



Key skills application of number Level 3

Monday 14 March 2005

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

Try to answer ALL the questions

YOU HAVE 1 HOUR 30 MINUTES TO FINISH THE TEST

INSTRUCTIONS

- Make sure your personal details are entered correctly in the answer booklet
 - Read each question carefully
 - 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 Calcium is an essential constituent of a balanced diet.

A company markets a soup powder as a replacement meal for slimmers.
A soup meal is made by adding water to the soup powder. Water contains no additional calcium.

The information below is shown on the packet.

= 100 grams of soup powder contain 537.82 milligrams of calcium

= 100 grams of soup powder provide 67.23% of the recommended daily amount of calcium for the average adult

= One serving of soup powder weighs 59.5 grams

a What is the recommended daily amount of calcium for the average adult?

1 mark

b Calculate the amount of calcium in one serving of soup powder.

1 mark

The company also markets a milkshake powder as a replacement meal for slimmers.

= Milkshake powder contains 234.29 milligrams of calcium per 100 grams

= 500 millilitres of skimmed milk contain 600 milligrams of calcium

For one serving of milkshake, a slimmer mixes 35 grams of the milkshake powder with 250 millilitres of skimmed milk. On one day, he has this milkshake for breakfast, the soup replacement meal for lunch and an evening meal of pasta (no calcium content) and yoghurt containing 270 milligrams of calcium.

- c Does the slimmer obtain the recommended daily amount of calcium for the average adult on this day? Show calculations to support your answer.

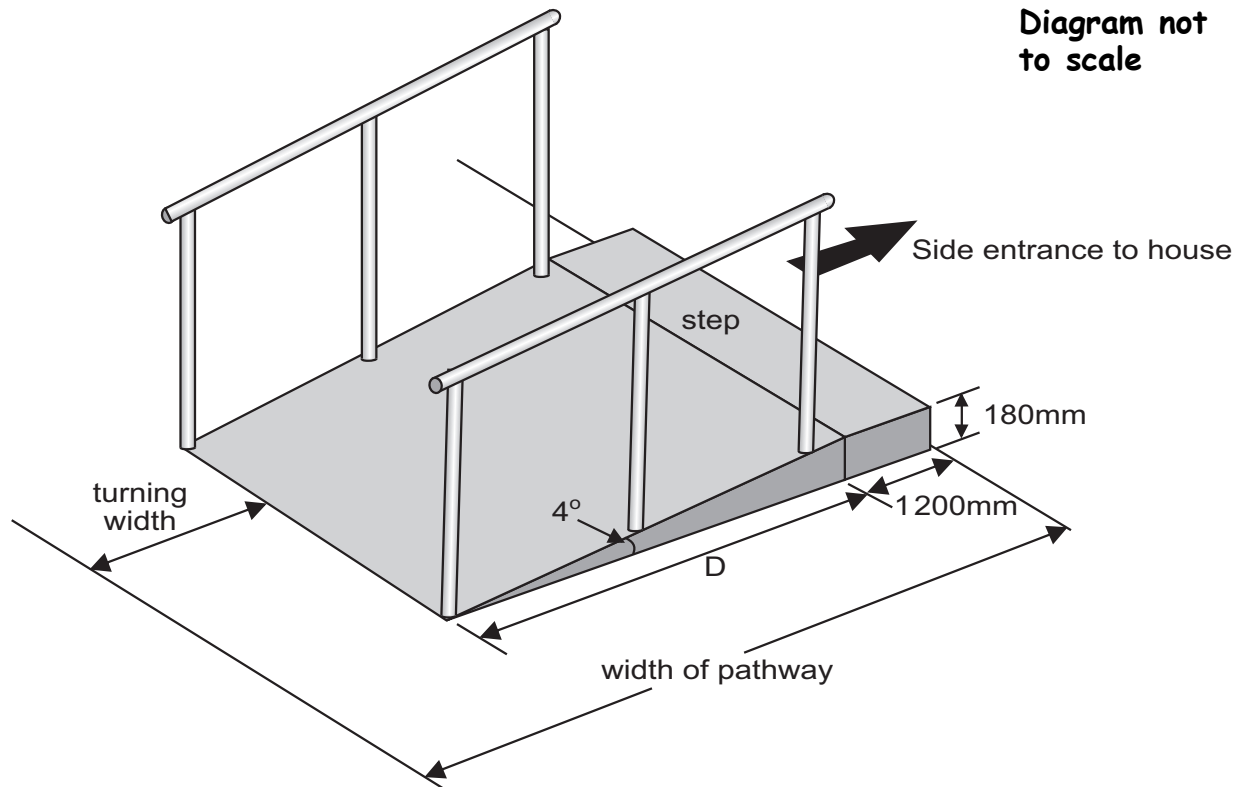
3 marks

Total 5 marks

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- 2 A builder has been asked to adapt the side entrance to a house for a disabled person. He needs to build a ramp for wheelchair access from the path at the side of the house to the step at the side entrance.

