**ALGEBRA I**

Wednesday, June 19, 2019 — 1:15 to 4:15 p.m., only

Student Name \_\_\_\_\_

School Name \_\_\_\_\_

**The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.**

Print your name and the name of your school on the lines above.

A separate answer sheet for **Part I** has been provided to you. Follow the instructions from the proctor for completing the student information on your answer sheet.

This examination has four parts, with a total of 37 questions. You must answer all questions in this examination. Record your answers to the Part I multiple-choice questions on the separate answer sheet. Write your answers to the questions in **Parts II, III, and IV** directly in this booklet. All work should be written in pen, except for graphs and drawings, which should be done in pencil. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale.

The formulas that you may need to answer some questions in this examination are found at the end of the examination. This sheet is perforated so you may remove it from this booklet.

Scrap paper is not permitted for any part of this examination, but you may use the blank spaces in this booklet as scrap paper. A perforated sheet of scrap graph paper is provided at the end of this booklet for any question for which graphing may be helpful but is not required. You may remove this sheet from this booklet. Any work done on this sheet of scrap graph paper will *not* be scored.

When you have completed the examination, you must sign the statement printed at the end of the answer sheet, indicating that you had no unlawful knowledge of the questions or answers prior to the examination and that you have neither given nor received assistance in answering any of the questions during the examination. Your answer sheet cannot be accepted if you fail to sign this declaration.

**Notice ...**

**A graphing calculator and a straightedge (ruler) must be available for you to use while taking this examination.**

**DO NOT OPEN THIS EXAMINATION BOOKLET UNTIL THE SIGNAL IS GIVEN.**

## Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers on your separate answer sheet. [48]

Use this space for computations.

1 The expression  $w^4 - 36$  is equivalent to

- (1)  $(w^2 - 18)(w^2 - 18)$       (3)  $(w^2 - 6)(w^2 - 6)$   
(2)  $(w^2 + 18)(w^2 - 18)$       (4)  $(w^2 + 6)(w^2 - 6)$

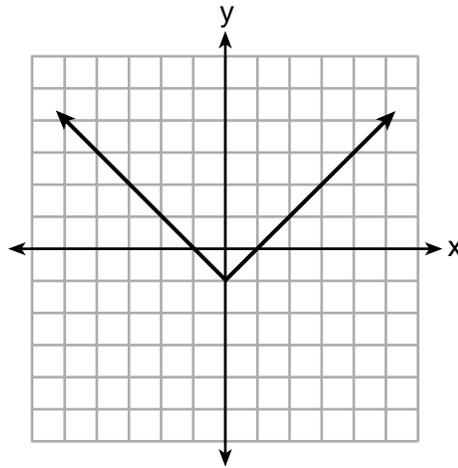
2 If  $f(x) = 4x + 5$ , what is the value of  $f(-3)$ ?

- (1)  $-2$       (3)  $17$   
(2)  $-7$       (4)  $4$

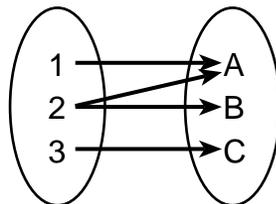
3 Which relation is *not* a function?

x	y
-10	-2
-6	2
-2	6
1	9
5	13

(1)



(3)



(4)

$$3x + 2y = 4$$

(2)



Use this space for  
computations.

7 Which expression results in a rational number?

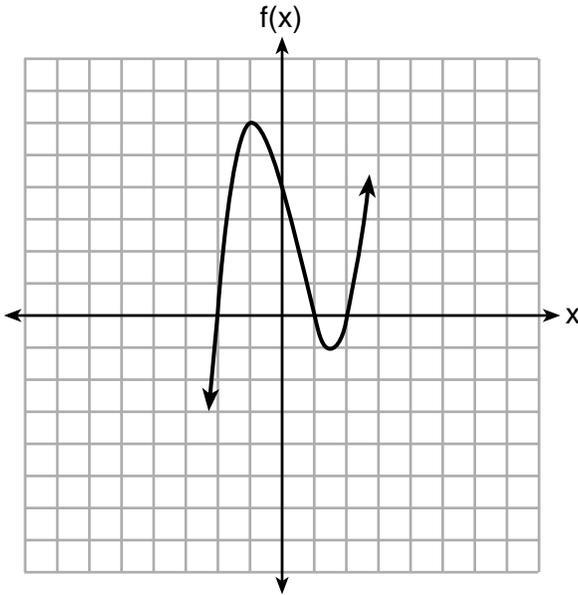
(1)  $\sqrt{2} \cdot \sqrt{18}$

(3)  $\sqrt{2} + \sqrt{2}$

(2)  $5 \cdot \sqrt{5}$

(4)  $3\sqrt{2} + 2\sqrt{3}$

8 A polynomial function is graphed below.



Which function could represent this graph?

