

I**ALGEBRA I**

Tuesday, April 30, 2019 - 8:00AM - 9:30AM

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. For each question, write on the separate answer sheet the numeral preceding the word or expression that best completes the statement or answers the question. [48]

Use this space for
computations.

- 1 At the school bookstore, a pencil costs $25¢$, a notebook costs $\$1.75$, and a piece of graph paper costs $5¢$. Which formula below could be used to determine the total cost c , in cents, of purchasing p pencils, n notebooks, and g pieces of graph paper?

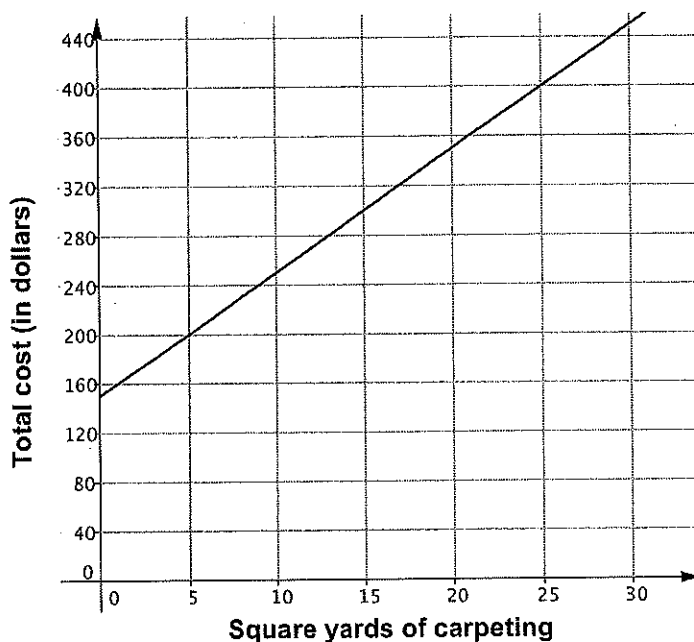
(1) $c = 25p + 1.75n + 5g$

(3) $c = 25p + 175n + 5g$

(2) $c = 0.25p + 1.75n + 0.05g$

(4) $c = 0.25p + 1.75n + 0.5g$

- 2 Eric is hiring a company to install carpeting in his house. The company charges a one-time installation fee plus a certain amount per square yard of carpeting. The graph below shows the relationship between the number of square yards of carpeting and the total cost, in dollars.



The quantity that represents the cost per square yard of carpeting is the

(1) Slope of the graph

(3) Domain of the function

(2) y-intercept of the graph

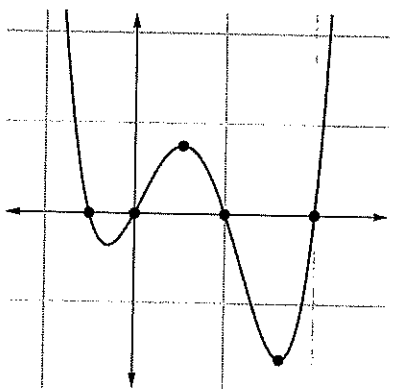
(4) Range of the function

Use this space for
computations.

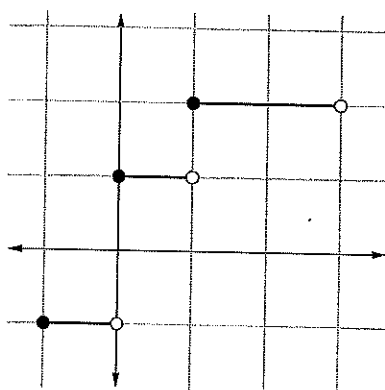
3 When the quadratic polynomial $5x + 2 - 4x^2$ is written in standard form, which statement is *false*?

- (1) The degree of the polynomial is less than the number of terms.
- (2) The constant term is less than the leading coefficient.
- (3) The value of a is less than the value of b .
- (4) The value of c is less than the value of b .

