



Unit Number

**U3051246/KA3T**

**Key Skills**

**Application of Number**

**Level 3**

**Monday 9 June 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 32 marks) consists of 5 short-answer questions.

Part B (total 18 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 A group of 13 sixth-form students took part in a sponsored charity run of 9 miles. Another student, who was unable to accompany his friends, decided to raise some extra money by swimming the same distance.

He started his swim in the 25-metre-long pool at a local sports centre at 6am and completed the 9 miles at 11.41am.

- a What was the swimmer's average speed, in miles per hour, for the 9-mile swim?

1 mark

1 mile is equivalent to 1.609 kilometres

- b How many complete lengths of the 25-metre-long pool did he need to swim to cover a distance of 9 miles?

1 mark

Altogether, the swimmer's sponsors gave him 23 pence for each length he swam. The group of 13 sixth-form students raised a total of £1430 in their charity run.

- c Did the swimmer raise more money or less money than that raised, on average, by **each** of the runners? Show working to support your answer.

2 marks

Total 4 marks

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- 2 A survey of breeding birds records the number of birds of different species seen in regions of the UK each year.

This survey data can be used to compare the frequency per square kilometre of one particular species in different regions. To do this, the number of birds of a species seen is divided by the number of sample 1-kilometre squares of land selected from that region. The table below gives some survey data for blackbirds in 2005.

**Survey data for blackbirds in 2005**

<b>Selected region</b>	<b>Dorset</b>	<b>Greater Manchester</b>
<b>Number of blackbirds seen</b>	617	898
<b>Number of sample 1-kilometre squares of land in the region</b>	38	58

- a Was the frequency per square kilometre of blackbirds greater in the Dorset region or the Greater Manchester region in 2005?  
Show working to support your answer.

**2 marks**

The population of goldfinches in the UK began to decrease in the 1970s but in March 2006 there was an increase in the number of these birds. In March 2006 there were 313 000 breeding pairs of goldfinches but this number was still only 90% of the estimated number in 1975.

- b How many breeding pairs of goldfinches were there estimated to be in 1975 in the UK?

**2 marks**

Another survey found that some people go to the Isle of Mull to see sea eagles.

This survey found that visitors to Mull were either groups of holidaymakers staying for an average of 4.45 days or groups of day-trippers visiting for 1 day only. The table below gives data about their estimated spending in 2005.

**Estimated spending by all groups of visitors to Mull in 2005**

Group	Number of groups	Expenditure per group per day in £	Average length of visit in days
Holidaymakers	67971	119.55	4.45
Day-trippers	33487	55.78	1.00

It was estimated that groups interested in seeing sea eagles spent 3.975% of the total amount spent by all groups of visitors.

- c Calculate the amount estimated to have been spent by groups of visitors to Mull interested in seeing sea eagles in 2005.

