Grade 9
Assessment Highlights
Mathematics

Alberta Provincial Achievement Testing 2018–2019

Alberta

This document was written primarily for:

Students		
Teachers	✓	Grade 9 Mathematics
Administrators	✓	
Parents		
General Audience		
Others		

Contents

You can find provincial achievement test-related materials on the Alberta Education website.

Additional topics of interest are found in the *General Information Bulletin*.

This document contains assessment highlights from the *2019 Grade 9 Mathematics Provincial Achievement Test*.

Assessment Highlights provides information about the overall test, the test blueprint, and student performance on the provincial achievement test that was administered in 2019. Also provided is information on student performance at the acceptable standard and the standard of excellence on selected items from the *2019 Grade 9 Mathematics Provincial Achievement Test*. This information is intended for teachers and is best used in conjunction with multi-year and detailed school reports that are available to schools via the Stakeholder File Exchange (SFX). *Assessment Highlights* for all provincial achievement test subjects and grades are posted on the Alberta Education website every year in the fall.

The examination statistics that are included in this document represent both French and English writers. If you would like to obtain English-only statistics or French-only statistics that apply to your school, please refer to your detailed reports, which are available on the Stakeholder File Exchange (SFX).

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The *2019 Grade 9 Mathematics Provincial Achievement Test*

This report provides teachers, school administrators, and the public with an overview of the performance of those students who wrote the *2019 Grade 9 Mathematics Provincial Achievement Test*. It complements the detailed school and jurisdiction reports.

How many students wrote the test?

A total of 41 612 students in Alberta wrote the *2019 Grade 9 Mathematics Provincial Achievement Test*.

What was the test like?

The *2019 Grade 9 Mathematics Provincial Achievement Test* consisted of two parts: *Part A* and *Part B*.

Part A consisted of 20 numerical-response questions and represented 20% of the final overall test score. The test assessed students' foundational skills and fluency in mental math, estimation, algebra, square roots, exponent laws, and arithmetic operations on rational numbers without the use of calculators.

Part B consisted of 32 multiple-choice questions and 8 numerical-response questions and represented 80% of the final overall test score. The test assessed students' ability to recall concepts and principles and to apply reasoning skills to solve problems. The test required students to apply their understanding of one or more mathematical concepts from within and/or across the four strands: *Number*, *Patterns and Relations*, *Shape and Space*, and *Statistics and Probability*.

How well did students do?

The percentages of students meeting the acceptable standard and the standard of excellence in 2019 are shown in the graph below. The examination statistics that are included in this document represent both French and English writers. If you would like to obtain English-only or French-only statistics that apply to your school, please refer to the detailed reports that are available on the Stakeholder File Exchange (SFX).

**Percentage of Students Meeting the Provincial Standards
(French and English combined)**

	2018 Total Test	2019 Total Test	2018 Part A	2019 Part A	2018 Part B	2019 Part B
Excellence	16.9%	21.4%	17.8%	21.9%	19.2%	24.0%
Acceptable	66.7%	67.4%	50.5%	51.3%	72.5%	74.2%
Below	33.3%	32.6%	49.5%	48.7%	27.5%	25.8%
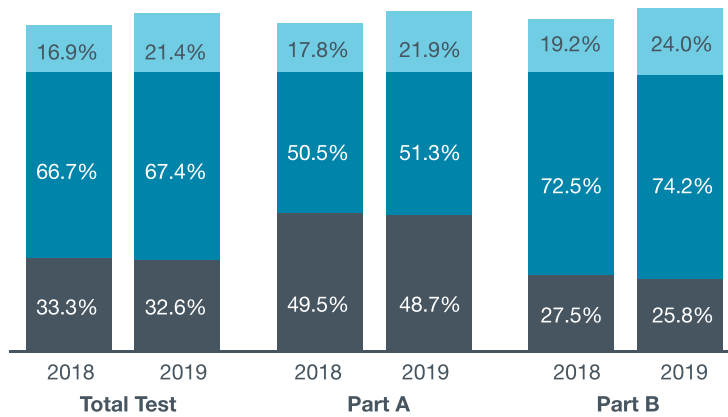
The percentage of students in the province who met the standard of excellence on the *2019 Grade 9 Mathematics Provincial Achievement Test* (based on those who wrote)

The percentage of students in the province who met the acceptable standard on the *2019 Grade 9 Mathematics Provincial Achievement Test* (based on those who wrote). **Note**: The percentage of students who met the acceptable standard includes the percentage of students who met the standard of excellence.

The percentage of students in the province who were below the acceptable standard on the *2019 Grade 9 Mathematics Provincial Achievement Test* (based on those who wrote)

2019 Test Blueprint and Student Achievement

In 2019, 67.4% of students who wrote the *Grade 9 Mathematics Provincial Achievement Test* achieved the acceptable standard, and 21.4% of students who wrote achieved the standard of excellence. There was a very strong positive correlation between student performance on *Part A* and performance on *Part B*. This suggests a strong relationship between routine algebraic operations and problem solving. Generally speaking, students who performed well on *Part A* also performed well on *Part B*, and vice versa.

The blueprints below show the reporting categories by which 2019 summary data are reported to schools and school authorities. The blueprints also show the provincial average of student achievement by both raw score and percentage.

