Large Scientific Infrastructures enriching online and digital Learning

Erasmus+ Programme 2020

Partnerships for Digital Education Readiness (Key Action 226)

Agreement nº 2020-1-UK01-KA226-SCH-094579

Intellectual Output 2

The LaSciL Toolbox

Output Number	2
Title	The LaSciL Toolbox
Lead Partner	DFET
Completion Date	June 2023
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Document Type*	Report
Dissemination Level**	*PU = Public*

**Document type*

R = Report
D=Demonstrator
O= Other

***Dissemination Levels*
PU = Public
PP = Restricted to other programme participants (including the Commission Services)
RE = Restricted to a group specified by the consortium (including the Commission Services).
CO = Confidential, only for members of the consortium (including the Commission Services).

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Introduction

The main aim of Output 2 is to produce a set of high quality digital tools and resources which teachers can integrate within their scenarios, but also which can be used as standalone guides to particular resources. These tools can be accessed via the LaSciL website at https://lascil.eu/index.php/tools/.

The tools themselves were created by the 5 partners of LaSciL with checks made by other partners to ensure they provide a straightforward resource in each instance. Choice of tools was made by partners from the bid process forward and ensuring that as our Demonstrators (extended resources) were created, no demonstrator was created without relevant tools being created to support it.

Our Tools split broadly into five categories which we detail here

- Robotic telescopes
- Planetarium software
- Astronomy and space exploration simulations
- Teaching tools
- Data science

1. Robotic Telescopes

1. 1 LCO Tools

This set of 6 PDF guides provides all the information required to use a remote astronomical telescope within the Las Cumbres Observatory (LCO) telescope network. The Faulkes Telescope Project (DFET) provide access to these telescopes free of charge to teachers and educators worldwide. The guides detail how to plan an observation and how to download the data afterwards. These images can then be used in imaging software such as Salsa J (see Section 4.1).

1.1.1 Accessing the LCO Data Archive

This document provides detailed information, along with screenshots, on how to access the LCO data archive. This allows users to access not just their own data, but any data taken by educational users.

1.1.2 Downloading Your Images From LCO

This document shows an alternate method that LCO users can use to access their images (and accompanying metadata) from their account.

1.1.3 LCO Observation Planning Steps

This document explains the steps that need to be taken when planning an observing session on the LCO robotic telescopes. It is particularly useful when used in conjunction with the planetarium software, Stellarium (see Section 2.1).

1.1.4 LCO Observing Plan

This is a simple checklist and template to allow users to create a set of observing requests with the LCO robotic telescopes.

1.1.5 LCO Simple Interface

Here, we provide detailed instructions which allow a user (once registered) to use their telescope account to access the LCO queue-scheduled interface. Instructions are given for both in ‘Simple’ or ‘Basic’ modes, allowing submission of an observation request of an object of their choice.

1.1.6 RTI Quick Guide

This guide shows the steps required to use the LCO network in ‘real-time’ (or RTI) mode. Here, users have exclusive access to a telescope for 30 minute blocks and are able to directly control where it moves and what images it collects.

2. Planetarium Software

2.1 Stellarium

Stellarium is a free planetarium software package available for computers and mobile devices. It is a very powerful tool to study the night sky, simulate past and future astronomical events and plan observing sessions on e.g. the LCO telescope network (see Section 1).

Our guide provides introductory material as well as weblinks to more advanced guides and tutorials.

