

ALGEBRA 1
June 2017
Part IV

Answer the question in this part. A correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided to determine your answer. Note that diagrams are not necessarily drawn to scale. 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. [6]

37. Central High School had five members on their swim team in 2010. Over the next several years, the team increased by an average of 10 members per year. The same school had 35 members in their chorus in 2010. The chorus saw an increase of 5 members per year.

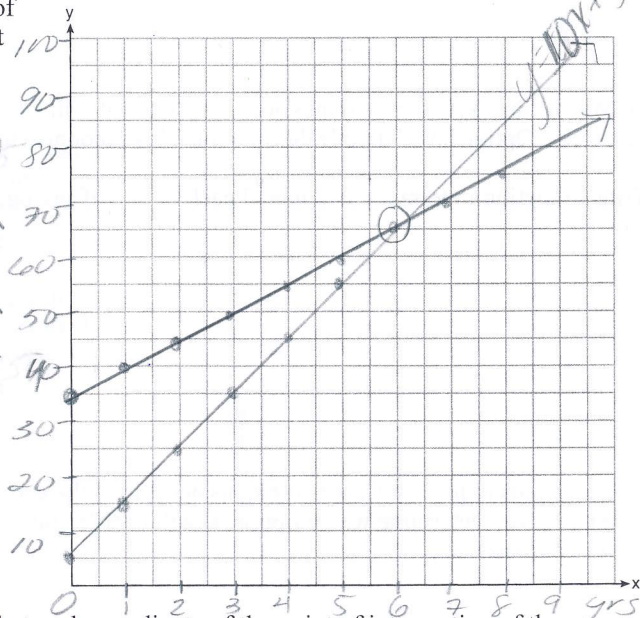
Write a system of equations to model this situation, where x represents the number of years since 2010.

$$y = 10x + 5$$

$$y = 5x + 35$$

Graph this system of equations on the set of axes.

x	y_1	y_2
0	5	35
1	15	40
2	25	45
3	35	50
4	45	55
5	55	60
6	65	65
7	75	70



Explain in detail what each coordinate of the point of intersection of these equations means in the context of this problem. # of yrs

(6, 65) in 6 yrs, 65 people are members of the chorus & swim team.

HW

3/18

classwork

3/22

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Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. 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 in the space provided. [48]

1. A part of Jennifer's work to solve the equation $2(6x^2 - 3) = 11x^2 - x$ is shown below.

Given: $2(6x^2 - 3) = 11x^2 - x$
Step 1: $12x^2 - 6 = 11x^2 - x$

Which property justifies her first step?

- (1) identity property of multiplication
- (2) multiplication property of equality
- (3) commutative property of multiplication
- (4) distributive property of multiplication over subtraction 1 4

2. Which value of x results in equal outputs for $j(x) = 3x - 2$ and $b(x) = |x + 2|$?

- (1) -2
- (2) 2 2 2
- (3) $\frac{2}{3}$
- (4) 4

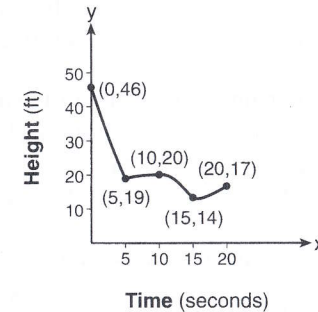
3. The expression $49x^2 - 36$ is equivalent to

- (1) $(7x - 6)^2$
- (2) $(24.5x - 18)^2$
- (3) $(7x - 6)(7x + 6)$ 3 3
- (4) $(24.5x - 18)(24.5x + 18)$

4. If $f(x) = \frac{1}{2}x^2 - (\frac{1}{4}x + 3)$, what is the value of $f(8)$?

- (1) 11
- (2) 17
- (3) 27 4 3
- (4) 33

5. The graph models the height of a remote-control helicopter over 20 seconds during flight.



Over which interval does the helicopter have the slowest average rate of change?

- (1) 0 to 5 seconds
- (2) 5 to 10 seconds 5 2
- (3) 10 to 15 seconds
- (4) 15 to 20 seconds

6. In the functions $f(x) = kx^2$ and $g(x) = |kx|$, k is a positive integer. If k is replaced by $\frac{1}{2}$, which statement about these new functions is true?

