Released 2008 Achievement Test

Mathematics

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This document contains released items from the 2008 Grade 9 English Mathematics Achievement Test.

Released test items, which contained approximately 25% of the total number of test items from previously secured achievement tests, were mailed to school administrators each fall from 2004 to 2006 and have been made available to teachers in only print form because of copyright limitations. **Every second year**, as of the fall of 2007, **a complete or partial test** for all achievement test subjects and grades (except grades 6 and 9 Mathematics; grades 3, 6, and 9 Français/French Language Arts; and Grade 9 Knowledge and Employability courses) will be **mailed** to school administrators in conjunction with the Assessment Highlights report for that year. The parts of those tests that are released in print form for which electronic copyright permission is received will subsequently be posted on the Alberta Education website. A test blueprint and an answer key that includes the difficulty, reporting category, test section, and item description for each test item will also be included. These materials, along with the Program of Studies and Subject Bulletin, provide information that can be used to inform instructional practice.

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

2008 Achievement Test Released Items

The items presented in this document are from the previously secured 2008 Grade 9 Mathematics Achievement Test. These items are released by Alberta Education for teacher and student use.

Grade 9 Mathematics Achievement Test
Released Items

2008

Item not released.

Use the following information to answer numerical-response question 1.

The following expressions are examples of powers.

$(2)^{-2}$	$-(2)^2$	$(-2)^2$	$-(2)^{-2}$
1	**2**	**3**	**4**

Numerical Response

1. Listed in order of **increasing** value, the expressions numbered above
are _____, _____, _____, and _____.

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

Items 2 and 3 not released.

4. What is the value of x in the equation $(2a^{-3})(6a^x) = 12a^{15}$?

    A.   −18

    B.   −12

    C.   12

    D.   18

5. The estimated mass of one of the smallest living organisms is 1.0×10^{-16} g. How
many of these organisms are needed to have a total mass of 1 g?

    A. 1×10^{16}

    B. 1×10^{15}

    C. 1×10^{-15}

    D. 1×10^{-16}

The perimeter of a triangle is $24x - 6$. The lengths of two sides of the triangle are represented by the expressions $5x - 7$ and $2x + 5$.

6. Which of the following expressions represents the length of the third side of the triangle?

    A. $17x + 8$

    B. $17x - 8$

    C. $17x + 4$

    D. $17x - 4$

7. Ross conducts a survey to determine the demand for a skateboard park. Ross can **best** minimize the bias in his survey by surveying people

    A. at only one location

    B. who have skateboards

    C. who are different ages

    D. at the same time of day

The square PQRS has been dilatated to form the square P′Q′R′S′, as shown on the grid below.
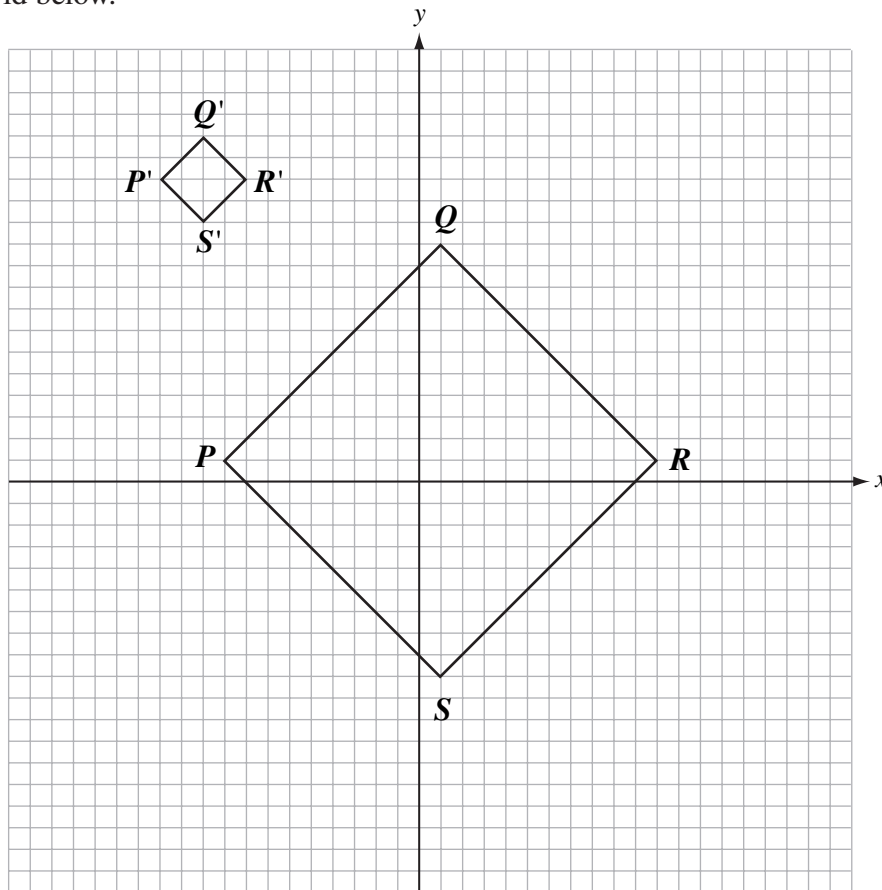
8. What is the scale factor of the dilatation shown above?

