



Key skills application of number Level 3

Monday 16th January 2006

Test Paper

YOU NEED

- This test paper
- An answer booklet
- A pen with black or blue ink
- Pencils
- An eraser
- A ruler marked in mm and cm
- 2mm squared paper
- A scientific calculator

You may use a bilingual dictionary

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

THERE ARE TWO PARTS TO THIS TEST

Part A (total 33 marks) consists of 5 short-answer questions

Part B (total 17 marks) consists of 1 extended-answer question

Total marks available: 50

INSTRUCTIONS

You have 15 mins 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

Try to answer ALL the questions and:

- Make sure your personal details are entered correctly in the answer booklet
- Write in black or blue ink
- Make sure that your writing is clear, and show all your working
- If you need extra paper, use a second answer booklet. Make sure you put your personal details on the front of the second answer booklet
- At the end of the test, hand the test paper, your answer booklets and all notes to the supervisor

REMEMBER: YOU HAVE 1 HOUR 30 MINUTES TO FINISH THE TEST

Part A - Short Answer Questions

1 In the year 2003, the total number of new cars registered in the UK was 2 579 050.

Of these, 704 637 were diesel cars.

- a Approximately, what fraction of new cars registered in the UK in 2003 were diesel cars?

1 mark

The number of new cars registered in 2003 was an increase of 0.6% on the number of new cars registered in the year 2002.

- b How many new cars were registered in the UK in 2002?

2 marks

One car manufacturer offered free fuel to customers who purchased a family saloon car between 1st January 2003 and 31st March 2003.

A customer purchased a family saloon car on 1st February 2003. The manufacturer offered free fuel from the month of purchase to 31st December 2003 on the basis of

- the car covering an average mileage of 10 000 miles per year
- the car having a fuel consumption of 7.2 litres per 100 kilometres
- an average petrol price of 72.9 pence per litre

1 kilometre is equivalent to 0.621 miles
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- c Calculate the value of the free fuel that the customer received based on the criteria in the manufacturer's offer.

3 marks

Total 6 marks

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- 2 Broadband Internet connections allow computer users to download files at much faster speeds than dial-up connections.

A company plans to replace its 56 kilobits per second dial-up connection with a 512 kilobits per second Broadband Internet connection. This company regularly downloads files that contain about 10 megabytes of data.

1 kilobit is equal to 1 000 bits
1 megabyte is equal to 1 024 kilobytes
1 kilobyte is equal to 1 024 bytes
1 byte is equal to 8 bits

- a What is the maximum amount of time the company can save by downloading a 10 megabyte file using a 512 kilobits per second Broadband Internet connection instead of a 56 kilobits per second dial-up connection?

3 marks

An advertisement claims that the 512 kilobits per second Broadband Internet connection that the company plans to use operates ten times faster than a dial-up connection.

- b Use estimation to show whether the advertising claim is correct.

1 mark

When a file is downloaded using a Broadband Internet connection extra bytes are needed to carry the file. To carry each 1 460 bytes of the file, 1 518 bytes of data have to be transferred.

- c When using a Broadband Internet connection, what percentage of the total number of bytes of data transferred are extra bytes of data needed to carry the contents of the file?

1 mark

Total 5 marks

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- 3 In the United Kingdom (UK) the number of credit cards and debit cards and the amount spent on them is increasing year by year. The table gives this information for the years 1998 and 2003.

Year	Number of credit cards and debit cards used (millions)	Total amount of spending (£ billions)
1998	118.3	140
2003	160.6	244

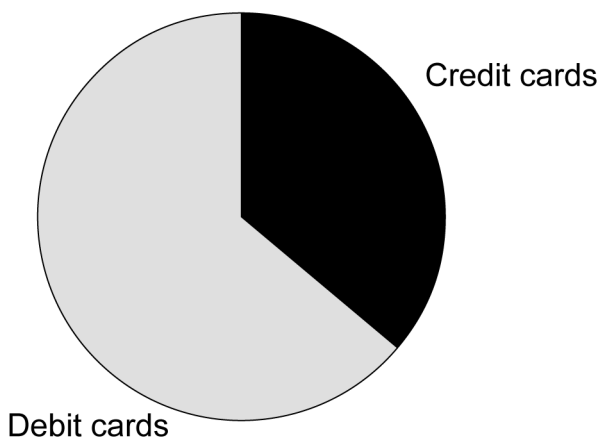
1 billion is 1 000 000 000

- a Calculate the increase in the average amount spent on one credit card or one debit card between the years 1998 and 2003 in the UK.

