

**Alberta Provincial
Achievement Testing**

**Assessment
Highlights
2014–2015**

**GRADE
6**

Mathematics

Alberta  Government

This document contains assessment highlights from the 2015 Grade 6 Mathematics Achievement Test. The examination statistics included in this document represent writers in English. To obtain French-only statistics which may apply to your school, please refer to the French version of this document.

Assessment Highlights provides information about the overall test, test blueprints, and student performance on the achievement test that was administered in 2015. Also provided is commentary on student performance at the acceptable standard and the standard of excellence on selected items from the 2015 Grade 6 Mathematics Achievement Test. This information is intended for teachers and is best used in conjunction with multi-year and detailed school reports that are available in schools via the extranet. *Assessment Highlights* reports for all achievement test subjects and grades will be posted on the Alberta Education website every year in the fall.

All released achievement tests, including test blueprints, answer keys with the item difficulty, reporting category, test section, and item description for each test item, are located at education.alberta.ca/admin/testing/achievement/answerkeys.aspx.

These materials, along with the program of studies and subject bulletins, provide information that can be used to inform instructional practice.

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The Alberta Education Internet address is education.alberta.ca.

This document was written primarily for:

Students	
Teachers	✓ of Grade 6 Mathematics
Administrators	✓
Parents	
General Audience	
Others	

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Contents

The 2015 Grade 6 Mathematics Achievement Test.....	1
How Many Students Wrote the Test?	1
What Was the Test Like?	1
How Well Did Students Do?.....	1
2015 Test Blueprint and Student Achievement.....	2
2015 Grade 6 Mathematics Achievement Test Design Commentary.....	3
Sample Questions from the 2015 Grade 6 Mathematics Achievement Test.....	4

The 2015 Grade 6 Mathematics Achievement Test

This report provides teachers, school administrators, and the public with an overview of the performance of those students who wrote the 2015 Grade 6 Mathematics Achievement Test. It complements the detailed school and jurisdiction reports.

How Many Students Wrote the Test?

A total of 43 103 students wrote the 2015 Grade 6 Mathematics Achievement Test. The English form of the test was written by 39 731 students, and the French form of the test was written by 3 372 students.

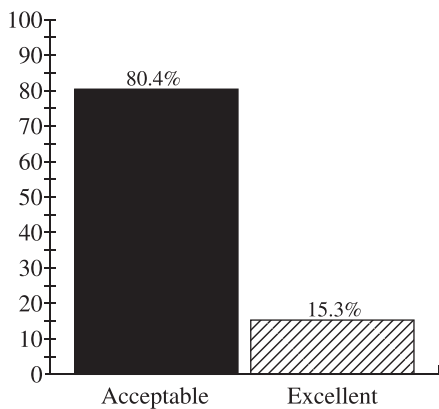
What Was the Test Like?

The 2015 Grade 6 Mathematics Achievement Test consisted of 40 multiple-choice and 10 numerical-response questions based on four strands: Number, Patterns and Relations, Shape and Space, and Statistics and Probability. In keeping with the intent of the 2007 Program of Studies, the questions on the test required students to apply their understanding of one or more mathematical concepts from within and/or across the four strands. As they solved the mathematical problems, students were expected to use the interrelated mathematical processes of Communication, Connections, Mental Mathematics and Estimation, Problem Solving, Reasoning, and Visualization. A detailed explanation of these mathematical processes is in the [Alberta K–9 Mathematics Program of Studies](#).

How Well Did Students Do?

The percentages of students meeting the acceptable standard and the standard of excellence in 2015 are shown in the graph below. Out of a total score of 50 on the test, the provincial average was 30.4/50 (60.8%). The results presented in this report are based on scores of students who wrote the English version of the test. Detailed provincial assessment results are provided in school and jurisdiction reports.

Percentage of Students Meeting the Acceptable Standard & Standard of Excellence (%)



■ 2015 Achievement Standards: The percentage of students in the province who met the acceptable standard on the 2015 Grade 6 Mathematics Achievement Test (based on those who wrote)

▨ 2015 Achievement Standards: The percentage of students in the province who met the standard of excellence on the 2015 Grade 6 Mathematics Achievement Test (based on those who wrote)

2015 Test Blueprint and Student Achievement

In 2015, 80.4% of students who wrote the English version of the test achieved the acceptable standard on the Grade 6 Mathematics Achievement Test, and 15.3% of students who wrote achieved the standard of excellence.

