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**S1 New Curriculum O-level mathematics**

**Term 3**

**Theme: Geometry and measures**

**Chapter 14: Time and timetables**

## Scientific Definition

Scientifically time is defined as:

- The **progression of events** from the past to the present and into the future.
- A **dimension** used to describe when events occur in relation to each other.
- A **measurable quantity**, often tracked by clocks and calendars.

### Time in Human Experience

- We perceive time through **memory** and **change**.
- Time feels faster or slower depending on our activities and emotions.
- It's deeply tied to our sense of aging, urgency, and planning.

### Applications of Time in Real Life

**1. Science and Technology**

- **Physics**: Time is a fundamental dimension in understanding motion, energy, and space-time.
- **Experiments**: Used to measure durations and analyze changes.
- **Computing**: Algorithms are optimized based on execution time.

**2. Business and Finance**

- **Interest Calculations**: Time determines how money grows or shrinks (e.g., compound interest).
- **Project Management**: Time is used to schedule tasks, allocate resources, and meet deadlines.
- **Forecasting**: Time series analysis helps predict trends in sales, stock markets, and demand.

**3. Daily Life and Productivity**

- **Scheduling**: Organizing appointments, tasks, and routines.
- **Task Management**: Estimating time for chores, work, or study improves efficiency.
- **Self-care**: Time allocation for rest, hobbies, and relationships boosts well-being.

**4. Sports and Fitness**

- **Performance Tracking**: Time measures speed, endurance, and progress.
- **Workout Planning**: Time intervals guide training intensity and recovery.

**5. Education and Learning**

- **Study Planning**: Time helps structure learning sessions and exam preparation.
- **Skill Development**: Mastery of any skill requires consistent time investment.

### Why Time Matters

- It's a **non-renewable resource**.
- Organizes our lives and schedules
- It governs **change**, **growth**, and **decision-making**.
- Mastering time leads to better **productivity**, **planning**, and **success**.
- Structures history and future planning
- Essential for science, technology, and navigation

## Standard Units of Time

These are the most commonly used units in daily life and business:

| Unit | Symbol | Equivalent |
|---|---|---|
| **Second** | s | Base SI unit of time |
| **Minute** | min | 60 seconds |
| **Hour** | h | 60 minutes = 3,600 seconds |
| **Day** | d | 24 hours = 86,400 seconds |
| **Week** | wk | 7 days |
| **Month** | mo | ~30 or 31 days (varies) |
| **Year** | yr | 12 months = 365 or 366 days |
| **Decade** | dec | 10 years |
| **Century** | cent | 100 years |
| **Millennium** | — | 1,000 years |

## Scientific Units of Time

Used in physics, computing, and engineering for ultra-precise measurements:

| Unit | Symbol | Equivalent |
|---|---|---|
| **Millisecond** | ms | $\frac{1}{1000}$second |
| **Microsecond** | µs | $\frac{1}{1000,000}$second |
| **Nanosecond** | ns | $\frac{1}{1000,000,000}$second |
| **Picosecond** | ps | $\frac{1}{1000,000,000,000}$ second |
| **Femtosecond** | fs | $\frac{1}{1000,000,000,000,000}$ second |
| **Planck Time** | — | ~$5.39 \times 10^{-44}$ seconds (smallest measurable unit) |

## Historical and Cultural Units

These units were based on celestial movements and cultural practices:

| Unit | Description |
|---|---|
| **Fortnight** | 14 days |
| **Lustrum** | 5 years (Roman census cycle) |
| **Olympiad** | 4 years (interval between Olympic Games) |
| **Decade** | 10 years |
| **Kalpa** | ~4.32 billion years (Hindu cosmology) |

## Telling time

Telling time is the skill of reading and expressing the current hour and minutes using a **clock or watch**.

