



Key skills application of number Level 3

Monday 10 November 2008

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 32 marks) consists of 5 short-answer questions

Part B (total 18 marks) consists of 1 extended-answer question

Total marks available: 50

INSTRUCTIONS

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

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

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Part A - Short-answer Questions

1 Gold jewellery is usually made from a mixture of pure gold and other metals.

In 9-carat gold, the weight of pure gold is 37.5% of the total weight.
A 9-carat plain gold ring has a total weight of 8.5 grams.

a What is the weight of pure gold in this 9-carat gold ring?

1 mark

A jeweller advertises a gold ring at £235.99. The value of the pure gold in this ring is £87.70.

b Approximately, what fraction of the jeweller's price is the value of the pure gold in this ring? Give your answer in a simple form.

1 mark

18-carat gold rings are made from pure gold, silver and copper in the ratio 75 : 16 : 9. An 18-carat gold ring weighs 17.1 grams. The price of pure gold was £301.68 per troy ounce in 2006.

1 troy ounce is equivalent to 31.1 grams

c What was the value of the pure gold in the 18-carat gold ring in 2006?

2 marks

Total 4 marks

2 Many shops offer free plastic carrier bags to their customers.

It is estimated that customers took 9.8 billion plastic carrier bags from shops in the United Kingdom (UK) during 2006.

There were 24.4 million households in the UK in 2006

1 billion is equal to 1 000 000 000

a On average, how many plastic carrier bags were taken from shops, per household, **each week** in the whole of 2006?

1 mark

A typical plastic carrier bag weighs 8.4 grams. In 2006, the total weight of plastic packaging waste produced in the UK, including plastic carrier bags, was 1.87 million tonnes.

1 tonne is equal to 1 000 kilograms

b Approximately, what was the ratio of the weight of plastic waste from carrier bags to the weight of other plastic packaging waste in 2006?

2 marks

Customers took 9.8 billion plastic carrier bags from shops in 2006; this represented an increase of 3.5% from 2005.

c If this rate of increase continues, in which year will the number of plastic carrier bags customers take from shops first exceed 12 billion?

2 marks

One supermarket chain predicted that customers would use 1.3 billion of its carrier bags to take away their shopping in 2006. It introduced a scheme to reduce, by a quarter, the number of new carrier bags taken by customers in 2006 by offering them a bonus of 1p for every carrier bag they brought back to re-use. New carrier bags cost the supermarket chain £7.47 per thousand bags.

- d If the supermarket chain introduced this bonus scheme at the start of 2006 and reduced the number of new carrier bags taken by a quarter, what was the overall increase in its costs for the year?

2 marks

Total 7 marks

Please go on to the next page

- 3 A car manufacturer advertised free fuel to buyers of one of its models of car.

A condition of the offer was that all the fuel, worth £3 000, had to be used within **one and a half years** (78 weeks) of buying the car. The car had an average fuel consumption of 25.9 miles per gallon. The price of fuel, at the time of the offer, was 93.9 pence per litre.

1 gallon is equivalent to 4.55 litres

- a If the price of fuel stayed the same, what is the average number of miles **per week** that a car owner had to drive in order to use all the fuel in the offer?

3 marks

- b Show how to check your answer to part a by estimation, without using a calculator.

1 mark

The car manufacturer used a picture of a fuel tanker to advertise the offer. The tank on the actual fuel tanker had a height of 1.9 metres, a width of 2.4 metres and a length of 9.7 metres. The capacity of the tank can be calculated using the formula below.

$$C = \frac{\pi H W L}{4}$$

where **C** is the capacity of the tank in cubic metres
H is the height of the tank in metres
W is the width of the tank in metres
L is the length of the tank in metres

1 cubic metre is equivalent to 1 000 litres

The price of fuel, at the time of the offer, was 93.9 pence per litre.

- c What was the total value of all the fuel contained in a full tank of this size, at the time of the offer?