Ramp from the outside pathway to the entrance



The step outside the side entrance is 180 millimetres high and 1200 millimetres deep. The builder will make the size of the angle between the ramp and the pathway 4° .

- a Calculate the horizontal distance D from the start of the ramp to the step.

2 marks

The ramp will have two handrails. Each handrail will be of equivalent length to the sloping surface of the ramp plus extensions that reach 300 millimetres beyond each end of the ramp.

- b What length should one handrail be?

2 marks

- c Use a different method to show how to check your answer to part b.

1 mark

The turning width at the bottom of the ramp must be at least 900 millimetres to allow the wheelchair to turn.

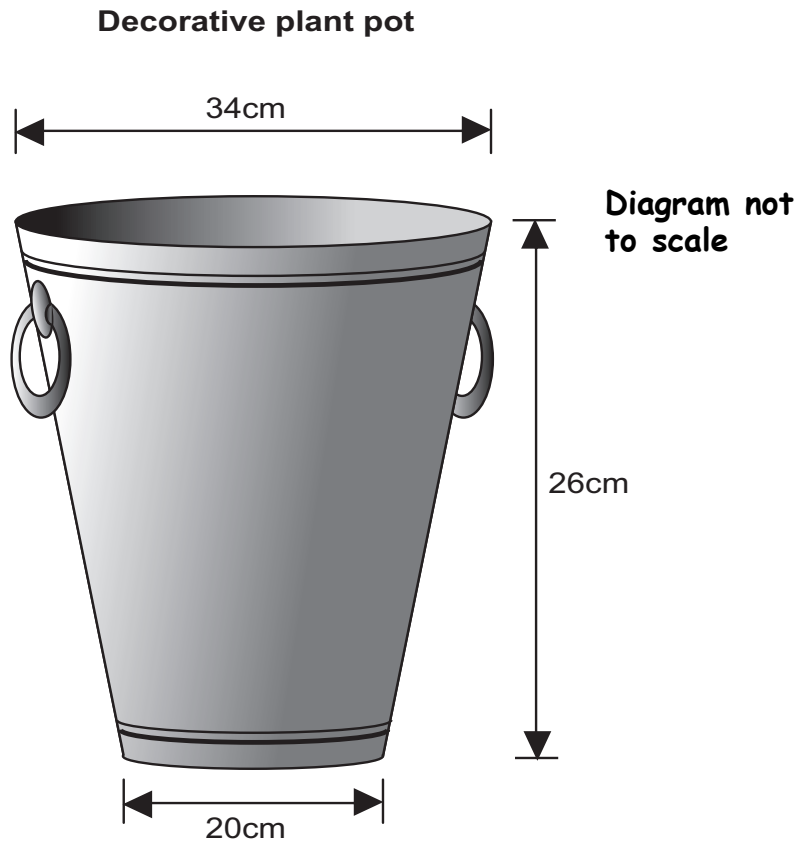
- d What should the minimum overall width of the pathway be to allow the wheelchair to turn?

1 mark

Total 6 marks

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- 3 A woman buys five identical, large, decorative plant pots for her patio. The diagram below shows the dimensions of one pot.



The capacity of each pot can be calculated from the formula below.

$$V = \frac{\pi h(R^2 + Rr + r^2)}{3}$$

where

V is the capacity of the pot in cm^3

h is the height of the pot in cm

R is the radius of the top of the pot in cm

r is the radius of the bottom of the pot in cm

- a What is the capacity of one pot?

2 marks

To prepare her large, decorative pots for planting, the woman adds compost until each pot is full to $\frac{7}{8}$ of its capacity.

- b In total, how many litres of compost does the woman need to prepare her five plant pots for planting?

2 marks

At the front of her house, the woman has three identical window boxes. Each window box holds 29.5 litres of compost when prepared for planting.

The cost of a 60-litre bag of compost is £3.49 and the cost of a 15-litre bag of compost is £1.29.

- c Calculate the minimum cost of the compost she needs to buy to prepare these three window boxes for planting.