A. $\dfrac{1}{6}$

B. $\dfrac{1}{5}$

C. 5

D. 6

9. **Item not released.**

2. **Item not released.**

10. Which of the following calculator keystroke sequences would give the solution to $\dfrac{33 + 9}{6 \times (5 - 2)}$?

A. 33 [+] 9 [÷] 6 [×] 5 [−] 2 [=]

B. [(] 33 [+] 9 [)] [÷] 6 [×] [(] 5 [−] 2 [)] [=]

C. 33 [+] 9 [÷] [(] 6 [×] [(] 5 [−] 2 [)] [)] [=]

D. [(] 33 [+] 9 [)] [÷] [(] 6 [×] [(] 5 [−] 2 [)] [)] [=]

11. **Item not released.**

Use the following information to answer question 12.

Cailey earns $15 an hour and her monthly expenses are $1 150.

12. Which of the following inequalities can be used to determine the number of hours, t, that Cailey must work in one month to save at least $200?
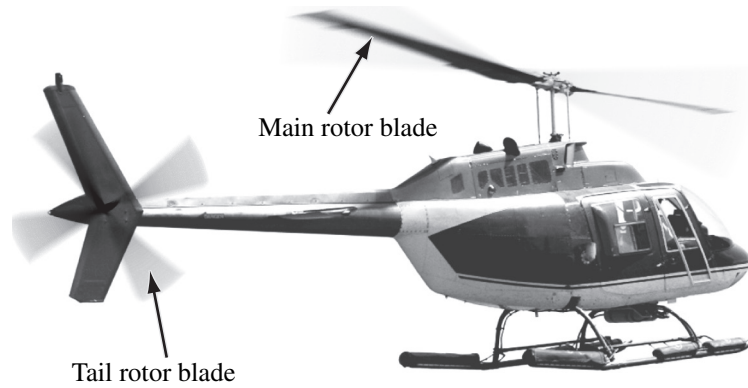
    A. $15t + 1\ 150 \geq 200$

    B. $15t + 1\ 150 \leq 200$

    C. $15t - 1\ 150 \geq 200$
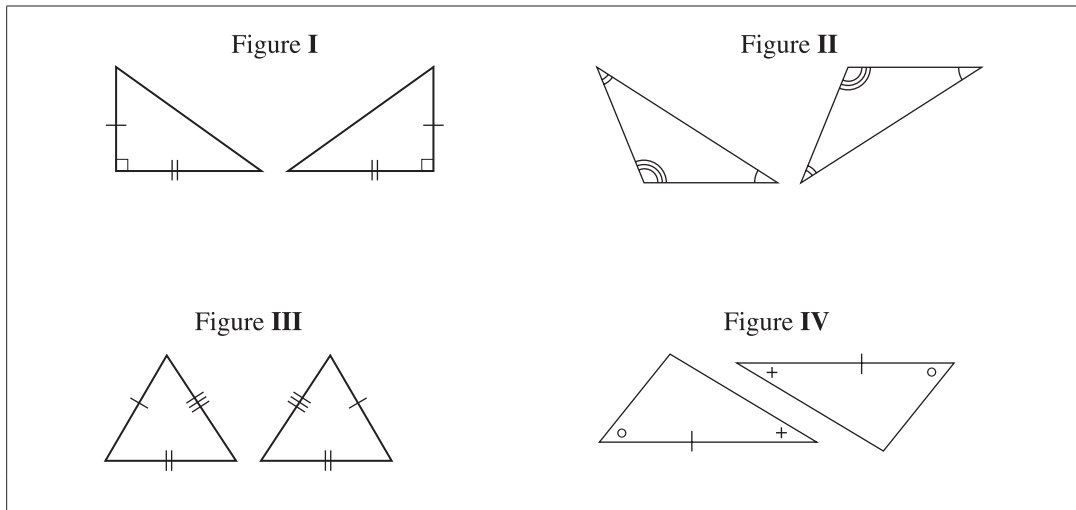
    D. $15t - 1\ 150 \leq 200$

The tail rotor blade of the helicopter shown below rotates 4 times for every 1 main rotor blade rotation.