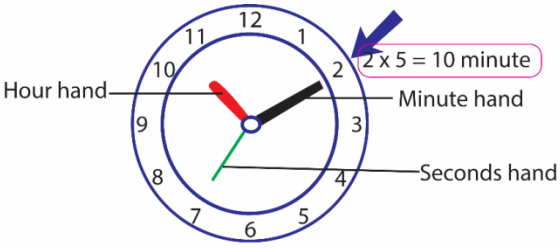
### How to Tell Time

**1. Using an Analog Clock**

- **Hour hand**: Short hand that points to the hour.
- **Minute hand**: Long hand that points to the minutes.
- **Second hand** (if present): Thin hand that moves continuously.

### Example 1

### Record the reading of the clock



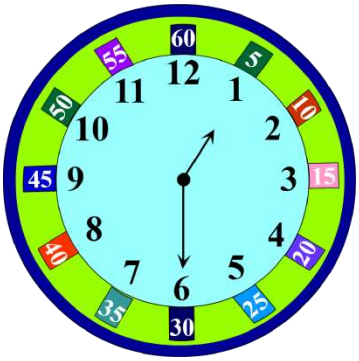

**Clock reads: 10:10:35**

## Trial 1

Find the readings of the following clocks



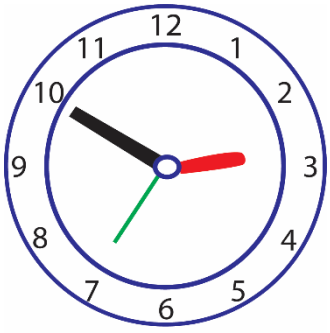
[10:10:36]



[1:30]



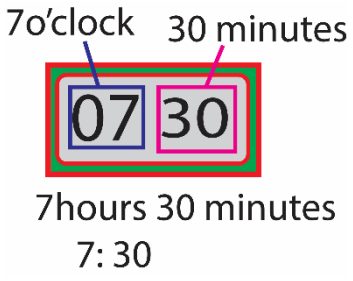
[5:00]



[2:50:35]

**2. Using a Digital Clock**

The first two figures indicate the hour and the second two figures the minutes, for example



## Trial 2

Find the readings of the following clocks




[10:12 am]




[12:08 pm]

## Common Time Expressions

| Time | How to Say It |
|---|---|
| 3:00 | Three o'clock |
| 3:15 | Quarter past three |
| 3:30 | Half past three |
| 3:45 | Quarter to four |
| 3:05 | Five past three |
| 3:55 | Five to four |

- Use **"past"** for minutes 1–30 after the hour.
- Use **"to"** for minutes 31–59 before the next hour.

## AM vs. PM

- **AM**: Midnight to noon
  (e.g., 7:00 AM = morning)
- **PM**: Noon to midnight
  (e.g., 7:00 PM = evening)

## Parts of the Day and Their Approximate Times

| Part of the Day | Time Range | Description |
|---|---|---|
| **Morning** | 6:00 AM – 12:00 PM | Active hours before noon |
| **Noon / Midday** | 12:00 PM | Sun at its highest point |
| **Afternoon** | 12:00 PM – 6:00 PM | Broad period after midday |
| **Night** | 7:00 PM – 6:00 AM | Darkest hours, sleep time |
| **Midnight** | 12:00 AM | Middle of the night |

### Time Conversion Examples

| From | To | Conversion |
|---|---|---|
| 1 minute | seconds | 60 seconds |
| 1 hour | minutes | 60 minutes |
| 1 day | hours | 24 hours |
| 1 week | days | 7 days |
| 1 year | days | 365 or 366 days |

## Trail 3

1. How many hours in two weeks
   [336 hours]
2. Convert 3 hours 45 minutes into minutes.
   [225 minutes]
3. Express 4hour 15 minutes into seconds.
   [15300 seconds]
4. Convert6456 seconds into hours, minutes and seconds. [1hr 47minutes 36 seconds]
5. Calculate number of hours in 5 weeks.
   [840 hours]
6. Convert 1,000,000 seconds into days.
   [11.574days]