Out of a total score of 50 on the test, the provincial average was 30.4/50 (60.8%). The blueprint below shows how the questions on the test were classified and includes the average raw score in each category for all Grade 6 students who wrote this test.

Strand	Level of Complexity*			Provincial Student Achievement (Raw Score and Percentage)
	Low	Moderate	High	
Number	8	8	2	10.7/18 (59.4%)
Patterns and Relations	2	9	3	9.1/14 (65.0%)
Shape and Space	7	3	2	7.2/12 (60.0%)
Statistics and Probability	2	3	1	3.5/6 (58.3%)
Provincial Student Achievement (Average Raw Score and Percentage)	11.6/19 (61.1%)	14.5/23 (63.0%)	4.2/8 (52.5%)	Total Test Raw Score 30.4/50 (60.8%)

*Each question is categorized according to its level of complexity (low, moderate, or high). Descriptions of the levels of complexity are in the [2015–2016 Mathematics 6 Subject Bulletin](#).

2015 Grade 6 Mathematics Achievement Test Design Commentary

The 2015 Mathematics Provincial Achievement Test for Grade 6 was based on the 2007 Alberta K–9 Mathematics Program of Studies that was implemented in the 2011–2012 school year. The test blueprint provides information about new test design features (e.g., complexity) and modified test design features (e.g., item format and strand). Items now are selected not only in terms of the knowledge and skills that they assess, but also in terms of their complexity with regard to content and cognition. The introduction of item complexity will provide more information about the depth to which students have mastered particular learning outcomes, as well as provide one more control in the selection of test items to better ensure that tests are equivalent from year to year. Please refer to the [2015–2016 Mathematics 6 Subject Bulletin](#) for more-detailed information about item complexity.

The selection of test items within each of the four strands is now based on two primary factors: item difficulty and item complexity.

Item difficulty refers to the percentage of students who chose the correct answer. Items for which the correct answer is selected by more than 70% of the students are generally considered easy. Items for which the correct answer is selected by 50–70% of the students are about average in difficulty. Items for which the correct answer is selected by fewer than 50% of the students are regarded as challenging.

Item complexity refers to the cognitive and content demands associated with an item. The rationale for classifying items by their level of complexity is to focus on the expectations underlying the item and not the ability of the student. The cognitive demands that an item makes on a student (i.e., what an item requires the student to recall, understand, analyze, and do) are made with the assumption that the student is familiar with the basic concepts of the task.

The categories—low complexity, moderate complexity, and high complexity—form an ordered description of the demands an item may make on a student. For example, low-complexity items may require a student to solve a one-step problem. Moderate-complexity items may require multiple steps. High-complexity items go even further and require a student to analyze and synthesize information. It is therefore important to consider both the content being assessed by an item and the item complexity when making inferences about student performance on any one outcome. Although there is a logical and predictable relationship between item difficulty and item complexity (i.e., items that are of high complexity tend to be more challenging), there are exceptions.