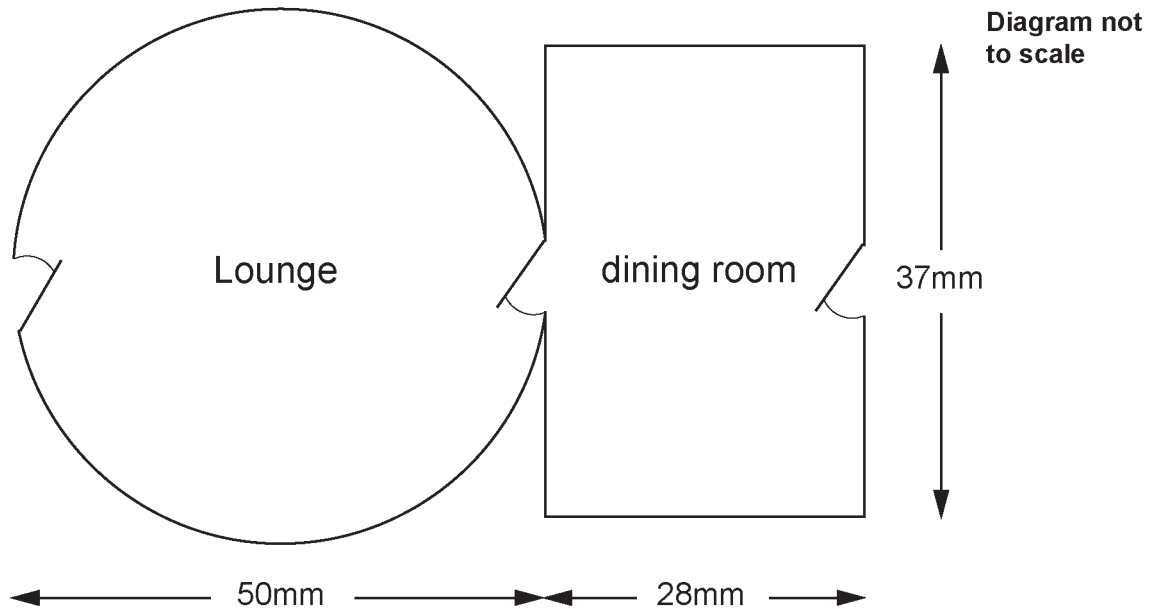
2 marks

Total 6 marks

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- 3 A man is buying a house which has been converted from a windmill. The seller has a plan of the house drawn to a scale of 1 : 150. She gives the man a sketch showing part of the ground floor with scaled dimensions from the plan.

**Sketch of part of the ground floor of the house converted from a windmill showing the scaled dimensions**



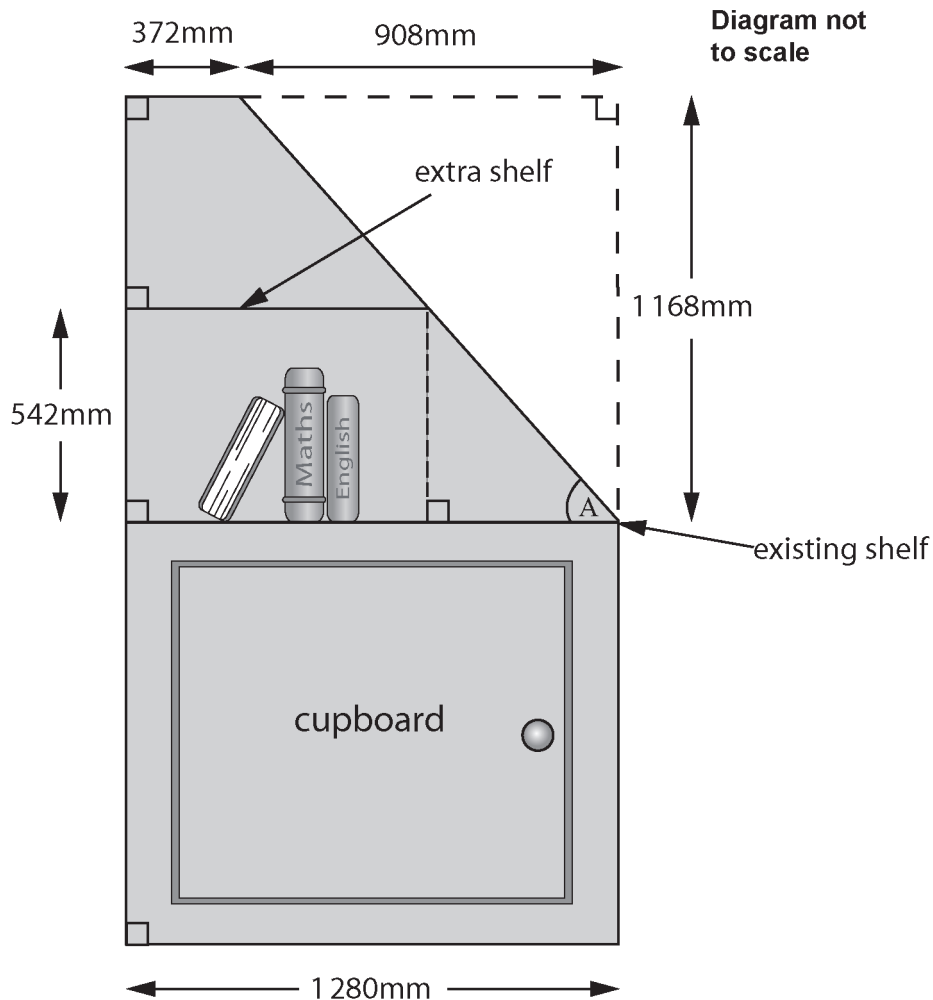
The man intends to stain and varnish the floors of the circular lounge and the rectangular dining room.

