



Unit Number

**U3051246/KA3T**

**Key Skills**

**Application of Number**

**Level 3**

**Monday 14 January 2008**

**Total Marks: 50**

**No. of Questions: 6**

**Time: 1 hour 30 minutes**

**Materials required for examination**

This test paper

An answer booklet

A pen with black or blue ink

A pencil and eraser

A ruler marked in mm and cm

2mm squared paper

A scientific calculator

**You may use a bilingual dictionary**

**Instructions to Candidates**

Do NOT open this test paper until you are told to do so by the supervisor.

In the boxes on the answer book, write your centre number, registration number, surname and initials. The paper reference is shown above.

Write in black or blue ink only.

You have 15 minutes to read through the paper prior to starting the test.

Use this time to read through all the questions carefully, consider how you will attempt them and make rough notes if you wish.

Do not start writing in the answer book until you are told you can.

You will then have 1 hour 30 minutes to finish the test.

At the end of the test, hand the test paper, the Answer Booklet(s) and all notes to the supervisor.

**Information for Candidates**

There are two parts to this test.

Part A (total 31 marks) consists of 5 short-answer questions.

Part B (total 19 marks) consists of 1 extended-answer question.

Try to answer ALL the questions.

**Advice to Candidates**

Make sure that your writing is clear, and show all your working.

Read each question carefully.

If you need extra paper, use a second answer booklet. Make sure you put your personal details on the front of this booklet too.

**Instructions to Centres**

This paper must not be photocopied

***Turn over***

## Part A - Short-answer questions

- 1 In 2006, a female celebrity sold the dress she had worn at an awards' ceremony in a charity auction on the internet.

The dress was sold for £4 301 and the money was donated to Oxfam's appeal to help people suffering from drought in East Africa. Oxfam's website stated that £40 could feed 50 children for a month in Tanzania.

- a According to Oxfam, how many children in Tanzania could be fed for a month with the money raised from the sale of the dress?

1 mark

During the 10 day internet charity auction a total of 70 000 people visited the website.

- b On average, approximately how many people visited the website each minute during the charity auction?

1 mark

Oxfam aimed to raise a total of £20 million for the appeal.

In 2006

- The population of the United Kingdom (UK) was 59.8 million
- Four fifths of the population of the UK were over 16 years of age

- c On average, how much did each person over the age of 16 years in the UK need to give in order to raise a total of £20 million for the appeal?

1 mark

In 2005, Oxfam spent a total of £154.4 million on aid programmes, programme support costs and management and administration. Spending on these individual items is given in the table below.

**Spending by Oxfam in 2005**

<b>Item</b>	<b>Spending (£million)</b>
Aid programmes	132.8
Programme support costs	16.7
Management and administration	4.9

In a leaflet about the charity this information will be displayed in a pie chart.

- d What is the size of the angle to the nearest degree for the sector of the pie chart representing spending on aid programmes?

**1 mark**

**Total 4 marks**

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- 2 At the end of 2001 admission charges were removed at many museums in England that had previously charged for entry.

The number of visitors to the National Railway Museum increased by 36% from 2001 to 2002. There were 740 928 visitors to the National Railway Museum in 2002.

- a How many visitors were there to the National Railway Museum in 2001?

1 mark

The table below gives the number of visitors to selected museums in England in 2001 and 2005.

**Number of visitors to selected museums**

Museum	Number of visitors in 2001	Number of visitors in 2005
Natural History Museum	1 657 124	3 329 201
National Maritime Museum	907 337	1 521 067
Science Museum	1 308 763	2 023 504

- b What was the approximate ratio of the number of visitors to the National Maritime Museum in 2001 to the number of visitors to the National Maritime Museum in 2005? Give your answer in a simple form.

1 mark

The Natural History Museum and the Science Museum are both open for 362 days a year.

- c On average, how many more visitors **per day** visited the Natural History Museum in 2005 than the Science Museum in 2005?

1 mark

The numbers of visitors to some museums which have never charged for admission have decreased since 2001. The number of visitors to the National Museum of Photography, Film and Television has decreased by an average of 8.5% per year since 2001. In 2005 there were a total of 621 352 visitors to this museum.

- d If the number of visitors to the National Museum of Photography, Film and Television continues to decrease at the same rate, in which year will the total number of visitors decrease to fewer than 475 000?

**2 marks**

**Total 5 marks**

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- 3 In the Winter Olympics, Skeleton Bob competitors travel on small sleds as fast as they can down a track made from ice.

The competitors each make two runs down the track and their times for the two runs are added together to give their combined time. The competitor with the fastest combined time wins. The table below gives the times of the winning competitors and the countries they represented in the Women's Skeleton Bob in the 2006 Winter Olympics.

**2006 Winter Olympics results for the Women's Skeleton Bob**

Medal position	Competitor's country	Combined time for two runs
Gold	Switzerland	1 minute 59.83 seconds
Silver	Great Britain	2 minutes 1.06 seconds
Bronze	Canada	2 minutes 1.41 seconds

- a On average, what was the difference in time per run between the gold medal winner and the silver medal winner?

