements that you have studied, describe and explain the ways in which the function of a settlement can change through time.

5. The Tata Nano (the world's cheapest car) has recently been unveiled in India. Evaluate the advantages and disadvantages of this for economic development and the environment.

6. Define and discuss the concept of 'sustainable development' using examples that you have studied.

SECTION 3: DIVINITY

1. Old Testament

> Solomon answered, "You have shown great kindness to your servant, my father David, because he was faithful to you and righteous and upright in heart. You have continued this great kindness to him and have given him a son to sit on his throne this very day... Give your servant a discerning heart to govern your people and to distinguish between right and wrong."
>
> (1 Kings 3:6 and 9)

Compare and contrast King David and King Solomon. Who was the better king?

2. New Testament

> So Peter and the other disciple started for the tomb. Both were running, but the other disciple outran Peter and reached the tomb first. He bent over, looked in at the strips of linen lying there but did not go in. Then Simon Peter, who was behind him, arrived and went into the tomb. He saw the strips of linen lying there, as well as the burial cloth that had been around Jesus' head. The cloth was folded up by itself, separate from the linen. Finally the other disciple, who had reached the tomb first, also went inside. He saw and believed.
>
> (John 20:3-8)

Explain the significance of seeing the linen strips and burial cloth. What is this passage teaching about belief?

3. Judaism

> Blessed art thou, O Lord our God, King of the universe,
> Who hast sanctified us by thy commandments
> And hast taken pleasure in us
> And in love and favour hast given us thy holy Sabbath
> As an inheritance, a memorial of the creation –
> That day being also the first of the holy convocations,
> In remembrance of the departure from Egypt.
> For thou hast chosen us and sanctified us above all nations
> And in love and favour hast given us thy holy Sabbath.
>
> (from the *Kiddush*)

With reference to this extract from the Kiddush, discuss the significance of the weekly celebration of Sabbath in the Jewish home.

4. Islam

> Marriage is positively enjoined in Islam, and young people are urged to marry with the explicit objective of avoiding exposure to sexual temptation. 'Young men, those of you who can support a wife should marry, for it keeps you from looking at women and preserves your chastity' says one of the hadiths. Under the Shari'ah the marriage contract is a legal contract sanctioned by the divine law. It is not, as in Christianity, a sacrament.
>
> (Malise Ruthven *Islam*)

Discuss the strengths and weaknesses of the Muslim attitude to marriage.

5. Christianity

Worship is, however, a very peculiar thing. If I were convinced that it always involved a process in which human beings in community came to share in a real, living experience of the vision of God's glory in and through Jesus Christ, I would have no hesitation in agreeing that worship is the very essence of Christian believing, the power source from which all Christian living draws its strength...Much worship is dull. Some of it is damaging. Occasionally it is scarcely recognizable as a Christian activity at all. So why do we continue to engage in it?

(John Puddefoot *What about Christianity?*)

With reference to Christian worship give a reply to John Puddefoot's question.

6. Buddhism

Thereupon the Buddha turned to his Disciples and said to them; 'Everything comes to an end, though it may last for an aeon. The hour of parting is bound to come in the end. Now I have done what I could do, both for myself and for others. To stay here would from now on be without any purpose. I have disciplined, in heaven and on earth, all those whom I could discipline, and I have set them in the stream. Hereafter this my Dharma, O monks, shall abide for generations and generation among living beings... when the light of knowledge has dispelled the darkness of ignorance, when all existence has been seen as without substance, peace ensues when life draws to an end, which seems to cure a long sickness at last. All conditioned things are subject to decay. Attain perfection through diligence.

(*The Buddhist Scriptures*)

What is Buddhism about? Discuss the ideas from the Buddha's final words in the passage above.

7. Hinduism

Since water is a natural cleansing agent and essential to life, a pool or river in a sacred place is regarded as a means of washing away sins and entering a new life. The seven sacred rivers of India are all associated with pilgrimage. All bad karma from previous misdeeds in this and previous lives can be washed away... The highest motive for going on pilgrimage is to seek spiritual liberation or moksha. This religious journey provides a unique opportunity to engage in some soul searching and deep contemplation.

(Veronica Voiels *Hinduism*)

Discuss the nature and purpose of Hindu pilgrimage.

8. Sikhism

'In the plate are placed three things: truth, contentment and meditation. The name of the Lord, the support of all, has also been put therein. Whosoever eats this food will be free from sorrow'

(Guru Arjan in the *Guru Granth Sahib*)

Discuss how Guru Arjan's metaphor describes the purpose and use of the Guru Granth Sahib.

[end of paper]

Eton College King's Scholarship Examination 2008

GENERAL II   **(One and a half hours)**

*Answer **two** questions.*

Marks will be awarded for clear, interesting and considered arguments.

Spend about 45 minutes on each question.

1. Under what circumstances might human cloning be acceptable?

2. Should health care be free?

3. 'Teenagers shouldn't have children.' Discuss.

4. 'It is better to read the book than see the film.' Discuss.

5. To what extent is monarchy an outdated institution?

6. How should a nation choose its leader?

7. 'It is impossible to prove the existence of God.' Discuss.

8. Is private education justifiable?

9. 'Artistic worth is only a matter of opinion.' Discuss.

10. Is religion a force for good in the world?

[End of paper]