- (1) The graphs of both $f(x)$ and $g(x)$ become wider. 6 1
- (2) The graph of $f(x)$ becomes narrower and the graph of $g(x)$ shifts left.
- (3) The graphs of both $f(x)$ and $g(x)$ shift vertically.
- (4) The graph of $f(x)$ shifts left and the graph of $g(x)$ becomes wider.

20. How many of the equations listed below represent the line passing through the points (2, 3) and (4, -7)?

$$\begin{aligned} 5x + y &= 13 \\ y + 7 &= -5(x - 4) \\ y &= -5x + 13 \\ y - 7 &= 5(x - 4) \end{aligned}$$

- (1) 1 (2) 2 (3) 3 (4) 4 20 3

21. The Ebola virus has an infection rate of 11 % per day as compared to the SARS virus, which has a rate of 4% per day.

If there were one case of Ebola and 30 cases of SARS initially reported to authorities and cases are reported each day, which statement is true?

- (1) At day 10 and day 53 there are more Ebola cases.
 (2) At day 10 and day 53 there are more SARS cases.
 (3) At day 10 there are more SARS cases, but at day 53 there are more Ebola cases.
 (4) At day 10 there are more Ebola cases, but at day 53 there are more SARS cases.

21 _____

22. The results of a linear regression are shown below.

$$\begin{aligned} y &= ax + b \\ a &= -1.15785 \\ b &= 139.3171772 \\ r &= -0.896557832 \\ r^2 &= 0.8038159461 \end{aligned}$$

Which phrase best describes the relationship between x and y ?

- (1) strong negative correlation (3) weak negative correlation
 (2) strong positive correlation (4) weak positive correlation 22 _____

23. Abigail's and Gina's ages are consecutive integers. Abigail is younger than Gina and Gina's age is represented by x . If the difference of the square of Gina's age and eight times Abigail's age is 17, which equation could be used to find Gina's age?

- (1) $(x + 1)^2 - 8x = 17$ (3) $x^2 - 8(x + 1) = 17$
 (2) $(x - 1)^2 - 8x = 17$ (4) $x^2 - 8(x - 1) = 17$ 23 4

24. Which system of equations does *not* have the same solution as the system below?

$$\begin{aligned} 4x + 3y &= 10 \\ -6x - 5y &= -16 \end{aligned}$$

- (1) $-12x - 9y = -30$ (3) $24x + 18y = 60$
 $12x + 10y = 32$ $-24x - 20y = -64$
 (2) $20x + 15y = 50$ (4) $40x + 30y = 100$
 $-18x - 15y = -48$ $36x + 30y = -96$ 24 4

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. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. 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 teacher wrote the following set of numbers on the board:

$$a = \sqrt{20} \quad b = 2.5 \quad c = \sqrt{225}$$

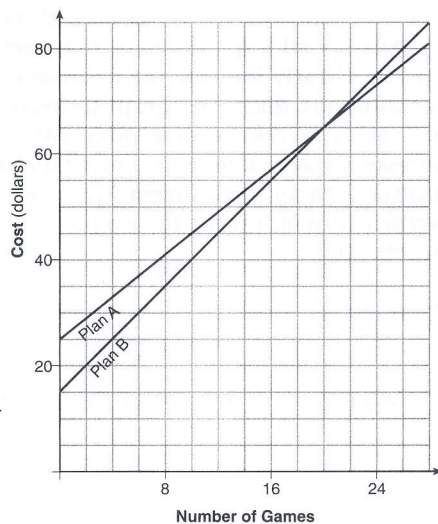
Explain why $a + b$ is irrational, but $b + c$ is rational.

26. Determine and state whether the sequence 1, 3, 9, 27, ... displays exponential behavior. Explain how you arrived at your decision.

27. Using the formula for the volume of a cone, express r in terms of V , h , and π .

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28. The graph models the cost of renting video games with a membership in Plan A and Plan B.