**1 mark**

Each run in the Women's Skeleton Bob was made down a track with a length of 1435 metres.

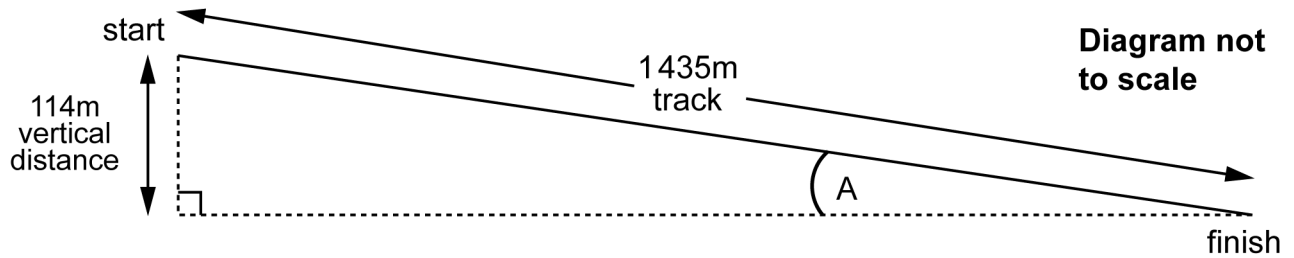
1 mile is equivalent to 1609 metres

- b What was the average speed of the gold medal competitor over her two runs, in miles per hour?

**3 marks**

The vertical distance between the start and the finish of the Skeleton Bob track was 114 metres.

**Simplified diagram of the 2006 Winter Olympics Skeleton Bob track**



- c What is the angle (A) at which the Skeleton Bob track is inclined in the simplified diagram above?

**2 marks**

- d Show how to check your answer to part c.

**1 mark**

**Total 7 marks**

**Please go on to the next page**

4 The UK is made up of England, Northern Ireland, Scotland and Wales.

A national newspaper produced a comparison of data, collected in 2005, from England, Northern Ireland, Scotland and Wales. The data is shown in the table below.

**A comparison of data from the UK in 2005**

	England	Northern Ireland	Scotland	Wales	UK
<b>Population</b>	50093100	1710300	5078400	2952500	59834300
<b>Land area (km<sup>2</sup>)</b>	130395	13 843	78782	20779	243799

Almost one third of the total land area of the UK is in Scotland, but only 5 078 400 people lived there in 2005.

a Approximately, what fraction of the UK's population lived in Scotland in 2005? Give your answer in a simple form.

**1 mark**

b On average, how many more people lived in each square kilometre of England than in each square kilometre of Wales in 2005?

**2 marks**

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Within England, house prices vary considerably between different regions. From October to December in 2005 a total of 207 houses were sold in a town in the north of England. The table below gives the distribution of their prices.

**Distribution of prices of houses sold in a town in the north of England  
from October to December 2005**

House price (£P)	Frequency
$25\,000 < P \leq 50\,000$	5
$50\,000 < P \leq 75\,000$	18
$75\,000 < P \leq 100\,000$	76
$100\,000 < P \leq 150\,000$	61
$150\,000 < P \leq 200\,000$	28
$200\,000 < P \leq 300\,000$	15
$300\,000 < P \leq 600\,000$	4

- c Calculate an estimate of the mean house price in the town from October to December 2005.

**3 marks**

In a town in the south of England the mean house price was £356 379 in 2005. However, the median house price in the same town was £295 000 in 2005.

- d Suggest a reason why the mean house price might be so much higher than the median house price for this town in the south of England.

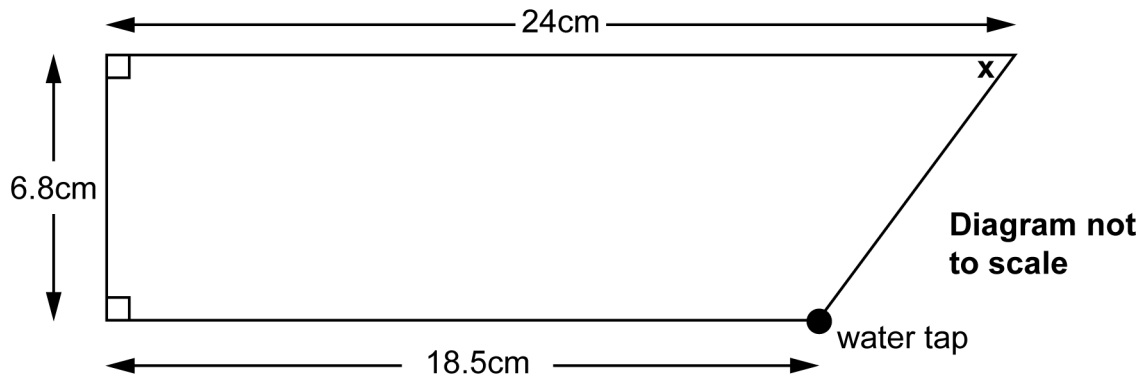
**1 mark**

**Total 7 marks**

- 5 A farmer in a popular holiday destination intends to convert one of his fields into a camp site for tents and caravans.

