Annotated investigation

The focus level for the investigation. Some investigations include activities for the levels before and after the focus level.

Outcomes may be selected from within a strand, across strands or across levels.

INVESTIGATION **MATHEMATICS**

Level 2

Finding the Gingerbread Man

Strands	Topics
Space	Location, direction and movement
Measurement	Time
Outcomes S 2.2, M 2.2	

Investigations may be presented as a problem to be solved, a question to be answered, a significant task to be completed or an issue to be explored.

Investigation

The Gingerbread Man has escaped from the classroom. How can you use maps, calendars and clocks to keep a record of his travels, and to help tell of his adventures?

Outlines the sequence of activities in the investigation in three phases.

Overview

The following table shows how this investigation is organised in phases associated with thinking, reasoning and working mathematically.

Thinking, reasoning and working mathematically

1. Identifying and describing	2. Understanding and applying	3. Communicating and justifying
Introducing the story Students: • read the story • make a Gingerbread Man • create representations and maps • sequence events by time. **Setting the scene** Students: • discover their Gingerbread Man is missing • brainstorm ways of tracking his journey. **Developing a plan** Students: • describe how maps, displays of time, calendar and journal entries are useful ways of tracking the journey.	**Explaining directions** Students: • record the journey on maps • draw and describe alternative pathways • use calendars to record dates • use clocks to represent times. **Sequencing events** Students: • sequence events by time and date • agree on a preferred pathway and give reasons for choice.	**Retelling and retracing** Students: • retrace the journey • use calendars and displays of time and digital photos to retell the story • draw a map for the Gingerbread Man to follow • evaluate and explain how maps and calendars were used to tell of the adventures of the Gingerbread Man.

Ways of thinking, reasoning and working mathematically are embedded in the three phases.

Core learning outcomes that are the focus of the investigation are stated in full.

Core learning outcomes

This investigation focuses on the following core learning outcomes from the *Years 1 to 10 Mathematics Syllabus*:

S 2.2 Students interpret and create simple maps, plans and grids to follow and give directions, and to locate or arrange places or objects.

M 2.2 Students use a calendar to locate and sequence events, read and interpret key times on 12-hour displays, and measure and compare durations of time.

Advice about how this investigation can be used.

Using this investigation

The sequence of activities suggested in this investigation provides opportunities for students to demonstrate learning described by core learning outcomes or aspects of core learning outcomes. The investigation may be modified to provide opportunities for students to demonstrate learning described by core learning outcomes at other levels.

Contribution to the attributes of a lifelong learner

Explanation of how the investigation contributes to the valued attributes of a lifelong learner.

Knowledgeable person with deep understanding	Students use their knowledge of location, direction, movement and time to track the Gingerbread Man's journey around the school. They learn how to combine different mathematical ideas to add detail to discussion, or be more precise when the situation demands precision.
Complex thinker	Students may build on their prior knowledge of mapping and time to predict the path that the Gingerbread Man was travelling around the school. They assess the adequacy of their methods to make decisions regarding the Gingerbread Man's whereabouts and compare those ideas with the strategies of their classmates.
Responsive creator	Students use different representations to record and illustrate the Gingerbread Man's journey. They construct models of the classroom, and create displays to assist them with their mathematical thinking. They use different representations of time to suit the situation — for example, digital representations on a map.
Active investigator	Students use their knowledge of mathematics to determine possible pathways for the investigation and answer questions posed by themselves and others.
Effective communicator	Students engage in substantive conversations using mathematical language. They can give directions that allow others to get to locations easily. They can adjust the language to suit their audience.
Participant in an interdependent world	Students collaborate with others, and participate in meaningful whole-class discussions. They take responsibility for their ideas and for actively responding to others' perspectives.
Reflective and self-directed learner	Students make informed decisions about the Gingerbread Man's journey, and draw on what they know and can do to investigate new ideas. Students also reflect on their teaching and the appropriateness of the strategies used to solve the investigation. Students may refine their ideas during the investigation and try out new ideas when re-creating the Gingerbread Man's journey using his photographs.