Part A Test Blueprint

Content Reporting Category	Number (Percentage) of Questions	Provincial Student Achievement (Average Raw Score and Percentage)
Rational Numbers	7 (35%)	3.3/7 (47.1%)
Powers and Exponent Laws	3 (15%)	1.6/3 (53.3%)
Square Roots of Perfect and Non-perfect Squares	4 (20%)	2.2/4 (55.0%)
Algebraic Expressions, Equations, and Inequalities	6 (30%)	2.5/6 (41.7%)
Number (Percentage) of Questions	(100%)	9.8/20 (49.0%)

Part B Test Blueprint

Program of Study Strand	Level of Complexity*			Provincial Student Achievement (Average Raw Score and Percentage)
	Low	Moderate	High	
Number	1	5	0	3.4/6 (56.7%)
Patterns and Relations	6	14	0	12.0/20 (60.0%)
Shape and Space	4	6	1	6.9/11 (62.7%)
Statistics and Probability	1	2	0	2.3/3 (76.7%)
Provincial Student Achievement (Average Raw Score and Percentage)	7.7/12 (64.2%)	16.2/27 (60.0%)	0.6/1 (60.0%)	Raw Score 24.5/40 (61.3%)

*Each question is categorized according to its level of complexity (low, moderate, or high). Descriptions of the levels of complexity can be found in the *2019-2020 Mathematics 9 Subject Bulletin.*

Sample Questions from the *2019 Grade 9 Mathematics Provincial Achievement Test—Part A*

The following 11 items illustrate substantial performance differences between students who performed at the standard of excellence, those at the acceptable standard, and those below the acceptable standard.

Reporting Categories: Rational Numbers (RN); Powers and Exponent Laws (PE); Square Roots of Perfect and Non-perfect Squares (SR); Algebraic Expressions, Equations, and Inequalities (AE)

Item	Key	% of Students with Correct Solution	Number of Unique Errors	Content Reporting Category	Item Description
2	9	43.5	1 900	PE	Apply the exponent laws to evaluate an expression (Gr.9, N.1)

Standard Achieved by Students on *Part A*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (*n* = 9 130)	85.4	136	1 (426)	3 (176)	81 (168)
Students Achieving Acceptable Standard* (*n* = 12 217)	44.7	1 004	1 (1 988)	3 (1 155)	81 (1 101)
Students Below Acceptable Standard (*n* = 20 013)	13.6	1 452	1 (849)	3 (777)	81 (425)

*Includes those students who achieved the acceptable standard but not the standard of excellence

2. Simplify, and then evaluate $\dfrac{(3^2)^4}{3(3)(3^4)}$.

   Answer: _____

Common correct response:

$$(3^2)(3^4)$$
$$(3^6)$$
$$\frac{3^8}{3^6} = 3^2 = 9$$

Common incorrect responses:

$$\frac{53}{9(81)}$$
$$\frac{53}{53}$$
Answer: __1/1__

4
$3\times3 + 3\times3$
$9 + 7\times3$
$a + 3$
$27 + 81$

$3+3 = 9$
4
$9 + 9\times9\times9$
$9 + 9\times9$
81×9

$$9\overline{)972} \; {}^{118} = 81$$

---

2. Simplify, and then evaluate $\dfrac{(3^2)^4}{3(3)(3^4)}$: $\dfrac{3^8}{3^8 \cdot 3}$

3^2

Answer: __3^1__

$$\frac{6561}{81}$$

$$\frac{3^?}{9^1(3^4)} =$$

$81 \quad + \quad 81$
$9 \times 9 \times 9 \times 9$
$3\times3\times3\times3 \times 3\times3\times3\times3$
$9 \times 3\times3\times3\times3\times3\times3$
$27 \times 3\times3 \times3\times3\times3$

$$81\overline{)6561}$$

81
81
81
6440
6561

Answer: __81__

$3\times3\times3\times3$
9×9
81

Item	Key	% of Students with Correct Solution	Number of Unique Errors	Content Reporting Category	Item Description
3	−1	61.7	342	AE	Solve a linear equation symbolically (Gr.9, PR.3)

Standard Achieved by Students on *Part A*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (n = 9 130)	97.5	18	1 (96)	−3 (24)	−0.5 (24)
Students Achieving Acceptable Standard* (n = 12 217)	72.6	127	1 (1 979)	3 (522)	−2 (386)
Students Below Acceptable Standard (n = 20 013)	22.2	294	1 (778)	3 (1 539)	2 (1 068)

*Includes those students who achieved the acceptable standard but not the standard of excellence

3. Solve for x in the following equation.

$x + 1 = 2x + 2$

Answer: $x =$ _____

Common correct response:

$$-\underset{-x}{x} + 1 = \underset{-x}{2x} + 2 \rightarrow \underset{-2}{+1} = x + \underset{-2}{2} \rightarrow -1 = x$$

Answer: $x =$ ___−1___

Common incorrect responses:

$$X + 1 = 2x + 2$$
$$\underset{-2}{X} = \underset{-2x}{2x+3} \quad \underset{-2}{-2} \qquad x = 1$$

$$|x + 1 = 2x + 2$$
$$-|x \qquad -|x$$

$$|= 2x + 2$$
$$\underset{-2}{} \qquad \underset{-2}{}$$
$$-| = 2x$$
$$\div 2 \div 2$$
$$-2 = x$$

$$\overset{2}{x} + 1 = \overset{4}{2x} + 2$$

$$\frac{X+1}{2} = \frac{2}{2}x + 2$$

$$\underset{-x}{1x} + 1 = 2x + \underset{-2}{2}$$
$$2 \cdot x \div 2 = 1 \cdot 2$$

$$1 = 1x$$

$$x = 2$$

Item	Key	% of Students with Correct Solution	Number of Unique Errors	Content Reporting Category	Item Description
4	3	62.6	1 056	RN	Solve a problem involving the addition of rational numbers in fraction form (Gr.9, N.3; Gr.7, N.5)