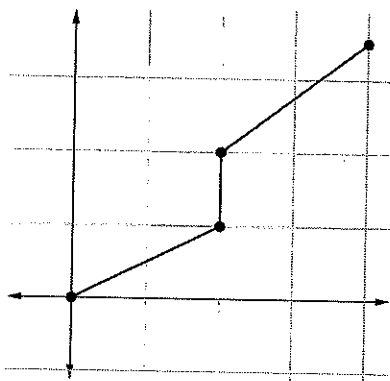
4 Which diagram does *not* represent a function?



(1)



(3)



(2)

x	$f(x)$
1	1
2	1
3	3
4	3
5	7
6	8

(4)

5 If $f(x) = 2^x + 4$ and $g(x) = x^2 - 4$, the value of $f(5) + g(-3)$ is

- (1) 16
- (2) 23
- (3) 34
- (4) 41

Use this space for
computations.

6 The function $f(x) = x^2 - 5x - 6$, written in correctly factored form, and its zeros are

- (1) $f(x) = (x - 2)(x + 3)$ with zeros of -2 and 3
- (2) $f(x) = (x + 3)(x - 2)$ with zeros of -3 and 2
- (3) $f(x) = (x - 6)(x + 1)$ with zeros of -6 and 1
- (4) $f(x) = (x + 1)(x - 6)$ with zeros of -1 and 6

7 Which operation between two polynomials will *not* always result in a polynomial?

- (1) Addition
- (2) Subtraction
- (3) Multiplication
- (4) Division

8 Judy solved the quadratic equation $x^2 - 16 = 0$ using the following steps:

- Step 1: $x^2 - 16 = 0$
- Step 2: $(x - 2)(x + 8) = 0$
- Step 3: $x - 2 = 0$ or $x + 8 = 0$
- Step 4: $x = 2$ or $x = -8$

Which statement is *true* about Judy's method?

- (1) Judy made a mistake between Steps 1 and 2.
- (2) Judy made a mistake between Steps 2 and 3.
- (3) Judy made a mistake between Steps 3 and 4.
- (4) Judy solved the equation correctly.

Use this space for computations.

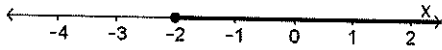
- 9 At a yearly basketball tournament, 64 different teams compete. After each round of the tournament, half of the teams remain, as shown in the accompanying table.

Round, r	Number of teams, t , remaining
0	64
1	32
2	16
3	8

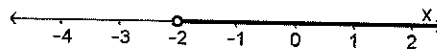
Which equation models the relationship between the round and the number of teams remaining?

- (1) $t = 64(0.5)^r$ (3) $t = 64(0.5)^{r-1}$
 (2) $t = 64(2)^r$ (4) $t = 64(2)^{r-1}$

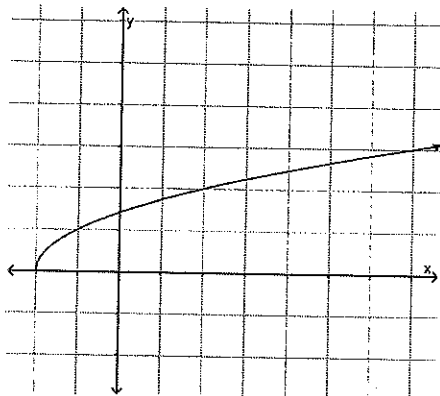
- 10 Which diagram represents the set of all solutions of the equation $y = \sqrt{x+2}$?



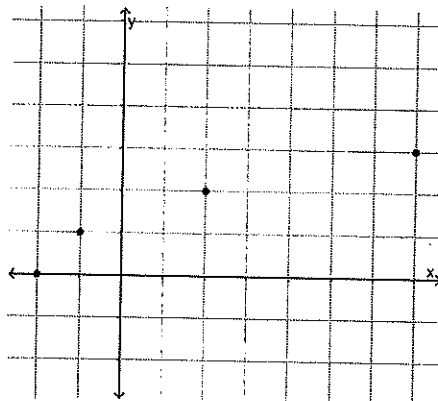
(1)



(3)



(2)



(4)

Use this space for
computations.