**Convert hours from 12-hour clock in 24hr clock**

- **AM times**: If the time is between **12:00 AM and 11:59 AM**, keep the hour the same — except for **12 AM**, which becomes **00**.
- **PM times**: If the time is between **12:00 PM and 11:59 PM**, add **12** to the hour — except for **12 PM**, which stays **12**.
- **24**-hour clock is written with 4 digits followed by hours

### Example 2

(a) Convert the following 12- hour clock time into 24-hour clock readings

| 12-hour clock readings | 24-hour clock readings |
|---|---|
| 7:00 AM | 0700 hrs |
| 12:00 noon | 0000 hrs |
| 3:45 PM | 1545 hrs |
| 11:59 PM | 2359hr |

(b) Convert the following 24- hour clock time into 12-hour clock readings

| 24-hour clock readings | 12-hour clock readings |
|---|---|
| 0124hrs | 1:24an |
| 1324hrs | 1:24pm |
| 1815hrs | 5:15pm |
| 0015h | 12:15pm |

### Trail 4

1. Convert the following from 12-clock to 24-clock.

   3.30 am

   4:15pm

2. Convert the following from 24-hour clock to 12-hour clock

(a) 2054h
(b) 02:54 am

## Duration of time

To find the duration between two times:

1. **Convert both times to 24-hour format** (if needed).
2. **Subtract the start time from the end time**.
3. If the end time is earlier than the start time (e.g. overnight), add 24 hours to the end time before subtracting.

### Example 3: Same Day

**Start:** 09:30 **End:** 14:15

**Duration:** 14:15 − 09:30 = **4 hours 45 minutes**

### Example 4: Overnight

**Start:** 22:00 **End:** 06:30

Add 24 hours to the end time: 06:30 + 24:00 = 30:30

Then subtract: 30:30 − 22:00 = **8 hours 30 minutes**

### Example 5

1. Matia left Soroti for Tororo at 10:15 pm on Sunday. He arrived at Tororo at 1:15 am on Monday. How long did the journey take?

   Time taken =

   $$\begin{pmatrix}\text{arrival time on}\\ 24\text{ clock} + 24\text{h}\end{pmatrix} - \begin{pmatrix}\text{departure}\\ \text{time on 24clock}\end{pmatrix}$$

   = (0115 + 24) – 2215

   = 2515 – 2215

   = 3hrs

2. A bus left Busia on Monday at 10.30am and reached Mukono at 1:45pm

   Change the time in24h before subtracting

   Duration = departure time – arrival rime

   = 1345 – 1030

   = 0315

Hence, time taken = 3hrs and 15minutes

3. A train left Mombasa on Monday at 11: 45am and reached Kampala at 3.30 pm on Tuesday. How long was the Journey?

   Duration = (1530 + 2400) – 1145)

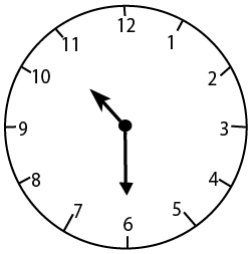
   = 3930 -1145

   =2745

   Journey took 27hours and 45 minutes or 1 day 3 hours and 45 minutes

## Trail 5

1. By the time Peter went to bed after his supper, his watch was reading as shown in the diagram




What is the time on the 24-hour clock? [2230h]