Standard Achieved by Students on *Part A*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (*n* = 9 130)	94.2	85	2 (71)	18 (53)	4 (35)
Students Achieving Acceptable Standard* (*n* = 12 217)	67.6	513	18/6 (446)	2 (404)	18 (252)
Students Below Acceptable Standard (*n* = 20 013)	20.7	938	7/11 (696)	18/6 (463)	1 (248)

*Includes those students who achieved the acceptable standard but not the standard of excellence

4. In simplest form, what is the value of $\dfrac{1}{6} + \dfrac{1}{3} + 2\dfrac{1}{2}$?

Answer: _____

Common correct responses:

$$\frac{1}{6} + \frac{1}{3}_{\times 2} + \frac{5}{2}_{\times 3}$$

$$\frac{1}{6} + \frac{2}{6} + \frac{15}{6} = \frac{18}{6} = 3$$

$$\frac{1}{6} + \frac{2}{6} + 2\frac{1}{2} \rightarrow \frac{3}{6} + 2\frac{1}{2}$$

$$\downarrow$$

$$3 \leftarrow \frac{1}{2} + 2\frac{1}{2}$$

Common incorrect responses:

4. In simplest form, what is the value of $\frac{1}{6} + \frac{1}{3} + 2\frac{1}{2}$?

$$\frac{2}{6} \quad \frac{23}{6}$$

$$\frac{1}{6} + \frac{2}{6} + 2\frac{3}{6}$$

Answer: $\dfrac{18}{6}$

$$2 + 2 + 1 = 5 \qquad \frac{1}{6} + \frac{2}{6} + \frac{5}{2}_{\times 3}$$

4. In simplest form, what is the value of $\frac{1}{6} + \frac{1}{3} + 2\frac{1}{2}$?

$$\frac{18 \div 6}{6 \div 6} \quad \frac{2}{1} \quad \frac{1}{6} + \frac{2}{6} + \frac{15}{6}$$

$$\frac{25}{11}$$

$$\frac{2}{9} + 2\frac{1}{2} = \frac{2}{9} + \frac{5}{2} = \frac{7}{11}$$

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Item	Key	% of Students with Correct Solution	Number of Unique Errors	Content Reporting Category	Item Description
9	3.6	21.2	1 456	RN	Apply the order of operations to evaluate a given expression with exponents (Gr.9, N.4)

Standard Achieved by Students on *Part A*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (n = 9 130)	58.0	300	10 (608)	1.8 (407)	2.6 (289)
Students Achieving Acceptable Standard* (n = 12 217)	17.3	851	10 (2 416)	5 (1 263)	2.6 (385)
Students Below Acceptable Standard (n = 20 013)	2.2	1 190	1 (1 097)	10 (948)	5 (472)

*Includes those students who achieved the acceptable standard but not the standard of excellence

9. Evaluate $\dfrac{(2 + 2 \times 5)^2}{2(4 \times 5)}$ and express your answer as a decimal.

   Answer: _____

Common correct response:

9. Evaluate $\dfrac{(2+\overset{10}{2}\times 5)^2}{2(4\times 5)}$ and express your answer as a decimal.

$\dfrac{(12)^2}{40}$ $\dfrac{144}{40}=$

$\begin{array}{r} 3.6 \\ 40\overline{\smash{)}144.0} \\ -120\downarrow \\ \hline 240 \end{array}$

40,80,120,160,200
240

Answer: $\underline{\ 3.6\ }$

Common incorrect responses:

9. Evaluate $\dfrac{\overset{4\ +\ 4\ \times\ 25}{(2+2\times 5)^2}}{2(4\times 5)}$ and express your answer as a decimal.

$2(20)$

$\dfrac{4+100}{40}$ $:$ $\dfrac{104}{40}=\dfrac{52}{20}=\dfrac{26}{10}=\dfrac{13}{5}$

$\overset{50}{}$ $\overset{25}{2}$ $\overset{13}{7}$ 13

$\begin{array}{r} 02.6 \\ 5\overline{\smash{)}13.0} \\ 0\downarrow \\ \hline 13 \\ 10\downarrow \\ \hline 30 \end{array}$

Answer: $\underline{\ 2.6\ }$

___

20×20 $\dfrac{20^2}{40}$ $\dfrac{40}{40}$

Answer: $\underline{\ \ 1\ \ }$

___

$\dfrac{(2^2+2^2\times 5^2)}{2(4\times 5)} \rightarrow \dfrac{(8\times 25)}{2\times 20} \rightarrow \dfrac{2\times 4\times 5\times 5}{2\times 4\times 5}$

Answer: $\underline{\ 5\ }$

Item	Key	% of Students with Correct Solution	Number of Unique Errors	Content Reporting Category	Item Description
10	2314	32.1	442	RN	Order given rational numbers involving square roots, fractions, powers, and decimals from the smallest value to the greatest value (Gr.9, N.3)

Standard Achieved by Students on *Part A*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (*n* = 9 130)	75.2	37	1243 (1 024)	1324 (467)	3241 (152)
Students Achieving Acceptable Standard* (*n* = 12 217)	29.7	114	1243 (4 752)	1324 (2 116)	4213 (814)
Students Below Acceptable Standard (*n* = 20 013)	6.8	394	1243 (1 449)	4312 (1 157)	1324 (931)

*Includes those students who achieved the acceptable standard but not the standard of excellence

10. Order the rational numbers listed below from **smallest** value to **greatest** value, using the numbers 1, 2, 3, and 4.