- 11 Four students in Ms. Smith's Algebra I class rewrote the expression $x^3 + 4x^2 - 12x$ in four different ways, as shown below.

Student	Rewritten Expression
Jose	$x(x^2 + 4x - 12)$
Maria	$(x^2 + 6x)(x - 2)$
Dante	$(x^2 - 2)(x + 6x)$
Alex	$x(x + 6)(x - 2)$

Which student's rewritten expression is *not* equivalent to the original expression?

- (1) Jose
(2) Maria
(3) Dante
(4) Alex

- 12 Two terms from a sequence are shown in the table below:

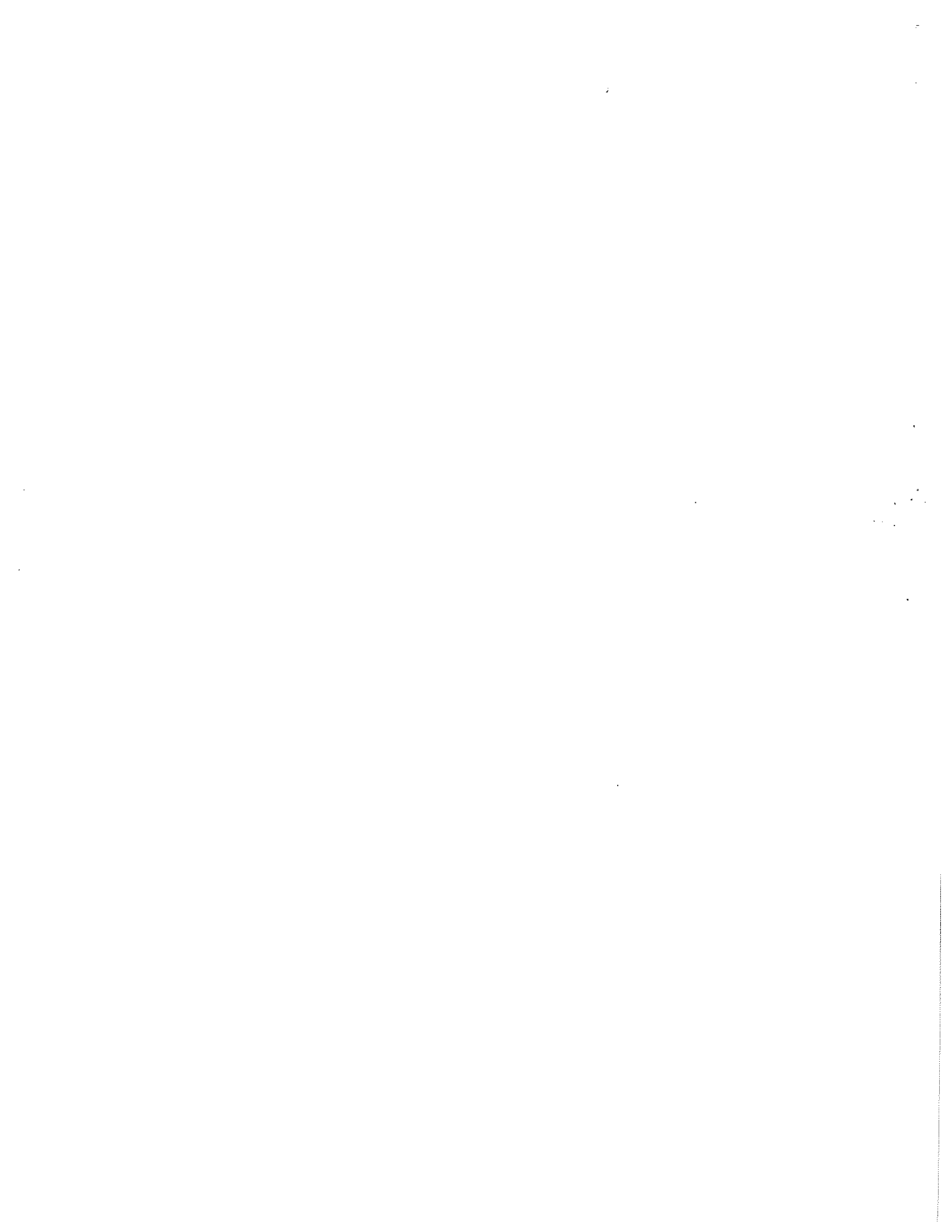
n	a_n
1	2
2	4

Which formula does *not* generate these terms?

