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0453/02

October/November 2013

2 hours

Additional Materials: Ruler

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO NOT WRITE IN ANY BARCODES.

You may not need all the answer lines for your answer.

You should read and study the sources **before** answering the questions.

The Insert is **not** required by the Examiner. It can be kept by the Centre and used as a teaching resource.

The number of marks is given in brackets [] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
4	
Total	

This document consists of **16** printed pages and **1** insert.

- 1 Study Fig. 1 which shows information about water.



Fig. 1

- (a) (i) Explain why 'water is a basic need for human life'.

.....

.....

.....

..... [2]

- (ii) State **four** other examples of basic needs.

1

2

3

4 [4]

- (b) (i) What is meant by 'Daily water use per person'?

.....

.....

.....

..... [2]

- (ii) Which method has been used to show daily water use per person in the five countries?

Choose from the methods listed below and circle the correct answer.

Divided bars Pictogram Proportionate symbols Field sketch [1]

- (iii) Give **one** advantage and **one** disadvantage of this method of presentation.

Advantage

.....

.....

Disadvantage

.....

..... [2]

- (iv) Suggest **one** way in which a researcher could use secondary data to find out exact figures for water use.

.....

..... [1]

- (c) (i) Explain why 'women in poor countries spend many hours each day carrying water'.

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- (ii) Explain why 'every day 25 000 people die from waterborne diseases'.

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[Total: 18 marks]

2 (a) Study Fig. 2 (Insert), which shows information about the use of water in each continent.

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(i) Name a continent where most of the land area is suffering from water shortages.

..... [1]

(ii) Suggest **one** reason why the continent which you have named in (i) is suffering from water shortages.

.....
..... [1]

(iii) Name the continent which uses the largest percentage of water for industry.

..... [1]

(iv) Identify **three** differences in the percentage use of water in Africa and North America.

1
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2
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..... [3]

(v) Suggest **two** reasons why a higher percentage of water is used for agriculture in Australasia than in Europe.

1
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2
..... [2]

- (b) Isaac lives in an apartment near the centre of Accra, the capital city of Ghana. Ghana is shown on Fig. 2.

He is carrying out a research investigation into his use of water and he has filled in the information shown in his water diary. One day in his diary is shown in Fig. 3.

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Tuesday 20 August 2013

	Column A	Column B	Column C
Activity	Amount used (litres)	Number of times per day	Total (litres)
Flushing the toilet	9	5	
Washing	2	3	6
Taking a shower	20	1	20
Using the washing machine	100	1	100
Preparing food and drinks	2	3	6
Using the dishwasher	30	1	30

