
Contents

Introduction	3
Purpose of This Document	4
Features of This Document	4
The Tasks	5
The Rubrics	5
Development of the Tasks	7
Assessment and Selection of the Samples	8
Use of the Student Samples	9
Teachers and Administrators	9
Parents	10
Students	10
Science, Academic	11
A Check on the Density of Maple Syrup	12
The Task	12
Expectations	12
Prior Knowledge and Skills	13
Task Rubric	14
Student Task Description	16
<i>Student Samples</i>	17
Teacher Package	49
Science, Applied	53
Chemical and Physical Change	54
The Task	54
Expectations	54
Prior Knowledge and Skills	55
Task Rubric	56
Student Task Description	58
<i>Student Samples</i>	60
Teacher Package	92

Une publication équivalente est disponible en français sous le titre suivant :
Le curriculum de l'Ontario : Copies types de 9^e année – Sciences, 2000.

This publication is available on the Ministry of Education's website
at <http://www.edu.gov.on.ca>.

Introduction

In 1999, the Ministry of Education published a new curriculum for Ontario secondary school students in Grades 9 and 10. The new curriculum is more specific than previous curricula with respect to both the knowledge and the skills that students are expected to develop and demonstrate in each grade. In the curriculum policy document for each discipline, teachers are provided with the curriculum expectations for each course within the discipline and an achievement chart that describes four levels of student achievement to be used in assessing and evaluating student work.

The document entitled *The Ontario Curriculum, Grades 9–12: Program Planning and Assessment, 2000* states that “assessment and evaluation will be based on the provincial curriculum expectations and the achievement levels outlined in this document and in the curriculum policy document for each discipline” (p. 13). The document also states that the ministry is providing a variety of materials to assist teachers in improving their assessment methods and strategies and, hence, their assessment of student achievement. The present document is one of the resources intended to provide assistance to teachers in their assessment of student achievement. It contains samples (“exemplars”) of student work at each level of achievement.

Ontario school boards were invited by the ministry to participate in the development of exemplars. Forty-seven district school boards responded to this invitation. Teams of subject specialists from across the province were involved in developing the assessment materials. They designed the performance tasks and scoring scales (“rubrics”) based on selected Ontario curriculum expectations, field-tested them in classrooms, suggested changes, administered the final tasks, marked the student work, and selected the exemplars used in this document. During each stage of the process, external validation teams reviewed the subject material to ensure that it reflected the expectations in the curriculum and that it was accessible to and appropriate for all students. Ministry staff who had been involved in the development of the curriculum policy documents also reviewed the tasks, rubrics, and exemplars.

The selection of student samples that appears in this document reflects the professional judgement of teachers who participated in the project. No students, teachers, or schools have been identified.

The procedures followed during the development and implementation of this project will serve as a model for boards, schools, and teachers in designing assessment tasks within the context of regular classroom work, developing rubrics, assessing the achievement of their own students, and planning for the improvement of students’ learning.

The samples in this document will provide parents¹ with examples of student work to help them monitor their children's progress. They also provide a basis for communication with teachers.

Use of the exemplar materials will be supported initially through provincial in-service training. A variety of additional opportunities (e.g., discipline- or subject-specific workshops and summer institutes) will be available to secondary school teachers to support the use of the exemplars.

Purpose of This Document

This document was developed to:

- show the characteristics of student work at each of the four levels of achievement for Grade 9;
- promote greater consistency in the assessment of student work across the province;
- provide an approach to improving student learning by demonstrating the use of clear criteria applied to student work in response to clearly defined assessment tasks;
- show the connections between what students are expected to learn (the curriculum expectations) and how their work can be assessed using the levels of achievement described in the curriculum policy document for the subject.

Teachers, parents, and students should examine the student samples in this document and consider them along with the information in the Teacher's Notes and Comments/Next Steps sections. They are encouraged to examine the samples in order to develop an understanding of the characteristics of work at each level of achievement in Grade 9 and the ways in which the levels of achievement reflect a progression in the quality of knowledge and skills demonstrated by the student.

The samples in this document represent examples of student achievement obtained using only one method of assessment, called performance assessment. Teachers will also make use of a variety of other assessment methods and strategies in evaluating student achievement in a course over a term or school year.

