Assessment Document for Students' Learning

in Mathematics

Grades (12) Royal Guard of Oman Technical

College

مركز القياس والتقويم
التربوي
وزارة التربية والتعليم

دائرة تقويم تعلم مواد
العلوم التطبيقية
وزارة التربية والتعليم

August 2023

Contents

Assessment is an essential element of the educational process, by which the effectiveness of the educational process is evaluated, and the desired educational goals are achieved accordingly. As well as through which the elements of the different educational process are improved and developed due to the important information and data on the strengths and weaknesses of these elements.

Despite the multiplicity of patterns of educational assessment, continuous assessment is one of the most prominent of these patterns. This is due to the great importance it poses to help students know how much they have improved and inform parents about their children's performance levels. In addition, continuous assessment provides the teachers with important information about the level of achievement of educational goals/outcomes and helps them improve teaching methods and activates the real partnership between all related parties concerned with student education and learning through the integration of roles and responsibilities to assure quality in education.

This document is your guide to apply the continuous assessment. It provides a brief theoretical framework for the concept of continuous assessment and associated concepts and provides you with a frame of reference for how to implement continuous assessment tools by clarifying the mechanisms for implementing these tools and technical specifications.

Definitions:

Continuous Assessment:

Assessment that is conducted —in schools, by teachers throughout the school year, rather than just at the end. Provides a fairer, more balanced picture of student's attainment. Also, allows the inclusion of skills (e.g., communication) which are difficult (practically) to assess by means of formal testing. It can be used for both formative and summative purposes.

Summative Assessment:

Assessment of student learning. Its purpose is to measure and report on standards of learning. Typically done by awarding marks and grades. Also, involves reporting to the Ministry and to parents.

Formative Assessment:

Assessment for student's learning. Its purpose is to improve students' learning. Typically done by giving feedback through different tools such as of tests, quizzes, homework, oral work, projects, etc.

The assessment objectives (AOs) against which the topics are assessed are:

AO1   Knowledge and understanding (50%).

AO2   Application and reasoning (50%)

AO1 Knowledge and Understanding.

This assessment objective tests the concepts, skills, and procedures that students learn. This may include:

- recalling mathematical information such as definitions, terminology, properties of numbers and shapes, formulae, notation, and symbols.

- carrying out routine procedures such as calculations, algebraic manipulation, solving a variety of equations

- answering routine questions, where instructions are given explicitly.

- organizing, interpreting, and presenting information in written, tabular, graphical and diagrammatic forms

- understanding numerical, algebraic, and spatial concepts and relationships

AO2 Application and Reasoning

This assessment objective tests the application of concepts, skills and procedures in problems which may be in unfamiliar or complex situations. Students are expected to think logically and systematically and communicate clearly. They may have to link different areas of mathematics. This may include:

- applying their knowledge in a range of contexts which may be purely mathematical or set in a real-life situation and could involve either a single step or several steps.

- identifying the key elements of a problem and formulating the problem into mathematical terms

- selecting and applying appropriate mathematical techniques

- representing situations or contexts using, for example, equations, diagrams

- interpreting solutions in context and communicating this appropriately

- using and interpreting information or results of statistical analyses

- communicating mathematically in a clear and logical manner, for example, evaluate solutions or representations, write conclusions with reasons, generalise relationships or justify their choice of strategy.

- showing or proving a given result, using a series of steps and / or giving reasons

- applying combinations of mathematical skills and techniques in problem solving

Cognitive levels:

Knowledge

1.	Recall/ Recognize	Make or identify accurate statements about science facts, relationships, processes, and concepts; identify the characteristics or properties of specific organisms, materials, and processes.
2.	Define	Provide or identify definitions of scientific terms; recognize and use scientific vocabulary, symbols, abbreviations, units, and scales in relevant contexts.
3.	Describe	Describe organisms, physical materials, and science processes that demonstrate knowledge of properties, structure, function, and relationships.
4.	Illustrate with Examples	Support or clarify statements of facts or concepts with appropriate examples; identify or provide specific examples to illustrate knowledge of general concepts.
5.	Demonstrate knowledge of scientific instruments	Demonstrate knowledge of how to use science. apparatus, equipment, tools, measurement devices, and scales.

Applying

1.	Compare/ Contrast/ Classify	Identify or describe similarities and differences between groups of organisms, materials, or processes; distinguish, classify, or order individual objects, materials, organisms, and processes based on given characteristics and properties.
2.	Use Models	Use a diagram or model to demonstrate understanding of a science concept, structure, relationship, process, or biological or physical system

		or cycle (e.g., food web, electrical circuit, water cycle, solar system, atomic structure).
3.	Relate	Relate knowledge of an underlying biological or physical concept to an observed or inferred property, behavior, or use of objects, organisms, or materials.
4.	Interpret Information	Interpret relevant textual, tabular, or graphical information considering a science concept or principle.
5.	Find Solutions	Identify or use a science relationship, equations, or formulas to find a qualitative or quantitative solution involving the direct application/demonstration of a concept.
6.	Explain	Provide or identify an explanation for an observation or natural phenomenon, demonstrating understanding of the underlying science concept, principle, law, or theory.