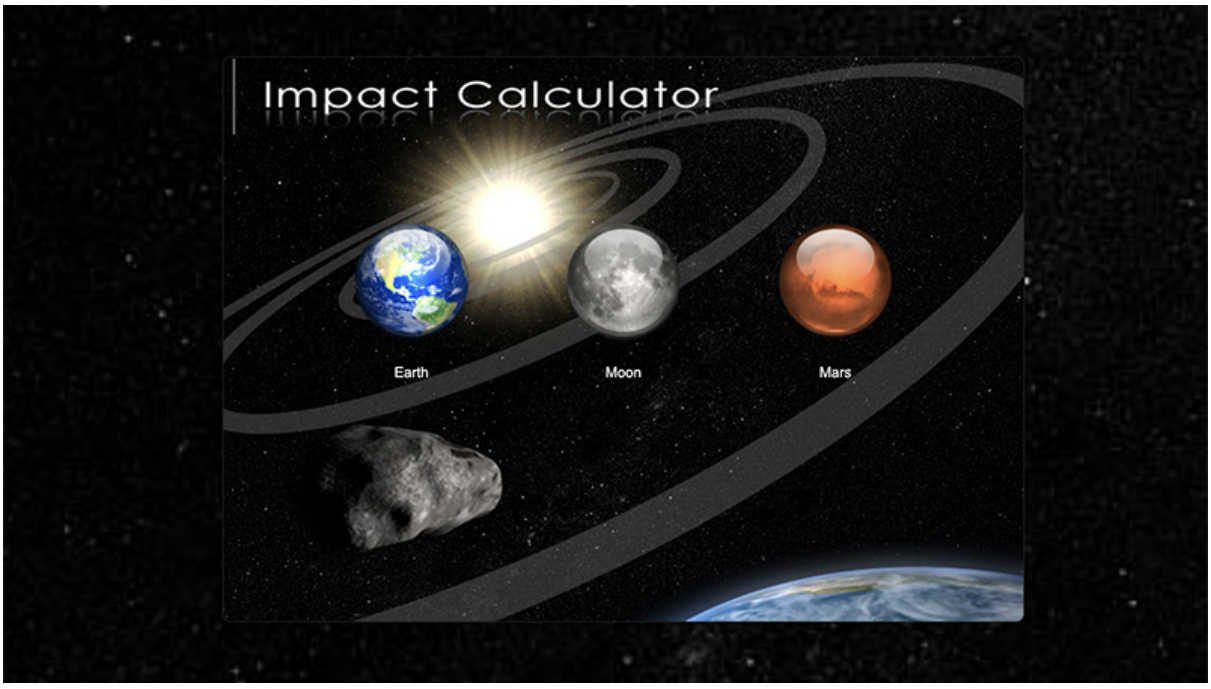
2.2 Sky and Telescope

These tools provided by the magazine, Sky and Telescope, include interactive night sky charts and visibility charts for solar system objects such as Jupiter and the Moon.

Our guide details several examples of useful apps available from this educational website.

3. Astronomy and space exploration simulations

3.1 Impact Calculator



This document explains how to use the Down2Earth project's Impact Calculator to simulate impacts from space. The simulator allows students and educators to examine the effects of velocity, mass, density on impact energy and ensuing consequences on Earth, the Moon and Mars.

3.2 Finding Moving Objects with Heavens Above

Heavens Above allows astronomers to determine the visibility of moving objects such as asteroids, comets, satellites and the International Space Station.

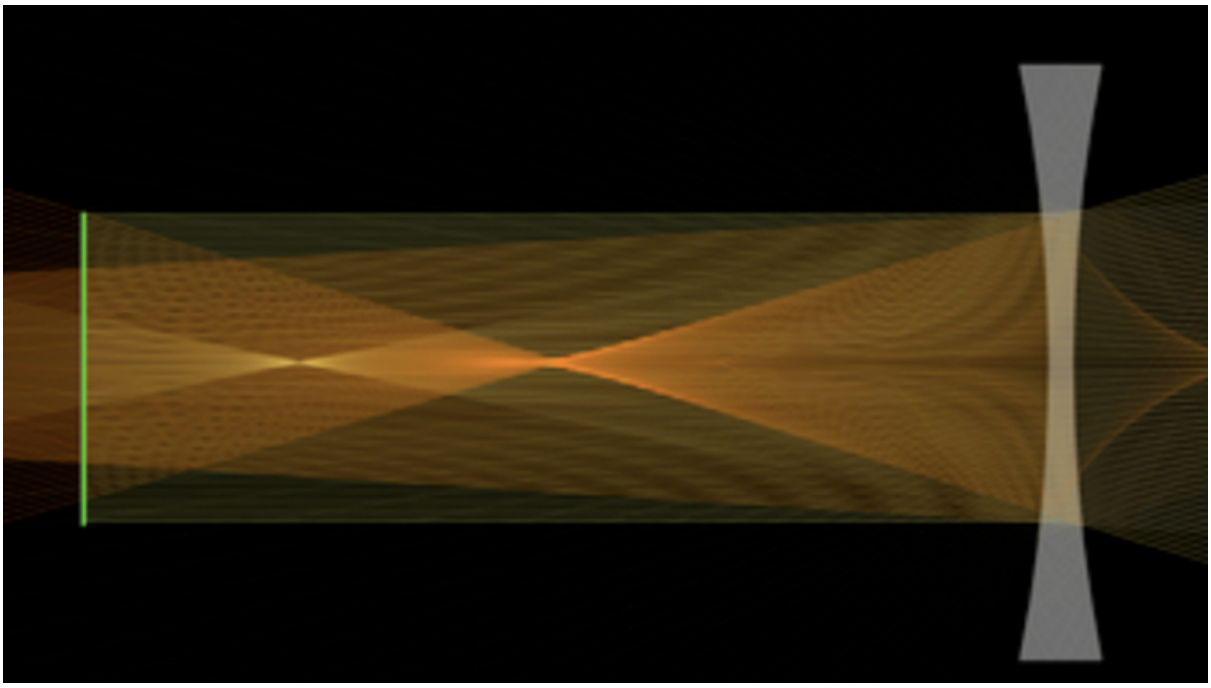
This document explains how to find known comets to observe with the LCO telescopes; similar steps can be taken to find known asteroids to observe. It provides detailed information on suitable filters and exposure times for observing these objects.