- (1) $a_n = 2n$
(2) $a_n = 2(n - 1) + 2$
(3) $a_n = 2^n$
(4) $a_n = 2^{n-1} + 2$

- 13 The volume of a cone can be calculated using the formula $V = \frac{1}{3}\pi r^2 h$. Which expression can be used to represent the height, h ?

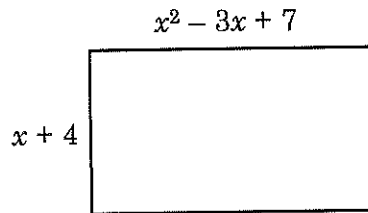
- (1) $\frac{3V^2}{\pi r}$
(2) $\frac{3V}{\pi r^2}$
(3) $\frac{V}{3\pi r^2}$
(4) $\frac{\sqrt{V}}{3\pi r}$



Part II

Answer all 8 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [16]

25 A window in the shape of a rectangle, as shown below, has a width of $x + 4$ and a length of $x^2 - 3x + 7$.



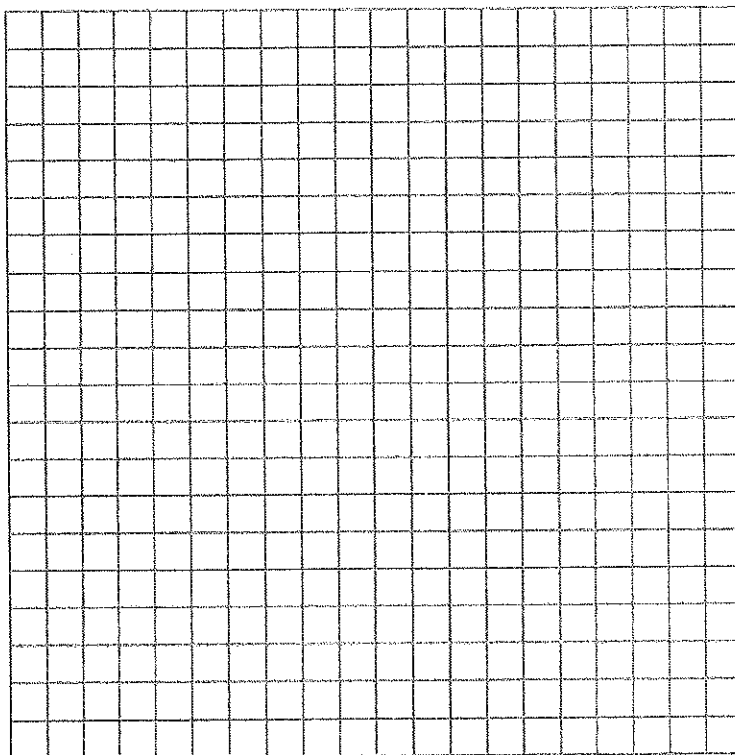
Express the area of the rectangle as single polynomial in simplest form.

26 Determine all zeroes of the function $f(x) = \text{[REDACTED]} [(x + 3)(x^2 - 4)]$ algebraically.

27 Luis spent \$55 buying songs and movies at an online store that charges \$1.25 for each song and \$2.75 for each movie. He purchased a total of 26 songs and movies combined.

Write a system of equations that represents this situation.