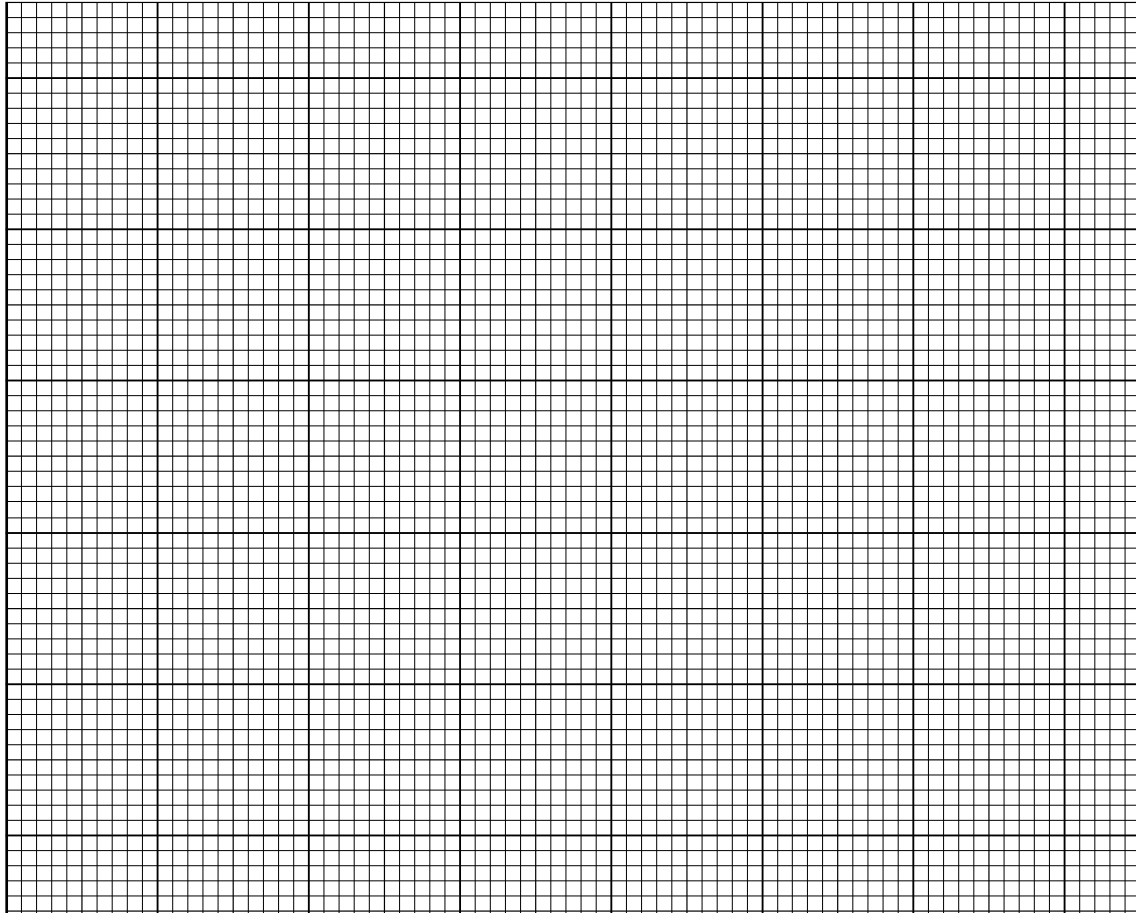
Fig. 3

- (i) Complete Fig. 3 by filling in the information in the empty box. [1]
- (ii) Calculate the total amount of water used by Isaac during the day.

..... litres [1]

- (iii) Use the figures in Column C of Fig. 3 to draw a **bar graph** to show Isaac's daily use of water.

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[4]

- (iv) Suggest how and explain why the figures would be different if the water diary in Fig. 3 had been completed by a student living in a shanty town/squatter settlement in Ghana.

How?

.....

Why?

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..... [3]

[Total: 17 marks]

3 (a) Study Fig. 4, which shows information about a village in Ghana.

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Four hundred people live in the village and their homes are spread out over a wide area. Most homes have thatched roofs but the larger ones and the school have corrugated iron roofs. At present the nearest supply of clean water is 3km away at a borehole. Many villagers pay 4000 cedis (approximately US\$4) a year to use it even though it is not reliable and there are times when the water dries up. The villagers often have to queue for 2 hours to use the borehole, especially during the dry season which usually lasts from 6 to 8 months. Those villagers who do not use the borehole carry water from springs in the hills which are over 5 kms away.

Four options are being considered to improve water supply for the villagers:

Option 1 Build a traditional well in the village

This is possible where the water is not too far below the surface. Two unskilled men can dig a well which is 10 metres deep in 7 days. Then a stonemason will need to put concrete around the top.

Option 2 Harvest rainwater

Fix guttering to the roofs and build storage tanks for the water to drain into. Tanks will need to be built using cement on a bamboo frame.

Option 3 Pipe water from springs in the hills

A spring can be dammed and water channelled down a pipe to the village where it can be stored in a large tank.

Option 4 Drill a borehole in the village

A team of engineers will need to bring in a mechanical drilling machine to reach the water, which is over 100 metres below the surface. Electric pumps will need to be fitted to pump up the water.