Use the number 1 to represent the **smallest** value.
Use the number 4 to represent the **greatest** value.

Order: _____ _____ _____ _____

Rational Number: $\sqrt{\dfrac{9}{25}}$ $\qquad \dfrac{3}{4} \qquad (0.7)^2 \qquad 0.7\overline{5}$

Common correct response:

Order:	2	3	1	4
Rational Number:	$\sqrt{\dfrac{9}{25}} = \dfrac{3}{5} = 0.6$	$\dfrac{3}{4}$ 0.75	$(0.7)^2$ 0.49	$0.7\overline{5}$

Common incorrect responses:

Order:	1	2	4	3
Rational Number:	$\sqrt{\dfrac{9}{25}}$ $\dfrac{3}{5}$ low	$\dfrac{3}{4}$ 75	$(0.7)^2$ 1.4	$0.7\overline{5}$ 0.7555

$$\begin{array}{l} \sqrt{9}=3 \quad \dfrac{3}{5}=0.6 \\ \sqrt{25}=5 \end{array}$$

$$\dfrac{3}{4}=0.75$$

$$0.7^2 = 7\times7=49$$

$$0.49$$

Order:	1	3	2	4
Rational Number:	$\sqrt{\dfrac{9}{25}}$	$\dfrac{3}{4}$	$(0.7)^2$	$0.7\overline{5}$

$$3\overline{)5}^{\,1.6} \\ \underline{3} \\ 20$$

Order:	4	2	1	3
Rational Number:	$\sqrt{\dfrac{9}{25}}$ $\dfrac{3}{5}$	$\dfrac{3}{4}$ 0.75	$(0.7)^2$ 0.49	$0.7\overline{5}$

Item	Key	% of Students with Correct Solution	Number of Unique Errors	Content Reporting Category	Item Description
11	4	57.7	1 339	SR	Determine the sum of two perfect squares that are given in fraction form (Gr.9, N.5)

Standard Achieved by Students on *Part A*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (n = 9 130)	93.8	85	2 (160)	8 (65)	1 (36)
Students Achieving Acceptable Standard* (n = 12 217)	64.7	539	8 (1 150)	2 (873)	6 (279)
Students Below Acceptable Standard (n = 20 013)	18.4	1 196	8 (1 667)	2 (486)	7 (256)

*Includes those students who achieved the acceptable standard but not the standard of excellence

11. What is the value of $\sqrt{\dfrac{100}{25}} + \sqrt{\dfrac{36}{9}}$?

    Answer: _____

Common correct response:

$$\frac{10^{\times 3}}{5_{\times 3}} + \frac{6^{\times 5}}{3_{\times 5}} \qquad \frac{30}{15} + \frac{30}{15}$$

$$\frac{60 \div 3}{15 \div 3} = \frac{20}{5}$$

Common incorrect responses:

$$\frac{10}{5} + \frac{6}{3} \rightarrow \frac{2}{1} + \frac{2}{1} = \frac{4}{2} = \frac{2}{1}$$

Answer: ___2___

$$\begin{array}{c} 36 \\ -27 \end{array}$$

$$\frac{16}{7}$$

$$4 + 4$$

3

Answer: ___8___

Item	Key	% of Students with Correct Solution	Number of Unique Errors	Content Reporting Category	Item Description
13	−2.5	35.9	977	AE	Evaluate a single variable expression when given the value of the variable (Gr.9, PR.3)

Standard Achieved by Students on *Part A*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (*n* = 9 130)	78.1	109	−3.5 (816)	2.5 (326)	3.5 (108)
Students Achieving Acceptable Standard* (*n* = 12 217)	37.2	461	−3.5 (2 904)	−1 (1 496)	2.5 (990)
Students Below Acceptable Standard (*n* = 20 013)	5.8	875	−1 (1 399)	−3.5 (714)	2 (366)

*Includes those students who achieved the acceptable standard but not the standard of excellence

13. If $x = -3,$ evaluate $\left(\dfrac{x+8}{10} + x \right)$ to the nearest tenth.

    Answer: _____

Common correct response:

$$\frac{-3+8}{10} + -3 \rightarrow \frac{5}{10} + -3 \rightarrow 0.5 + -3 = -\cancel{0}.5$$

Answer: -2.5

$$\begin{array}{r} 2\cancel{8}.\cancel{1}00 \\ -0.50 \\ \hline 2.50 \end{array}$$

Common incorrect responses:

$$\frac{-3+8}{10} + -3 \qquad -3\frac{5}{10} \qquad -3\frac{1}{2}$$

$$\left(\frac{-3+8}{10}^{5} -3\right) \qquad \frac{5}{10} -3$$

$$0.5 - 3 = -3.5$$

Answer: -3.5

$$\frac{-3+8}{10} + -3 \qquad \frac{-3}{+8}$$
$$\frac{5}{10} + -3 \qquad \frac{}{5}$$
$$\qquad 0 + 3 \qquad 1$$