1 mark

Total 5 marks

Please go on to the next page

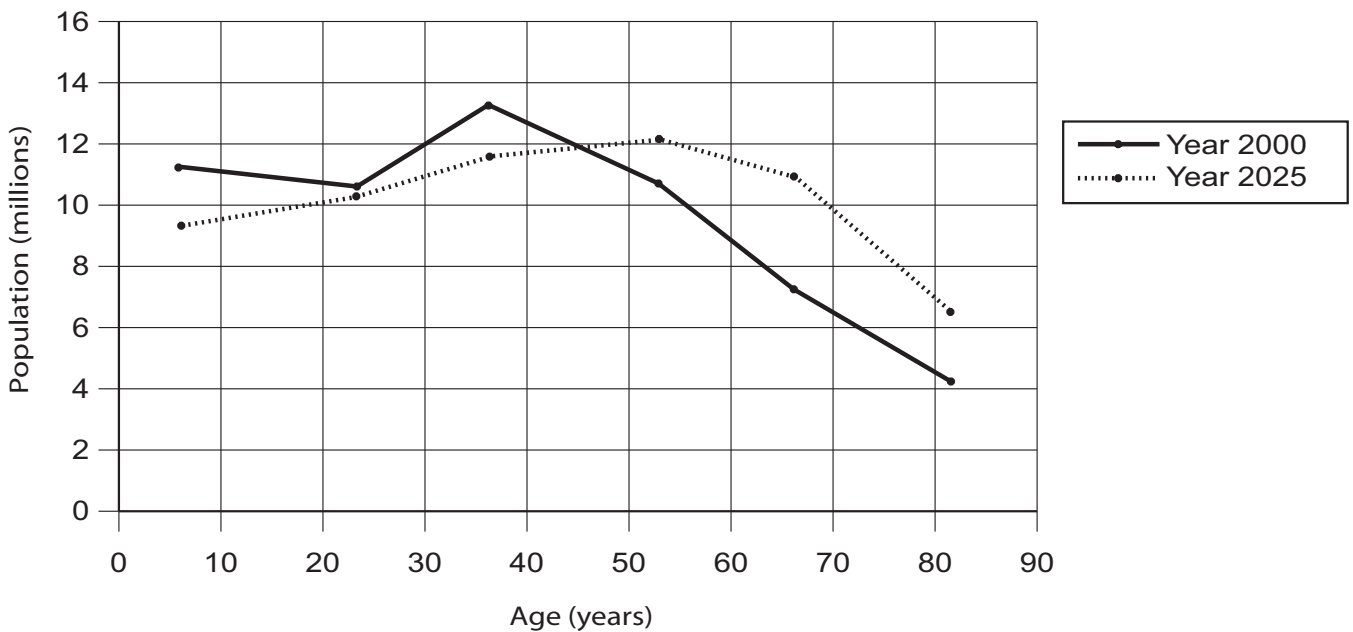
4 In the year 2002 a record number of 8 560 people in England and Wales lived to be 100 years old. Of these people, 6 822 were female.

a What approximate fraction of people living to be 100 years old in England and Wales in 2002 was male?

1 mark

The frequency polygons below show the age distribution of the UK population in 2000 and the predicted age distribution of the UK population in 2025.

Frequency polygons to show the age distribution of the UK population in 2000 and the predicted age distribution of the UK population in 2025



b Use the frequency polygons to compare the age distribution in 2000 and the predicted age distribution in 2025. Make two relevant comparisons about the distributions.

2 marks

The table below shows the predicted age distribution of the UK population in 2025.

Predicted age distribution of the UK population in 2025			
Age (years)	Population of males (millions)	Population of females (millions)	Population of males and females (millions)
0-14	4.90	4.75	9.65
15-29	5.20	5.10	10.30
30-44	6.00	5.75	11.75
45-59	6.10	6.00	12.10
60-74	5.35	5.75	11.10
75-89	2.55	3.95	6.50
Total	30.10	31.30	61.40

- c Calculate an estimate of the mean age of the predicted total UK population (male and female) in 2025.

3 marks

- d Use the predicted data to calculate an estimate of the ratio of males to females in the 75-89 years age group for the UK population in the year 2025.

1 mark

In the year 2000:

- The mean age of the UK population was 38.4 years.
 - The ratio of males to females in the 75-89 years age group was estimated to be 10 : 19.
- e Compare your answers for parts c and d with this data for the year 2000. Make one relevant point about the mean age of the UK population and one relevant point about the ratio of males to females in the 75-89 years age group.

2 marks

Total 9 marks

- 5 The table below gives the value of the state pensions for single people and married couples in the year 2003.

Status	Basic State Pension for 2003 (£ per year)
Single person	3926.00
Married couple	6276.40

These pensions are expected to increase by an average of 2.0% per year to correspond with the rate of inflation. A pensioners' organisation campaigns for an annual increase of 2.0% plus an extra 2.5% to give a total increase of 4.5% per year.

- a If the campaign is successful, what will be the basic state pension for a single person in 2006?

2 marks

It is estimated that during 2004 a total of 2.5 million pensions will be paid out. An estimated three-quarters of these will be paid to single people and the rest to married couples.