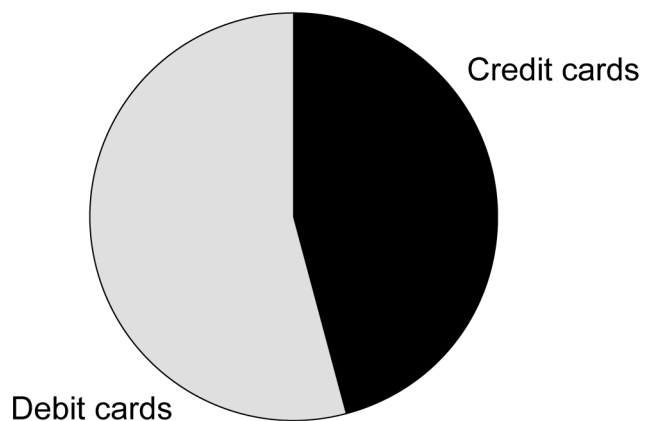
2 marks

The pie charts below show the proportions of the total number of transactions and the total spending using credit cards and debit cards in the UK in 2003.

Proportions of transactions using credit and debit cards in the UK in 2003



Proportions of spending on credit and debit cards in the UK in 2003



- b Compare the two pie charts and comment on the average amount per transaction spent on credit cards compared to the average amount per transaction spent on debit cards in the UK during 2003.

2 marks

At the beginning of April 2004 the total debt in the UK from credit cards, personal loans and mortgages amounted to £956 billion. The number of households in the UK in 2004 was 2.45×10^7

- c What was the average debt of each UK household from credit cards, personal loans and mortgages at the beginning of April 2004?

1 mark

At the end of July 2004 the total debt in the UK from credit cards, personal loans and mortgages rose to £1.004 trillion from a total debt of £956 billion at the beginning of April 2004.

1 trillion is 1 000 billion

- d Calculate the percentage increase in debt in the UK from credit cards, personal loans and mortgages in the 4 months between the beginning of April 2004 and the end of July 2004.

1 mark

At the end of July 2004, BBC News predicted that

'In three years time, debt in the UK from credit cards, personal loans and mortgages will exceed £1.5 trillion.'

- e Show calculations to check the BBC News prediction.

2 marks

- f What assumption had BBC News made in making this prediction?

1 mark

Total 9 marks

- 4 A young man plans to work as a self-employed window cleaner. He needs to buy a suitable ladder. He estimates that to reach the highest windows the ladder must reach a height of 4.5 metres above the ground.

The Health and Safety Executive recommends that window cleaners use ladders that are positioned at an angle of 75° to the ground (as shown in the diagram)