Answer: 1

Item	Key	% of Students with Correct Solution	Number of Unique Errors	Content Reporting Category	Item Description
14	6	63.2	406	SR	Determine how many perfect squares there are between two given whole numbers that are not perfect squares (Gr.9, N.5)

Standard Achieved by Students on *Part A*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (*n* = 9 130)	95.1	33	7 (184)	5 (148)	8 (17)
Students Achieving Acceptable Standard* (*n* = 12 217)	73.2	141	7 (1 394)	5 (918)	8 (261)
Students Below Acceptable Standard (*n* = 20 013)	27.6	376	7 (1 187)	5 (882)	4 (711)

*Includes those students who achieved the acceptable standard but not the standard of excellence

14. How many whole numbers between 39 and 160 are perfect squares?

   Answer: _____

Common correct response:

49, 64, 81, 100, 121, 144

Answer: _____6_____

Common incorrect responses:

Answer: 49, 64, 81, 100, 121, 136, 149

49   144
 ↓   ↓
 7   12

Answer: _____5_____

Item	Key	% of Students with Correct Solution	Number of Unique Errors	Content Reporting Category	Item Description
18	34	41.0	1 338	SR	Determine which two whole numbers are nearest in value to a given square root (Gr.9, N.5)

Standard Achieved by Students on *Part A*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (*n* = 9 130)	87.3	79	12 (197)	24 (147)	1314 (112)
Students Achieving Acceptable Standard* (*n* = 12 217)	43.8	489	1314 (902)	24 (702)	311 (556)
Students Below Acceptable Standard (*n* = 20 013)	6.2	1 203	113 (411)	311 (401)	1012 (329)

*Includes those students who achieved the acceptable standard but not the standard of excellence

Use the following information to answer question 18.

P and Q represent the two whole numbers closest to $\sqrt{\dfrac{121}{9}}$.
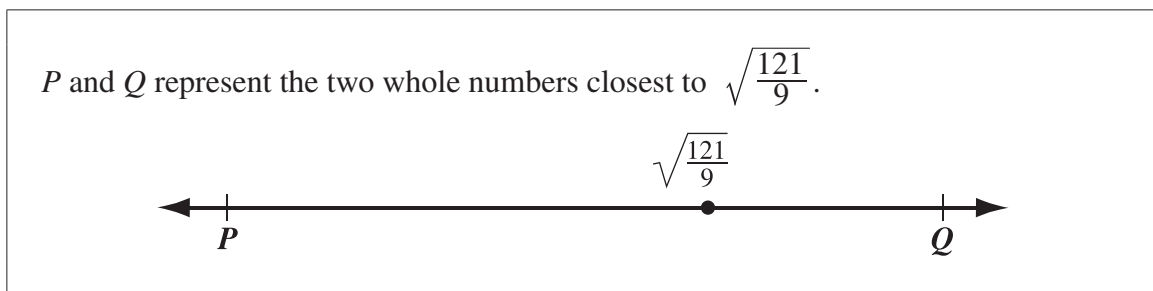
18. Determine the values of *P* and *Q*.

Answer: _____ and _____

                     P   **Q**

            (Record in the   (Record in the
            first box)   **second** box)

Common correct response:

Use the following information to answer question 18.

P and Q represent the two whole numbers closest to $\sqrt{\frac{121}{9}}$.

$$3 \quad\quad \sqrt{\frac{121}{9}} \; \frac{11}{3} \quad\quad 4$$
$$P \quad\quad\quad 3\frac{2}{3} \quad\quad Q$$
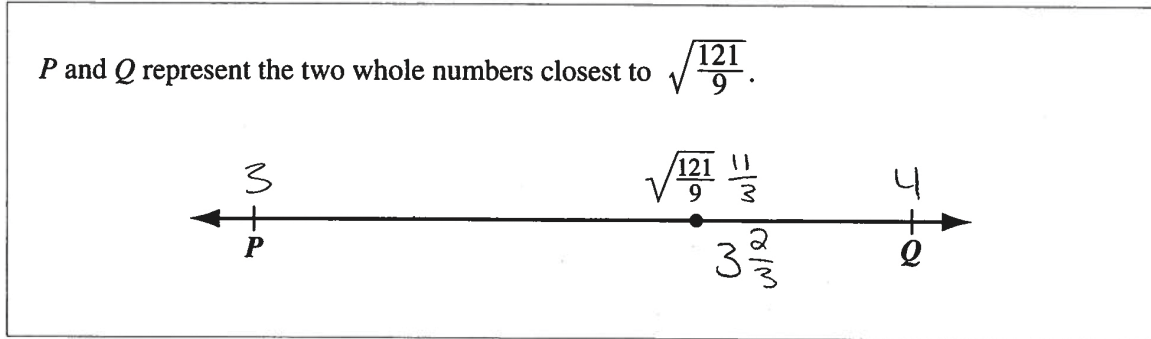
18. Determine the values of P and Q.

