

5 Josh graphed the function $f(x) = -3(x - 1)^2 + 2$. He then graphed the function $g(x) = -3(x - 1)^2 - 5$ on the same coordinate plane. The vertex of $g(x)$ is $(1, -5)$.

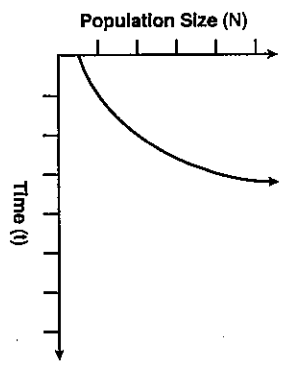
- (1) 7 units below the vertex of $f(x)$
- (2) 7 units above the vertex of $f(x)$
- (3) 7 units to the right of the vertex of $f(x)$
- (4) 7 units to the left of the vertex of $f(x)$

Use this space for computations.
 Congruent Calculator
 Check as well!
 pot equations in $y =$

6 A survey was given to 12th-grade students of West High School to determine the location for the senior class trip. The results are shown in the table below.

	Niagara Falls	Darien Lake	New York City	DTA
Boys	56	74	103	233
Girls	71	92	88	251
DTA	127	166	191	484

7 Which type of function is shown in the graph below?



- (1) Linear
- (2) exponential
- (3) square root
- (4) absolute value

Use this space for computations.

Assuming neither the total # of boys nor girls
 $\frac{56}{233} = .2403133170$
 $\frac{71}{251} = .282868526$
 $\frac{103}{484} = .2128099173$

Boys	Girls	Total
56	71	127
74	92	166
103	88	191
233	251	484

Standard form
 $(2x - 5)(2x + 3)$
 $(2x^2 + 3x - 10x - 15)$
 $(2x^2 - 7x - 15)$
 $2x^2 - 7x - 15x$
 OR
 $(2x - 5)(2x + 3)$
 $(2x^2 + 3x - 10x - 15)$
 $(2x^2 - 7x - 15)$
 $2x^2 - 7x - 15x$

8 The expression $16x^2 - 81$ is equivalent to $(4x - 9)(4x + 9)$.
 (1) $(8x - 9)(8x + 9)$
 (2) $(8x - 9)(8x - 9)$
 (3) $(4x - 9)(4x + 9)$
 (4) $(4x - 9)(4x - 9)$

9 The owner of a landscaping business wants to know how much time on average, his workers spend mowing lawns. Which is the most appropriate rate with which to calculate an answer to this question?
 (1) lawns per employee
 (2) lawns per day
 (3) employee per lawns
 (4) hours per lawn

10 A ball is thrown into the air from the top of a building. The height $h(t)$, of the ball above the ground t seconds after it is thrown can be modeled by $h(t) = -16t^2 + 64t + 80$. How many seconds after being thrown will the ball hit the ground?
 (1) 5
 (2) 2
 (3) 80
 (4) 144

12 When $(x^2 - 5)(2x + 3)$ is expressed as a polynomial in standard form, which statement about the resulting polynomial is true?
 (1) The constant term is 2.
 (2) The leading coefficient is 2.
 (3) The degree is 2.
 (4) The number of terms is 2.

13 The population of a city can be modeled by $P(t) = 3810(1.0035)^t$, where $P(t)$ is the population after t years. Which function is approximately equivalent to $P(t)$?
 (1) $P(t) = 3810(0.1427)^t$
 (2) $P(t) = 3810(1.0035)^t$
 (3) $P(t) = 26.670(0.1427)^t$
 (4) $P(t) = 26.670(1.0035)^t$

Can also put
 sec back
 into $\sqrt{\quad}$
 OR
 exponent rule:
 $(x^a)^b = x^{ab}$

$$L = \text{width}$$

$$w = \text{width}$$

$$L + 7 = \text{length}$$

$$\frac{L}{w} = \frac{L+7}{L}$$

$$L^2 = (L+7)w = A(L)$$

20 The length of a rectangular patio is 7 feet more than its width, w . The area of a patio, $A(w)$, can be represented by the function

- (1) $A(w) = w + 7$
- (2) $A(w) = w^2 + 7w$
- (3) $A(w) = 4w + 14$
- (4) $A(w) = 4w^2 + 28w$

Use this space for computations.