- a What is the total area of the **actual** floors of the circular lounge and the rectangular dining room in square metres?

**3 marks**

The man plans to build an extra shelf in a recessed area of wall in the hall. The seller has provided a sketch to show some of the **actual** dimensions of the recessed area and the man has drawn in the position of the extra shelf.

**Vertical view sketch showing the actual dimensions of the recessed area of wall in the hall**



b Find the angle (A) on the sketch.

2 marks

c What is the minimum length of wood the man requires for the extra shelf? Give your answer to the nearest millimetre.

2 marks

**Total 7 marks**

- 4 Garden centres in the UK predicted total sales to the value of £5 billion for the year 2006. Over the Easter weekend in 2006 the value of sales at garden centres was £120 million.

1 billion is 1 000 000 000

- a Approximately, what fraction of the predicted total value of sales at garden centres in 2006 was recorded over the Easter weekend?  
Give your answer in a simple form.

**1 mark**

Of the predicted total value of sales for 2006, pots and containers were expected to account for £4.50 in every £100.

- b What was the expected value of sales of pots and containers in 2006?

**1 mark**

Sales of bedding plants were expected to account for 21.5% of the predicted total value of sales. This was five times as much as that expected for sales of garden chemicals.

- c How much did garden centres expect the value of sales of garden chemicals to be in 2006?

**1 mark**

To encourage sales at the end of June, the manager at one garden centre reduced the price of garden furniture by 15%. He used the following formula to calculate what his percentage increase in sales of garden furniture must be to maintain his takings.

$$p = 10000 \left( \frac{1}{100 - x} \right) - 100$$

where **p** is the percentage increase in sales  
**x** is the percentage reduction in price

- d Use the formula to calculate what percentage increase in sales of garden furniture the manager must achieve to maintain his takings.

**2 marks**

The workers at this garden centre will plant a flower bed measuring 7.2 square metres (72 000 square centimetres). They want to plant three times as many helianthemum plants as santolina plants. Helianthemum plants will each occupy a space of 900 square centimetres of ground and santolina plants will each occupy a space of 2 100 square centimetres of ground.

- e Use this information to form two equations about the number of helianthemum plants and the number of santolina plants, if all the available space in the flower bed is used.

**1 mark**

- f Use your equations from part e to find how many helianthemum plants and how many santolina plants will be needed for the flower bed if all the available space is used.

**2 marks**

**Total 8 marks**

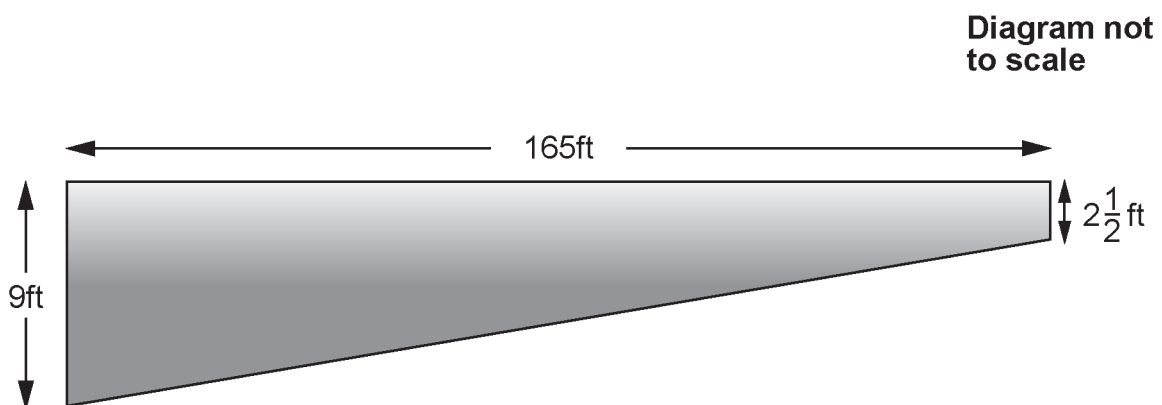
- 5 Lidos, or open-air swimming pools, became fashionable in the 1920s and 1930s. Many lidos have since closed and in the UK only 97 are now open whereas 300 were open in 1950.

a Calculate the percentage of lidos in the UK that have closed since 1950.