The core content covered in the investigation appears in black text. Core content not included in the investigation appears in a lighter shade.

Core content

Core content in black text only is included in this investigation.

Space — Location, direction and movement: Level 2	Measurement — Time: Level 2
Location and movement • simple maps • sketches of simple plans (e.g. rooms) • relative size of objects and locations • non-labelled grids • alphanumeric grids (e.g. B3) • movement (e.g. paces, steps, grid spaces) • different viewpoints (above, 'bird's-eye view', front, behind, side) • alternative pathways **Direction and angle** • language – full, half, quarter and three-quarter turns – left and right turns – clockwise, anticlockwise	**Units and conventions** • units – seconds (s) – minutes (min) – hours (h) o half hour, quarter hour – years (yr) • 12-hour displays – analogue (o'clock, half hour, 5-minute interval markings) – digital (all times) • seasons • calendars – abbreviations for days (e.g. Mon) – months in words • representations (e.g. 9:30, nine-thirty) **Relationships** • days and months • weeks and a year • months and a year • analogue and digital displays • duration – estimation of seconds, minutes

Resources

- maps of the school
- versions of the story of the Gingerbread Man
- construction materials
- calendars
- analogue clocks

Resources needed for the investigation. Teachers should add to or make adjustments to resources as necessary.

Sets the scene and introduces the investigation to students. Typically in this phase, students may:

- describe an investigation in their own words
- link the investigation to known mathematics
- identify situations that require similar ways of thinking, reasoning or working mathematically
- identify the mathematics required
- revise and clarify knowledge, procedures and strategies
- identify and negotiate possible pathways through the investigation.

1. Identifying and describing

Introducing the story

Students:

- read or listen to versions of the story of the *The Gingerbread Man*
- make their own Gingerbread Man or a non-edible version is made for the class
- identify the landmarks and characters within the story
- use landmarks and characters to create a simple map of the Gingerbread Man's journey within the story. They discuss the relative size of objects and locations. The teacher helps students to discover that maps are representations of the environment
- discuss how landmarks and buildings have been represented on their maps. They discuss how some students may have chosen a bird's-eye view to represent objects, while others may have chosen a front view
- make a model of the classroom using construction materials, and place a representation of the Gingerbread Man somewhere within this model. They draw a bird's-eye view of his position looking down on the model
- identify the major events in the story and sequence these by time.

  Focus question could include:
  – If the story began at 9:00 a.m. and continued all day, what did the Gingerbread Man do at certain times of the day?
- sequence events and represent key times on an analogue display
- track the journey on the map using a piece of string. They include time markers using different representations of digital time.

Setting the scene

Students:

- listen to the teacher describe the scenario in which the Gingerbread Man has escaped from the classroom and left a trail of crumbs behind on the floor (the crumbs will be used later in a mapping activity).

  Note: The teacher should arrange for different staff members to deliver messages with reference to the sightings of the Gingerbread Man within the school grounds during the course of a week. Messages should include the time and location of the last sighting. Ensure that the class receives the first message recounting when and where the Gingerbread Man was last seen shortly after the discovery that the Gingerbread Man has escaped from the classroom.
- are informed that they will receive regular messages relating to the Gingerbread Man's whereabouts
- discuss how they can keep a record of the Gingerbread Man's journey and aspects of the journey they wish to track of (e.g. location and time).

  Focus questions could include:
  - How can we keep a record of his journey?
  - What aspects of his journey will we want to track?
  - How can we do this so that someone else can follow his journey?
- brainstorm ways in which location and time can be recorded.

Developing a plan

Students:

- identify the most useful ways to keep a record of the journey. They identify the advantages of using maps, displays of time, calendars and journal entries
- collaboratively design an action plan that identifies important elements that are needed to track the journey
- record the action plan with assistance from the teacher. This may be used as a personal checklist and as an assessment tool when making decisions about the demonstration of learning.

