

MATHS SESSION 4: IN-COUNTRY GAPS 2

Age range: 11–16 years

<p>Outline Learners will consider and compare different ways in which time use data can be presented. They will use pie charts to compare their own daily time use with that of individual young people from the four Young Lives countries (Ethiopia, India, Peru and Viet Nam). Learners will explore how gender and place of residence (urban or rural) can affect how long a young person spends on different activities each day. Learners will use $<$, $>$ or $=$ to compare the data and discuss possible reasons for any differences.</p>		
<p>Learning objectives</p> <ul style="list-style-type: none"> To understand how to use $<$, $>$ or $=$ to compare amounts. To identify some different ways in which data can be presented and to consider the advantages and disadvantages of different representations. To be able to construct a pie chart. To recognise that factors such as gender and place of residence (urban or rural) can affect the amount of time young people spend doing different daily activities. 	<p>Learning outcomes</p> <ul style="list-style-type: none"> Learners will use $<$, $>$ or $=$ to compare time use data between boys and girls and young people living in urban and rural areas. Learners will compare and discuss different ways of presenting data. Learners will construct pie charts to represent their own time use data and that for some young people in the four Young Lives countries. 	
<p>Key questions</p> <ul style="list-style-type: none"> What activities do I do each day? How much time do I spend on these different activities? What are the advantages and disadvantages of these different ways of presenting time use data? Are any of these ways not suitable for the data? Why? How can I construct a pie chart for this time use data? What similarities and differences in daily time use are there between boys and girls? What similarities and differences in daily time use are there between young people living in urban and rural areas? 	<p>Resources</p> <ul style="list-style-type: none"> <i>Maths slideshow B</i> (slides 2–12) Resource sheets: <ul style="list-style-type: none"> <i>Eva's day 1 and 2</i> <i>Time use pie charts (Completed table)</i> <i>Time use and gender (Completed table)</i> <i>Urban and rural time use (Completed table)</i> Activity sheets: <ul style="list-style-type: none"> <i>Time use pie charts (Table)</i> <i>Pie chart templates</i> <i>Time use and gender (Tables 1 and 2)</i> <i>Urban and rural time use (Tables 1 and 2)</i> 	
<p>Curriculum links</p>		
<p>England KS3 Mathematics <i>Pupils should be taught to:</i> Statistics</p> <ul style="list-style-type: none"> Construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data. <p>Number</p> <ul style="list-style-type: none"> Use the symbols $=$, \neq, $<$, $>$, \leq, \geq. Use the four operations applied to integers and decimals. Use standard units of time. 	<p>Wales KS3 Mathematics Developing numerical reasoning</p> <ul style="list-style-type: none"> Justify numerical and algebraic results, making appropriate connections. <p>Using algebra skills</p> <ul style="list-style-type: none"> Express a set of numbers as a single inequality using $<$ $>$ \leq \geq. <p>Using data skills</p> <ul style="list-style-type: none"> Construct a wide range of graphs and diagrams to represent the data and reflect the importance of scale. Interpret diagrams and graphs (including pie charts). 	<p>Scotland Mathematics and Numeracy</p> <ul style="list-style-type: none"> I can display data in a clear way. I can select appropriately from a wide range of tables, charts, diagrams and graphs when displaying discrete, continuous or grouped data, clearly communicating the significant features of the data. MTH 3 and 4-21a I can research, compare and contrast aspects of time and time management as they impact on me. MNU 4-10a

Note:

- *These are suggested activities and resources to support your teaching rather than guide it. Additional teaching input may be required to develop learners' knowledge, skills and understanding of some of these concepts.*
- *The profiles of the featured young people in this resource are based on in-depth interviews conducted with them in 2007 when they were 12 to 16 years old. This age group was chosen so that the young people would be of a comparable age to learners in the UK. Although there have been some significant changes in the communities and lives of these featured young people since 2007, there will still be some young people in these communities today with similar lives and stories.*

Activity 4.1 (45 min)

Time use pie charts

In Maths session 3, learners calculated the average amounts of time young people in Ethiopia spend doing different activities each day. They also started to investigate the effects of gender and place of residence (urban or rural) on time use.