1 mark

A campaign to reopen a lido in London has been successful. The rectangular adult pool will be relined in stainless steel to stop leakages. The adult pool is 165 feet long, 66 feet wide and the bottom slopes uniformly from a depth of 9 feet to a depth of  $2\frac{1}{2}$  feet.

Simplified diagram of a cross-section of the length of the adult pool



The area of the bottom of the pool is 10 898 square feet.

1 square metre is equivalent to 10.764 square feet

b Calculate, in square metres, the total area of the four sides and the bottom of the pool that need to be relined with stainless steel.

3 marks

Regulations state that the entire contents of a pool should be circulated for filtration and treatment in no longer than 5 hours.

The children's pool at this lido is 66 feet long, 20 feet wide and a uniform 2 feet deep throughout. The contents of this pool are circulated at a rate of 1.5 litres per second.

<p>1 foot is equivalent to 0.305 metres 1 cubic metre is equivalent to 1000 litres</p>
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- c When it is full to the brim, will the children's pool meet regulations for circulating the entire contents of the pool in no longer than 5 hours?  
Show working to justify your answer.

**3 marks**

**Total 7 marks**

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**Part B - Extended-answer question**

- 6 Research into the use of public libraries shows that people are taking out fewer books but they are using libraries more for their internet facilities.

The number of library visits increased by 22 million between the year 2001 and the year 2004. The number of library visits was 340 million in 2004.

- a Approximately, what was the ratio of the number of library visits in the year 2001 to the number of library visits in the year 2004?  
Give your answer in a simple form.

**1 mark**

34.351 million of the UK population were members of a library in 2004.

The population of the UK was  $5.957 \times 10^7$  in 2004

- b What percentage of the population of the UK were members of a library in 2004?

**1 mark**

On average, public libraries stocked 4.01 books per member in 2001. A total of 110.133 million books were stocked by public libraries in 2004 for the 34.351 million members.

- c On average, what was the difference between the number of books stocked per member by public libraries in 2001 and the number of books stocked per member by public libraries in 2004?

**1 mark**

The data in the table below shows the numbers of different types of books issued to borrowers in the years 1994, 1999 and 2004.

**Number of books issued by type and by year**

Type of book	1994	1999	2004
Adult fiction	303 million	235 million	167 million
Adult non-fiction	138 million	115 million	85 million
Children's	110 million	110 million	89 million

- d Use the information in the table to draw a line graph with three lines on the same axes to compare the numbers of books of different types issued to borrowers in the UK in 1994, 1999 and 2004. Label your lines clearly.

**5 marks**

- e Use your graph to estimate between which two consecutive years the number of children's books issued became greater than the number of adult non-fiction books issued.

**1 mark**

- f Explain what your line graph in part d tells you about the trend in the numbers of books of the three different types issued to borrowers in the UK between the years 1994 to 2004.

**1 mark**

Number of books issued per visit to percentage of adult library users						
Number of books	0	1	2	3	4	5 - 10
Percentage of adult library users	2.7	21.4	23.6	17.2	14.0	21.1

A library service report provides the following information about the numbers of books issued per visit to adult library users in 2004.

- g Calculate an estimate of the mean number of books issued per visit to adult library users in 2004?

**3 marks**

Over the past five years there has been an increase of 70% per year in the total number of computers for public internet access from libraries. The total number of computers for public internet access was 39 270 in 2004.

- h If this increase continues at the same rate, in which year will the number of computers for public internet access exceed 900 000?

**2 marks**

On average, library expenditure in the UK in 2004 amounted to £17.80 per person of the population.

The population of the UK was  $5.957 \times 10^7$  in 2004

- i What was the total library expenditure in the UK in 2004?

**1 mark**

201 new lending books were bought per 1000 of the population in 2004. The average retail price paid for each of these books was £7.36.

- j Use this information to calculate the total retail price for the new lending books bought by public libraries in 2004.

**1 mark**

- k Show how to check your answer to part j by estimation without using a calculator.

**1 mark**

**Total 18 marks**

## End of test

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