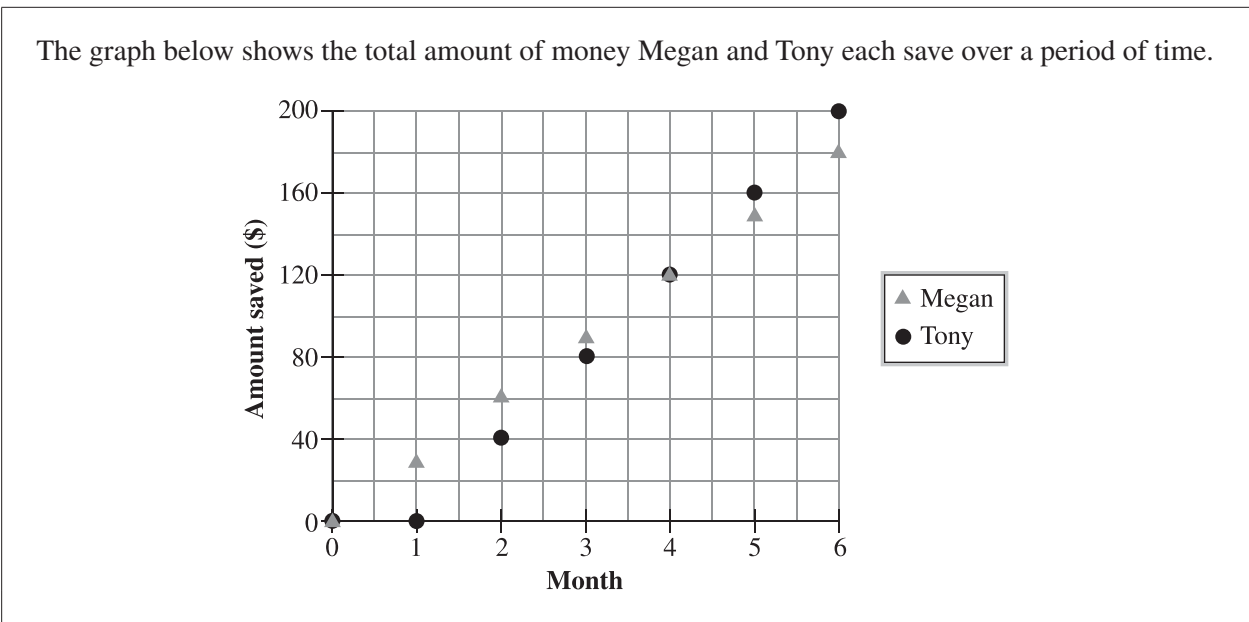
The following 10 items have been released to illustrate significant performance differences between 3 groups of students: those students who achieved the standard of excellence, those who achieved the acceptable standard, and those students who were below the acceptable standard. The purpose of these comparisons is to provide additional information that may be used for instructional purposes.

Sample Questions from the 2015 Grade 6 Mathematics Achievement Test

The following 10 items illustrate significant performance differences between students who obtained the standard of excellence, the acceptable standard, or below the acceptable standard.

Item #	Strand	Specific Outcome	Item Complexity	Item Description
1	PR	1	Moderate	Identify the statement that describes the relationship shown on a graph.

	% of Student Responses (*Correct)			
	A	B*	C	D
Students Achieving Standard of Excellence	1.1	95.4	2.6	0.9
Students Achieving Acceptable Standard	3.8	82.2	11.5	2.5
Students Below Acceptable Standard	10.7	53.9	28.8	6.6



- Which of the following statements about the graph shown above is correct?
 - Megan saves more money each month than Tony.
 - Tony saves more money than Megan by the fifth month.
 - Megan and Tony always have different amounts of money saved.
 - Tony and Megan save the same total amount of money in six months.

Item #	Strand	Specific Outcome	Item Complexity	Item Description
10	SS	3	High	Determine the height of a rectangular prism given the length and width of the prism and the number of identical cubes that can completely fill the prism. (Gr.5, SS.4)

	% of Student Responses (*Correct)			
	A	B*	C	D
Students Achieving Standard of Excellence	5.4	82.4	5.0	7.2
Students Achieving Acceptable Standard	11.0	48.8	25.9	13.9
Students Below Acceptable Standard	15.7	32.9	35.9	15.0