- Give learners copies of *Eva's day 1* and *2*. Colour copies of the data are provided on slides 3 to 6. Explain that the data shows how much time Eva (from Peru) spends on each activity in a typical day. Time use is rounded to the nearest hour. The data is presented in four different ways: table, pie chart, bar chart and line graph. Note that learners are also introduced to Eva in the *Introduction session* and *English sessions 1* and *2*. Further information about Eva is provided on slide 7.
- Discuss the advantages and disadvantages of each different way of presenting the data and ask the following questions:
 - *Which way of presenting the data do you prefer and why?*
 - *Are any of these presentations not suitable for the data? Why?* Explain that the line graph is not suitable as the data is discrete rather than continuous.
 - *Are there any other ways in which the data could be presented, for example using a pictogram or bar line chart?*
- Explain that learners are going to be creating pie charts to represent time use data. Use the time use data for Eva to demonstrate how to draw a pie chart to represent the time use data.

For example:

How many hours in total are there in a day? Answer: 24 hours

How many degrees in total are there in a pie chart? Answer: 360°

How many degrees will each hour represent? Answer: 15° (360° ÷ 24)

$$\begin{aligned}
 \text{Size of angle for time spent sleeping} &= \text{Number of hours spent sleeping each day} \times 15^\circ \\
 &= 10 \times 15^\circ \\
 &= 150^\circ
 \end{aligned}$$

- Distribute copies of the *Time use pie charts* table. Explain that the table shows the individual time use data for four of the other Young Lives young people: Sarada and Salman (India), and

Phuoc and H'Mai (Viet Nam). Note that learners are also introduced to these young people in the *Introduction session* and *English sessions 1* and *2*. Ask learners to complete the first “Me” column in the table to show their individual daily time use.

- Support learners to create pie charts to represent the time use data for themselves and one or more of the young people. Learners should create a separate pie chart for each person. Ask them first to complete the *Time use pie charts* table to show the size of angle for each activity type. The answers for this activity are provided in *Time use pie charts – Completed table*.
- Discuss what the pie charts show about the time use of these young people. Learners could be asked to write a paragraph about each pie chart.
- Discuss any similarities and differences that learners have noticed in daily time use between the different Young Lives young people and themselves. Ask learners what they think might be the potential causes of any differences. For example, why might some young people not be able to go to school?
- Finish the activity by sharing the further information about these four young people provided on slides 8 to 11.

Differentiation

- *Make it easier:* Ask learners to use the Pie chart templates to help them draw their pie charts. Alternatively, learners could construct bar charts instead of pie charts to represent the time use data.
- *Make it harder:* Ask learners to create pie charts to represent the time use data in the Time use and gender and Urban and rural time use tables.

Activity 4.2 (30 min)

Comparing time use

- Recap any similarities and differences between the various young people’s daily time use that learners identified in *Activity 4.1*. Discuss what they think might be the reasons for some of the differences. Explain that learners are going to be investigating in more detail how gender and living in an urban or rural area affect daily time use.
- Organise learners into pairs. Give half the class copies of the *Time use and gender* table and the other half copies of the *Urban and rural time use* table. Make sure learners understand the meaning of ‘rural’ and ‘urban’.
- Explain that the *Time use and gender* table shows the mean daily time use for boys and girls in all the Young Lives communities in each of the four countries (Ethiopia, India, Peru and Viet Nam). The *Urban and rural time use* table shows the mean time use for young people in urban and rural areas for each of these four countries. Two copies of each table are provided: in *Table 1*, time use is recorded in hours and minutes; in *Table 2*, time use is recorded in decimal hours.
- Allow time for learners to look at their tables and share their initial responses to them. Support learners to understand the data in the tables. You might like to challenge them to come up with a sentence or two themselves to explain the table and the data being shown.

- Ask learners to complete their table. For each activity type, they should:
 - Insert $<$, $>$ or $=$ to show the comparison between mean daily time use for boys and girls or urban and rural.
 - Calculate the difference between mean daily time use for boys/girls or urban/rural.
- The answers for this activity are provided in *Time use and gender – Completed table* and *Urban and rural time use – Completed table*.
- Use the differences in time use to create newspaper headlines such as “Girls in Ethiopia spend over an hour a day longer than boys doing domestic chores!” Or calculate for a week, month or year for greater effect. For example, “Girls in Ethiopia spend nearly 17 days a year more than boys doing domestic chores’ (66min/day x 365 = 24,090 min/year = c.17 days/year). Remind learners that they should include a caveat for their headline that they obtained their statistics from a sample of mainly poorer people.
- Show slide 12 and discuss any similarities and differences learners notice between the daily time use of young people in the Young Lives communities in each country using the questions as prompts:
 - *What similarities and differences in daily time use are there between young people living in urban and rural areas in each of the four countries?*
 - *What similarities and differences in daily time use are there between boys and girls in each of the four countries?*
 - *What do you think are the reasons for some of these similarities and differences?*
 - *Do you think the differences are fair?*

For further information about inequalities as a result of gender and location, see *Background notes for teachers*.