Features of This Document

This document contains the following:

- a description of each performance task, as well as the curriculum expectations related to the task
- the task-specific assessment chart, or rubric
- two samples of student work for each of the four levels of achievement
- Teacher's Notes, which provide some details on the level of achievement for each sample
- Comments/Next Steps, which offer suggestions for improving achievement
- the Teacher Package that was used by teachers in administering the task

It should be noted that *each sample* for a specific level of achievement represents the characteristics of work at that level of achievement.

1. In this document, *parent(s)* refers to parent(s) and guardian(s).

The Tasks

The performance tasks for science were based directly on curriculum expectations selected from the Grade 9 courses in the policy document for science. The tasks encompassed the four categories of knowledge and skills in science (i.e., Knowledge/Understanding, Inquiry, Communication, and Making Connections), requiring students to integrate their knowledge and skills in meaningful learning experiences. The tasks gave students an opportunity to demonstrate not only how well they had learned to use the required knowledge and skills in one context, but how well they could use their knowledge and skills in another context.

Teachers were required to explain the scoring criteria and descriptions of the levels of achievement (i.e., the information in the task rubrics) to the students before they began the assignment (for the rubrics, see pages 14 and 56).

The Rubrics

In this document, the term *rubric* refers to a scoring scale that consists of a set of achievement criteria and descriptions of the levels of achievement for a particular task. The scale is used to assess students' work; this assessment is intended to help students improve their performance level. The rubric identifies key criteria by which students' work is to be assessed, and it provides descriptions that indicate the degree to which the key criteria have been met. The teacher uses the descriptions of the different levels of achievement given in the rubric to assess student achievement on a particular task.

The rubric for a specific performance task is intended to provide teachers and students with an overview of the expected final product with regard to the knowledge and skills being assessed as a whole.

The achievement chart in the curriculum policy document for science provides a standard province-wide tool for teachers to use in assessing and evaluating their students' achievement over a period of time. While the chart is broad in scope and general in nature, it provides a reference point for all assessment practice and a framework within which to assess and evaluate student achievement. The descriptions associated with each level of achievement serve as a guide for gathering and tracking assessment information, enabling teachers to make consistent judgements about the quality of student work while providing clear and specific feedback to students and parents.

For the purposes of the exemplar project, a single rubric was developed for a performance task in each course. This task-specific rubric was developed in relation to the achievement chart in the curriculum policy document.

The differences between the achievement chart and the task-specific rubric may be summarized as follows:

- The achievement chart contains broad descriptions of achievement. Teachers use it to assess student achievement over time, making a summative evaluation that is based on the total body of evidence gathered through using a variety of assessment methods and strategies.

- The rubric contains criteria and descriptions of achievement that relate to a specific task. The rubric uses some terms that are similar to those in the achievement chart but focuses on aspects of the specific task. Teachers use the rubric to assess student achievement on a single task.

The rubric contains the following components:

- an identification (by number) of the expectations on which student achievement in the task was assessed
- the four categories of knowledge and skills
- the relevant criteria for evaluating performance of the task
- descriptions of student performance at the four levels of achievement (level 3 on the achievement chart is considered to be the provincial standard)

As stated earlier, the focus of performance assessment using a rubric is to improve students' learning. In order to improve their work, students need to be provided with useful feedback. Students find that feedback on the strengths of their achievement and on areas in need of improvement is more helpful when the specific category of knowledge or skills is identified and specific suggestions are provided than when they receive only an overall mark or general comments. Student achievement should be considered in relation to the criteria for assessment stated in the rubric for each category, and feedback should be provided for each category. Through the use of a rubric, students' strengths and weaknesses are identified and this information can then be used as a basis for planning the next steps for learning. In this document, the Teacher's Notes section indicates the reasons for assessing a student's performance at a specific level of achievement, and the Comments/Next Steps section indicates suggestions for improvement.

