SIT190 - Magi - Cultural - OnTrack Assessment

Trimester 1, 2024

Babylonians and Quadratics

In this task, you investigate the cultural contribution of the Babylonians to the solving of quadratic equations. A short paper on some of their methods is available at `https://www.jstor.org/stable/27963851`, but you can refer to other papers and/or books too.

1. Identify the period of time when the cultural contribution was made. Remember to reference the paper(s) you use.

2. Describe the types of problems that motivated the Babylonians to find methods to solve quadratics.

3. The paper describes how the Babylonians found solution to quadratics of the form $x^2 + px = q$, $q > 0$.

   (a) Give an example of a quadratic in this form (your example must not be one of those given in the paper).

   (b) State the formula the Babylonians used to solve quadratics of this form.

   (c) State the quadratic formula used now, that is, the one that was given in this unit. Express this formula in terms of the variables p and q so it can be easily applied to quadratics of the form $x^2 + px = q$.

   (d) Solve the example quadratic using the Babylonian method.

   (e) Solve the example quadratic using the quadratic formula.

   (f) Compare the solutions found by the two methods. Explain any differences.

   (g) Given your answer for Question 2, can you suggest why the Babylonians developed their method compared to the current day methods?

4. The Babylonians also solved quadratics of the form $ax^2 + bx = c$. Their method involved a change of variable which gave them a quadratic of the form $u^2 + bu = ac$ which could be solved using the Babylonian method for solving $x^2 + px = q$. This is briefly described in the paper `https://www.jstor.org/stable/27963851`.

   - Demonstrate how this method can be applied to find a solution to the quadratic $2x^2 + 3x - 10$.

Submission

In order to complete this task, you must submit the following:

1. Period of time correctly given. All references to be provided.

2. Good examples of the types of problems that motivated the study of quadratics in the format $x^2 + px = q$.

3. Question 3

   a Example of quadratic in correct format.

   b Formula used by Babylonians correctly stated.

c Quadratic formula correctly stated in terms of p and q to match the Babylonian format of $x^2 + px = q$, $q > 0$.

d Solution using the Babylonian method including all working and steps.

e Solution using the quadratic formula including all working and steps.

f Short paragraph comparing the two methods and an explanation about the differences and why they occur. This is an HD task, so it is expected that this is written clearly and with no grammatical errors or typing errors.

g Clear explanation about why the motivations listed in (Q2) may have influenced the development of the Bablylonian method.

4. Question 4: a solution showing all steps and working using the method presented in the paper.

- Change of variable
- Solving using the Babylonian method

Useful Resources

The unit site has links to electronic resources (papers and books) on the cultural contributions to mathematics. These are available in the weekly content under 'Interesting Snippets'.

MAGI

Further Thoughts

1 Further Thoughts

You have completed the tasks for this week. Reflect on how you might apply the new knowledge to your areas of interest and study.

Many recreational puzzles can be solved using mathematics. Here is an example. One of these equations is not of the form we have looked at this week, but you can use the substitution method to solve it.

Ruby is two times older than Sammi. Fourteen years ago, Ruby was four times older than Sammi. How old is Sammi now?

Note: This puzzle is **not** part of the High Distinction On-Track task.