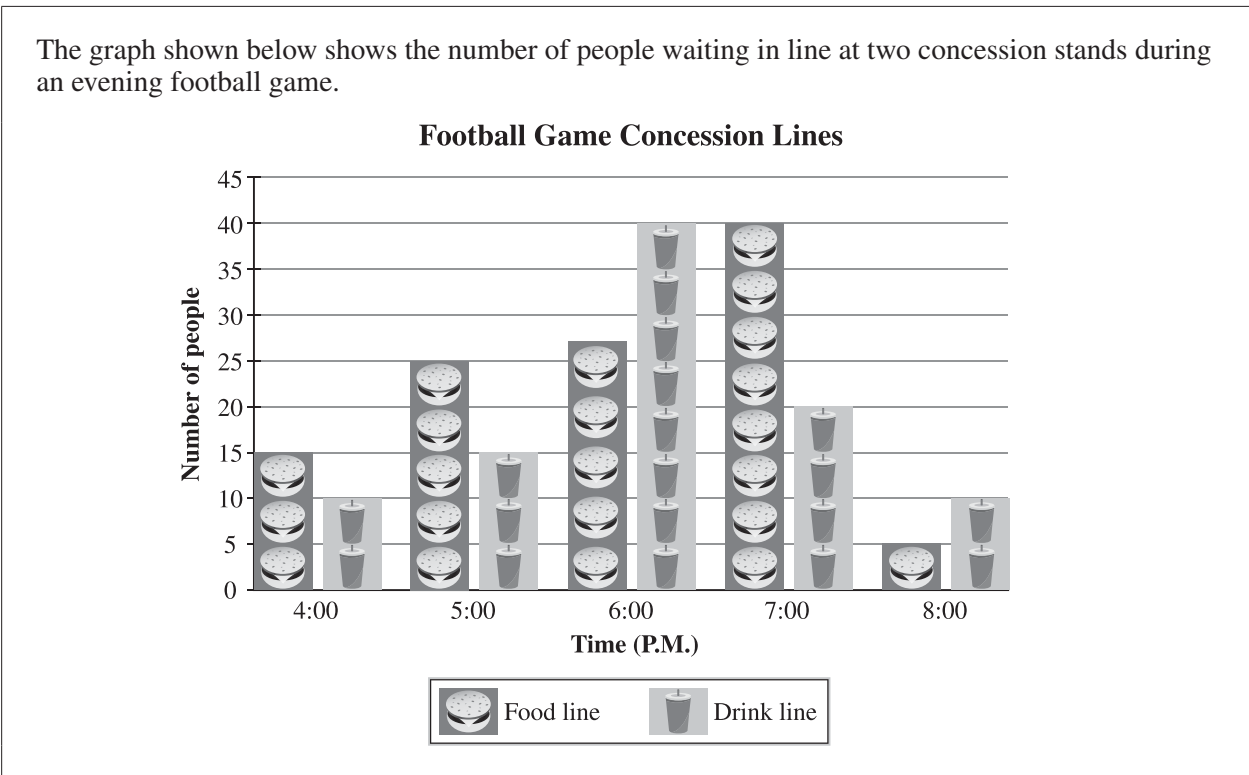
A set of 24 toy blocks completely fills the box shown below. Each toy block is a cube and has a side length of 6 cm.

10. What is the height of the box?

- A. 18 cm
- B. 24 cm
- C. 30 cm
- D. 36 cm

Item #	Strand	Specific Outcome	Item Complexity	Item Description
18	SP	3	Moderate	Read and interpret data from a double bar graph to draw a conclusion. (Gr.5, SP.2)

	% of Student Responses (*Correct)			
	A	B	C*	D
Students Achieving Standard of Excellence	0.3	0.3	97.1	2.3
Students Achieving Acceptable Standard	4.8	5.5	85.7	4.0
Students Below Acceptable Standard	13.4	28.6	50.8	6.3



18. At what time were there twice as many people waiting in the food line as there were waiting in the drink line?
- A. 5:00 P.M.
 - B. 6:00 P.M.
 - C. 7:00 P.M.
 - D. 8:00 P.M.

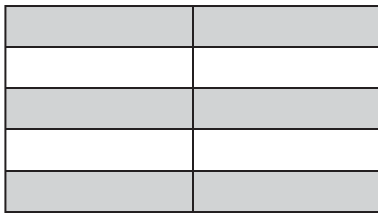
Item #	Strand	Specific Outcome	Item Complexity	Item Description
22	N	5	Low	Identify the 2-D design that has the same ratio of white shapes to grey shapes as a given 2-D design.

	% of Student Responses (*Correct)			
	A	B	C	D*
Students Achieving Standard of Excellence	1.7	0.4	3.9	94.0
Students Achieving Acceptable Standard	27.7	4.3	7.6	60.3
Students Below Acceptable Standard	53.6	14.7	10.7	19.6

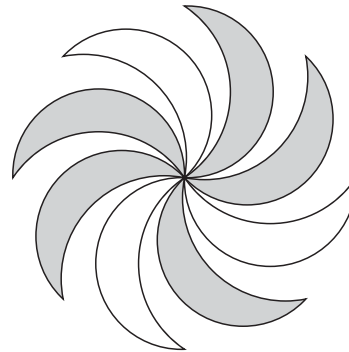
Ali used white circles and grey circles to create a design.

22. Which of the following designs has the same ratio of white shapes to grey shapes as Ali's design?

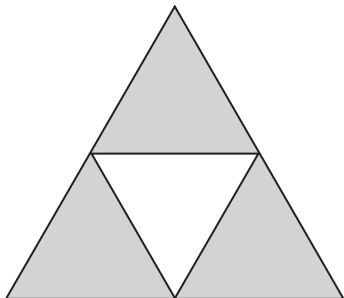
A.