In the exemplar project, a single rubric encompassing the four categories of knowledge and skills was used to provide an effective means of assessing the particular level of student performance in the performance task, to allow for consistent scoring of student performance, and to provide information to students on how to improve their work. However, in the classroom, teachers may find it helpful to make use of additional rubrics if they need to assess student achievement on a specific task in greater detail for one or more of the four categories. For example, it may be desirable in evaluating an oral report to use one rubric for the content (Knowledge/Understanding), one for the research (Inquiry), one for the writing of the report and the delivery of the oral presentation (Communication), and one for relating aspects of science to specific issues (Making Connections).

The rubrics for the tasks in the exemplar project are similar to the scales used by the Education Quality and Accountability Office (EQAO) for the Grade 3, Grade 6, and Grade 9 provincial assessments in that both the rubrics and the EQAO scales are based on the Ontario curriculum expectations and the achievement charts. The rubrics differ from the EQAO scales in that they were developed to be used only in the context of classroom instruction to assess achievement in a particular assignment in a course.

Although rubrics were used effectively in this exemplar project to assess responses related to the performance tasks, they are only one way of assessing student achievement. Other means of assessing achievement include observational checklists, tests, marking schemes, or portfolios. Teachers may make use of rubrics to assess students' achievement on, for example, essays, reports, exhibitions, debates, conferences, interviews, oral presentations, recitals, two- and three-dimensional representations, journals or logs, and research projects.

Development of the Tasks

The performance tasks for the exemplar project were developed by teams of subject specialists in the following way:

- The teams selected a cluster of curriculum expectations that focused on the knowledge and skills in the course that are considered to be of central importance in the subject. Teams were encouraged to select a manageable number of expectations to enable teachers to focus their feedback to students. The particular selection of expectations ensured that all students in the course would have the opportunity to demonstrate their knowledge and skills in each category of the achievement chart in the curriculum policy document for the subject. Different tasks were developed for the academic courses and applied courses.
- For each course, the teams drafted two tasks that would encompass all of the selected expectations and that could be used to assess the work of all students in the course. (Only one of these tasks would eventually be used for the final administration of the task.)
- The teams established clear, appropriate, and concrete criteria for assessment, and wrote the descriptions for each level of achievement in the task-specific rubric, using the achievement chart for the subject as a guide.
- The teams prepared detailed instructions for both teachers and students participating in the assessment project.
- The two tasks were field-tested in classrooms across the province – one in the fall of 1999, the other in the winter of 2000 – by teachers who had volunteered to participate in the field test. Student work was scored by teams of teachers of the subject. In addition, classroom teachers, students, and board contacts provided feedback on the task itself and on the instructions that accompanied the task. Suggestions for improvement were taken into consideration in the revision of the tasks, and the feedback helped to determine which of the two tasks would actually be used for the final administration of the tasks in May 2000.

In developing the tasks, the teams ensured that the resources needed for completing the task – that is, all worksheets and support materials – were provided. It was also suggested that students could consult the teacher-librarian at the school about additional print and electronic materials.

Prior to both the field tests and the final administration of the tasks, a team of validators – including research specialists, gender and equity specialists, and subject experts – reviewed the instructions in the teacher and student packages, making further suggestions for improvement.

Assessment and Selection of the Samples

After the final administration of the tasks, student work was scored by trained board personnel. The student samples were then forwarded to the ministry, where a team of teachers from across the province, who had been trained by the ministry to assess achievement on the tasks, scored and selected the student samples that would serve as the exemplars for each level of achievement.

The rubrics were the primary tool used to evaluate student work at both the district school board level and the provincial level. The samples that appear in this document were selected in the following way:

- At the district school board level, after some training was provided, teachers of the subject evaluated and discussed the student work until they were able to reach a consensus regarding the level to be assigned for achievement in each category. This evaluation was done to ensure that the student work being selected clearly illustrated that level of performance.
- Student work was then sorted into two groups: (1) work that demonstrated the same level of achievement in all four categories; and (2) work that demonstrated achievement at more than one level over the four categories.
- All the samples were submitted to a provincial selection team of teachers, who re-scored and validated the samples of work that demonstrated the same level of achievement in all four categories, and chose, through consensus, two samples that best represented the characteristics of work at that level.