Answer: ___3___ and ___4___
         P   Q

Common incorrect responses:

18. Determine the values of P and Q.

Answer: __1 3__ and __1 4__
         P   Q

$$99 = 11$$
$$108 = 12$$
$$117 = 13$$
$$= 14$$

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18. Determine the values of P and Q.

$$10 \times 10 = 100$$

$$12\sqrt{2} = 144$$

$$\frac{121}{9} = 12\frac{4}{9}$$

Answer: __10__ and __12__
         P   Q
(Record in the   (Record in the
first box)   second box)

Item	Key	% of Students with Correct Solution	Number of Unique Errors	Content Reporting Category	Item Description
19	−27	48.8	622	AE	Solve a linear equation symbolically that includes fractions (Gr.9, PR.3)

Standard Achieved by Students on *Part A*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (*n* = 9 130)	88.8	61	−13 (376)	−3 (146)	15 (93)
Students Achieving Acceptable Standard* (*n* = 12 217)	55.1	289	−13 (1 213)	−3 (1 086)	−9 (808)
Students Below Acceptable Standard (*n* = 20 013)	13.3	523	−9 (818)	−3 (633)	3 (469)

*Includes those students who achieved the acceptable standard but not the standard of excellence

19. Solve for x in the equation $\frac{x}{3} + 7 = -2$.

Answer: $x =$ _____

Common correct response:

19. Solve for x in the equation $\dfrac{x}{3} + 7 = -2.$

$\dfrac{x}{3} + 7 = -2$
$-7 \quad -7$

$\dfrac{x}{3 \times 3} = -9 \times 3 = -27$

$\dfrac{-27}{3} + 7 = -2$

$-9 + 7 = -2$

Answer: $x = \underline{-27}$

Common incorrect responses:

$\dfrac{x}{3} + 7 = -2$
$\times 3 \qquad \times 3$

$x + 7 = -6$
$-7 \quad -7$

$x = -13$

---

19. Solve for x in the equation $\dfrac{x}{3} + 7 = -2.$
$-7 \quad -7$

$3\dfrac{x}{3} = -9$

$\dfrac{3x}{3} = \dfrac{-9}{3}$

Answer: $x = \underline{-3}$

$3 \times \dfrac{x}{3}$

$x + 7 = -2$ $= x = -9$
$-7 \quad -7$

Answer: $x = \underline{-9}$

Item	Key	% of Students with Correct Solution	Number of Unique Errors	Content Reporting Category	Item Description
20	0	54.3	2 459	PE	Simplify and evaluate an expression by applying the exponent laws (Gr.9, N.2)

Standard Achieved by Students on *Part A*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (*n* = 9 130)	89.1	135	1 (426)	3 (80)	2187 (72)
Students Achieving Acceptable Standard* (*n* = 12 217)	60.0	1 311	1 (1 392)	3 (965)	2187 (322)
Students Below Acceptable Standard (*n* = 20 013)	23.1	1 694	3 (766)	1 (598)	45 (254)

*Includes those students who achieved the acceptable standard but not the standard of excellence

20. Simplify, and then evaluate $(3^4 \times 3^3) - (3^7 \times 3^0)$.

Answer: _____

Common correct response:

$$(3^7) - (3^7) = 0$$

Answer: 0

Common incorrect responses:

20. Simplify, and then evaluate $(3^4 \times 3^3) - (3^7 \times 3^0)$.

$$(3^7) - (3^7)$$
$$3^0 = 1$$

Answer: 1

20. Simplify, and then evaluate $(3^4 \times 3^3) - (3^7 \times 3^0)$.

$(81 \times 27) - 0$

$$\begin{array}{r} 27 \\ 27 \\ + 27 \\ \hline 81 \end{array}$$

$$\begin{array}{r} 81 \\ \times 27 \\ \hline 567 \\ + 1620 \\ \hline 2187 \end{array}$$

$$3^4 \times 3^3 - 3^7 \times 3^0$$
$$3^7 - 3^7 = 3$$

Answer: 3^0

Sample Questions from the
2019 Grade 9 Mathematics Provincial Achievement Test—Part B

The following eight items illustrate substantial performance differences between students who performed at the standard of excellence, those at the acceptable standard, and those below the acceptable standard.

Strands: Number (N); Patterns and Relations (PR); Shape and Space (SS); Statistics and Probability (SP)

Item	Key	% of Students with Correct Solution	Strand & Outcome	Item Complexity	Item Description
3	B	60.4	SS.3	Moderate	Solve a problem using the properties of similar polygons

Standard Achieved by Students on *Part B*	% of Student Responses				
	A	B	C	D	No Response
Students Achieving Standard of Excellence	6.5	86.8	5.7	0.8	0.2
Students Achieving Acceptable Standard*	24.2	58.8	13.6	3.0	0.4
Students Below Acceptable Standard	36.4	39.0	16.7	6.9	1.0

*Includes those students who achieved the acceptable standard, but not the standard of excellence

The regular hexagons shown below are similar and are arranged according to a pattern.

