Reframing Mathematical Futures II RMFII

ASSESSMENT TASK INSTRUCTIONS

Please read the following instructions carefully before using the RMFII Forms.

PREPARATION:

1. COPIES - Make as many copies of the Form(s) as necessary – these should be prepared as booklets (i.e., printed and stapled) so that individual student work can be kept together. Do not print the scoring Rubrics, Student Score Sheet or Raw Score Translator – these are for staff use.
2. ADMINISTRATION - Decide when to administer the Forms - this is best done over two or three 20 to 30-minute sessions. The tasks should be completed in order and booklets will need to be kept intact and collected at the end of each session.
3. BRIEF STUDENTS - Use the **Sample Question** (included in the Appendix) to explore what is meant by the phrase: *explain your reasoning using as much mathematics as you can*. Show and discuss the four student responses and use the scoring rubric with the class to score each response, noting that diagrams, words or symbols may be used. **Note:** For Geometry Forms A and C, which include the Angles and Location Task, you will need to take the class through a paper folding exercise before administering the Form as they will need to use the resulting paper shape in one of the tasks – instructions for constructing this model are included in the Appendix.

ADMINISTERING THE FORMS:

1. Distribute the booklets. Stress that the purpose of doing this is to inform future teaching – it is in their interests to do as well as they can and not copy.
2. Students are expected record all of their work on the Form so there is **no need** for scrap paper or jotters etc. Encourage students to explain their reasoning using words, diagrams or equations.
3. Students should have access to pens, pencils, and erasers. Rejected work should be crossed out, not obliterated or rubbed out as it could provide some clues to students' thinking. Rulers are **not** needed but calculators can be used for the Geometry Forms.
4. Keep unfinished Forms in a safe place and ensure as far as possible that all students have an opportunity to attempt all tasks.

STUDENT SUPPORT:

- Tasks can be read by the teacher to support students for whom the task of reading would interfere with their capacity to respond to the task itself (e.g., students from non-English speaking backgrounds)

- Teachers can answer questions (e.g., explain the meaning of an unusual word) provided that this does not amount to telling students what to do – the object of the exercise is not that students get the right answer, but that they are given an opportunity to demonstrate what they actually do know and can do largely on their own.
- Where students are reluctant to provide a written explanation but are prepared to provide an oral explanation, teachers can briefly describe the reasoning on the student's form so that the student's thinking can be recognised.

ON COMPLETION OF THE FORMS:

- Once students have had a reasonable opportunity to attempt each item in each task, collect the Forms and mark the student's work using the form-specific Scoring Rubrics attached. Record scores on the Student Score Sheet, noting any interesting responses/observations in the comments column.
- When the marking is completed, the student's total score can be compared to the Raw Score Translator (also attached). This will assign the student's performance to a Zone in the relevant Learning Progression for mathematical reasoning.

IDENTIFYING WHERE STUDENTS ARE AND WHERE TO GO TO NEXT:

The **Learning Progressions** for each area of mathematical reasoning were developed on the basis of a detailed item analyses (Rasch Modelling) of data collected from approximately 3000 Year 5 to 10 students over the course of the Reframing Mathematical Futures II Project (see Siemon et al, 2018).

Rasch modelling allows both students' performance and item difficulty to be measured using the same unit and placed on an interval scale (Bond & Fox, 2015). Student performances are located at the point on the scale where they have more than a 50% chance of gaining the score required for the items located below that point but less than a 50% chance of scoring at the level required for items located above that point. This means that there are some aspects of the behaviours identified within the relevant Zone that need to be consolidated and established to deepen students' understanding and others that need to be introduced and developed to progress their learning to the next Zone.

Refer to the **Teaching Advice** for the relevant aspect of mathematical reasoning to determine a starting point for teaching and/or targeted intervention.

Note: If using the assessment tasks with whole classes, there may be a small number of students who receive a zero score or a perfect score. Assuming this represents the best they can do, all that can be said about these students is that they are either below Zone 1 or above Zone 8.

References:

* Siemon, Callingham, Day, Horne, Seah, Stephens & Watson (2018) available from: https://merga.net.au/common/Uploaded%20files/Annual%20Conference%20Proceedings/2018%20Annual%20Conference%20Proceedings/Siemon.pdf

Bond, T. & Fox, C. (2015), *Applying the Rasch Model: Fundamental measurement in the human sciences* (3rd Ed.). Mahwah, NJ: Lawrence Erlbaum

APPENDIX

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Sample Question:

A gecko is about 8 cm long.
A frilled-neck lizard is about 6 times as long as a gecko.

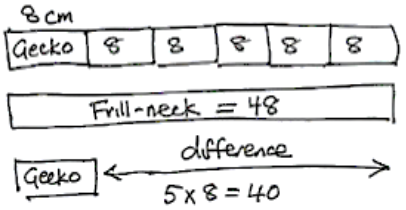
The difference between the length of a frilled-neck lizard and a gecko is about

2 cm ⬭ 14 cm ⬭ 40 cm ⬭ 48 cm ⬭

Explain your reasoning using as much mathematics as you can (you may use a diagram if you wish)

(ACARA, 2013)

Four Student Responses:

Student 1. *40 cm*	Student 2. *40 cm because I added them and subtracted*
Student 3. *40 cm. Frill neck is 6 geckos so 6 X 8 = 48. Difference is 48 - 8 = 40*	Student 4. 

Scoring Rubric:

0	No response or irrelevant response
1	Correct (40 cm) but no reasoning or explanation provided
2	Correct, incomplete reasoning or an operational description given
3	Correct, correct reasoning using words, diagram or symbols

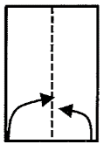
Instructions for making the paper model needed for Geometry Form A and C

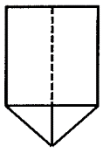
Before undertaking Geometry Form A and C, teachers will need to take the class through the paper folding exercise below. The folded shape is needed for the Angles and Location task and it needs to be as accurate as possible with creases well marked. We suggest you do this yourself a number of times first. Do not discuss the shape in any other way – just ensure that the students have it with them when they come to do the task.

Each student will need a clean sheet of A4 paper

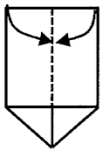
STEP 1. Fold the A4 paper lengthwise (also called hot dog fold).

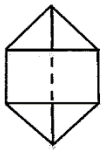
STEP 2. Fold the bottom two corners in to fold line creating a point at bottom.



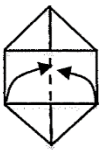


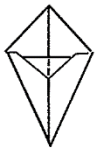
STEP 3. Do the same with the two corners at the top.





STEP 4. Fold the two corners at the bottom to the centre to create a sharper point at the bottom.





STEP 5. Do the same with the two corners at the top.