Differentiation

- *Make it easier: Use $<$, $>$ or $=$ to compare mean daily time use for boys and girls or young people living in urban and rural areas but do not calculate differences in mean time use. See Oxfam’s Everyone Counts, Unit 3 Session 4. www.oxfam.org.uk/education/resources/everyone-counts*
- *Make it harder: Calculate the percentage difference between mean daily time use for boys/girls or young people living in urban/rural areas.*

Further ideas

- Ask learners to look in newspapers or on the Internet to find examples of different ways of presenting data. They should discuss why they think the authors chose particular ways to represent the data and any advantages or disadvantages of their methods.
- Ask learners to calculate mean time use for different activity types for their class or year group and present the data using a pie chart. Alternatively learners could compare time use data for boys and girls in their class or school. *Note that sensitivity is needed with this activity as some learners (for example, those who care for other family members or have other responsibilities at home) may not wish to discuss their time use and family situation with others.*

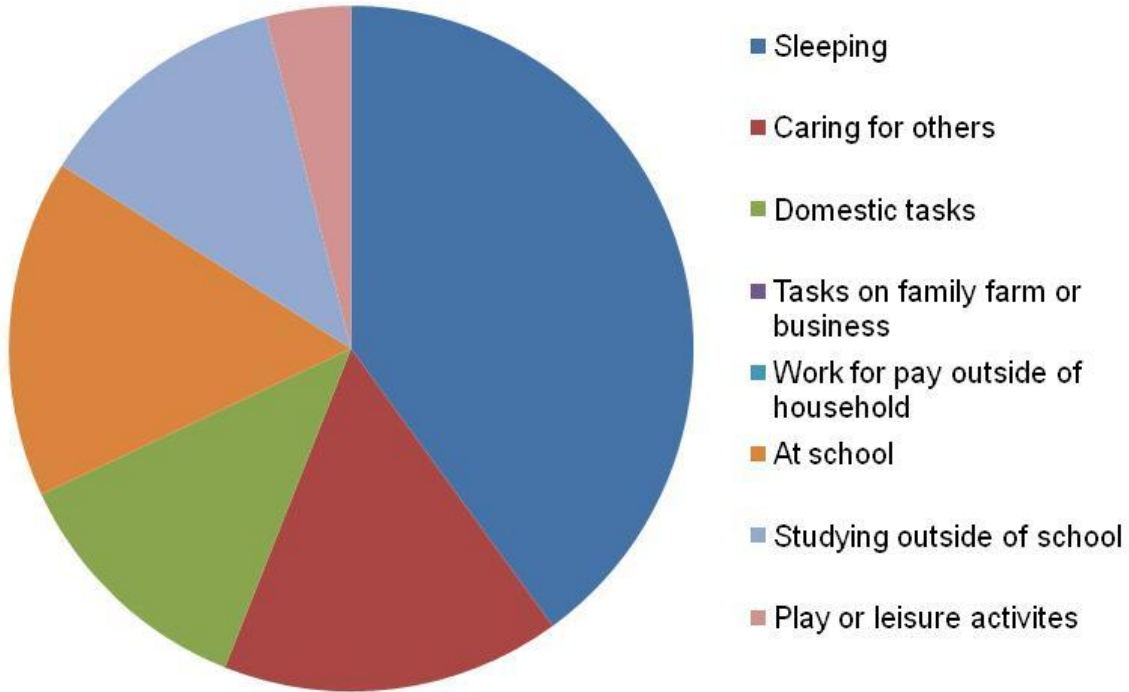
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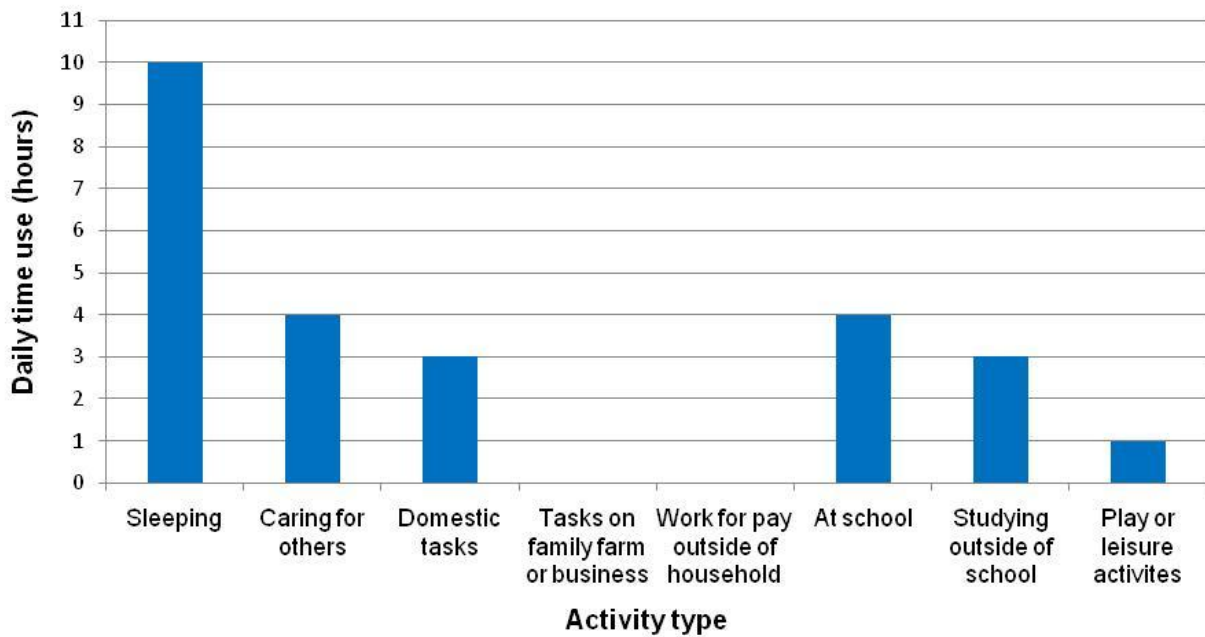
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Eva's day 1