3.3 Stelvision Telescope Simulator

The Stelvision Telescope Simulator allows users to simulate a telescope's field of view based on the characteristics of your telescope and eyepiece.

Our guide shows how telescope properties such as focal length and field of view are related to each other.

3.4 Ray Optics Simulator



This app allows students to create their own optics experiment using lenses and mirrors. It can also be used to simulate a telescope and understand how ray tracing helps us interpret what can be seen through a telescope.

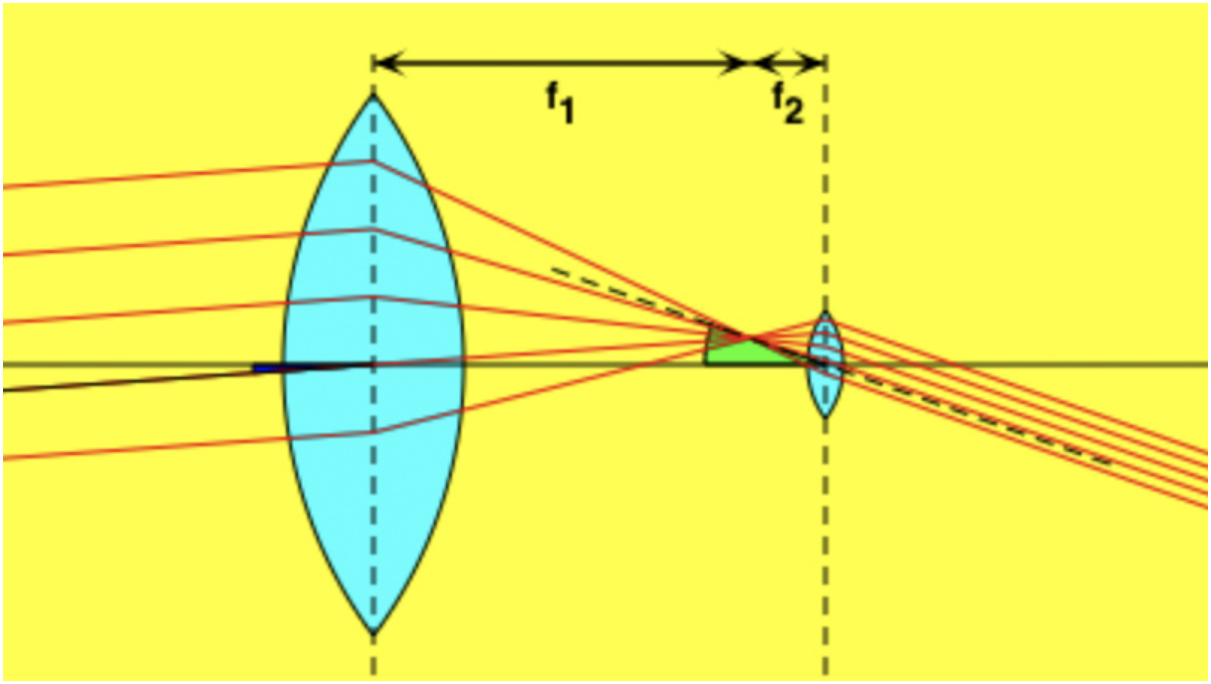
Our guide demonstrates how to access and use the app.