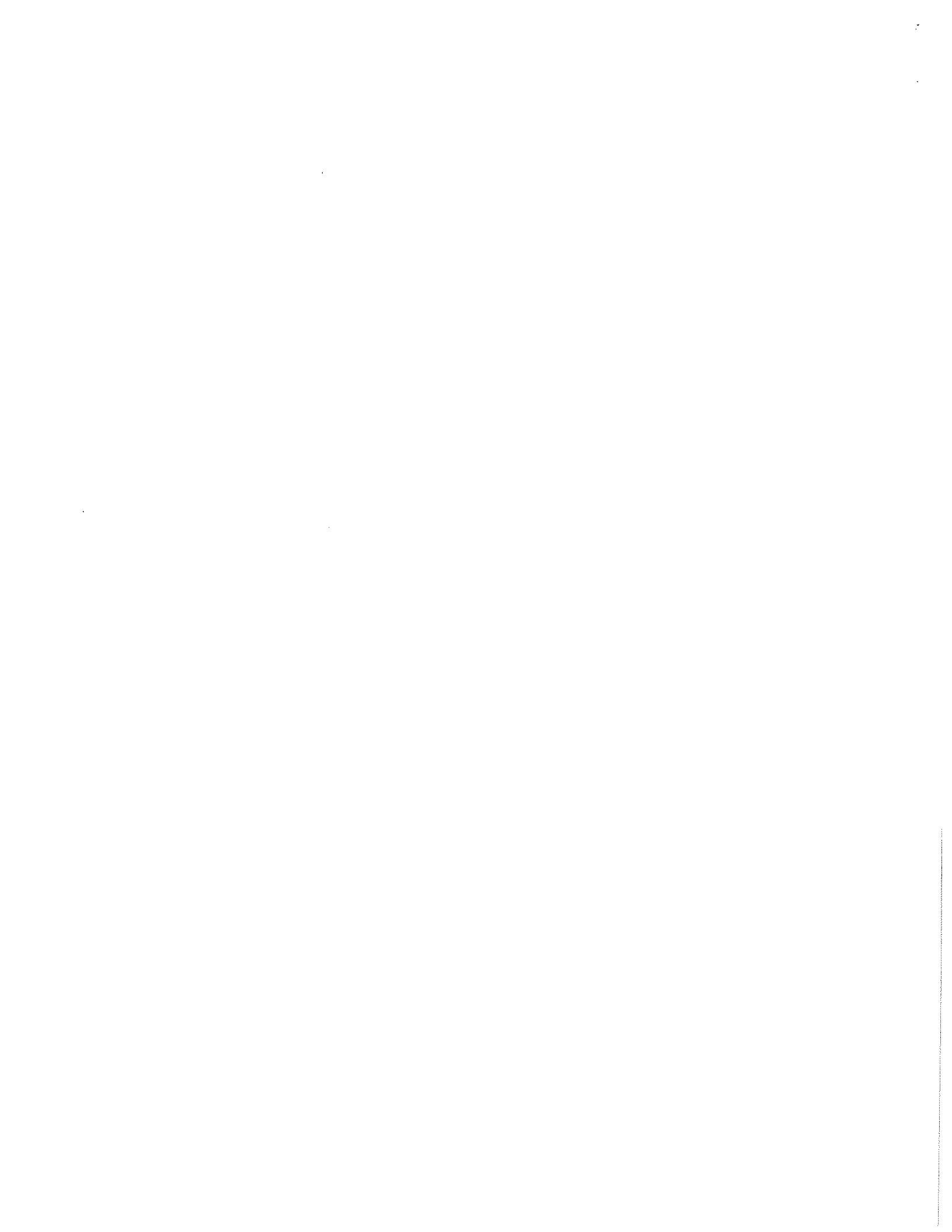
Determine how many songs *and* how many movies Luis purchased, using either an algebraic or graphical approach. [The use of the grid is optional.]



28 Solve the following equation for x , in terms of a and b .

$$ax = 15 + bx$$

29 Terry solved the equation $x^2 + 10 = 5x$ using the quadratic formula and stated that it has no real solutions. Is Terry correct? Justify your answer.