Pie chart

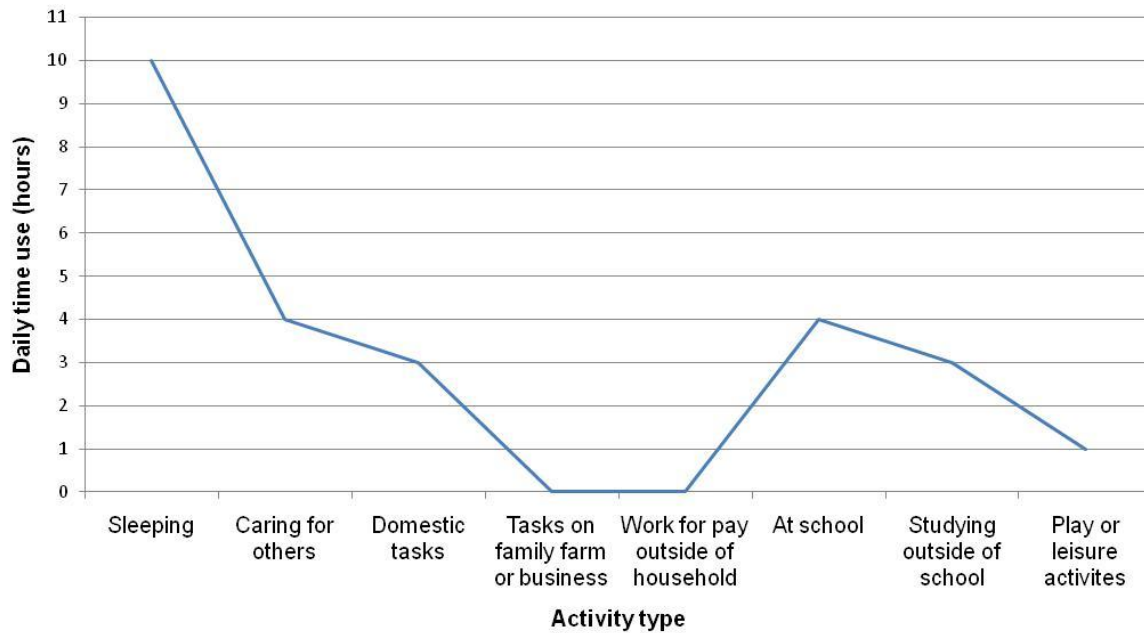


Bar chart



Eva's day 2

Line graph



Table

Activity type	Sleeping	Caring for others	Domestic tasks	Tasks on family farm or business	Work for pay outside of household	At school	Studying outside of school	Play or leisure activities
Daily time use (hours)	10	4	3	0	0	4	3	1

Time use pie charts

Table

Complete this table to show the size of angle for each activity type (to the nearest $^{\circ}$).