3.5 Telescope Simulator

The Telescope Simulator allows us to explore how various telescope parameters will affect the performance of a simple refracting astronomical telescope.

Our guide demonstrates how to access and use the app.

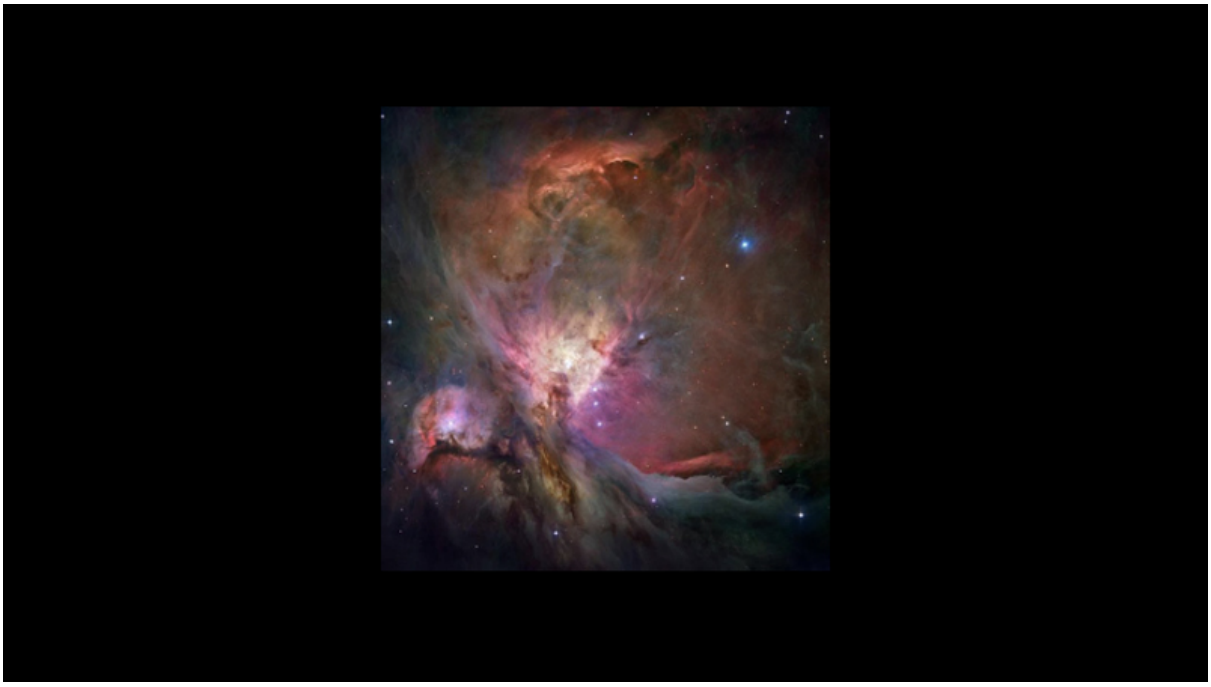
3.6 Refracting Astronomical Telescope



The Refracting Astronomical Telescope Tool provides an alternative approach to visualising and calculating the parameters of a refracting telescope.

Our guide demonstrates how parameters related to the eyepiece and optical tube can be altered to produce different fields of view.

3.7 Field of View Calculator



The Field of View Calculator simulates the field of view for eyepieces, binoculars and cameras.

Our guide describes some of the parameters available in this detailed app.