(1)  $f(x) = (x + 1)(x^2 + 2)$

(3)  $f(x) = (x - 1)(x^2 - 4)$

(2)  $f(x) = (x - 1)(x^2 - 2)$

(4)  $f(x) = (x + 1)(x^2 + 4)$

9 When solving  $p^2 + 5 = 8p - 7$ , Kate wrote  $p^2 + 12 = 8p$ . The property she used is

(1) the associative property

(2) the commutative property

(3) the distributive property

(4) the addition property of equality

**Use this space for  
computations.**

**10** David wanted to go on an amusement park ride. A sign posted at the entrance read “You must be greater than 42 inches tall and no more than 57 inches tall for this ride.” Which inequality would model the height,  $x$ , required for this amusement park ride?

- (1)  $42 < x \leq 57$                       (3)  $42 < x$  or  $x \leq 57$   
(2)  $42 > x \geq 57$                       (4)  $42 > x$  or  $x \geq 57$

**11** Which situation can be modeled by a linear function?

- (1) The population of bacteria triples every day.  
(2) The value of a cell phone depreciates at a rate of 3.5% each year.  
(3) An amusement park allows 50 people to enter every 30 minutes.  
(4) A baseball tournament eliminates half of the teams after each round.

**12** Jenna took a survey of her senior class to see whether they preferred pizza or burgers. The results are summarized in the table below.

	Pizza	Burgers
Male	23	42
Female	31	26

Of the people who preferred burgers, approximately what percentage were female?

- (1) 21.3                                      (3) 45.6  
(2) 38.2                                      (4) 61.9

**13** When  $3a + 7b > 2a - 8b$  is solved for  $a$ , the result is

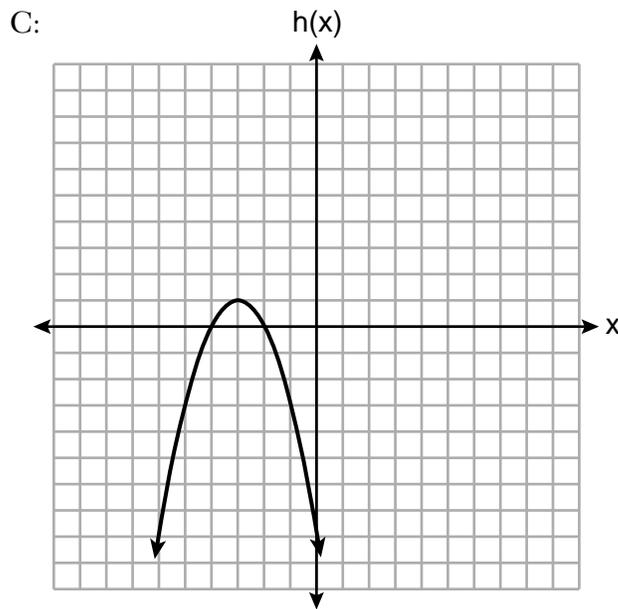
- (1)  $a > -b$                                   (3)  $a < -15b$   
(2)  $a < -b$                                   (4)  $a > -15b$

Use this space for  
computations.

14 Three functions are shown below.

A:  $g(x) = -\frac{3}{2}x + 4$

B:  $f(x) = (x + 2)(x + 6)$



Which statement is true?

- (1)  $B$  and  $C$  have the same zeros.
- (2)  $A$  and  $B$  have the same  $y$ -intercept.
- (3)  $B$  has a minimum and  $C$  has a maximum.
- (4)  $C$  has a maximum and  $A$  has a minimum.

15 Nicci's sister is 7 years less than twice Nicci's age,  $a$ . The sum of Nicci's age and her sister's age is 41. Which equation represents this relationship?

- (1)  $a + (7 - 2a) = 41$
- (2)  $a + (2a - 7) = 41$
- (3)  $2a - 7 = 41$
- (4)  $a = 2a - 7$

Use this space for  
computations.