2. A minute-hand of a clock makes 2 ½ revolutions to cover the time of the Mathematics examination. If the exam starts at 9.45 am, at what time will it end? [12.15pm]
3. Kantono went to sleep at 2130 hours. What time on a 12-hour clock did she go to sleep?[9:30pm]
4. Musa went to sleep at 19 30 hours and did not wake up until 08:30 hours the following day. How long did he take sleeping? [13hours]
5. Jane slept from 9.10pm. to 5.35am. For how long did she sleep? [8hours 25minutes]
6. The first half of the football match ended at 5.25 p.m. after being played for 45 minutes. At what time did the match start?[4:40pm]
7. It started raining at 9:45 a.m. and stopped at 1:25p.m. For how long did it rain? [3hours 40 minutes]
8. A debate which took $1\frac{1}{4}$ hours ended at 4:10p.m. What time did it start? [2:55pm]
9. A watch loses 5 second every hour. How many minutes will it lose in two days? [4 minutes]
10. Birthday party started at4:30 p.m. and lasted $2\frac{3}{4}$ hours. At what time did the party end? [8:15pm]
11. A bus left Kampala on Saturday at 10:15am and arrived at Kigali on Sunday at 2:30pm. How long was the journey [28h 15mins]

## Time table

**Time tabling** refers to the process of **organizing tasks, events, or activities into a structured schedule**. It's used in schools, workplaces, transport systems, and personal planning to make sure everything fits efficiently into available time.

### Example 6

1. The time- table below shows how a pupil spent has time one Saturday

***Use it to answer the question that follow.***

| ITEMS | ACTIVITY |
|---|---|
| 7:00am - 10:30 am | Digging |
| 10:45am -12:45 pm | Washing |
| 1:00p.m -2:45 pm | lunch& Resting |
| 3:00p.m -4:30 pm | Playing |
| 5:00p.m -7:30 pm | Reading |

(a) How long did he take playing?

4.30pm -3.00pm = 1h30mins

(b) It he dug his maize garden at a rate of 2 rows in every 30 minutes, find the number of rows he dug that day.

Time taken digging = 10.30am – 7.00am

= 3hour 30minutes

= (3 x 60 + 30) minutes

= 210 minutes

30minutes are required to dig 2row

∴ 210 minutes are required to dig = $\frac{210\ x\ 2}{30}$

$= 14\ rows$

**2.** The table below show the arrival and departure time for a bus that travels from Kampala to Hoima daily.

| **Town** | **Arrival time** | **Departure time** |
|---|---|---|
| Kampala | | 7:30 am |
| Busunju | 8:10 am | 8:30 am |
| Bukomero | 9:30 am | 9:45a.m |
| Kibogo | 10:15a.m | 10:40 am |
| Hoima | 11:49 am | |

(a) At what time does the bus leave Kampala? (03marks)

At 7:30am

(b) How long does the bus stay at Bukomero?

9: 45

- 9: 30

15 minutes

(c) How long does the bus take to travel from Bukomero to Kiboga?

10: 15

- 9: 45

30 minutes

(d) Find the total time taken by the bus to travel from Kampala to Hoima

11: 40

- 7: 30

4: 10 4hour and 10minutes

**Trail 6**

1. The table shows a time table for a bus travelling between two towns A and D via towns B and C.

| Town | Arrival time | Departure time |
|---|---|---|
| A | | 8:00am |
| B | 10:40am | 11:00am |
| C | 2:30pm | 2:50pm |
| D | 4:20pm | |

(a) At what time does the bus leave town A? [8:00am]
(b) At what time does it arrive at town D? [4:20pm]
(c) How long does it take from town A to town D? [8h an 20mins]

2. The timetable below is for a bus travelling from Mbale to Kampala. Use it to answer the questions that follow.

| | | |
|---|---|---|
| Mbale | Departure | 9.00am |
| Tororo | Arrival | 9.45am |
| | Departure | 10.00am |
| Iganga | Arrival | 11.15am |
| | Departure | 11.20am |
| Jinja | Arrival | |
| | Departure | 12.20pm |
| Kampala | Arrival | 1.00pm |

(i) How long does the bus take to travel from Mbale to Kampala? [4hours]

(ii) Find the total time the bus takes stopping on the way. (40minute]

(iii) If Kampala is about 252Km from Mbale, Find the average speed of the bus. [63km/h]

3. Study the time table of a bus and answer the questions that follow

| Bus stations | Arrival | Departure |
|---|---|---|
| Soroti | | 20:30 |
| Kumi | 22:00 | 22:15 |
| Mbale | 23:30 | 24:00 |
| Iganga | 01:30 | 01:45 |
| Jinja | 02:05 | 02:55 |
| Kampala | 04:00 | |

(a) Where does the bus start?