The following points should be noted:

- Two samples of student work are included for each of the four achievement levels in each subject for which there is written work. The use of two samples is intended to show that the characteristics of an achievement level can be exemplified in different ways.
- Although the samples of student work in this document were selected to show a level of achievement that was largely consistent in the four categories of Knowledge/Understanding, Inquiry, Communication, and Making Connections, teachers using rubrics to assess student work will notice that students' achievement frequently varies across the categories (e.g., a student may be achieving at level 3 in Knowledge/Understanding but at level 4 in Communication).
- Although the student samples show responses to most questions, students achieving at level 1 and level 2 will often omit answers or will provide incomplete responses or incomplete demonstrations.
- Students' effort was not evaluated. Effort is evaluated separately by teachers as part of the "learning skills" component of the Provincial Report Card.
- This document does not include any student samples that were assessed using the rubrics and judged to be below level 1. (Work judged to be below level 1 is work on which a student achieves a mark of less than 50%. A student whose overall achievement at the end of a course is below 50% will not obtain a credit for the course.) Teachers are expected to work with students whose achievement is below level 1, as well as with their parents, to help the students improve their performance.

Use of the Student Samples

Teachers and Administrators

The samples of student work included in this document will help teachers and administrators by:

- providing student samples and criteria for assessment that will enable them to help students improve their achievement;
- providing a basis for conversations among teachers, parents, and students about the criteria used for assessment and evaluation of student achievement;
- facilitating communication with parents regarding the curriculum expectations and levels of achievement for each subject or course;
- promoting fair and consistent assessment within subjects and courses.

Teachers may choose to:

- use the teaching/learning activities outlined in the performance tasks;
- use the performance tasks and rubrics in this document in designing comparable performance tasks;
- use the samples of student work at each level as reference points when assessing student work;
- use the rubrics to clarify what is expected of the students and to discuss the criteria and standards for high-quality performance;
- review the samples of work with students and discuss how the performances reflect the levels of achievement;
- adapt the language of the rubrics to make it more “student friendly”;
- develop other assessment rubrics with colleagues and students;
- help students describe their own strengths and weaknesses and plan their next steps for learning;
- share student work with colleagues for consensus marking;
- partner with other schools to design tasks and rubrics, and to select samples for other performance tasks and other subject areas.

Administrators may choose to:

- encourage and facilitate teacher collaboration regarding standards and assessment;
- provide training to ensure that teachers understand the role of the exemplars in assessment, evaluation, and reporting;
- establish an external reference point for schools in planning student programs and for school improvement;
- facilitate sessions for parents and school councils using this document as a basis for discussion of curriculum expectations, levels of achievement, and standards;
- participate in future exemplar projects within their district school boards or with the Ministry of Education.

Parents

The performance tasks in this document exemplify a range of meaningful and relevant learning activities related to the curriculum expectations for Grade 9 science courses. In addition, this document invites the involvement and support of parents as they work with their children to improve their achievement. Parents may use the samples of student work and the rubrics as:

- resources to help them understand the levels of achievement;
- models to help monitor their children’s progress from level to level;
- a basis for communication with teachers about their children’s achievement;
- a source of information to help their children monitor achievement and improve their performance;
- models to illustrate the application of the levels of achievement.

Students

Students are asked to participate in performance assessments in all curriculum areas. When students are given clear expectations for learning, clear criteria for assessment, and immediate and helpful feedback, their performance improves. Students’ performance improves as they are encouraged to take responsibility for their own achievement and to reflect on their own progress and “next steps”.

It is anticipated that the contents of this document will help students in the following ways:

- Students will be introduced to a model of one type of task that will be used to assess their learning, and will discover how rubrics can be used to improve their product or performance on an assessment task.
- The performance tasks and the exemplars will help clarify the curriculum expectations for learning.
- The rubrics and the information given in the Teacher’s Notes section will help clarify the assessment criteria.
- The information given under Comments/Next Steps will support the improvement of achievement by focusing attention on two or three suggestions for improvement.
- With an increased awareness of the performance tasks and rubrics, students will be more likely to communicate effectively about their achievement with their teachers and parents, and to ask relevant questions about their own progress.
- Students can use the criteria and the range of student samples to help them see the differences in the levels of achievement. By analysing and discussing these differences, students will gain an understanding of ways in which they can assess their own responses and performances in related assignments and identify the qualities needed to improve their achievement.