He has a plan of one field drawn to a scale of 1 : 1250

**Sketch of the field showing scaled measurements taken from the plan**



Health and Safety regulations state that there must be a water tap within 90 metres of each tent or caravan. There is an existing water tap in one corner of the field as shown on the sketch above.

- a Would this existing water tap be within 90 metres of a caravan or tent in the corner marked x on the sketch? Show calculations to support your answer.

3 marks

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A maximum of 75 tents or caravans are allowed per hectare of the total useable land on a camp site, excluding access roads and service areas. The farmer plans to have a 200 metre long access road that is 4 metres wide and a rectangular service area measuring 32 metres by 16 metres in the field.

1 hectare is equal to 10 000 square metres
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- b If the farmer carries out his plans, what is the maximum number of tents or caravans that will be allowed on the field?

**3 marks**

The farmer decides to use a smaller field as a camp site. This field is suitable for 40 caravans and 30 tents. He will charge camping fees of

- £12 per night for caravans
- £8 per night for tents.

The camp site will be open for 30 weeks of the year. The farmer predicts that he will earn maximum income from the site for 8 weeks of the year, two thirds of maximum income for a further 5 weeks and a quarter of maximum income for the remainder of time the camp site is open.

- c How much does the farmer expect to earn in camping fees during his first year of opening?

**2 marks**

**Total 8 marks**

**Part B - Extended-answer question**

- 6 In 2002, the National Reading Campaign carried out a survey on the reading habits of adults in the UK.

They asked the adults taking part in the survey how many books they had read for pleasure during 2001. The results are shown in the table below.

**Number of books read for pleasure in 2001**

Number of books read	Percentage of men	Cumulative percentage (men)	Percentage of women	Cumulative percentage (women)
0	35	35	22	22
1 – 4	29	64	27	49
5 – 19	22	86	28	77
20 – 49	8	94	14	91
50 – 100	6	100	9	100

- a Use the data in the table to draw a cumulative frequency graph with two lines to show the number of books read by men and the number of books read by women in 2001.  
**5 marks**
- b Estimate from your graph the median number of books read by men and the median number of books read by women in 2001.  
**2 marks**
- c Compare the number of books read by men with the number of books read by women in 2001 and make one comment on your findings.  
**1 mark**

One measure of how easily a book can be read with understanding is the *SMOG* (Simplified Measure of *Gobbledygook*) formula used by librarians.

$$R = \sqrt{3n} + 8$$

where **R** is the *SMOG* readability level  
**n** is the average number of words with three or more syllables in samples of 10 consecutive sentences

*SMOG* readability levels indicate the level of literacy that an adult needs to read a book with understanding.

**Relationship between *SMOG* readability levels and adult literacy levels**

<b>SMOG readability level ( to nearest whole number)</b>	<b>Adult literacy level</b>
10 and below	Entry Level
11 – 12	Level 1
13 – 14	Level 2
15 and above	Above Level 2

The *Harry Potter* books are popular with both adults and children. In a study of *Harry Potter and the Philosopher's Stone*, there was an average of 7.71 words with three or more syllables in samples of 10 consecutive sentences.

- d Use the data given above and the *SMOG* formula to find the *SMOG* readability level for *Harry Potter and the Philosopher's Stone* and the adult literacy level needed in order to read it with understanding.

**3 marks**

The sixth Harry Potter book, *Harry Potter and the Half Blood Prince*, broke all records for sales during the first day of its release in July 2005. One supermarket chain sold 430 000 copies of the book, priced at £7.97, in the first 24 hours. The books cost the supermarket chain £6 796 per 1000 to purchase from the publisher.

- e How much profit did the supermarket chain make **per minute**, on average, from the sales of the books in the first 24 hours? Ignore any other costs.  
**2 marks**

Immediately following its release at midnight (UK time) on the 16th of July, an average of 1 396 copies of the book were sold per minute in the UK and an average of 4 792 copies of the book were sold per minute in the USA.

- f Write one equation that links the combined total number of copies (N) of the book sold altogether in the UK and the USA with the number of minutes (T) after its release.  
**1 mark**

- g Use your equation to find the time (UK time) on the 17th of July when a total of one million copies of the book had been sold altogether in the UK and the USA.  
**2 marks**

- h Show how to check your answer to part g.  
**1 mark**

On the day of the release of *Harry Potter and the Half Blood Prince*, postal workers delivered one copy to 1 in every 50 households in the UK.

There were  $2.47 \times 10^7$  households in the UK in 2005  
A copy of *Harry Potter and the Half Blood Prince* weighs 730 grams

1 tonne is equal to 1 000 kilograms

- i To the nearest tonne, what was the total weight of all the copies of this book delivered by postal workers in the UK on the day of its release?

**2 marks**

**Total 19 marks**

## End of test

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