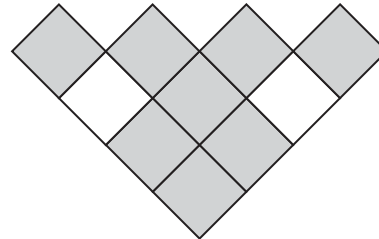
B.



C.

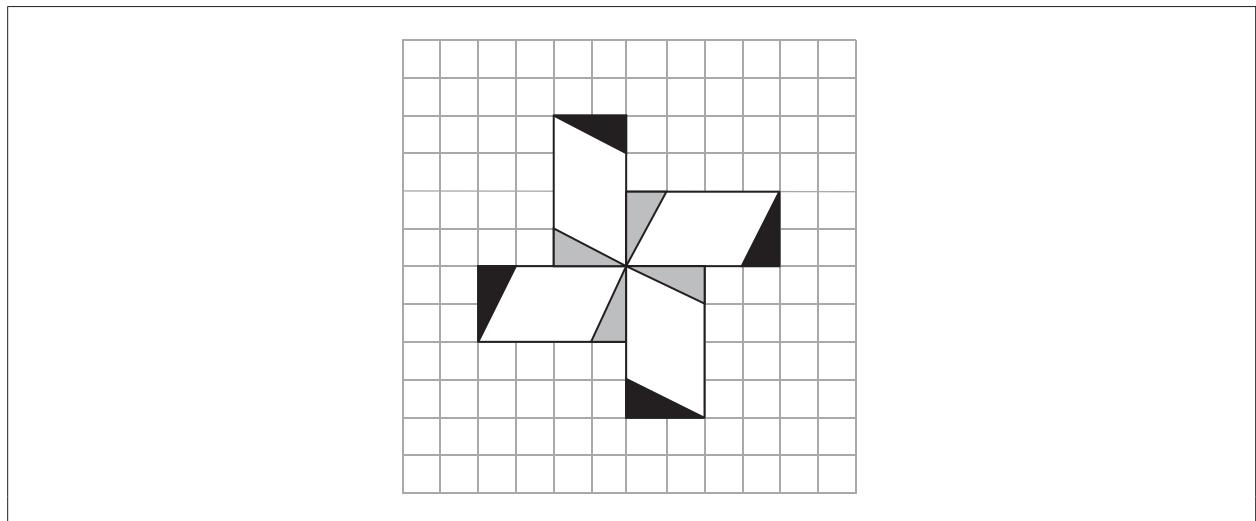


D.



Item #	Strand	Specific Outcome	Item Complexity	Item Description
25	SS	7	High	Analyze a given design to determine the 2-D shape that undergoes successive transformations to create the design.

	% of Student Responses (*Correct)			
	A	B	C	D*
Students Achieving Standard of Excellence	9.1	1.2	5.3	84.4
Students Achieving Acceptable Standard	27.2	9.5	17.4	45.5
Students Below Acceptable Standard	27.4	23.7	26.9	20.0