Activity	Sarada (India)		Salman (India)		Phuoc (Viet Nam)		H'Mai (Viet Nam)		Me	
	Daily time use (hours)	Size of angle ($^{\circ}$)	Daily time use (hours)	Size of angle ($^{\circ}$)	Daily time use (hours)	Size of angle ($^{\circ}$)	Daily time use (hours)	Size of angle ($^{\circ}$)	Daily time use (hours)	Size of angle ($^{\circ}$)
Sleeping	10		10		8		8			
Caring for others	1		0		0		2			
Domestic tasks	1		0		1		5			
Tasks on family farm or business	0		0		0		5			
Work for pay outside of household	0		8		0		0			
At school	6		0		5		0			
Studying outside of school	1		0		3		0			
Play or leisure activities	5		6		7		4			

Time use pie charts

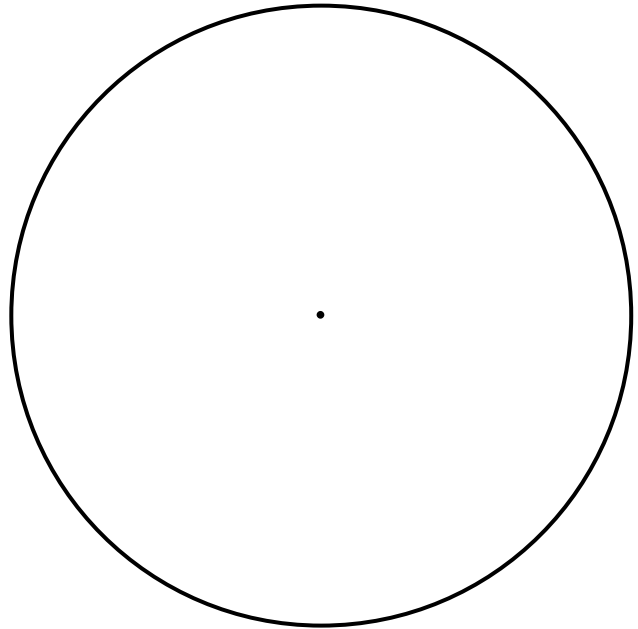
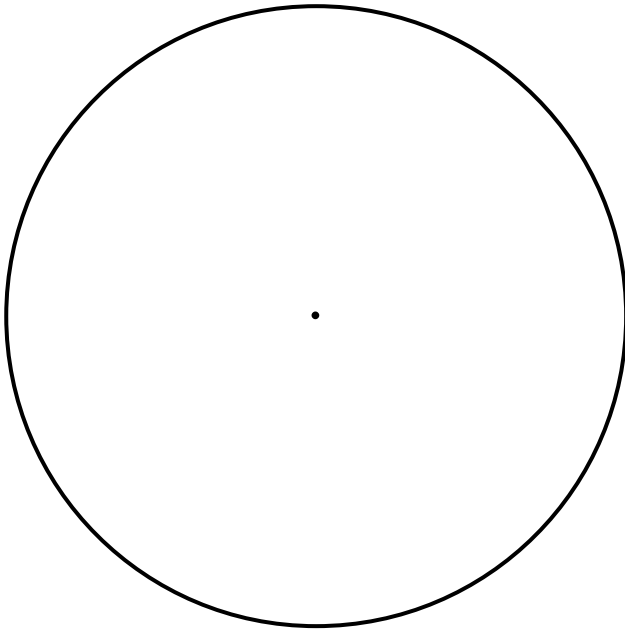
Completed table

Activity	Sarada (India)		Salman (India)		Phuoc (Viet Nam)		H'Mai (Viet Nam)		Me	
	Daily time use (hours)	Size of angle (°)	Daily time use (hours)	Size of angle (°)	Daily time use (hours)	Size of angle (°)	Daily time use (hours)	Size of angle (°)	Daily time use (hours)	Size of angle (°)
Sleeping	10	150	10	150	8	120	8	120		
Caring for others	1	15	0	0	0	0	2	30		
Domestic tasks	1	15	0	0	1	15	5	75		
Tasks on family farm or business	0	0	0	0	0	0	5	75		
Work for pay outside of household	0	0	8	120	0	0	0	0		
At school (including travelling)	6	90	0	0	5	75	0	0		
Studying outside of school	1	15	0	0	3	45	0	0		
Play or leisure activities	5	75	6	90	7	105	4	60		