- b Calculate the cost to the government of the extra 2.5% increase in pensions for single people and married couples in 2004.

2 marks

The campaign claims that a total pension increase of £300 million would have cost each adult in the UK less than 2p per day.

The adult population of the UK in 2003 was 4.63×10^7

- c Briefly comment on this claim. Show working to support your comment.

2 marks

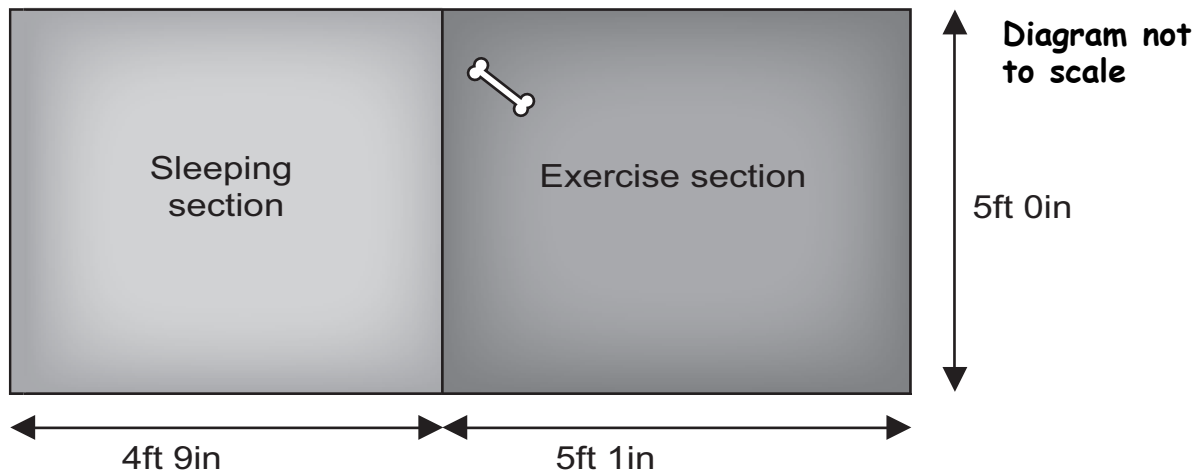
Total 6 marks

Part B - Extended-answer question

- 6 The owner of a boarding kennels business reviews his accommodation for dogs when new regulations are introduced.

The new regulations state that each dog must have a minimum sleeping area of 1.90 square metres and a minimum exercise area of 2.46 square metres. A plan of the existing accommodation for one dog at the kennels is shown below.

Existing accommodation for one dog



12 inches are equal to 1 foot
1 foot is approximately equal to 0.3048 metres

- a Calculate the area of the sleeping section and the area of the exercise section. State clearly whether the existing accommodation satisfies the regulations for the minimum size of each section.

3 marks

To expand his business, the owner plans to build 10 new kennels of the minimum size required to meet the regulations and 14 new kennels, each with a total area of 6 square metres, for larger dogs. The charge for planning application for these new kennels is £1.80 per square metre or part of a square metre.

- b Calculate the total cost of the planning application for the 24 new kennels.

2 marks

One 4.5-litre bucket of cleaning solution is used to clean each of these 24 kennels once a day. The instructions on the container state that 100 millilitres of concentrated liquid cleaner are required to make 10 litres of cleaning solution.

- c Calculate the number of 5-litre containers of concentrated cleaner that will be needed to provide sufficient cleaner for a month of 31 days.

2 marks

The data in the table below shows the boarding fees collected for one day.

Number and size of dog	Fee per day (£)
6 small dogs	7.65 each
7 medium dogs	7.95 each
4 pairs of small dogs	13.50 per pair

The fees include VAT at 17.5%.

- d Calculate the total income from boarding fees, excluding VAT, on this day.

2 marks

The boarding kennels owner pays out a total of £176.00 in wages each week to two assistants. Assistant A is paid £5.00 per hour and assistant B is paid £4.60 per hour. Between them, the two assistants work a total of 36 hours per week.

- e Use this information to construct two equations about the assistants' wages and the hours they work per week.

1 mark

- f How many hours does each assistant work per week? State your answers clearly.

2 marks

The table below shows the number of dogs and the weekly profit in the existing boarding kennels for six different weeks.

Number of dogs	Weekly profit (£)
13	147
15	254
18	406
19	440
21	550
22	605

The owner uses this data to predict the weekly profit for 24 dogs in the new kennels.

g Draw a suitable graph to show the relationship between number of dogs and weekly profit.

4 marks

h Draw, by inspection, the line of best fit.

1 mark

i Use your graph to estimate the weekly profit for 24 dogs.

1 mark

j What assumption has the owner made in making this prediction?

1 mark

Total 19 marks

End of test

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