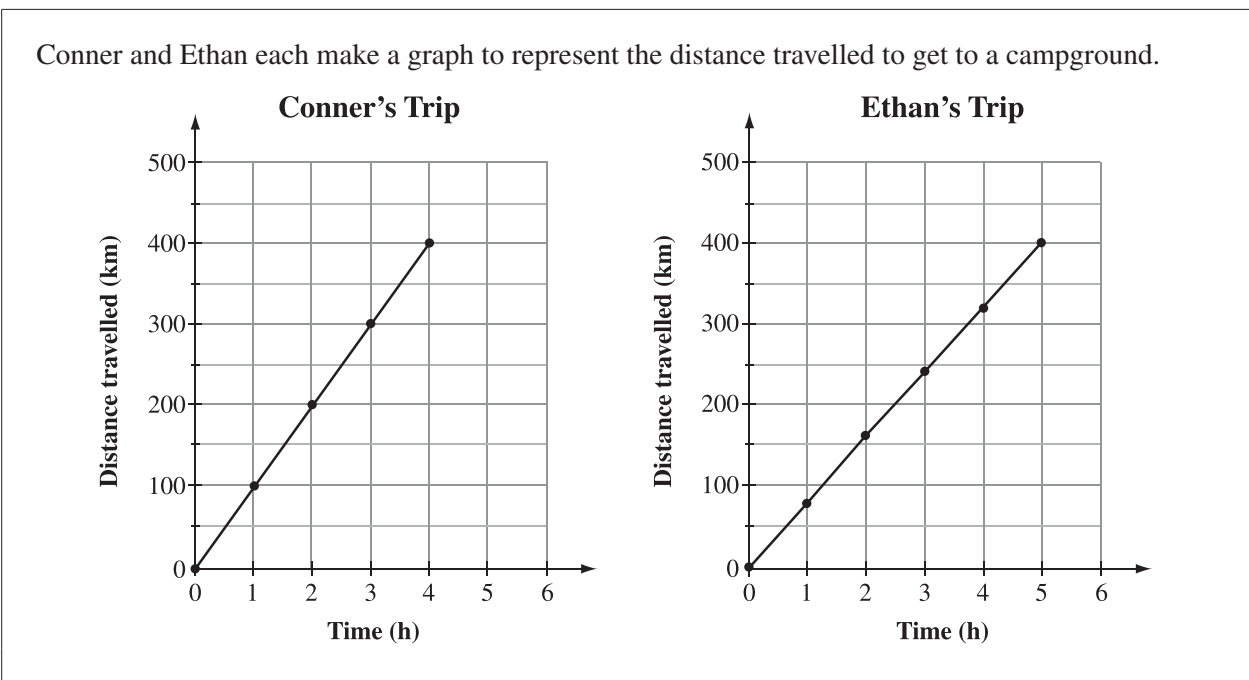


25. Which of the following rows correctly identifies the shape and transformations used to create the design shown above?

	Shape	Transformations
A.		Successive 90° clockwise rotations around point Z
B.		Successive 180° clockwise rotations around point Z
C.		Successive 180° clockwise rotations around point Z
D.		Successive 90° clockwise rotations around point Z

Item #	Strand	Specific Outcome	Item Complexity	Item Description
30	SP	1	Moderate	Compare and interpret two line graphs to draw a conclusion.

	% of Student Responses (*Correct)			
	A*	B	C	D
Students Achieving Standard of Excellence	81.9	3.2	13.2	1.7
Students Achieving Acceptable Standard	53.4	15.6	23.9	6.9
Students Below Acceptable Standard	28.0	34.7	20.7	13.7



30. After 2 hours, who was closer to the campground and by how many kilometres?

- A. Conner was closer by 40 km.
- B. Ethan was closer by 40 km.
- C. Conner was closer by 60 km.
- D. Ethan was closer by 60 km.

Item #	Strand	Specific Outcome	Item Complexity	Item Description
36	N	9	Moderate	Given an incomplete equation, identify the missing operations to complete the equation.

	% of Student Responses (*Correct)			
	A	B	C*	D
Students Achieving Standard of Excellence	4.4	1.8	91.3	2.4
Students Achieving Acceptable Standard	19.7	12.8	52.4	14.1
Students Below Acceptable Standard	27.1	22.6	28.0	18.1

An incomplete math equation is shown below.

$$24 \square (6 + 2 \times 3) \bigcirc 10 = 12$$

36. Which of the following rows identifies the operation symbols that accurately complete the equation above?

Row	\square	\bigcirc
A.	–	+
B.	–	÷
C.	÷	+
D.	÷	–

Item #	Strand	Specific Outcome	Item Complexity	Item Description
40	PR	5	High	Apply knowledge of preservation of equality to create and solve an equation that represents a given context.

	% of Student Responses (*Correct)			
	A	B*	C	D
Students Achieving Standard of Excellence	1.0	95.2	1.1	2.2
Students Achieving Acceptable Standard	13.6	62.3	12.0	9.7
Students Below Acceptable Standard	25.5	25.8	24.2	19.4

Five children and their father are sitting on a teeter totter that is balanced as shown below. The mass of each child sitting on the left side is 36 kg. The mass of each child sitting on the right side is $\frac{1}{2}$ the mass of one child on the left side.



40. What is the mass of the father?

- A. 60 kg
- B. 72 kg
- C. 84 kg
- D. 90 kg

Item #	Strand	Specific Outcome	Item Complexity	Item Description
NR 6	N	6	Moderate	Given a list of ingredients and their quantities for making a snack, determine what percentage of the snack is made of just two of the ingredients.