Pie chart templates

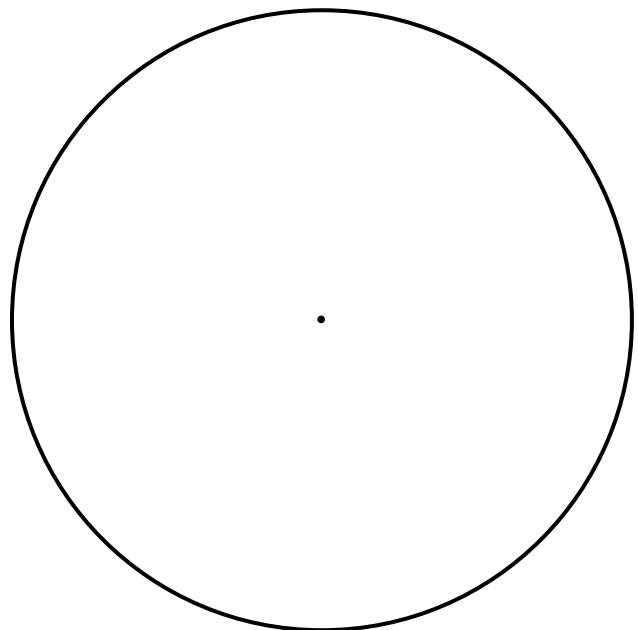
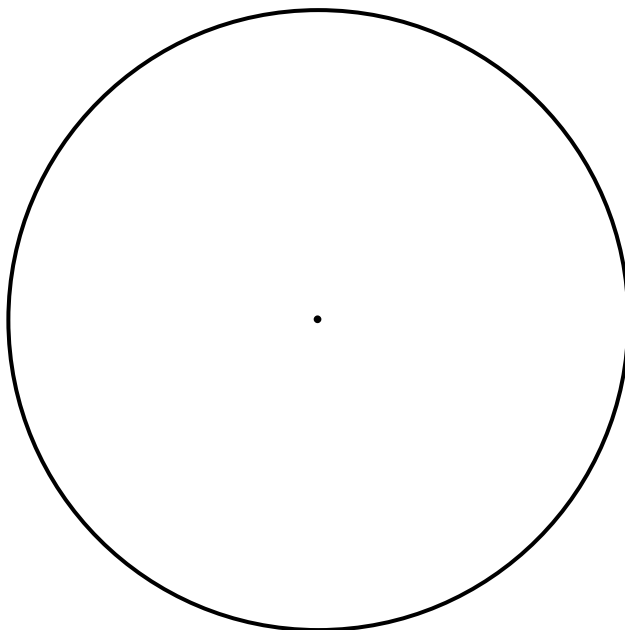
Name:

Name:



Name:

Name:



Time use and gender

Table 1

Complete the table to compare mean time use for boys and girls. Insert the correct symbol (<, > or =) and calculate the difference between each data pair.

Time use given in hours (h) and minutes (min).

	Ethiopia				India				Peru				Viet Nam			
	Boys	<, >, =	Girls	Difference	Boys	<, >, =	Girls	Difference	Boys	<, >, =	Girls	Difference	Boys	<, >, =	Girls	Difference
Time spent sleeping	9h		9h		8h 54min		8h 54min		9h 30min		9h 42min		8h 54min		8h 36min	
Time spent caring for others	30min		48min		6min		18min		1h 12min		1h 24min		18min		24min	
Time spent doing domestic tasks	1h 42min		2h 48min		42min		1h 24min		2h 12min		2h 18min		1h		1h 24min	
Time spent doing tasks on family farm or business	2h		54min		24min		12min		54min		54min		42min		36min	
Time spent working for pay outside of household	12min		6 min		24min		24min		18min		12min		0		6min	
Time spent at school	5h 18min		5h 30min		6h 6min		6h 12min		4h 48min		4h 48min		4h 24min		4h 24min	
Time spent studying outside of school	1h 42min		1h 42min		2h		1h 48min		2h 54min		3h		2h 42min		3h	
Time spent playing or doing leisure activities	3h		2h 36min		4h 6min		3h 30min		2h 42min		2h 24min		6h		5h 30min	

Time use and gender

Table 2

Complete the table to compare mean time use for boys and girls. Insert the correct symbol (<, > or =) and calculate the difference between each data pair.

Time use given in decimal hours.