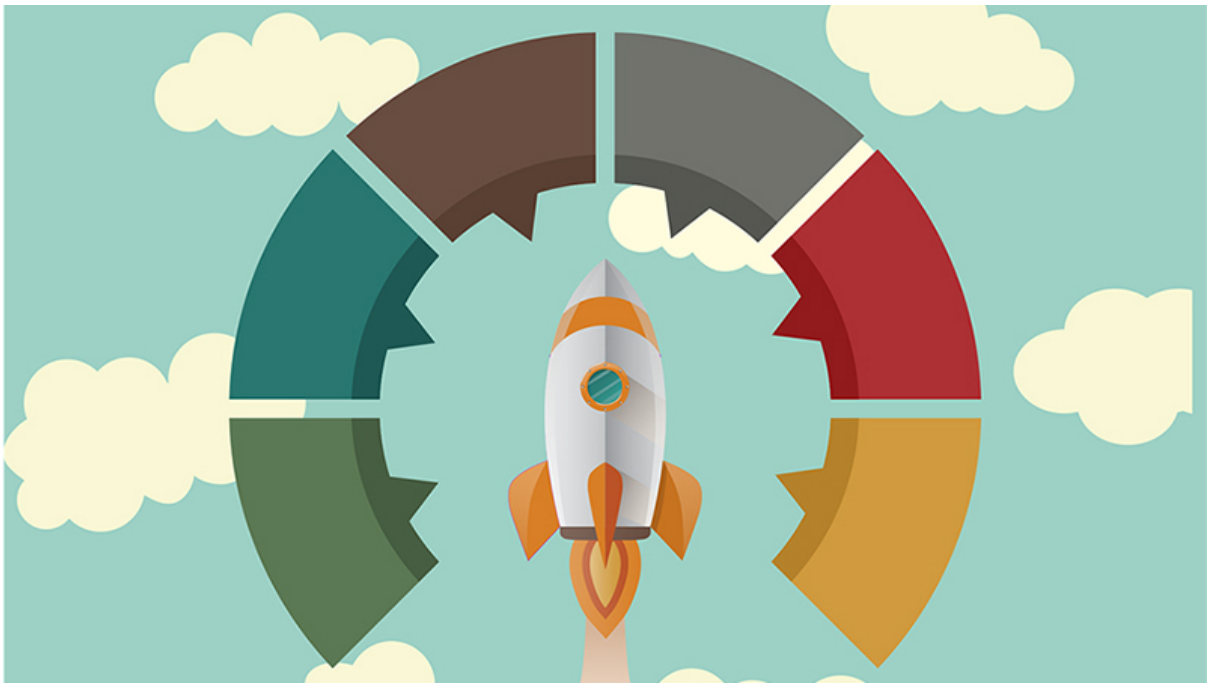
4. Teaching tools

4.1 Salsa J

Salsa J is software dedicated to image handling and analysis in the classroom by both teachers and students.

Written in Java, Salsa J works across multiple platforms, in several languages and provides hands-on exercises designed to allow the use of real astronomical data.

4.2 Infographics for Scientific Papers



Available via visme.co, we provide a user guide on how to use impactful infographics to support pupils' understanding of scientific data.

4.3 Playposit

Playposit is a free web application that allows us to create interactive video tutorials. This application runs in a browser and allows us to insert quiz questions into the video stream.

Our guide shows how to create an account and how to add text and questions to video material to make them interactive.

4.4 Wordwall

Wordwall can be used to create both interactive and printable custom activities for the classroom which can then be used on any web-enabled device. Our guide demonstrates how to create an account and create activities such as quizzes, word-searches and crosswords.

4.5 Mentimeter

Available in more than 30 languages, Mentimeter can be used as an online polling tool or as a way of asking multiple choice questions to check students' knowledge of a particular topic.

Our guide shows how to create an account as well as demonstrating how graphics can be incorporated into quiz questions and word clouds.

4.6 Padlet

Padlet is a multi-platform virtual board that teachers can use to promote collaborative work among their students. It can be set up to be a 'live wall' which is continuously updated by participants.

Our guide describes how to create an account, upload files (e.g. images, videos, documents) and includes examples of previously created Padlets.