Main rotor blade

Tail rotor blade

13. How many times will the helicopter's main rotor blade rotate if its tail rotor blade rotates 600 000 000 times?

A. 1.5×10^8

B. 1.5×10^9

C. 2.4×10^8

D. 2.4×10^9

Figure **I**

Figure **II**

Figure **III**

Figure **IV**

14. Which figure does **not** prove congruency?

A.   I

B.   II

C.   III

D.   IV

_____

15. Francis has an equal number of nickels, dimes, and quarters. If she has $4.40 in coins, then the total number of nickels that she has is

A.   33

B.   30

C.   11

D.   10

Items 16 to 18 not released.

A student completed the following four steps to solve the equation $\frac{x}{40} + \frac{x}{60} = 1$. However, in one of the steps the student makes a mistake.

Step 1 $120\left(\frac{x}{40} + \frac{x}{60}\right) = 1$

Step 2 $\frac{120x}{40} + \frac{120x}{60} = 1$

Step 3 $3x + 2x = 1$

Step 4 $5x = 1$

Solution $x = \frac{1}{5}$

19.   In which step was the mistake made in solving the equation?

A.   Step 1
B.   Step 2
C.   Step 3
D.   Step 4

---

20.   What is the value of the expression $2x^2 - 3x + 2x - 3$ if $x = 8$?

A.   53
B.   85
C.   101
D.   117

21.   If the expression $-3x + 5 + x - 8 + 5x - 7$ is simplified, which of the following rows identifies the coefficient and the constant?

| Row	Coefficient	Constant
A.	3	10
B.	3	-10
C.	-3	10
D.	-3	-10

3. Cailey is training for a race. Each day she runs 2 km more than she did the previous day. If Cailey ran a total of 21 km in 3 days, then how many kilometres did she run on the first day?

Answer: _____ **kilometres**

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

Use the following algebra-tile legend and algebra-tile model to answer question 22.

LEGEND:

☐ Shaded is positive

☐ Unshaded is negative

☐ = 1   │ = x ◻ = x^2
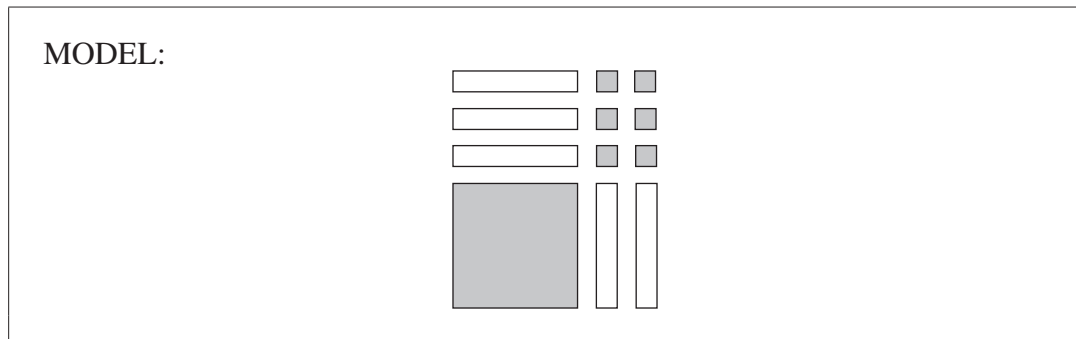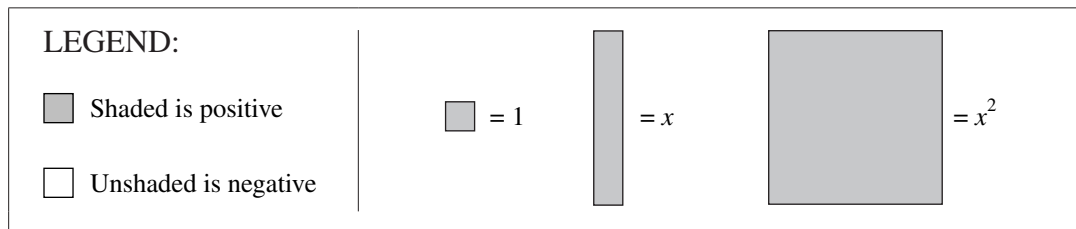
MODEL:

22. A factorization of the trinomial represented by the algebra-tile model above is

A. $(x - 2)(x - 3)$
B. $(x + 3)(x + 2)$
C. $(x + 6)(x - 1)$
D. $(x - 1)(x - 6)$

23. Item not released.

Two friends spent a total of $3\frac{1}{2}$ hours at various places in a mall as shown below.