	% of Student Responses	
	Correct	Incorrect
Students Achieving Standard of Excellence	93.3	6.7
Students Achieving Acceptable Standard	67.8	32.2
Students Below Acceptable Standard	20.4	79.6

The following ingredients are mixed together to create a snack.



Numerical Response

6. What percentage of the snack is made of pretzels and mixed nuts?


Answer: _____ %

(Record your answer in the numerical-response section on the answer sheet.)


Item #	Strand	Specific Outcome	Item Complexity	Item Description
NR 7	N	7	Low	Place a set of integers on a number line.

	% of Student Responses	
	Correct	Incorrect
Students Achieving Standard of Excellence	92.8	7.2
Students Achieving Acceptable Standard	73.4	26.6
Students Below Acceptable Standard	22.6	79.4


The four sleeping bags shown below have different temperature ratings.




Bag A: $-7\text{ }^{\circ}\text{C}$



Bag B: $3\text{ }^{\circ}\text{C}$

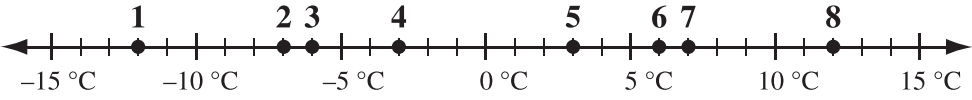


Bag C: $-12\text{ }^{\circ}\text{C}$



Bag D: $-6\text{ }^{\circ}\text{C}$

Four of the eight numbered locations on the number line below represent the temperature ratings of the sleeping bags.



Numerical Response

7. Match each sleeping bag's temperature rating to the corresponding numbered location shown on the number line.

Bag A's location is _____. (Record in the **first** column)

Bag B's location is _____. (Record in the **second** column)

Bag C's location is _____. (Record in the **third** column)

Bag D's location is _____. (Record in the **fourth** column)

(Record all **four digits** of your answer in the numerical-response section on the answer sheet.)

Achievement Testing Program Support Documents

The Alberta Education website contains several documents that provide valuable information about various aspects of the achievement testing program. To access these documents, go to the Alberta Education website at education.alberta.ca. Click on one of the specific links to access the following documents.

Achievement Testing Program *General Information Bulletin*

The [*General Information Bulletin*](#) is a compilation of several documents produced by Alberta Education and is intended to provide superintendents, principals, and teachers with easy access to information about all aspects of the achievement testing program. Sections in the bulletin contain information pertaining to schedules and significant dates; security and test rules; test administration directives, guidelines, and procedures; calculator and computer policies; test accommodations; test marking and results; field testing; resources and web documents; forms and samples; and Provincial Assessment Sector contacts.

Subject Bulletins

At the beginning of each school year, subject bulletins are posted on the Alberta Education website for all achievement test subjects for grades 6 and 9. Each bulletin provides descriptions of assessment standards, test design and blueprinting, and scoring guides (where applicable) as well as suggestions for preparing students to write the tests and information about how teachers can participate in test development activities.

Examples of the Standards for Students' Writing

For achievement tests in grades 6 and 9 English Language Arts and Français/French Language Arts, writing samples have been designed to be used by teachers and students to enhance students' writing and to assess this writing relative to the standards inherent in the scoring guides for the achievement tests. The exemplars documents contain sample responses with scoring rationales that relate student work to the scoring categories and scoring criteria.

Previous Achievement Tests and Answer Keys

All January achievement tests (parts A and B) for Grade 9 semestered students are secured and must be returned to Alberta Education. All May/June achievement tests are secured except Part A of grades 6 and 9 English Language Arts and Français/French Language Arts. Unused or extra copies of only these Part A tests may be kept at the school after administration. Teachers may also use the released items and/or tests that are posted on the Alberta Education website.

Parent Guides

Each school year, versions of the [*Alberta Provincial Achievement Testing Parent Guide*](#) for grades 6 and 9 are posted on the Alberta Education website. Each guide presents answers to frequently asked questions about the achievement testing program as well as descriptions of and sample questions for each achievement test subject.

Involvement of Teachers

Teachers of grades 6 and 9 are encouraged to take part in activities related to the achievement testing program. These activities include item development, test validation, field testing, and marking. In addition, arrangements can be made through the Alberta Regional Professional Development Consortia for teacher in-service workshops on topics such as Interpreting Achievement Test Results to Improve Student Learning.