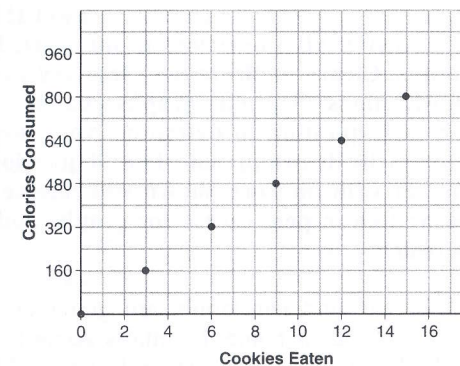
Explain why Plan B is the better choice for Dylan if he only has \$50 to spend on video games, including a membership fee.

Bobby wants to spend \$65 on video games, including a membership fee. Which plan should he choose? Explain your answer.

Classwork 3/22
#31, 32

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29. Samantha purchases a package of sugar cookies. The nutrition label states that each serving size of 3 cookies contains 160 Calories. Samantha creates the graph showing the number of cookies eaten and the number of Calories consumed.



Explain why it is appropriate for Samantha to draw a line through the points on the graph.

30. A two-inch-long grasshopper can jump a horizontal distance of 40 inches. An athlete, who is five feet nine, wants to cover a distance of one mile by jumping. If this person could jump at the same ratio of body-length to jump-length as the grasshopper, determine, to the nearest jump, how many jumps it would take this athlete to jump one mile.

31. Write the expression $5x + 4x^2(2x + 7) - 6x^2 - 9x$ as a polynomial in standard form.

$$5x + 8x^3 + 28x^2 - 6x^2 - 9x$$

$$8x^3 + 22x^2 - 4x$$

32. Solve the equation $x^2 - 6x = 15$ by completing the square.

$$3 \pm 2\sqrt{6}$$

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work

mini green regents review book

p. 11, p. 14 #20, 23, 24, p. 17 #31, 32

p. 11

2.) $j(x) = 3x - 2$

calc. $b(x) = |x + 2|$

x	j(x)	b(x)
-2	-8	0
2	4	4
$\frac{2}{3}$	0	2.6
4	10	6

6.) $f(x) = Kx^2$

$g(x) = |Kx|$

calc. substitute

K w/ $\frac{1}{2}$

wider

p. 14

20.) $5x + y = 13$

$-5x \quad -5x$

$y = -5x + 13 \checkmark$

calc. check pts

$y + 7 = -5(x - 4)$

$y = -7 - 5(x - 4) \checkmark$

calc.

4.) $f(x) = \frac{1}{2}x^2 - (\frac{1}{4}x + 3)$

calc.

$f(8) = \frac{1}{2}(8)^2 - [\frac{1}{4}(8) + 3]$

$= \frac{1}{2}(64) - [2 + 3]$

$= 32 - 5$

$f(8) = 27$

5.) average rate of change

is slope. $\rightarrow m = \frac{\Delta y}{\Delta x}$

x	y
5	19
10	20

$m = \frac{1}{5}$

slowest

x	y
10	20
15	14

$m = \frac{-6}{5}$

$m = -1.2$

23.) let

Gina's age = x

Abby's age = x - 1

gina's age - Abby's age

$(x) - 8(x - 1) = 17$

24.) $4x + 3y = 10$

$-6x - 5y = -16$

$\times 3 \quad -12x - 9y = -30 \checkmark$

$-\frac{1}{2} \rightarrow 12x + 10y = 32$

x	y
15	14
20	17

$m = \frac{3}{5}$

$\times 40x + 30y = 100$
 $36x + 30y = -96$
 should be +96

p. 17

factor

$$32.) x^2 - 6x = 15$$

$$\left(\frac{-b}{2}\right)^2 = \left(\frac{-(-6)}{2}\right)^2 = \boxed{9}$$

$$x^2 - 6x + \boxed{9} = 15 + \boxed{9}$$

$$\sqrt{(x-3)^2} = \sqrt{24}$$

$$x-3 = \pm \sqrt{24}$$

$$\begin{array}{r} +3 \quad +3 \\ \hline x = 3 \pm \sqrt{24} \end{array}$$

$$\downarrow$$

$$\boxed{x = 3 \pm 2\sqrt{6}}$$

$$\begin{array}{r} \sqrt{24} \\ \sqrt{4 \cdot 6} \\ 2\sqrt{6} \end{array}$$