Food court	25% of the time
Movie theatre	43% of the time
Shops	29% of the time
Other	3% of the time

24. How many minutes did they spend in the food court?

    A.   11.4 min

    B.   28.5 min

    C.   52.5 min

    D.   81.3 min

Items 25 and 26 not released.

A playground is rectangular in shape with dimensions as shown in the diagram below.
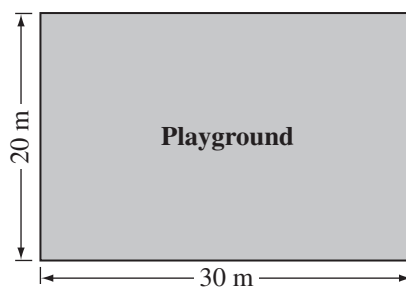
27. By how many metres must both dimensions of the playground be increased in order to double the area of the playground?

    A.   10 m

    B.   20 m

    C.   50 m

    D.   100 m
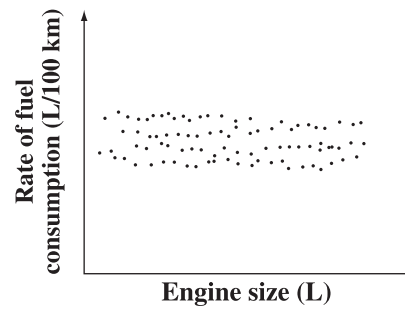
4. **Item not released.**

Items 28 and 29 not released.

30. Which of the following scatter plots **best** shows that at a constant speed, automobiles with smaller engines are more likely to have better fuel economy?
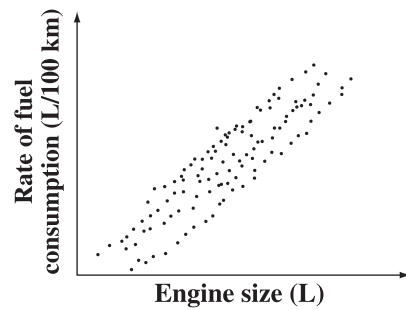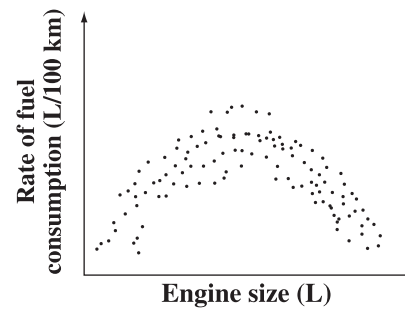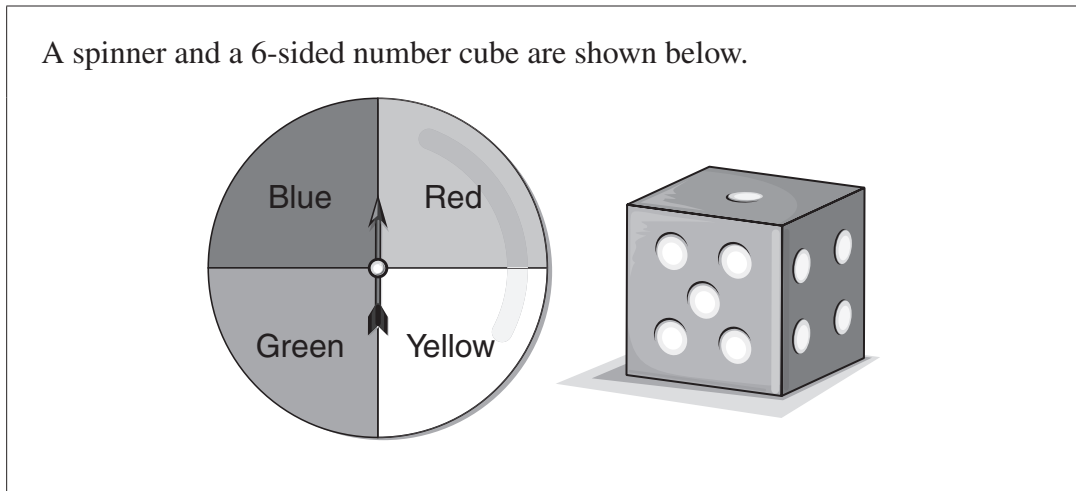
A.

B.

C.

D.

A spinner and a 6-sided number cube are shown below.
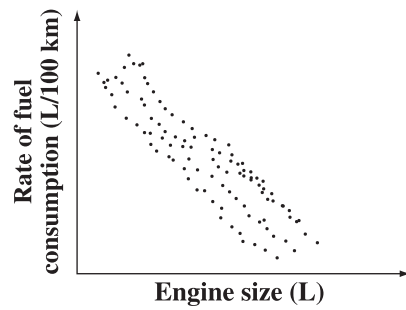
31. What is the probability of spinning the colour red and then rolling a 1 or 2?