Simplified diagram showing the correct position of a ladder

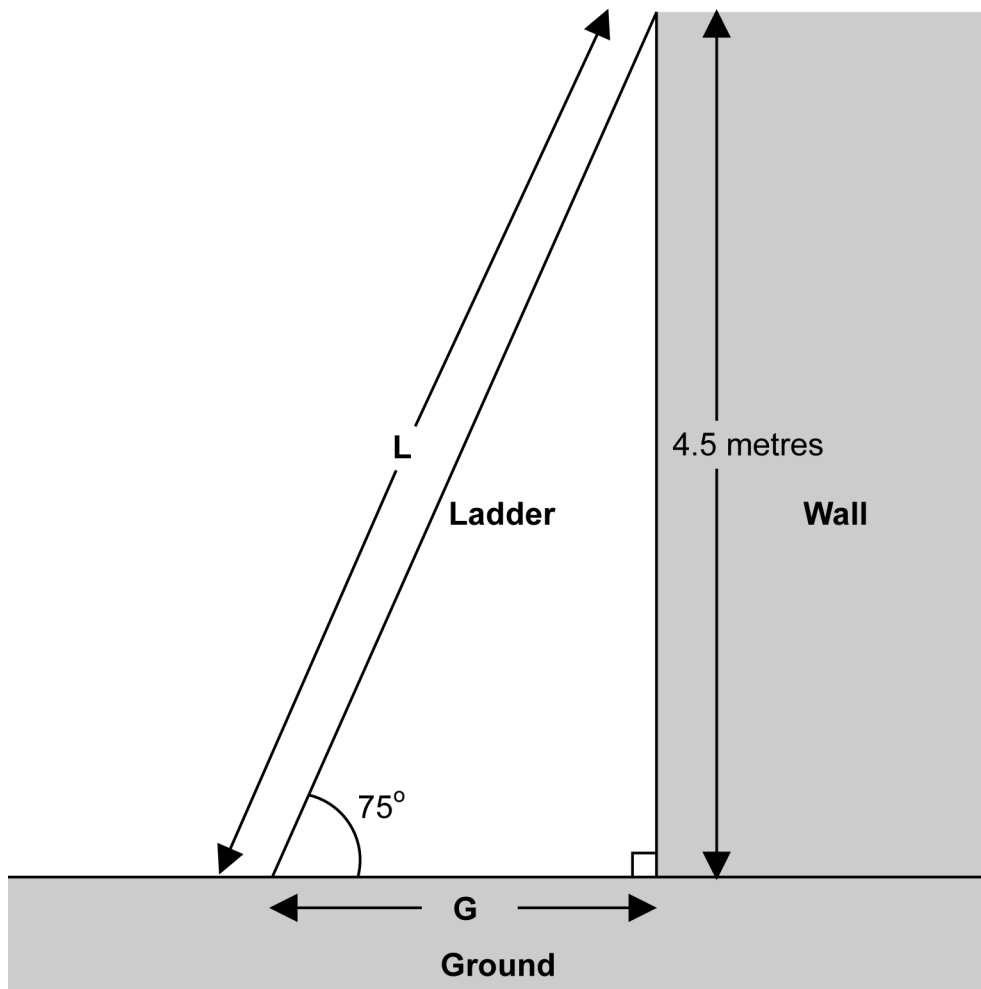


Diagram not to scale

- a What is the minimum length (shown as L in the diagram) of a suitable ladder that will reach to a height of 4.5m?

2 marks

A Health and Safety leaflet suggests that in practice a window cleaner can position a ladder correctly by putting the base of it 1 metre away from the wall for every 4 metres it reaches up the wall.

- b Compare the distance from the base of the ladder to the base of the wall, as suggested in the Health and Safety leaflet, with the recommended distance (shown as **G** in the diagram). Comment on your findings.

2 marks

To make a living as a self-employed window cleaner, the young man thinks he will need to earn £9 000 in a year. He plans to work a 40-hour week with 4 weeks paid holiday in a year. He estimates that

- one tenth of his 40-hour week will be taken up with activities that he will not be able to charge for
 - due to the weather, he will only be able to clean windows for 55% of the remaining working week
- c Calculate how much income per hour the young man needs if he is to make a living as a self-employed window cleaner.

2 marks

Total 6 marks

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5 A city council in the United Kingdom (UK) plans to build a new library.

The new library will open for 7 days each week for all 52 weeks in the year. It is expected to accommodate 1 750 000 visitors each year. The opening hours of the new library are shown in the table below.