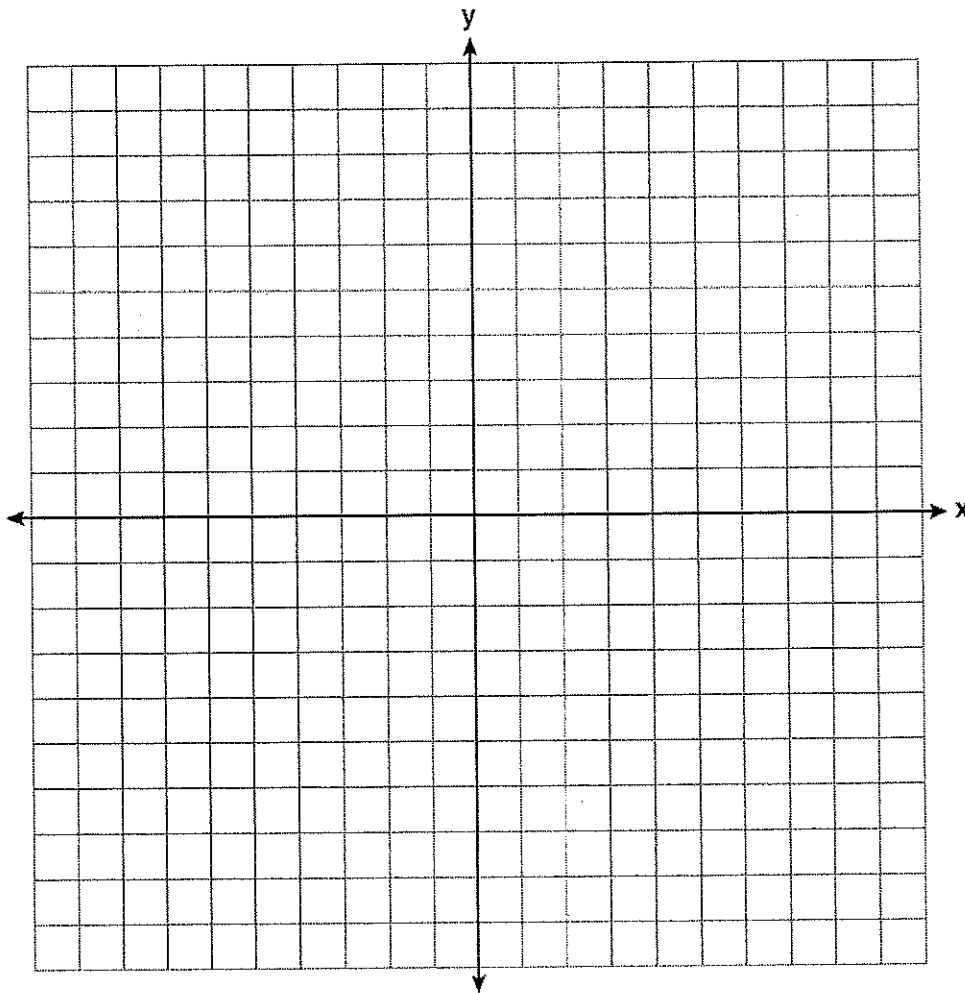


Part III

Answer all 4 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [16]

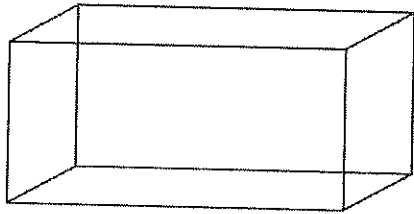
33 On the set of axes below, solve the following system of inequalities graphically.

$$\begin{aligned}y &> -x + 3 \\ 2y + 6 &\leq x\end{aligned}$$



Larry believes that $(4, -1)$ is a solution. Is he correct? Explain your reasoning.

