Desirable features

High-quality performance is evidenced by:

• well-structured and sequenced explanation and illustration of the application of mathematical principles to solve certain questions.

• astuteness in selecting questions that are significantly different from each other and that reflect the motivation for them within their cultural context.

Acceptable performance (successful task completion) is evidenced by:

• knowledge of three different cultures and their view of the universe.

• some understanding of mathematical principles used to solve certain questions.

YEARS 7–9

TASK #7

Pi in the Sky

Students will demonstrate an understanding of different mathematical approaches used to frame and answer questions about astronomy asked by cultures from three different historical ages. For each culture, they will immerse themselves in one such question as well as the ways in which the culture used or developed mathematics to frame and answer the question. They will then present one of three tutorials, chosen in consultation with the teacher, to communicate the essential ideas and techniques of the mathematics of the situation in an informative way in oral and written format.

New Basics referents

Multiliteracies and communications media
- Communicating using … intercultural understandings

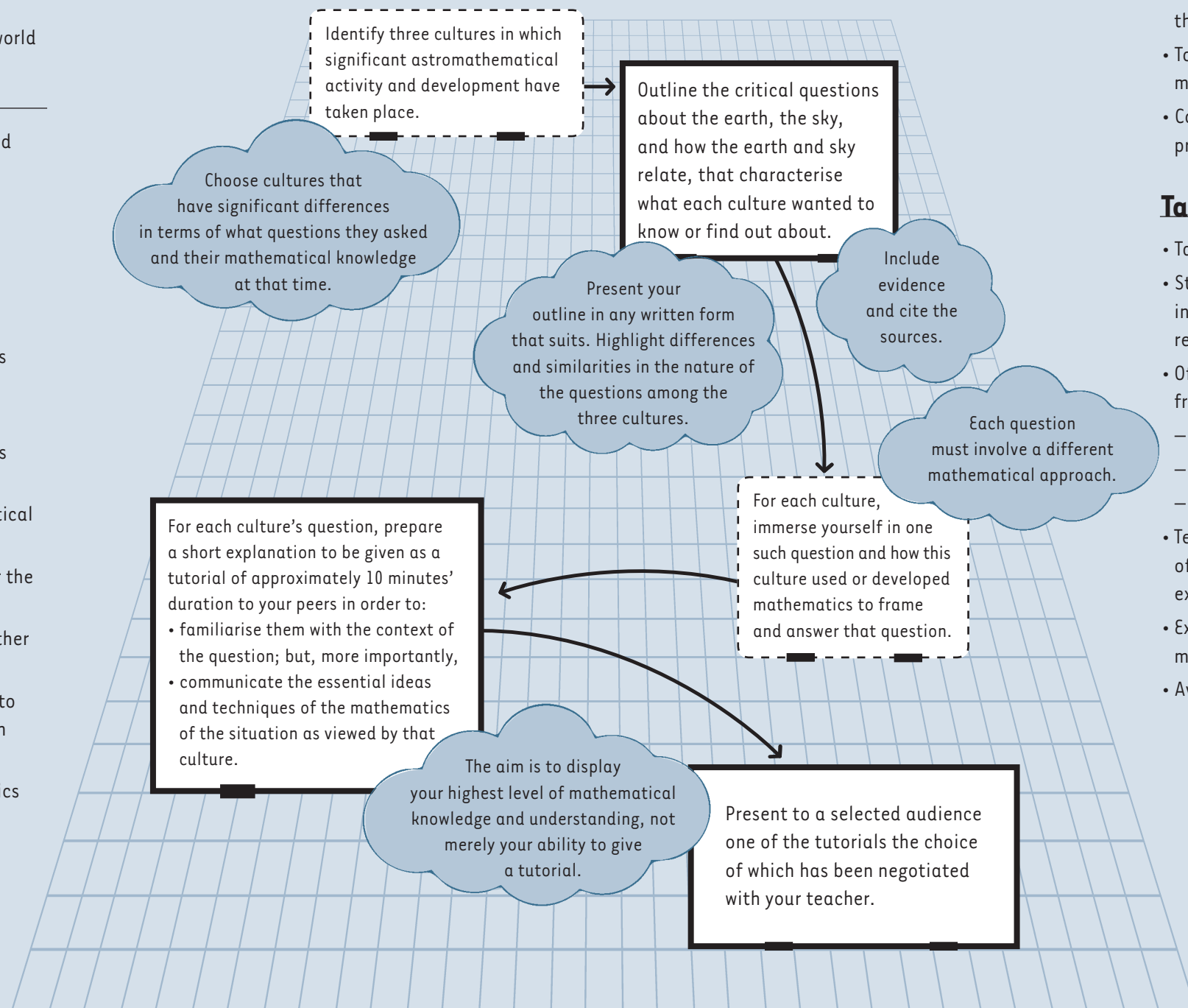**Active citizenship**
- Understanding the historical foundation …

Environments and technologies
- Developing a scientific understanding of the world

Targeted repertoires of practice

- Applying the conventions of quoting, citing and referencing
- Appreciating the methodology of the various branches of mathematics (e.g. geometry, trigonometry, algebra)
- Comparing and contrasting ideas/information
- Developing an audience's mathematical knowledge, concepts, techniques, applications and sensitivities
- Explain to others orally and in writing
- Identifying curved shapes, such as arcs, circles and ellipses
- Sequencing the steps that lead to a mathematical solution
- Substituting in formulae (e.g. such as that for the inverse square law)
- Translating information from one form to another to make it comprehensible
- Understanding how mathematics was/is used to frame questions of significance, particularly in astronomy
- Understanding the development of mathematics across cultures

Ideas, hints and comments

- Students might use the Internet to research archaeoastronomy.
- Students might consider how geometry, trigonometry, algebra or even computer algorithms have been used.
- Students might enrich their tutorials by considering the empirical basis for the mathematics presented.
- To show differences and similarities, students might use tables or diagrams.
- Consider having students rehearse their presentations to an alternative audience.

Task parameters

- Task intensity: medium–high
- Students must give their presentations individually, but may elect to work in groups for research and discussion.
- Of the three cultures, there must be one each from the following:
  — pre-Greek
  — mainstream culture from last 100 years
  — the period in between.
- Teachers will not negotiate the choice of topic of the tutorial to be presented until all three explanations have been developed.
- Explanations must detail the workings of the mathematics involved.
- Available grades: 4

Identify three cultures in which significant astromathematical activity and development have taken place.

Outline the critical questions about the earth, the sky, and how the earth and sky relate, that characterise what each culture wanted to know or find out about.

Choose cultures that have significant differences in terms of what questions they asked and their mathematical knowledge at that time.

Present your outline in any written form that suits. Highlight differences and similarities in the nature of the questions among the three cultures.

Include evidence and cite the sources.

Each question must involve a different mathematical approach.

For each culture, immerse yourself in one such question and how this culture used or developed mathematics to frame and answer that question.

For each culture's question, prepare a short explanation to be given as a tutorial of approximately 10 minutes' duration to your peers in order to:
- familiarise them with the context of the question; but, more importantly,
- communicate the essential ideas and techniques of the mathematics of the situation as viewed by that culture.

The aim is to display your highest level of mathematical knowledge and understanding, not merely your ability to give a tutorial.

Present to a selected audience one of the tutorials the choice of which has been negotiated with your teacher.