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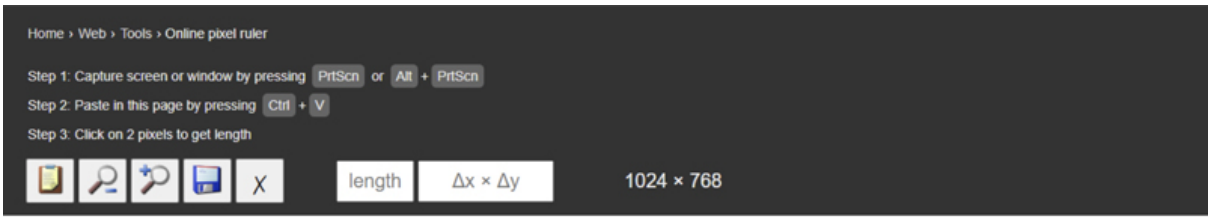
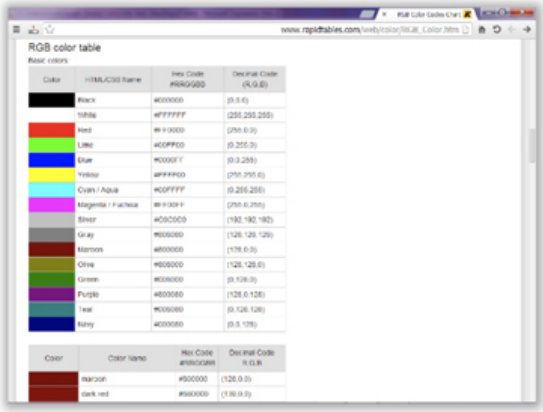
4.7 Online Pixel Ruler

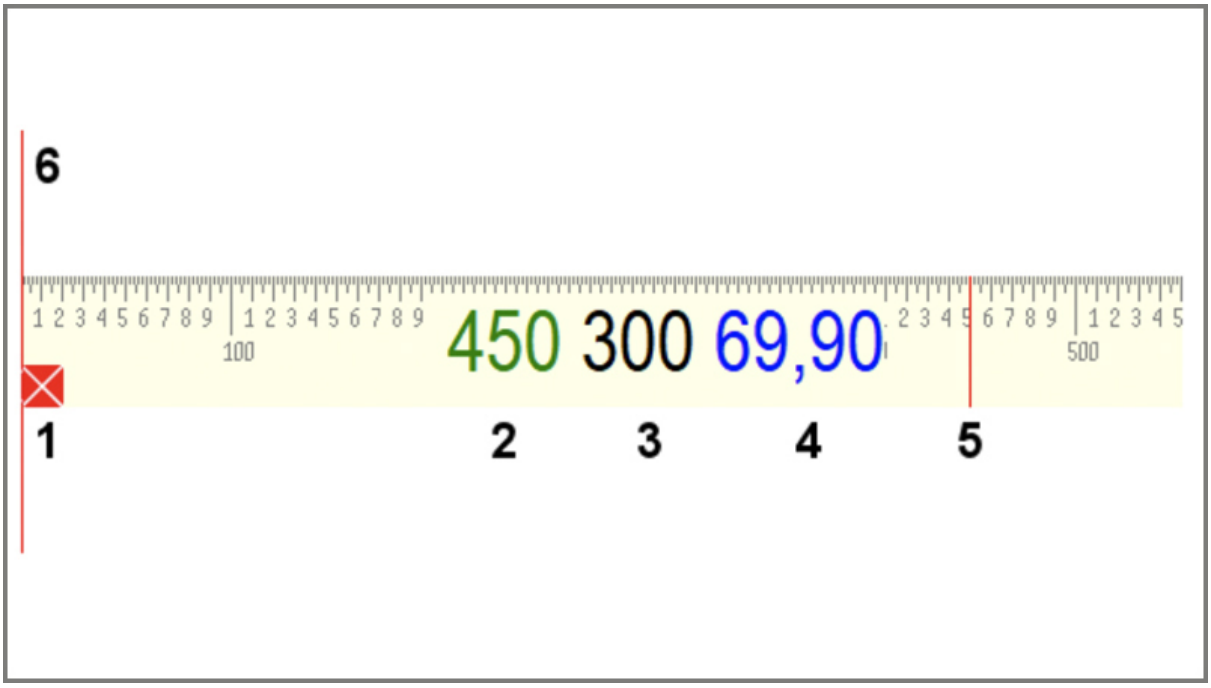




The Online Pixel Ruler is an online tool to measure distances in images.

Our Guide shows how sizes of objects and distances to them can be calculated using this simple tool.