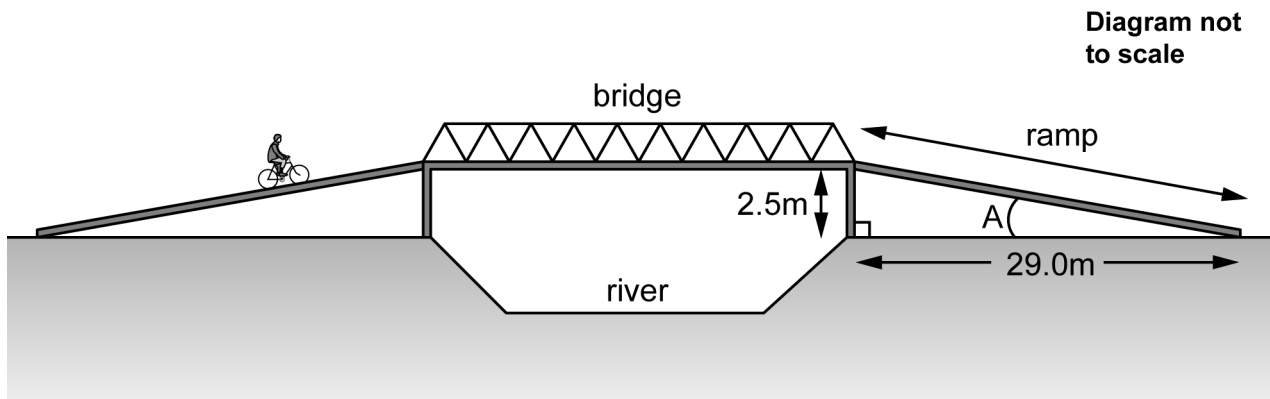
3 marks

Total 7 marks

- 4 A cycling organisation plans to build a cycle trail through a country park.

The plan includes a new bridge where the cycle trail crosses a river. Cyclists will reach the bridge by a uniformly-sloping ramp. The new bridge is shown in the simplified diagram below.

Simplified diagram showing the side view of the new bridge



- a At what angle (A) is the ramp inclined?

2 marks

New guidelines state that the angle of a ramp should be 4° or less to allow access for all users. The cycling organisation amends its plans, keeping the bridge height as 2.5 metres, but changing the ramp's inclination (A) to be 4° .

- b What is the length of the ramp required for the amended plan?

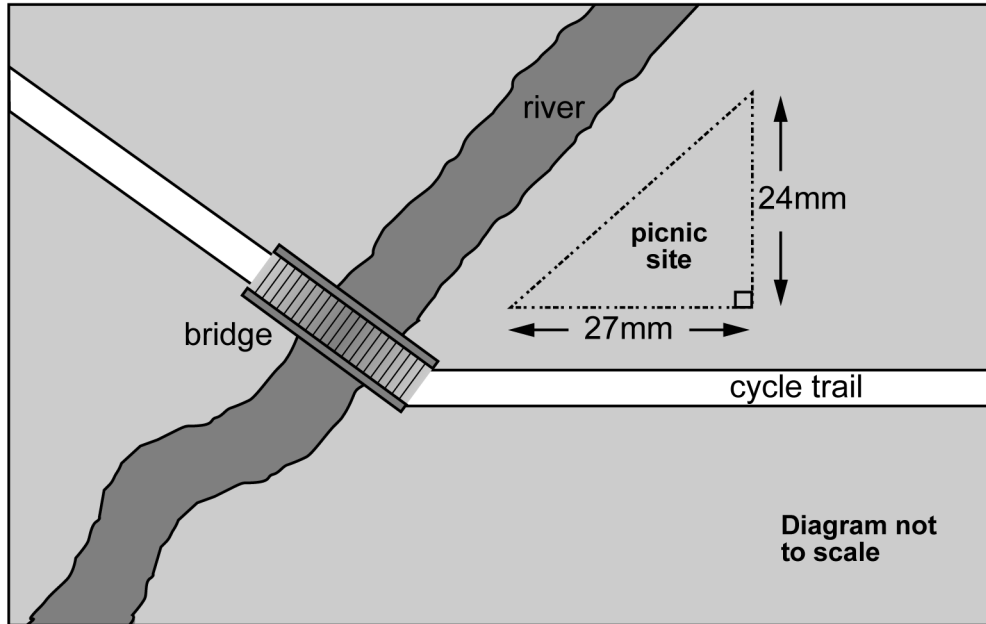
2 marks

- c Show how to check your answer to part b using a different method.

1 mark

The council has agreed to make a picnic site close to the cycle trail and the river. It will allocate one picnic table for each 18 square metres of space on the picnic site. The scaled dimensions of the picnic site taken from a plan drawn to a scale of 1 : 1250 are shown on the sketch below.