Fig. 4

- (i) Explain why it is important that the local village community is involved in making the decision of which option to choose.

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..... [4]

(ii) Which of these options do you think should be chosen?

Option

Explain **two** advantages of the option you have chosen.

1

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2

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..... [4]

(iii) Choose **two** of the options which you have rejected. For each one explain one disadvantage of the option.

Option

Disadvantage

.....

.....

.....

Option

Disadvantage

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..... [4]

[Total: 12 marks]

- 4 (a) Study Fig. 5 which contains information about a research investigation into water supply.

The study area lies in the state of Rajasthan in Western India which experiences water shortages.

A researcher from the University of Dehli spent a week carrying out an investigation into water supply in six villages in the Jodhpur District, each with different sources of water. Access to water varies across the six villages and sources include piped water supplies, hand pumps, wells, tanks, rivers and *nadis* (traditional rain harvesting structures).

Information was gathered with the help of structured questionnaires at household level, through informal group discussions with the older people from the villages, and by visiting and observing the water sources. A sample of 15 to 20 households representing various socio-economic groups in each village was taken.

Fig. 5

- (i) Identify the country in which this research investigation was carried out.

..... [1]

- (ii) Identify **three** different methods by which **primary data** was collected.

1

2

3 [3]

- (iii) Suggest why the sample of households chosen in each village had to represent different socio-economic groups.

.....
.....
..... [1]

- (iv) Describe **one** way in which this sample could have been chosen.

.....
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..... [2]

- [6]

- (b) Study Fig. 6 which contains information about the percentage of sample households using different sources of water in six villages in the Jodhpur District.

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Village	Piped Water	Hand pumps	Wells	Tanks	Rivers	Nadis (traditional rain harvesting structures)
Anganwa		100				
Soorpura	29	41	30			
Modijoshiyan		53		100		7
Lolawas		20	27	86		20
Bacharna			100	13	40	
Kalijal			47	65		94

Fig. 6

- (i) Suggest a reason why the total figures for some villages add up to more than 100%.

.....

 [1]

- (ii) Identify a village where:

All the sample households used hand pumps

Most people use traditional rain harvesting structures [2]

- (iii) Suggest **three** reasons to explain differences between water supply methods used in Soorpura and Bacharna.

1

 2

 3
 [3]

(c) The researcher set up the following hypotheses about water use in the villages:

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Hypothesis 1

There is a positive relationship between the average time spent on collecting water and the average distance travelled to collect it.

Hypothesis 2

There is no relationship between the average amount of water used per household and the average time spent on collecting it.

- (i) Suggest why the researcher expected that there would be a positive relationship between the average time spent on collecting water and the average distance travelled to collect it.

.....

 [1]

- (ii) Suggest why the researcher expected that there would not be a relationship between the average amount of water used per household and the average time spent on collecting it.

.....

 [1]

- (d) Study Fig. 7, which shows information that the researcher found out in order to test the hypotheses about water use in the six villages.

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	Column A	Column B	Column C
Village	Average amount of water used per household (litres per day)	Average distance travelled to collect water (metres)	Average time spent on collecting water (hours per week)
Anganwa	276	120	14
Soorpura	311	136	18
Modijoshiyan	343	283	17
Lolawas	107	217	15
Bacharna	316	934	22
Kalijal	217	1859	19