Identifies possible sources of evidence from activities in this phase of the investigation. (For assessment techniques, see page 71 *Years 1 to 10 Mathematics Syllabus.*)

Makes explicit what students are expected to know and do with what they know to demonstrate their learning in this phase of the investigation.

Provides opportunities for students to develop the mathematical understandings needed to proceed with the investigation. Typically in this phase, students may:

- choose and apply relevant knowledge, procedures and strategies
- clarify and refine their thinking
- listen to the reasoning and explanations of others as they work independently or cooperatively
- represent problems using objects, pictures, symbols or mathematical models
- generate possible solutions and validate their findings by trial or experimentation, or by discussing and debating their reasoning.

Assessing learning

Sources of evidence could include:

- a simple map of a scene from the Gingerbread Man
- drawings of a bird's-eye view of a model of the classroom
- action plans.

When making judgments, teachers consider whether the student has:

- knowledge of maps and plans as representations of the environment
- arranged objects to create simple maps and plans
- sequenced events by time
- knowledge of 12-hour displays as representations of points in time and the passing of time.
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2. Understanding and applying

Explaining directions

Students:

- use the plan of the classroom and, with help from the teacher, sketch the trail that the Gingerbread Man left as he escaped from the classroom. The teacher encourages and models the language of location, direction and movement to describe his path. The teacher helps students to highlight the trail and write a simple paragraph to explain what direction (clockwise and anticlockwise) the Gingerbread Man chose to make his escape
- use the messages from staff to locate and describe where the Gingerbread Man was last seen, and to represent his pathway using an existing map of the school. They use grid references to describe his last known position
- understand that some messages may result in discussion arising — for example, if the Gingerbread Man has been seen running past the library at 9:30 a.m. and sighted at 10:00 a.m. playing on the netball courts, students could discuss possible pathways he may have taken between the library and the netball courts. Students offer explanations about how time was spent during sightings, and time the activities that are suggested
- record the information received in messages on a calendar. The teacher displays a large calendar for students to read and locate the date of particular messages. Alternatively, students may have a copy of their own calendar in their portfolios and record this individually
- record the times that events occurred within each day. They identify and discuss times within messages and the different representations used — for example, Mon 1:30 p.m. or Monday, one-thirty (seen running past the office). The teacher helps students to use analogue clock faces or digital time formats to represent times and write simple sentences to record events beside them. This can be done using blank templates or a display on a wall in the classroom using paper plates to represent analogue clock faces, or large digital clock displays to represent digital time.

Sequencing events

Students:

- welcome the Gingerbread Man when he returns to the classroom at the end of the week. He has taken photos of his journey using a digital camera (the photos have the time and date recorded on them). He shows these to the class out of sequence
- sequence the photographs of the Gingerbread Man's journey using the dates and times as referents
- discuss the probable pathways taken by the Gingerbread Man and reach consensus while acknowledging and accepting possible alternatives. They need to agree on a pathway prior to following the path around the school
- use alphanumeric grids to locate the position of buildings within the school grounds, and use these when describing the Gingerbread Man's path around the school
- explain their reasoning for the suggestions they make about the pathway, positioning and relative size of objects.

Identifies possible sources of evidence from activities in this phase of the investigation. (For assessment techniques, see page 71 *Years 1 to 10 Mathematics Syllabus.*)

Assessing learning

Sources of evidence could include:
- the highlighted trail of the pathway taken in the classroom
- descriptions or representations of different pathways
- the use of analogue clocks to represent times of sightings
- sequencing of photos
- directions used to describe pathways indicated by photographs.

When making judgments, teachers consider whether the student has:
- used the language associated with location, direction and movement
- used grids to arrange and locate objects on a map of the school
- interpreted a simple map or plan to locate places or objects
- read a calendar to locate dates/days of sightings
- read and interpreted key times on analogue or digital displays
- knowledge of how 12-hour displays are structured and represented
- sequenced events by time
- discovered relationships between different units of time.

Makes explicit what students are expected to know and do with what they know to demonstrate their learning in this phase of the investigation.