Sketch of the picnic site showing scaled measurements taken from the plan



- d How many picnic tables will the council need for the picnic site?

3 marks

Total 8 marks

Please go on to the next page

- 5 A student plans to spend a year in Australia.

She will fly from London to Sydney in Australia via Bahrain. Details of her flight are given below.

Flights from London to Sydney, Australia

Airport		Day	Time
London Heathrow	Departure	9 th September	0930
Bahrain	Arrival	9 th September	1910
Bahrain	Departure	9 th September	2000
Sydney	Arrival	10 th September	2045
All times are local times			

Local time in Sydney is equal to local time in London plus 10 hours

- a What will be the total time spent flying on her journey between London and Sydney?

1 mark

Please go on to the next page

The student's luggage will exceed the free weight allowance by at least 10 kilograms so she plans to send some luggage to Sydney by air freight. The air freight charges from two companies are shown in the table below.

Air freight charges to Sydney, Australia

Company	Charges
World Freight	A fixed charge of £27.86 plus £11.45 per kilogram
Pacific Air Cargo	A fixed charge of £209 for 10 kilograms or less plus £5.50 for every kilogram above 10 kilograms

Each air freight company claims that it offers better value for money.

The companies use the information in the table above to produce formulas to calculate their charges.

Company	Charges
World Freight	$27.86 + 11.45w$
Pacific Air Cargo	$209 + 5.5(w - 10)$
where w is weight in kgs of the luggage	

- b Use the formulas to find the weight of luggage for which the charges of the two companies are the same.

2 marks

The student packs 34 kilograms of luggage to send by air freight.

- c How much will it cost her to send the luggage to Sydney using the cheaper of the two companies?

2 marks

Before she travels, the student plans to buy 500 Australian dollars.
The travel agent makes a commission charge equal to 1.5% of the value of the Australian dollars bought.

On the day the student visits the travel agent
£1 is equivalent to 2.31 Australian dollars

- d Including the commission, how much will it cost the student, in pounds (£), to buy 500 Australian dollars?

1 mark

Total 6 marks

Part B - Extended-answer Question

- 6 People in the UK have increasing amounts of personal debt from loans, overdrafts, credit cards and store cards.

In 2006, a survey was carried out into personal debt in the UK. A total of 1950 people took part in the survey. The results are shown in the table below

Results of the personal debt survey in 2006

Amount of debt (d) in £	Number of people
$0 \leq d < 1000$	839
$1000 \leq d < 2000$	273
$2000 \leq d < 3000$	136
$3000 \leq d < 4000$	98
$4000 \leq d < 5000$	97
$5000 \leq d < 10000$	254
$10000 \leq d < 20000$	253

- a What percentage of the people who took part in the survey had an amount of personal debt greater than or equal to £3 000?
1 mark
- b Calculate an estimate of the mean amount of personal debt per person of those who took part in the survey.
3 marks
- c Give one reason why the mean amount of personal debt that you have calculated in part b is only an estimate.
1 mark

The median amount of personal debt of the people who took part in the survey was £1 498.

- d Which of the two averages, the mean or the median, better represents the amount of personal debt of the people who took part in the survey? Give a reason for your choice.
2 marks

- e Use the data in the table to draw a histogram to display the results of the survey.

5 marks

- f What does your histogram tell you about the distribution of the amounts of personal debt of the people who took part in the survey?

1 mark

By the end of 2006, the total amount of personal debt in the UK had risen to £211.9 billion, an increase of 7.2% over the previous year. A report stated that personal debt in the UK had increased at a rate equivalent to £1 million every 4 minutes during 2006.

1 billion is 1000 000 000

- g Is the statement in the report correct? Show calculations to support your answer.

3 marks

The results of research relating personal debt to income in selected European countries in 2006 are shown in the table below.

Personal debt and income in euros (€) in 2006

Country	UK	France	Germany	Italy	Spain
Average personal debt (€)	5670	2460	3510	1260	1876
Average income (€)	23616	21842	21032	20247	18584

- h Make a numerical comparison between average personal debt as a proportion of average income in the UK, and average personal debt as a proportion of average income in France. Show calculations to support your answer.

2 marks

Total 18 marks

End of test

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