(b) Where does it travel to

(c) How long does the whole journey take from start to finish (Give your answer in hours)

(d) The bus travels half th total journey. Which is the nearest station?

(e) Rona lives in kumi. She wants to travelto Mbale. It take 40 minutes to walk from Rona'shouseto Kimi bus station. What is the latest time that Rona should leave herhouse?

(f) Give the time on a 12-hour clock when the bus will arrive at Mbale.

(g) What is the total time the bus spends at the bus stations on its journey? Give your answer in hours and minute.

(h) Musa wants to travel from Jinja to Kumi. Can he use this bus forhis journey? Explain your answer. [No The tabledoes not show whether the bus returns to Kumi]

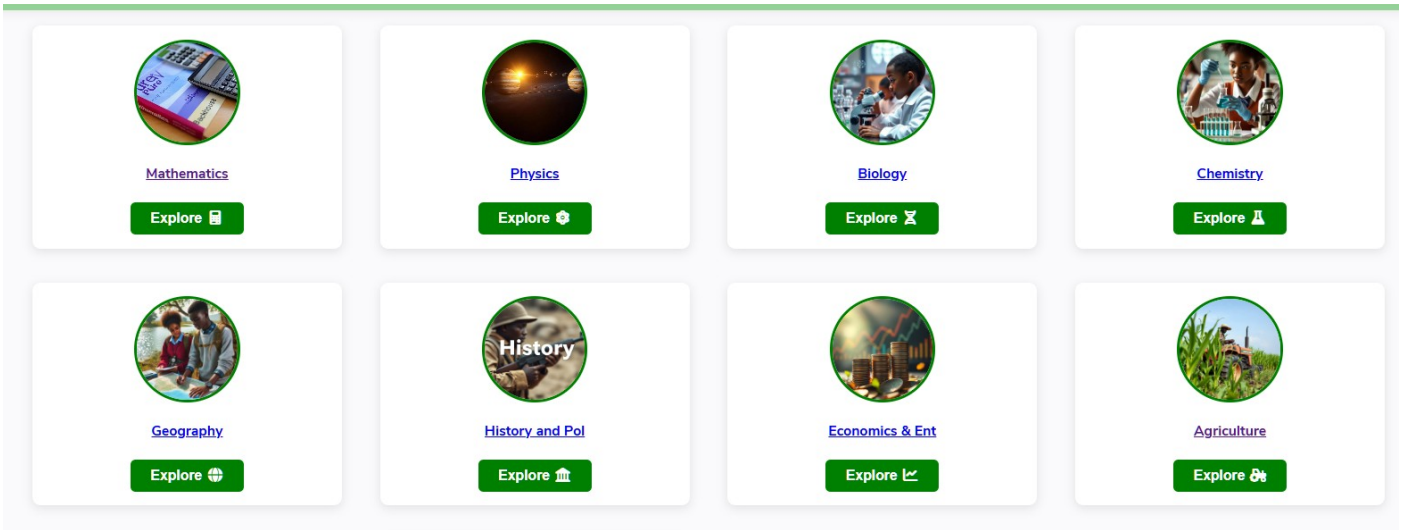
4. In Mugo primary School, there are two bells. One bell is for lower primary and the other is for upper primary. The bell for lower primary rings after every 30 minutes, that for upper primary rings after every 40 minutes. If both bells are rung at, 9: 10 a.m. when will they next be rung at the same time? [11.10am]
5. At Kampala Bus Park, buses travelling to Arua and Mbarara leave after very 40munites and 50 munities respectively. The first buses to the town leave together at 6:00am. At what time will buses to the two towns leave Kampala together again? [9.20am]

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Dr. Bbosa Science

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