| Hexagon 1 | Hexagon 2 | Hexagon 3 | Hexagon 4 | Hexagon 5 | Hexagon 6 |
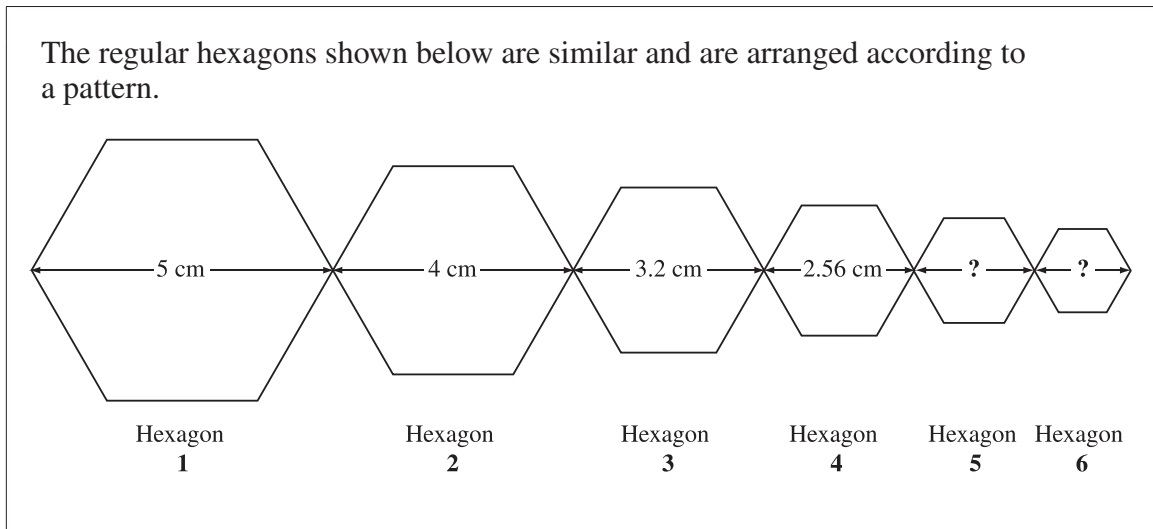
3. To the nearest tenth of a centimetre, what is the **total** length of the 6 hexagons?

- **A.** 17.0 cm
- **B.** 18.4 cm
- **C.** 19.0 cm
- **D.** 19.9 cm

Item	Key	% of Students with Correct Solution	Strand & Outcome	Item Complexity	Item Description
14	A	51.0	PR.7	Moderate	Represent a polynomial expression in simplest form by dividing a binomial by a monomial

Standard Achieved by Students on *Part B*	% of Student Responses				
	A	B	C	D	No Response
Students Achieving Standard of Excellence	90.2	1.5	7.0	1.3	0.0
Students Achieving Acceptable Standard*	48.6	6.4	34.5	10.4	0.1
Students Below Acceptable Standard	19.2	16.8	38.2	24.9	0.9

*Includes those students who achieved the acceptable standard, but not the standard of excellence

Use the following information to answer question 14.

Simplify the following expression.

$$\frac{6x^2 - 9x}{3x}$$

14. Which of the following expressions represents the simplest form of the expression shown above?

 A. $2x - 3$
 B. $3x - 6$
 C. $2x^2 - 3x$
 D. $3x^2 - 6x$

Item	Key	% of Students with Correct Solution	Strand & Outcome	Item Complexity	Item Description
18	B	55.6	SS.2	Moderate	Identify the composite 3-D object that has a certain surface area

Standard Achieved by Students on *Part B*	% of Student Responses				
	A	B	C	D	No Response
Students Achieving Standard of Excellence	0.9	92.1	5.9	1.0	0.1
Students Achieving Acceptable Standard*	7.9	54.9	24.5	12.3	0.4
Students Below Acceptable Standard	15.6	23.1	27.4	32.9	1.0

*Includes those students who achieved the acceptable standard, but not the standard of excellence

Tricia builds a 3-D object that has a surface area of 270 cm^2 using 8 cubes that are identical to the cube shown below.

3 cm
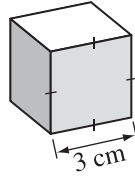
18. Which of the following 3-D objects did Tricia build?

A.
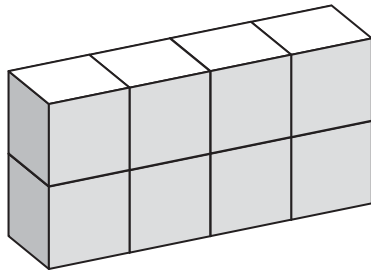
B.
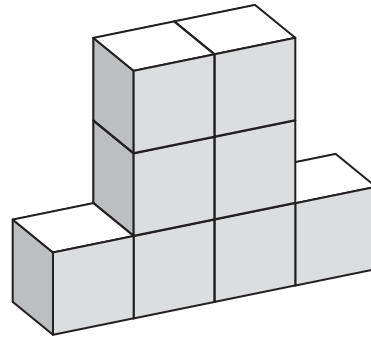
C.
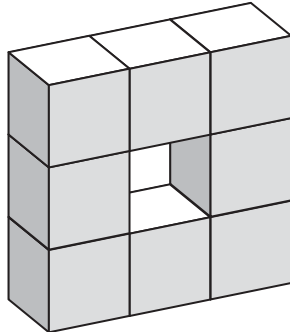
D.
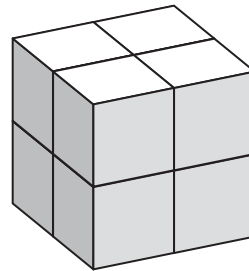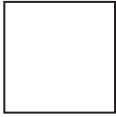
Item	Key	% of Students with Correct Solution	Number of Unique Errors	Strand & Outcome	Item Complexity	Item Description
NR1	4	55.3	534	PR.5	Low	Determine the number of algebra tiles required to model the simplified form of a given polynomial expression

Standard Achieved by Students on *Part B*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (n = 9 976)	91.6	17	3 (320)	12 (171)	5 (76)
Students Achieving Acceptable Standard* (n = 20 884)	63.4	82	12 (2 260)	3 (1 498)	10 (657)
Students Below Acceptable Standard (n = 10 750)	20.1	520	12 (2 621)	3 (967)	2 (670)

*Includes those students who achieved the acceptable standard, but not the standard of excellence