	Ethiopia				India				Peru				Viet Nam			
	Boys	<, >, =	Girls	Difference	Boys	<, >, =	Girls	Difference	Boys	<, >, =	Girls	Difference	Boys	<, >, =	Girls	Difference
Time spent sleeping (hours)	9		9		8.9		8.9		9.5		9.7		8.9		8.6	
Time spent caring for others (hours)	0.5		0.8		0.1		0.3		1.2		1.4		0.3		0.4	
Time spent doing domestic tasks (hours)	1.7		2.8		0.7		1.4		2.2		2.3		1		1.4	
Time spent doing tasks on family farm or business (hours)	2		0.9		0.4		0.2		0.9		0.9		0.7		0.6	
Time spent working for pay outside of household (hours)	0.2		0.1		0.4		0.4		0.3		0.2		0		0.1	
Time spent at school (hours)	5.3		5.5		6.1		6.2		4.8		4.8		4.4		4.4	
Time spent studying outside of school (hours)	1.7		1.7		2		1.8		2.9		3		2.7		3	
Time spent playing or doing leisure activities (hours)	3		2.6		4.1		3.5		2.7		2.4		6		5.5	

Time use and gender

Completed table

Activity	Ethiopia				India				Peru				Viet Nam			
	Boys	<, >, =	Girls	Difference	Boys	<, >, =	Girls	Difference	Boys	<, >, =	Girls	Difference	Boys	<, >, =	Girls	Difference
Time spent sleeping	9h	=	9h	0	8h 54min	=	8h 54min	0	9h 30min	<	9h 42min	12 min	8h 54min	>	8h 36min	18 min
	9h		9h	0	8.9h		8.9h	0	9.5h		9.7h	0.2h	8.9h		8.6h	0.3h
Time spent caring for others	30min	<	48min	18 min	6min	<	18min	12 min	1h 12min	<	1h 24min	12 min	18min	<	24min	6 min
	0.5h		0.8h	0.3h	0.1h		0.3h	0.2h	1.2h		1.4h	0.2h	0.3h		0.4h	0.1h
Time spent doing domestic tasks	1h 42min	<	2h 48min	1h 6 min	42min	<	1h 24min	42 min	2h 12min	<	2h 18min	6 min	1h	<	1h 24min	24 min
	1.7h		2.8h	1.1h	0.7h		1.4h	0.7h	2.2h		2.3h	0.1h	1h		1.4h	0.4h
Time spent doing tasks on family farm or business	2h	>	54min	1h 6 min	24min	>	12min	12 min	54min	=	54min	0	42min	>	36min	6 min
	2h		0.9h	1.1h	0.4h		0.2h	0.2h	0.9h		0.9h	0	0.7h		0.6h	0.1h
Time spent working for pay outside of household	12min	>	6 min	6 min	24min	=	24min	0	18min	>	12min	6 min	0	<	6min	6 min
	0.2h		0.1h	0.1h	0.4h		0.4h	0	0.3h		0.2h	0.1h	0		0.1h	0.1h
Time spent at school	5h 18min	<	5h 30min	12 min	6h 6min	<	6h 12min	6 min	4h 48min	=	4h 48min	0	4h 24min	=	4h 24min	0
	5.3h		5.5h	0.2h	6.1h		6.2h	0.1h	4.8h		4.8h	0	4.4h		4.4h	0
Time spent studying outside of school	1h 42min	=	1h 42min	0	2h	>	1h 48min	12 min	2h 54min	<	3h	6 min	2h 42min	<	3h	18 min
	1.7h		1.7h	0	2h		1.8h	0.2h	2.9h		3h	0.1h	2.7h		3h	0.3h
Time spent playing or doing leisure activities	3h	>	2h 36min	24 min	4h 6min	>	3h 30min	36 min	2h 42min	>	2h 24min	18 min	6h	>	5h 30min	30 min
	3h		2.6h	0.4h	4.1h		3.5h	0.6h	2.7h		2.4h	0.3h	6h		5.5h	0.5h

Urban and rural time use

Table 1

Complete the table to compare mean time use for young people living in rural and urban areas. Insert the correct inequality sign (<, > or =) and calculate the difference between each pair of data.

Time use provided in hours (h) and minutes (min).

Activity	Ethiopia				India				Peru				Viet Nam			
	Urban	<, >, =	Rural	Difference	Urban	<, >, =	Rural	Difference	Urban	<, >, =	Rural	Difference	Urban	<, >, =	Rural	Difference
Time spent sleeping	9h 6min		9h		8h 42min		9h		9h 36min		9h 30min		8h 36min		8h 48min	
Time spent caring for others	36min		36min		12min		12min		1h 12min		1h 30min		24min		18min	
Time spent doing domestic tasks	2h 12min		2h 18min		48min		1h 6min		2h 12min		2h 18min		54min		1h 18min	
Time spent doing tasks on family farm or business	24min		2h 12min		0		24min		36min		1h 42min		6min		48min	
Time spent working for pay outside of household	6min		12min		12min		30min		18min		18min		0		6min	
Time spent at school	5h 54min		5h 6 min		6h 48min		5h 54min		4h 54min		4h 18min		4h 42min		4h 18min	
Time spent studying outside of school	1h 54min		1h 36min		2h 6min		1h 54min		3h 6min		2h 36min		4h 6min		2h 36min	
Time spent playing or doing leisure activities	3h 18min		2h 30min		3h 42min		3h 48min		2h 42min		2h 12min		5h 12min		5h 54min	

Urban and rural time use

Table 2

Complete the table to compare mean time use for young people living in rural and urban areas. Insert the correct inequality sign (<, > or =) and calculate the difference between each pair of data.