A. $\dfrac{1}{24}$

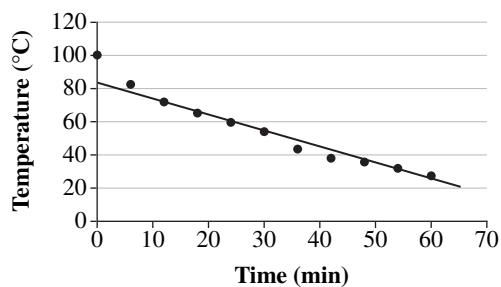**B.** $\dfrac{1}{12}$

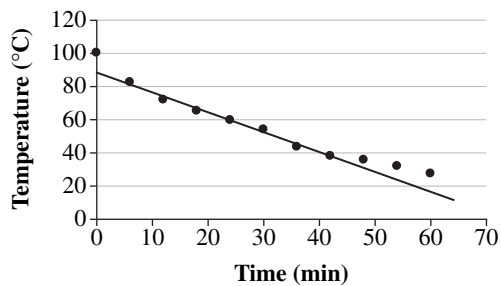**C.** $\dfrac{1}{8}$

D. $\dfrac{1}{6}$

The temperature of a solution was taken over a 60-minute period. The results were graphed on a scatter plot.

32. Which of the following scatter plots shows the line of best fit for the temperatures of the solution over the 60-minute period?
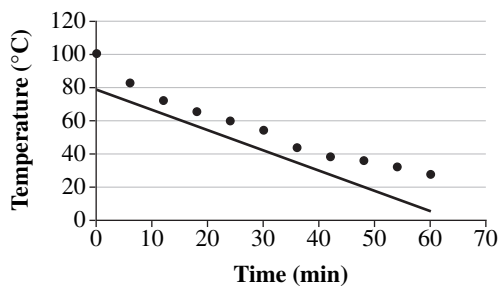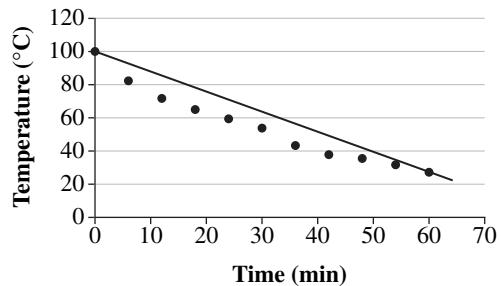
A.

B.

C.

D.

A "half-pipe" such as those used by skateboarders is shown below.

20 m

Diameter = 10 m
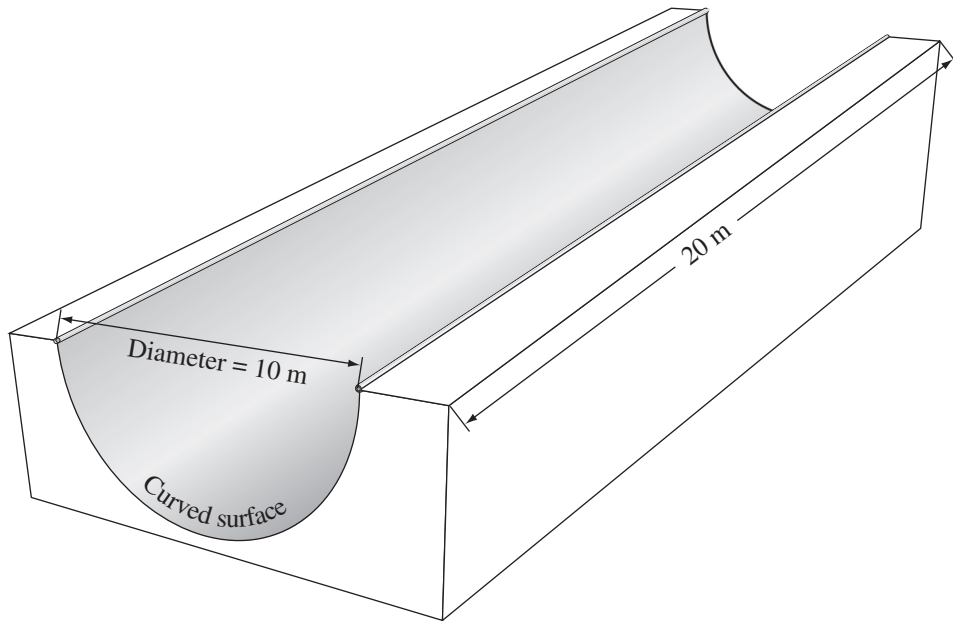
Curved surface

Circumference of a circle = πd

33. What is the area of the curved surface of the half-pipe, to the nearest metre?

A. 157 m^2

B. 200 m^2

C. 314 m^2

D. 628 m^2

$$\frac{(2^3 \times 2^4)^2}{(2^2 \times 4^3)}$$

34. Which of the following powers is equivalent to the expression above?

    A. 2^6

    B. 2^9

    C. 4^{16}

    D. 4^{18}

A student performs an experiment by throwing a paper cup into the air and observing how it lands. A tally chart of the results is shown below.