- 16 The population of a small town over four years is recorded in the chart below, where 2013 is represented by  $x = 0$ . [Population is rounded to the nearest person]

Year	2013	2014	2015	2016
Population	3810	3943	4081	4224

The population,  $P(x)$ , for these years can be modeled by the function  $P(x) = ab^x$ , where  $b$  is rounded to the nearest thousandth. Which statements about this function are true?

- I.  $a = 3810$
- II.  $a = 4224$
- III.  $b = 0.035$
- IV.  $b = 1.035$

- (1) I and III
- (2) I and IV
- (3) II and III
- (4) II and IV

- 17 When written in factored form,  $4w^2 - 11w - 3$  is equivalent to

- (1)  $(2w + 1)(2w - 3)$
- (2)  $(2w - 1)(2w + 3)$
- (3)  $(4w + 1)(w - 3)$
- (4)  $(4w - 1)(w + 3)$

- 18 Which ordered pair does *not* represent a point on the graph of  $y = 3x^2 - x + 7$ ?

- (1)  $(-1.5, 15.25)$
- (2)  $(0.5, 7.25)$
- (3)  $(1.25, 10.25)$
- (4)  $(2.5, 23.25)$

- 19 Given the following three sequences:

- I. 2, 4, 6, 8, 10...
- II. 2, 4, 8, 16, 32...
- III.  $a, a + 2, a + 4, a + 6, a + 8...$

Which ones are arithmetic sequences?

- (1) I and II, only
- (2) I and III, only
- (3) II and III, only
- (4) I, II, and III

Use this space for  
computations.

**20** A grocery store sells packages of beef. The function  $C(w)$  represents the cost, in dollars, of a package of beef weighing  $w$  pounds. The most appropriate domain for this function would be

- (1) integers (3) positive integers  
(2) rational numbers (4) positive rational numbers

**21** The roots of  $x^2 - 5x - 4 = 0$  are

- (1) 1 and 4 (3)  $-1$  and  $-4$   
(2)  $\frac{5 \pm \sqrt{41}}{2}$  (4)  $\frac{-5 \pm \sqrt{41}}{2}$

**22** The following table shows the heights, in inches, of the players on the opening-night roster of the 2015-2016 New York Knicks.

84	80	87	75	77	79	80	74	76	80	80	82	82
----	----	----	----	----	----	----	----	----	----	----	----	----

The population standard deviation of these data is approximately

- (1) 3.5 (3) 79.7  
(2) 13 (4) 80

**23** A population of bacteria can be modeled by the function  $f(t) = 1000(0.98)^t$ , where  $t$  represents the time since the population started decaying, and  $f(t)$  represents the population of the remaining bacteria at time  $t$ . What is the rate of decay for this population?

- (1) 98% (3) 0.98%  
(2) 2% (4) 0.02%

**24** Bamboo plants can grow 91 centimeters per day. What is the approximate growth of the plant, in inches per hour?

- (1) 1.49 (3) 9.63  
(2) 3.79 (4) 35.83

## High School Math Reference Sheet

1 inch = 2.54 centimeters	1 kilometer = 0.62 mile	1 cup = 8 fluid ounces
1 meter = 39.37 inches	1 pound = 16 ounces	1 pint = 2 cups
1 mile = 5280 feet	1 pound = 0.454 kilogram	1 quart = 2 pints
1 mile = 1760 yards	1 kilogram = 2.2 pounds	1 gallon = 4 quarts
1 mile = 1.609 kilometers	1 ton = 2000 pounds	1 gallon = 3.785 liters
		1 liter = 0.264 gallon
		1 liter = 1000 cubic centimeters

Triangle	$A = \frac{1}{2}bh$
Parallelogram	$A = bh$
Circle	$A = \pi r^2$
Circle	$C = \pi d$ or $C = 2\pi r$
General Prisms	$V = Bh$
Cylinder	$V = \pi r^2 h$
Sphere	$V = \frac{4}{3}\pi r^3$
Cone	$V = \frac{1}{3}\pi r^2 h$
Pyramid	$V = \frac{1}{3}Bh$

Pythagorean Theorem	$a^2 + b^2 = c^2$
Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Arithmetic Sequence	$a_n = a_1 + (n - 1)d$
Geometric Sequence	$a_n = a_1 r^{n-1}$
Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Radians	1 radian = $\frac{180}{\pi}$ degrees
Degrees	1 degree = $\frac{\pi}{180}$ radians
Exponential Growth/Decay	$A = A_0 e^{k(t - t_0)} + B_0$

Tear Here

Tear Here