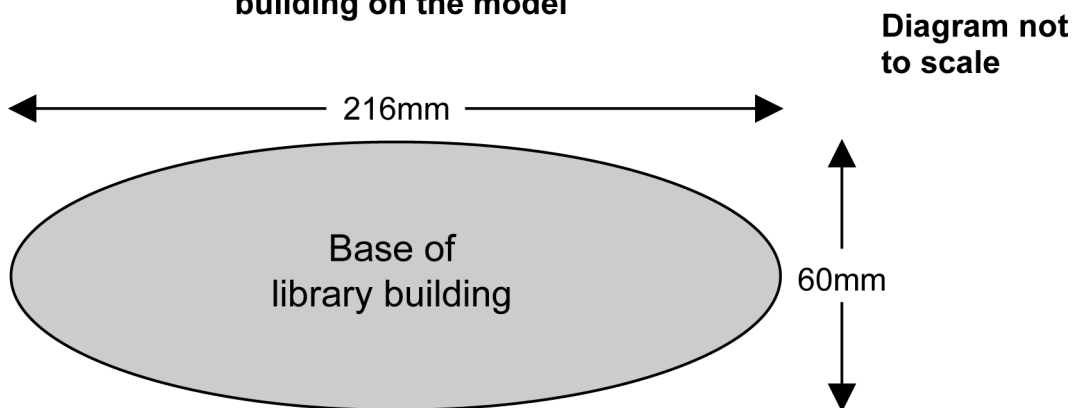
Day	Opening time	Closing time
Monday	09:00	20:00
Tuesday	09:00	20:00
Wednesday	09:00	20:00
Thursday	09:00	20:00
Friday	09:00	20:00
Saturday	09:00	17:00
Sunday	10:00	13:00

a What is the average number of visitors, to the nearest ten, that the new library can expect per hour?

1 mark

The new library building floor will be in the shape of an ellipse. A simplified diagram showing the measurements of the base of a model made to a scale of 1 : 1 250 is shown below.

Simplified diagram to show the base of the library building on the model



$$\text{Area of an ellipse} = \frac{\pi AB}{4}$$

where **A** is the maximum length of the ellipse
B is the maximum width of the ellipse

- b Calculate the area of the base of the actual library building, to the nearest square metre.

3 marks

Another UK city council compares the building costs of its new library with those of a new library in Hong Kong. The new UK library has a floor area of 44 500 square metres and the building costs were £130 million. The library in Hong Kong has a floor area of 33 800 square metres and the building costs were 690 million Hong Kong dollars.

£1 is equivalent to 14.23 Hong Kong dollars

- c Calculate the building costs in £ per square metre of floor area for the new UK library and the building costs in £ per square metre of floor area for the Hong Kong library. What is the approximate ratio of the building costs per square metre for the UK library to the building costs per square metre for the Hong Kong library?

3 marks

Total 7 marks

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Part B - Extended Answer Question

- 6 The table below gives the attendance figures in the year 2003 for the 29 most popular theme parks in the UK and mainland Europe.

Attendance at the 29 most popular theme parks in the UK and mainland Europe in 2003						
Attendance in millions (A)	$1 \leq A < 2$	$2 \leq A < 3$	$3 \leq A < 4$	$4 \leq A < 5$	$5 \leq A < 6$	$6 \leq A < 11$
Number of theme parks	16	6	4	1	0	2

- a Draw a histogram to show the distribution of the attendances at the 29 most popular theme parks in the UK and mainland Europe in 2003.
4 marks
- b Refer to your histogram and make one comment about what the distribution shows.
1 mark

A company plans to site a new theme park elsewhere in mainland Europe. As part of its market research, the company wants to know the average attendances at the 29 most popular theme parks in the UK and mainland Europe in 2003.

- c Calculate an estimate of the mean attendance at the 29 most popular theme parks in the UK and mainland Europe in 2003.
3 marks
- d Identify the class in which the median lies for the attendance at the 29 most popular theme parks in the UK and mainland Europe in 2003.
1 mark

During its market research the company discovers that the two theme parks in the UK and mainland Europe in 2003 with the highest attendance had a combined attendance of 16.43 million.

- e Comment on the effect this information has on the value for the estimates of the mean and the median attendance at the 29 most popular theme parks in the UK and mainland Europe in the year 2003.
1 mark

f What is the modal class for the attendance at the 29 most popular theme parks in the UK and mainland Europe in the year 2003?

1 mark

g Which of these three averages, the mean, the median or the mode gives the company the best indication of the likely attendance at the new theme park? Give a reason for your choice.

2 marks

One of the theme parks in the UK donated 24 admission tickets with a total value of £498 to a local charity. Some of these tickets were child tickets valued at £19 each and the rest were adult tickets valued at £26 each.

h Use this information to form two equations about the number of child tickets and the number of adult tickets donated by the theme park to the local charity.

1 mark

i Calculate how many child tickets and how many adult tickets were donated by the theme park to the local charity.

2 marks

j Show how to check your answers to part i.

1 mark

Total 17 marks

End of test

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