Possible Outcome		Number of Outcomes
Cup lands on its side		⦀⦀ ⦀⦀ ⦀⦀ ⦀⦀
Cup lands upright		‖
Cup lands upside down		‖‖

Numerical Response

5. According to the tally chart above, the probability of the cup **not** landing on its side, expressed as a percentage, is _____ %.

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

15

Three Views of a Stack of Boxes

| Top view | Front view | Left side view |
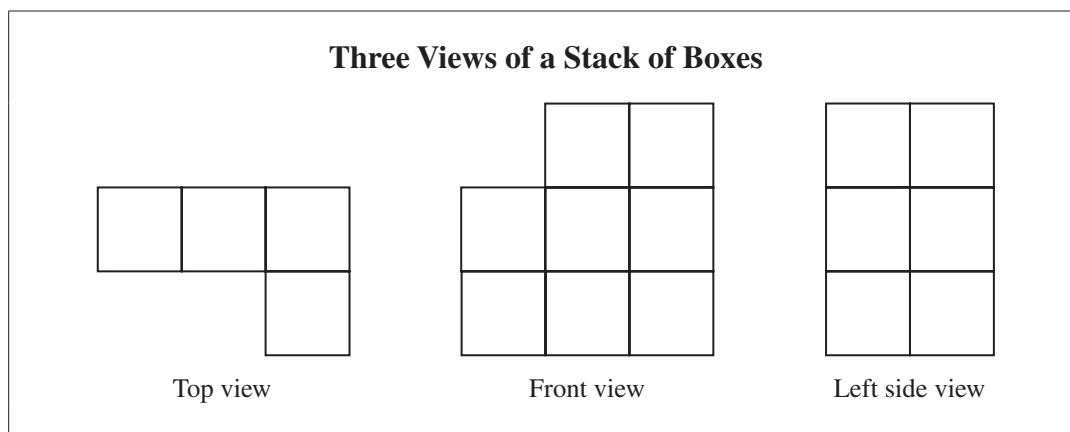
35. Which of the following stacks of boxes represents the three views shown above?

A.
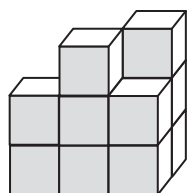
Front view

B.
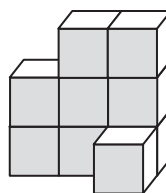
Front view

C.
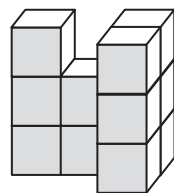
Front view

D.
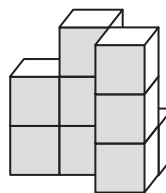
Front view

36. If $x = 90,$ then which of the following expressions is a rational number?

A. $\dfrac{1}{x}$

B. $\sqrt{x}$

C. πx

D. $\tan x^\circ$

37. Movers from a particular moving company charge $46.00/hr. Which of the following graphs represents the relationship between the number of hours that the movers work and the total cost of a move?

A.

B.

C.

D.
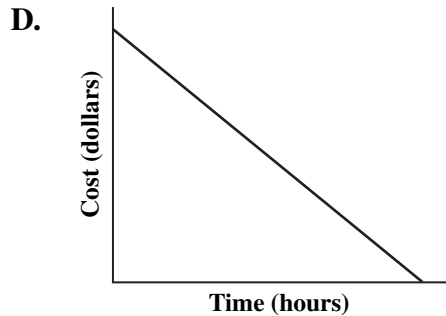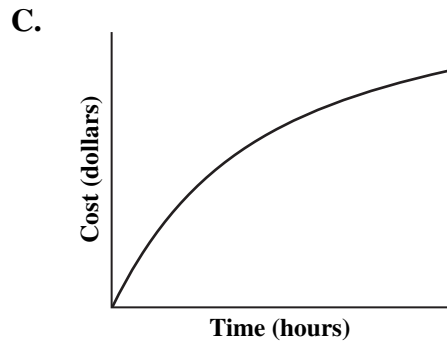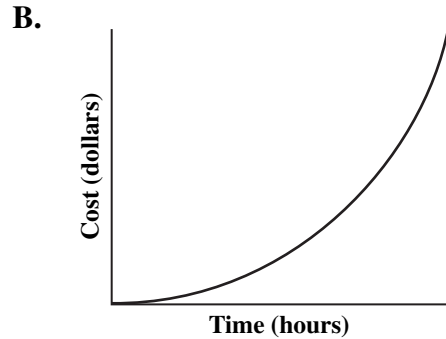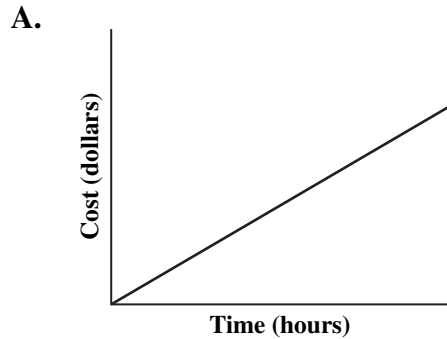
Items 38 to 42 not released.