Reasoning		
1.	Analyze	Analyze problems to determine the relevant relationships, concepts, and problem-solving steps; develop and explain problem-solving strategies.
2.	Integrate/ Synthesize	Provide solutions to problems that require consideration of a number of different factors or related concepts; make associations or connections between concepts in different areas of science; demonstrate understanding of unified concepts and themes across the domains of science; integrate mathematical concepts or procedures in the solutions to science problems.
		Combine knowledge of science concepts with information from experience

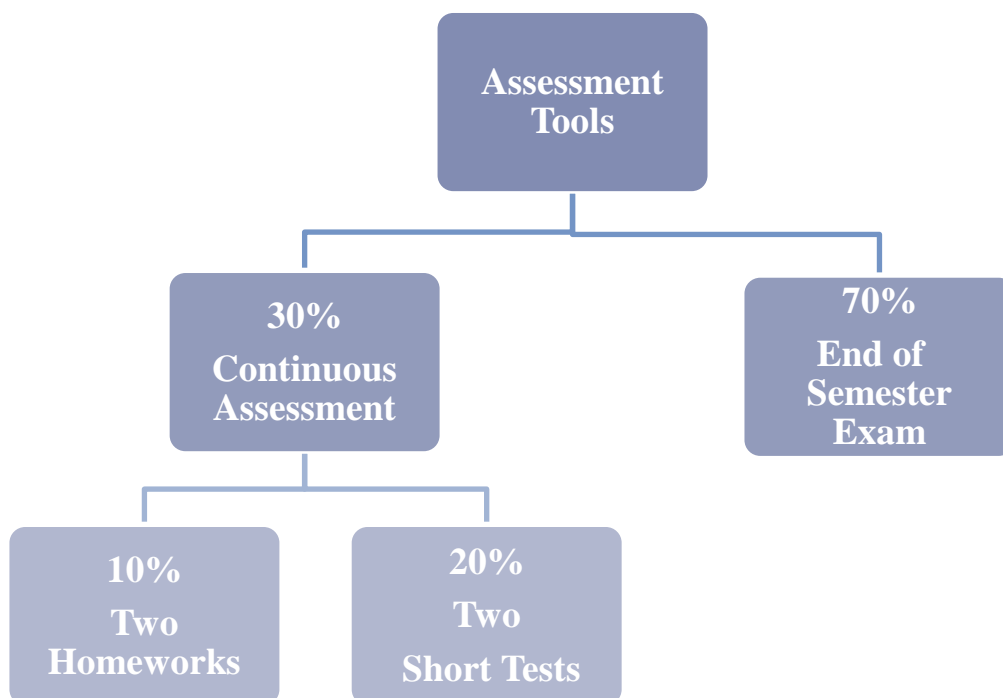| 3.	Hypothesize/ Predict	or observation to formulate questions that can be answered by investigation; formulate hypotheses as testable assumptions using knowledge from observation and/or analysis of scientific information and conceptual understanding; make predictions about the effects of changes in biological or physical conditions considering evidence and scientific understanding.
4.	Design	Design or plan investigations appropriate for answering scientific questions or testing hypotheses; describe or recognize the characteristics of well- designed investigations in terms of variables to be measured and controlled and cause-and-effect relationships; make decisions about measurements or procedures to be use in conducting investigations.
5.	Draw Conclusions	Detect patterns in data, describe or summarize data trends, and interpolate or extrapolate from data or given information; make valid inferences on the basis of evidence and/or understanding of science concepts; draw appropriate conclusions that address questions or hypotheses, and demonstrate understanding of cause and effect.
6.	Generalize	Make general conclusions that go beyond the experimental or given conditions and apply those conclusions to new situations; determine general formulas for expressing physical relationships.
7.	Evaluate	Weigh advantages and disadvantages to make decisions about alternative processes, materials, and sources; consider scientific and social factors to evaluate the impact of science and technology on biological and physical systems; evaluate alternative explanations and problem-solving strategies and solutions; evaluate results of investigations with respect to sufficiency of data to support conclusions.

Each item will be designated as low (L), medium (M) or high (H) demand. The purpose of this is to enable differentiation between students. The table below describes the three levels of demand.

Low (L)	It is expected that most students will be able to answer low demand questions correctly. Items may have one or more of the following features: • test the least demanding aspects of a learning objective. • involve a small number of steps. • involve the use of routine procedures. • specify explicitly what the student needs to do • involve simple problems.
Medium (M)	Items may have one or more of the following features: • test the more demanding aspects of a learning objective. • require the selection and use of techniques and procedures to solve a problem. • involve several steps.
High (H)	It is expected that a minority of students will be able to answer high demand questions. Items may have one or more of the following features: • test the most demanding aspects of a learning objective. • involve the application of techniques and procedures to solve challenging multi-step problems. • there may be little guidance in the question.