Legend

$\blacksquare = 1$ $\blacksquare = x$ $\blacksquare = x^2$

$\square = -1$ $\square = -x$ $\square = -x^2$

Numerical Response

1. What is the **minimum** number of algebra tiles required to represent the **simplified** form of the expression $-2x^2 + 4x + x^2 + 2 - 3x$?
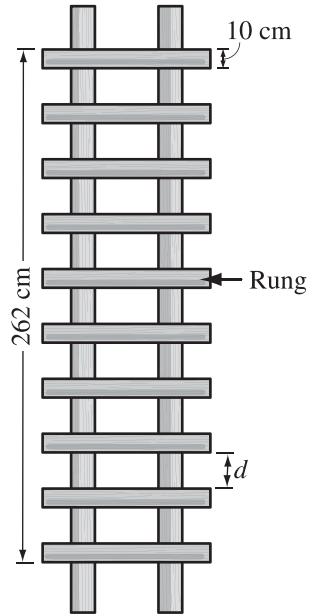
Answer: _____

Item	Key	% of Students with Correct Solution	Number of Unique Errors	Strand & Outcome	Item Complexity	Item Description
NR2	18	58.9	675	PR.1	Moderate	Solve, using a linear equation, a given problem that involves a pictorial representation of a linear pattern

Standard Achieved by Students on *Part B*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (n = 9 976)	94.6	61	16.2 (215)	162 (84)	26.2 (33)
Students Achieving Acceptable Standard* (n = 20 884)	68.5	320	16.2 (1 646)	26.2 (1 505)	162 (461)
Students Below Acceptable Standard (n = 10 750)	21.9	598	26.2 (3 161)	20 (1 426)	16.2 (799)

*Includes those students who achieved the acceptable standard, but not the standard of excellence

The diagram below shows a ladder with equally spaced rungs. Each rung has the same dimensions.

10 cm

262 cm

Rung

d

Numerical Response

2. The distance, d, between the rungs is _____ cm.

Item	Key	% of Students with Correct Solution	Number of Unique Errors	Strand & Outcome	Item Complexity	Item Description
NR4	132	48.5	603	SS.1	Low	Solve a problem by applying a circle property that involves the tangent to a circle property

Standard Achieved by Students on *Part B*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (n = 9 976)	90.4	73	114 (172)	84 (153)	48 (73)
Students Achieving Acceptable Standard* (n = 20 884)	53.2	247	114 (1 748)	66 (814)	84 (754)
Students Below Acceptable Standard (n = 10 750)	14.4	552	33 (1 253)	66 (1 138)	114 (1 045)

*Includes those students who achieved the acceptable standard, but not the standard of excellence

Use the following information to answer numerical-response question 4.

The letter *O* represents the centre of the circle shown below.
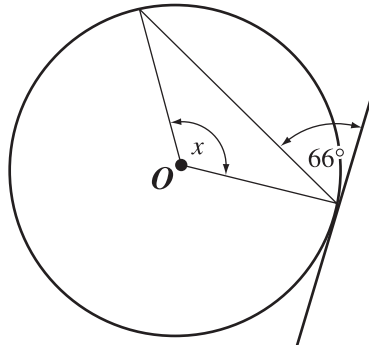
Numerical Response

4. If the line shown above is a tangent to the circle, then the measure of angle *x* is
_____ degrees.

Item	Key	% of Students with Correct Solution	Number of Unique Errors	Strand & Outcome	Item Complexity	Item Description
NR6	65	49.8	403	PR.1	Low	Identify an expression that represents a relationship in a given pattern from a given set of expressions (Gr.7, PR.1)

Standard Achieved by Students on *Part B*	% of Students with Correct Solution	Number of Unique Errors	Three Most Common Errors (Number of Students)		
Students Achieving Standard of Excellence (n = 9 976)	92.4	39	44 (287)	56 (77)	41 (74)
Students Achieving Acceptable Standard* (n = 20 884)	58.1	100	44 (3 622)	64 (685)	45 (478)
Students Below Acceptable Standard (n = 10 750)	10.2	375	44 (2 739)	64 (1 167)	46 (1 021)

*Includes those students who achieved the acceptable standard, but not the standard of excellence

The figures below represent an increasing pattern of blue, white, and yellow squares.
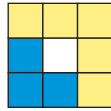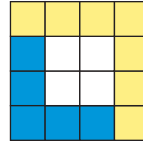
| Figure **1** | Figure **2** | Figure **3** | Figure **4** |
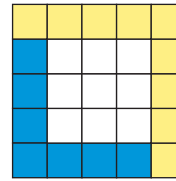
For each expression below, the letter *n* represents the figure number.

Expression #1	n
Expression #2	$2n$
Expression #3	$n - 1$
Expression #4	$n + 2$
Expression #5	$2n - 1$
Expression #6	$2n + 1$

Numerical Response

6. The number of yellow squares in each figure can be represented by Expression #_____. (Record in the **first** box)

The number of blue squares in each figure can be represented by Expression #_____. (Record in the **second** box)

Provincial Achievement Testing Program Support Documents

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

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

Previous provincial achievement tests and answer keys

All January provincial achievement tests (parts A and B) for Grade 9 semestered students are secured and must be returned to Alberta Education. All May/June provincial 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 answers frequently asked questions about the Provincial Achievement Test Program and provides descriptions of and sample questions for each provincial achievement test subject.

Involvement of teachers

Teachers of grades 6 and 9 are encouraged to take part in activities related to the Provincial Achievement Test 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 provincial achievement test results to improve student learning.