34 Paul purchased a new fish tank, represented by the diagram below.



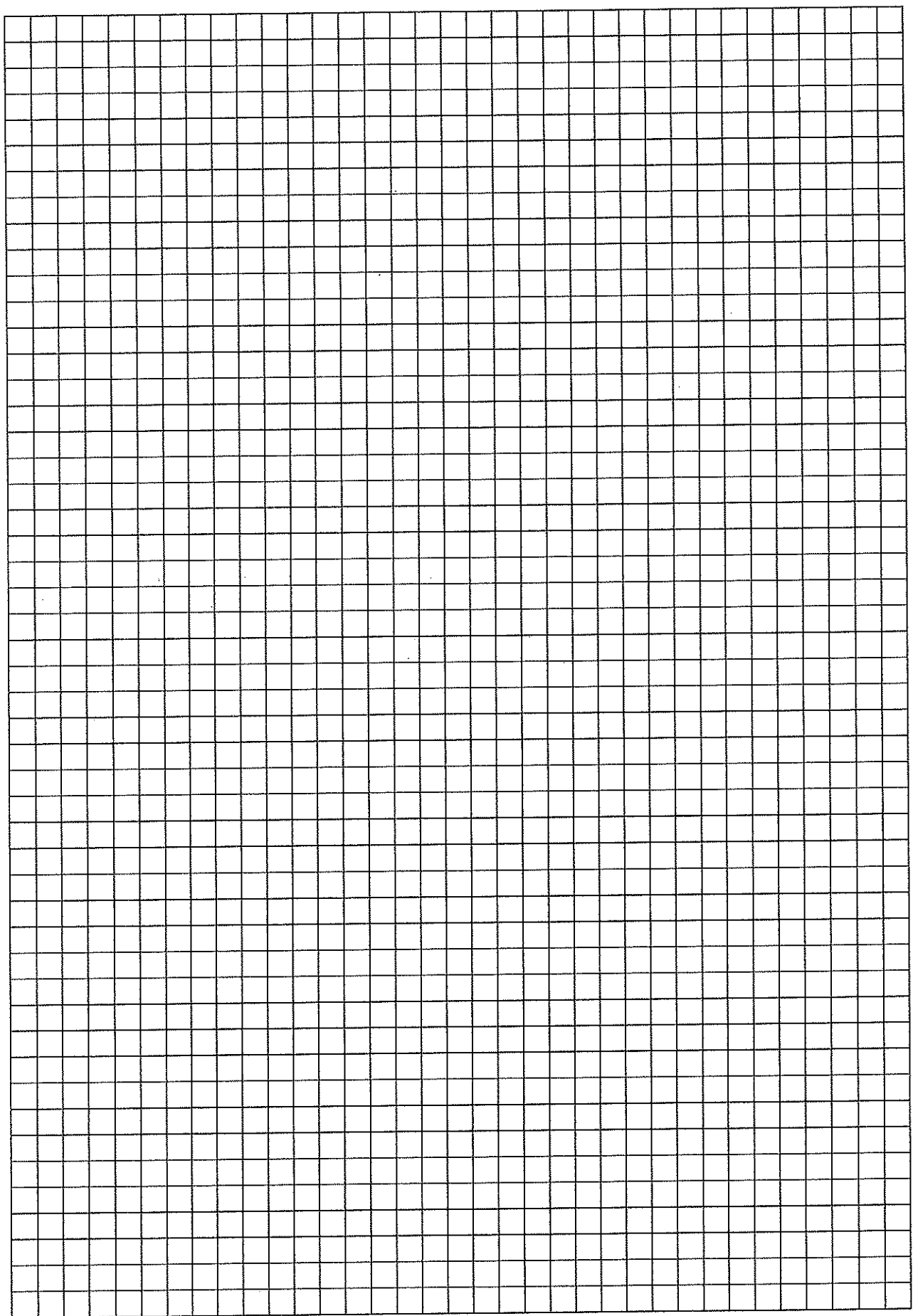
The height, h , of the tank is 3 feet, and the width, w , is 6 feet longer than the length, l . The volume of the tank ($V = lwh$) is 60 ft^3 .

Write an equation that could be used to calculate the length of the tank.

Determine the exact length of the tank in simplest radical form.

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Scrap Graph Paper — This sheet will *not* be scored.



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	$A = A_0 e^{k(t - t_0)} + B_0$

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