3. Communicating and justifying

This phase provides opportunities for students to:
- describe their new learning
- share their solutions
- explain procedures and strategies
- apply new learning to similar situations.

Students may evaluate their own and others' thinking and reasoning, and make generalisations or pose problems.

Retelling and retracing

Students:
- use the information gathered from the maps and calendars to retrace the Gingerbread Man's journey around the school. They measure and compare how long it took for the Gingerbread Man to travel from one place to another
- go back to the classroom and retell the story of the Gingerbread Man's journey using a calendar, displays of time and the digital photos as a guide. This could be done as imaginary diary entries from the Gingerbread Man's point of view, or retold from the student's point of view
- draw a map showing a pathway to another classroom for the Gingerbread Man to follow. This is so another class in the school can follow the investigation. Students may also like to read their diary entry or story to the students in another class
- use the negotiated checklist from the identifying phase to help them present their maps, displays and stories to the teacher. They explain how close their maps and calendars were to the Gingerbread Man's story and why similarities and differences occurred.

Assessing learning

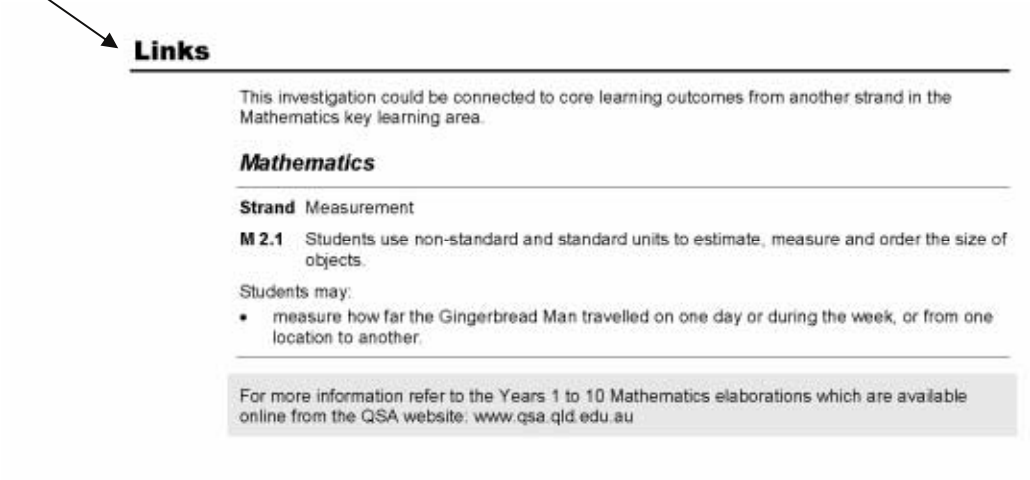
Sources of evidence could include:
- retelling the story of the journey using calendars, clocks, digital photos and maps
- maps showing a pathway to another classroom
- information from prepared checklists.

When making judgments, teachers consider whether the students has:
- interpreted a simple map or plan to locate places or objects or draw a pathway
- measured and compared durations
- knowledge of the conventions for and purpose of calendars
- sequenced events by time
- arranged places or objects to create simple maps and plans.

Makes explicit what students are expected to know and do with what they know to demonstrate their learning in this phase of the investigation.

Identifies possible sources of evidence from activities in this phase of the investigation. (For assessment techniques, see page 71 *Years 1 to 10 Mathematics Syllabus.*)

Identifies links to other strands or topics within the Mathematics key learning area, or to other key learning areas. This section may include suggestions that could be used to expand the investigation, or as a basis for the development of related investigations or units of work.



Links

This investigation could be connected to core learning outcomes from another strand in the Mathematics key learning area.

Mathematics

Strand Measurement

M 2.1 Students use non-standard and standard units to estimate, measure and order the size of objects.

Students may:

- measure how far the Gingerbread Man travelled on one day or during the week, or from one location to another.

For more information refer to the Years 1 to 10 Mathematics elaborations which are available online from the QSA website: www.qsa.qld.edu.au