Time use provided in decimal hours.

Activity	Ethiopia				India				Peru				Viet Nam			
	Urban	<, >, =	Rural	Difference	Urban	<, >, =	Rural	Difference	Urban	<, >, =	Rural	Difference	Urban	<, >, =	Rural	Difference
Time spent sleeping (hours)	9.1		9		8.7		9		9.6		9.5		8.6		8.8	
Time spent caring for others (hours)	0.6		0.6		0.2		0.2		1.2		1.5		0.4		0.3	
Time spent doing domestic tasks (hours)	2.2		2.3		0.8		1.1		2.2		2.3		0.9		1.3	
Time spent doing tasks on family farm or business (hours)	0.4		2.2		0		0.4		0.6		1.7		0.1		0.8	
Time spent working for pay outside of household (hours)	0.1		0.2		0.2		0.5		0.3		0.3		0		0.1	
Time spent at school (hours)	5.9		5.1		6.8		5.9		4.9		4.3		4.7		4.3	
Time spent studying outside of school (hours)	1.9		1.6		2.1		1.9		3.1		2.6		4.1		2.6	
Time spent playing or doing leisure activities (hours)	3.3		2.5		3.7		3.8		2.7		2.2		5.2		5.9	

Urban and rural time use

Completed table

Activity	Ethiopia				India				Peru				Viet Nam			
	Urban	<, >, =	Rural	Difference	Urban	<, >, =	Rural	Difference	Urban	<, >, =	Rural	Difference	Urban	<, >, =	Rural	Difference
Time spent sleeping	9h 6min	>	9h	6min	8h 42min	<	9h	18min	9h 36min	>	9h 30min	6min	8h 36min	<	8h 48min	12min
	9.1h		9h	0.1h	8.7h		9h	0.3h	9.6h		9.5h	0.1h	8.6h		8.8h	0.2h
Time spent caring for others	36min	=	36min	0	12min	=	12min	0	1h 12min	<	1h 30min	18min	24min	>	18min	6min
	0.6h		0.6h	0	0.2h		0.2h	0	1.2h		1.5h	0.3h	0.4h		0.3h	0.1h
Time spent doing domestic tasks	2h 12min	<	2h 18min	6min	48min	<	1h 6min	18min	2h 12min	<	2h 18min	6min	54min	<	1h 18min	24min
	2.2h		2.3h	0.1h	0.8h		1.1h	0.3h	2.2h		2.3h	0.1h	0.9h		1.3h	0.4h
Time spent doing tasks on family farm or business	24 min	<	2h 12min	1h 48min	0	<	24min	24min	36min	<	1h 42min	1h 6min	6min	<	48min	42min
	0.4h		2.2h	1.8h	0		0.4h	0.4h	0.6h		1.7h	1.1h	0.1h		0.8h	0.7h
Time spent working for pay outside of household	6 min	<	12min	6min	12min	<	30min	18min	18min	=	18min	0	0	<	6min	6min
	0.1h		0.2h	0.1h	0.2h		0.5h	0.3h	0.3h		0.3h	0	0		0.1h	0.1h
Time spent at school	5h 54min	>	5h 6min	48min	6h 48min	>	5h 54min	54min	4h 54min	>	4h 18min	36min	4h 42min	>	4h 18min	24min
	5.9h		5.1h	0.8h	6.8h		5.9h	0.9h	4.9h		4.3h	0.6h	4.7h		4.3h	0.4h
Time spent studying outside of school	1h 54min	>	1h 36min	18min	2h 6min	>	1h 54min	12min	3h 6min	>	2h 36min	30min	4h 6min	>	2h 36min	1h 30min
	1.9h		1.6h	0.3h	2.1h		1.9h	0.2h	3.1h		2.6h	0.5h	4.1h		2.6h	1.5h
Time spent playing or doing leisure activities	3h 18min	>	2h 30min	48min	3h 42min	<	3h 48min	6min	2h 42min	>	2h 12min	30min	5h 12min	<	5h 54min	42min
	3.3h		2.5h	0.8h	3.7h		3.8h	0.1h	2.7h		2.2h	0.5h	5.2h		5.9h	0.7h