Numerical Response

6. Sidney wants to build a rectangular ice rink in her backyard. If she wants the ice rink to have the **greatest** possible area within a perimeter of 36 m, then she should make the length of one side of the ice rink _____ m.

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

A 6 m ladder leans against a vertical wall of a house at an angle of 70°, as shown below.
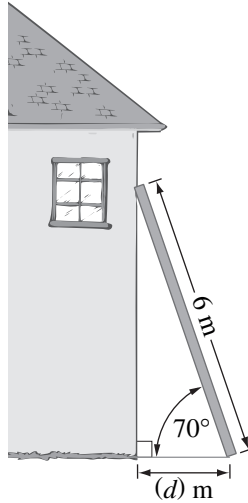
43. Which of the following trigonometric ratios can be used to calculate the distance, d, from the house to the base of the ladder?

A. $\cos 70° = \dfrac{d}{6}$

B. $\cos 70° = \dfrac{6}{d}$

C. $\sin 70° = \dfrac{d}{6}$

D. $\sin 70° = \dfrac{6}{d}$

Hank can see the top of a tree in a mirror that is placed 475 cm from the tree when he stands 190 cm from the mirror, as shown below.
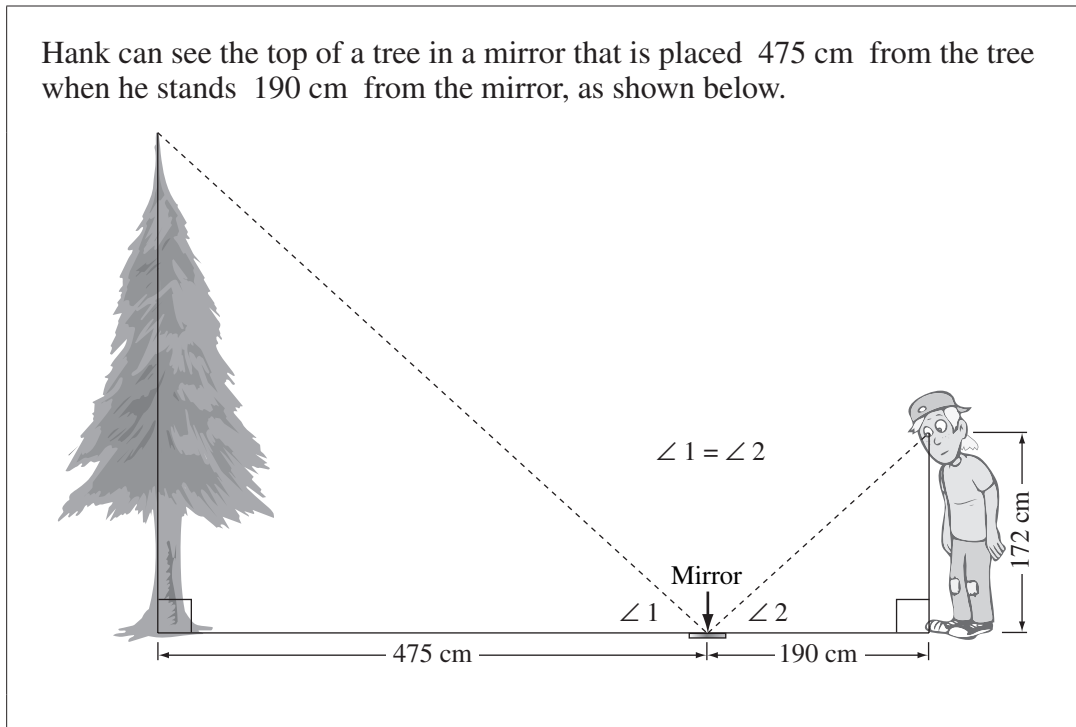
44. What is the height of the tree shown above?