4.8 Online Pixel Ruler 2



Here, we present an alternative online measuring tool, Pixel Ruler which can

Our Guide shows how this can be used in conjunction with a LaSciL demonstrator.

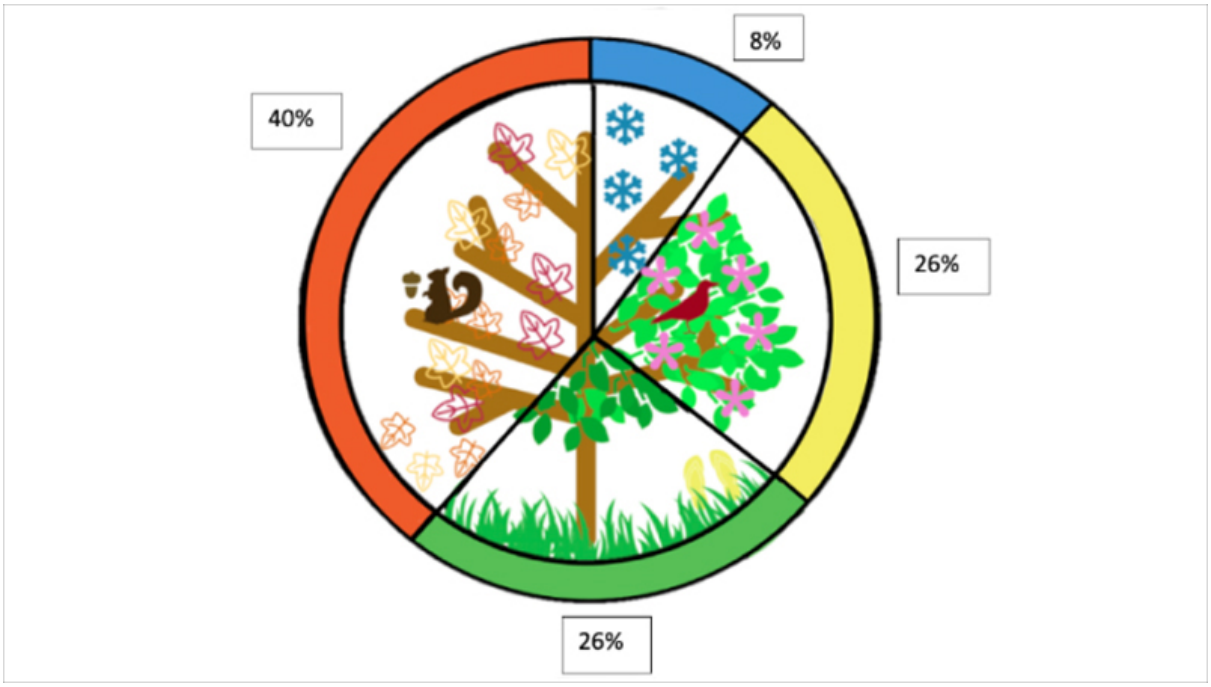
5. Data science

5.1 CODAP for Data Science

CODAP (Common Online Data Analysis Platform) is an easy-to-use data analysis tool. It can be used to summarize, visualize, and interpret data.

Our guide presents a simple example and includes links to several more advanced tutorials.

5.2 How to Do Data Talks With Students



This document explains how to find helpful advice on how to conduct Data Talks in the classroom as presented in the youcubed website. It includes video tutorials and tips on data visualisation.

5.3 Tableau Public for Data Science

Tableau Public is a free platform to explore, create and publicly share data visualisations online.

Our guide shows how to create an account as well as pointing towards video tutorials and a useful example dataset.

5.4 Tracker

Tracker is a free, open source, multi-platform software package for digital video analysis and modelling, especially within physics education.

Our guide provides instructions and a detailed example of the power of Tracker

5.5 Interactive for transit method

This app is provided by the Institute of Physics and allows cameras (such as those on laptops) to capture light and measure the 'dip' of a transiting exoplanet.

Our guide shows how this app can be used to simulate a planet passing in front of its host star as imaged by a telescope on Earth.

5.6 SOHO Movie Theatre

This app facilitates the creation of movie style images from sets of images taken by NASA's SOHO (Solar and Heliospheric Observatory) satellite.

Our guide illustrates the steps required to create an animated movie of the Sun's behaviour over time.