Fig. 7

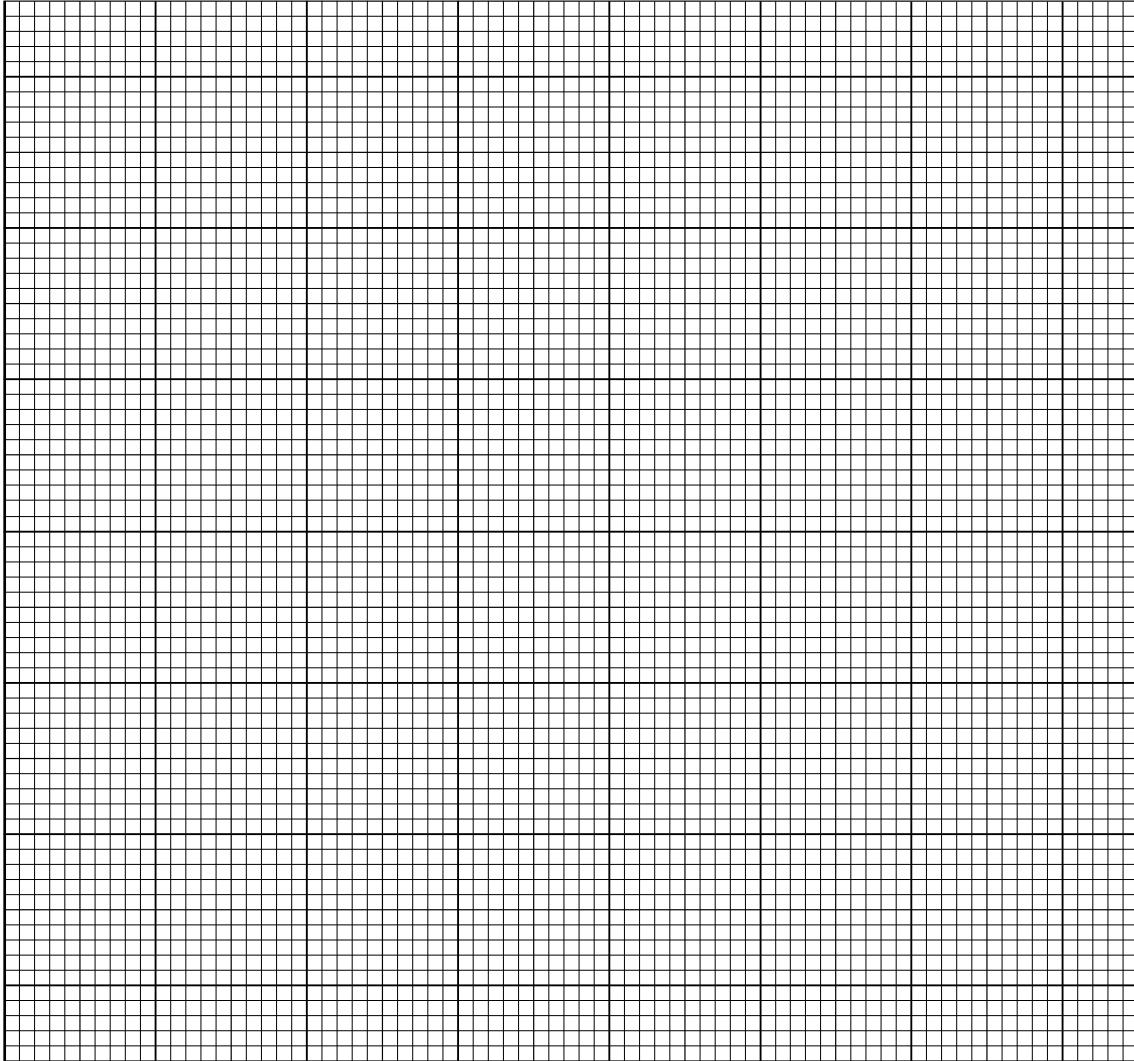
- (i) Complete the table below to show the rank order of the average distance travelled to collect water and the average time collecting it.

	Average distance travelled to collect water (metres)	Average time spent on collecting water (hours per week)
MOST	Kalijal	Bacharna
		
LEAST	Anganwa	Anganwa

[2]

- (ii) Use the figures in Columns A and C of Fig. 7 to draw a **scatter graph** to show the relationship between the average amount of water used per household and the average time spent on collecting it.

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[4]

- (iii) How far do you agree with Hypotheses 1 and 2?

Support your answer by referring to the data.

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[6]

[Total: 33 marks]

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