There is no restriction on the combination of assessment objective and level of demand for an item. It is possible to have a high demand AO1 question or a low demand AO2 question.

Relative weight for Assessment Tools

```
                    ┌─────────────────┐
                    │   Assessment    │
                    │     Tools       │
                    └─────────────────┘
            ┌───────────────┴───────────────┐
    ┌───────────────┐                ┌───────────────┐
    │     30%       │                │     70%       │
    │  Continuous   │                │   End of      │
    │  Assessment   │                │  Semester     │
    │               │                │    Exam       │
    └───────────────┘                └───────────────┘
      ┌──────┴──────┐
┌───────────┐ ┌───────────┐
│    10%    │ │    20%    │
│    Two    │ │    Two    │
│ Homeworks │ │Short Tests│
└───────────┘ └───────────┘
```

Assessment Summary Marks Distribution for Grad 12

Continuous Assessment		Total	End-of-Semester Exam	Total Marks
HomeWorks	Short Tests			
Twice a semester	Twice a semester			
5 marks each (Total 10 marks)	10 marks each (Total 20 marks	30 Marks	70 Marks	**100 Marks**

- **HomeWorks**

The tool	Total marks	Specifications
HomeWorks	10	• Determine the date of delivery. • Homework consists of two parts (5+5) marks. • Giving feedback to students • Cater for the different needs and different levels of the students. • Coud be specific exercises from the book or the teacher give the students a homework sheet with items like exam.

Description of Homework (Standards)

Marks	Gradient	The Standard
5	Always	
4	Usually	The student answers are correct and in precise steps, can re-solve the homework in the educational situation, benefits from feedback.
3	Sometimes	
2	Little	
1	Rarely	

- **Short Test**

The tool	Number of periods	Total marks	Specifications
Short Tests	2	20	• Two short tests per semester. • Calculator is allowed. • Determine the date of test. • The short test is done in 35 minutes. • 10 marks for each short test • The test cannot repeat to improve the marks. The answer key must be prepared and clear where the level and marks are shown for each item. • Marks must be as a whole number with or without half only (like 5 and are accepted but 5. 5 is not accepted). • The first short test is taken in the middle of the semester, while the second is at the end of the semester.

Item Type	Number of Items	The Marks for Each Item	Notes
Multiple-Choice	3	1	multiple-choice items which may be placed anywhere in the paper (there will not be a separate multiple-choice section).
Short answer Items	1	2-3	Two marks are allocated for the item if it has ahigh level of difficulty
Long answer Items	1	4-5	Put in two parts a and b

Suggested model for the short test specification

Item Number		Item Type	The Marks for Each Item	Level of demand
1		Multiple-Choice	1	Low
2		Short answer Items	2	Medium
3		Multiple-Choice	1	Medium
4	a	Long answer Items	2	High
	b	Long answer Items	3	Low
5		Multiple-Choice	1	Medium

- **Topics First Semester:**

    Precalculus

    Trigonometry

    Vectors

    Matrices

    Complex Numbers

    Binomial Theorem

- **Topics Second Semester:**

    Functions

    Differentiation

    Integration

    Statistics

- The time limit for the assessment will be 3 hours.

- There will be one examination paper in each semester.

- It will be prepared centrally.

- Match with learning taxonomy-cognitive domain (knowing, applying, and reasoning).

- All questions are compulsory.

- There are 70 marks in total for each semester.

- There are 28 questions at most per paper.

- There are 12 single-mark multiple-choice items which may be placed anywhere in the paper (there will not be a separate multiple-choice section). It is expected that these questions will cover a range of topics, levels of demand and assessment objectives.

- The other questions are written answer questions each comprising 1 or more items; items will be worth up to 5 marks.

- There is a short answer Items, each worth 2 to 4 marks

- There is a minimum of 2 long-answer items, each worth 5 to 6 marks.

- the use of calculators is permitted.

The level /type of given questions or items should be divided into:

Percentage	Knowledge and understanding AO1			Application and Reasoning AO2		
	50%			50%		
Mark	35			35		
	40%L	40%M	20%H	40% L	40%M	20% H
	14	14	7	14	14	7

SPECIFICATIONS FOR FIRST SEMESTER EXAM

TOPIC	Weight (%)	Marks		
		Multiple-Choice	Extended Response (Short & Long answer Items)	Total
Precalculus	18	2	10	12
Trigonometry	34	4	20	24
Vectors	11	1	7	8
Matrices	15	2	8	10
Complex Numbers	18	2	10	12
Binomial Theorem	4	1	3	4
Total	100	12	58	70

SPECIFICATIONS FOR SECOND SEMESTER EXAM

TOPIC	Weight (%)	Marks		
		Multiple-Choice	Extended Response (Short & Long answer Items)	Total
Function	7	1	4	5
Differentiation	45	5	26	31
Integration	27	3	16	19
Statistics	21	3	12	15
Total	100	12	58	70

Assessment Sheet for Grade 12:

Students Name	H.W 10%		Short Tests 20%		Total 30	Final Exam 70	Total 100
	5	5	10	10			