A. 256 cm

B. 362 cm

C. 430 cm

D. 525 cm

2008 Test Blueprint and Item Descriptions

The following table provides information on 30* of the test items that appeared on the 2008 Grade 9 Mathematics Achievement Test.

Test Sections (Curricular Content Areas)	Reporting Category		Number of items and Percentage of Released Test
	Knowledge	**Skills**	
	Recall facts, concepts, procedures, and terminology	Apply facts, concepts, procedures, terminology, and relationships to solve problems in a variety of situations	
Number • Number Concepts • Number Operations	5, 36	4, 10, 13, 24, 34, NR1	**8** **(16%)**
Patterns and Relations • Patterns • Variables and Equations • Relations and Functions	21	6, 12, 15, 19, 20, 22, NR3	**8** **(16%)**
Shape and Space • Measurement • 3-D Objects and 2-D Shapes • Transformations	35, 43, 44	8, 14, 27, 33, NR6	**8** **(16%)**
Statistics and Probability • Data Analysis • Chance and Uncertainty	7, 37	30, 31, 32, NR5	**6** **(12%)**
Number of items and Percentage of Released Test	**8** **(16%)**	**22** **(44%)**	**30** **(60%)**

*Please Note: Twenty items have not been released from the 2008 test.

The following table provides additional information about the 30 items.

Item	Key	Difficulty (%)	Reporting Category	Strand	Item Description
4	D	75.1	S	N	Apply the exponent laws to solve an equation with integral exponents
5	A	71.6	K	N	Perform an operation with or without a calculator involving scientific notation and exponent laws
6	D	58.4	S	PR	Determine the binomial expression that represents the sum of three first-degree, single-variable binomial expressions
7	C	62.2	K	SP	Determine the data collection method that best minimizes bias for a given survey
8	B	55.1	S	SS	Determine the scale factor of a dilatation that is displayed on a grid
10	D	48.1	S	N	Determine the proper calculator keystroke sequence to solve an expression
12	C	50.2	S	PR	Identify the first-degree, single-variable inequality that represents information in a word problem
13	A	68.0	S	N	Solve a problem involving rational numbers expressed in scientific notation
14	B	65.6	S	SS	Use the properties of congruent triangles to determine which set triangles are congruent
15	C	81.8	S	PR	Solve a word problem involving coins that leads to a first-degree, single-variable equation

Item	Key	Difficulty (%)	Reporting Category	Strand	Item Description
19	A	51.7	S	PR	Identify the step in which an error was made in solving a first-degree, single-variable equation
20	D	81.0	S	PR	Evaluate a single-variable polynomial expression, given the value of the variable
21	B	67.7	K	PR	Evaluate a first-degree, single-variable expression and identify the resulting coefficient and constant
22	A	63.1	S	PR	Determine the factorization of a trinomial expression that is represented by an algebra tile model
24	C	70.7	S	N	Express the solution to a problem in decimal form that involves operations with mixed fractions and percentage
27	A	64.3	S	SS	Determine the dimensions of a rectangle that has double the area of another rectangle
30	C	57.6	S	SP	Interpret a set of scatter plots to determine which one represents a given relationship
31	B	58.9	S	SP	Determine the probability of two independent events
32	A	62.4	S	SP	Identify the line of best fit for a given scatter plot
33	C	53.5	S	SS	Calculate the surface area of a half cylinder given its diameter and height
34	A	42.8	S	N	Use the exponent laws to simplify an expression with integral bases and whole number exponents

Item	Key	Difficulty (%)	Reporting Category	Strand	Item Description
35	D	65.3	K	SS	Identify a 3-D object given its plan and elevation views
36	A	51.9	K	N	Identify the single-variable, monomial expression that represents a rational number, given the value of the variable
37	A	79.1	K	SP	Interpret a graph to determine the relationship between two variables
43	A	65.1	K	SS	Identify the trigonometric ratio that represents a dimension in a right angled triangle
44	C	65.7	K	SS	Use the properties of similar triangles to determine the length of an unknown side
NR1	2413	41.2	S	N	Apply the exponent laws for powers with integral exponents to determine the values of four expressions
NR3	5	55.4	S	PR	Create a single-variable equation that models a situation involving a pattern and solve the equation to determine the first value of the pattern
NR5	20	63.9	S	SP	Determine the probability of a single event, based on experimental results, expressed as a percentage
NR6	9	37.7	S	SS	Given the perimeter of a rectangle, determine the side length of the rectangle that would produce the greatest area