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. 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. [6]

25 If $g(x) = -4x^2 - 3x + 2$, determine $g(-2)$.

$g(x) = -4x^2 - 3x + 2$
 $g(-2) = -8$

OR

$$g(x) = -4x^2 - 3x + 2$$

$$g(-2) = -4(-2)^2 - 3(-2) + 2$$

$$g(-2) = -4(4) - 3(-2) + 2$$

$$g(-2) = -16 + 6 + 2$$

$$g(-2) = -8$$

OR

A plus sign

$$g(x) = -4x^2 - 3x + 2$$

$$g(-2) = -4(4) - 3(-2) + 2$$

$$g(-2) = -16 + 6 + 2$$

$$g(-2) = -8$$

21 A dolphin jumps out of the water and then back into the water. His jump could be graphed on a set of axes where x represents time and y represents distance above or below sea level. The domain for this graph is best represented using a set of

- (1) integers NOT
- (2) positive integers
- (3) real numbers NOT
- (4) positive real numbers

OR

put into calc to get solution points!

$$x - 4y = -10$$

$$x + y = 5$$

$$x - 4y = -10$$

$$x + y = 5$$

$$-5y = -15$$

$$y = 3$$

$$x + 3 = 5$$

$$x = 2$$

$(2, 3)$

23 Which interval represents the range of the function $h(x) = 2x^2 - 2x - 4$?

- (1) $(0, 5, \infty)$
- (2) $(-4, 5, \infty)$
- (3) $[0, 5, \infty)$
- (4) $[-4, 5, \infty)$

24 What is a common ratio of the geometric sequence whose first term is 5 and third term is 245?

- (1) 7
- (2) 49
- (3) 120
- (4) 240

OR

guess + check

$$a_1 = 5$$

$$a_2 = 245$$

$$a_3 = 245$$

$$r = \frac{245}{5} = 49$$

26 A student is in the process of solving an equation. The original equation and the first step are shown below.

Original: $3a + 6 = 2 - 5a + 7$
 Step one: $3a + 6 = 2 + 7 - 5a$

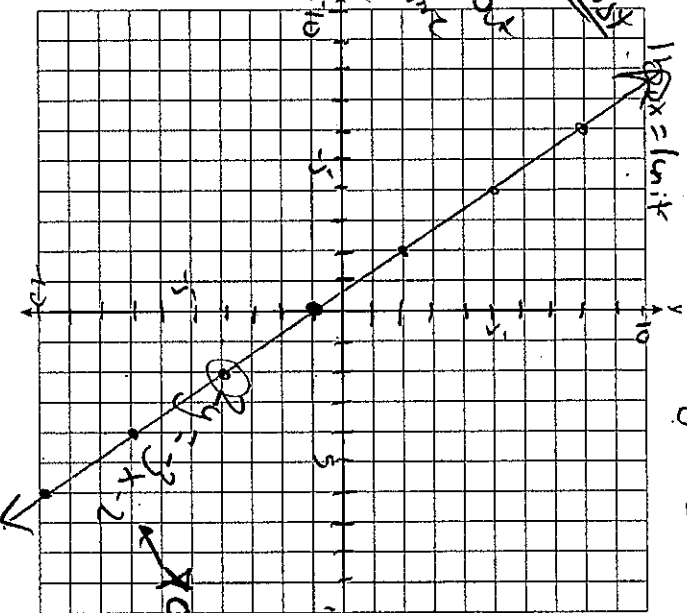
Which property did the student use for the first step? Explain why this property is correct.

Commutative Property of Addition
 b/c the order of the terms $-5a + 7$ is switched from the original to step one. Prop: $a + b = b + a$.

27 On the set of axes below, graph the line whose equation is $2y = -3x - 2$.

$y = -\frac{3}{2}x - 1$

$m = -\frac{3}{2}$
 $b = -1$



OR

x	y
-2	0
0	-1
2	-2
4	-3
6	-4

This linear equation contains the point (2, k). State the value of k.

$x = 2$
 $2y = -3x - 2$
 $2y = -3(2) - 2$
 $2y = -6 - 2$
 $2y = -8$
 $y = -4$

OR
 $(2, -4)$
 $k = -4$

Check: $2y = -3x - 2$
 $2(-4) = -3(2) - 2$
 $-8 = -6 - 2$
 $-8 = -8$

28 The formula $a = \frac{v_f - v_i}{t}$ is used to calculate acceleration as the change in velocity over the period of time.

Solve the formula for the final velocity, v_f , in terms of initial velocity, v_i , acceleration, a , and time, t .

$$t \left(a \right) = \frac{v_f - v_i}{t} \quad \text{get rid of } t \text{ (x)}$$

$$at = v_f - v_i + v_i$$

$$v_f = at + v_i$$

or

~~$$a = \frac{v_f - v_i}{t}$$~~

$$at = v_f - v_i + v_i$$

$$v_f = at + v_i$$

→ must have () at numerator is a binomial

29 Solve $\frac{3}{5}x + \frac{1}{3} < \frac{4}{5}x - \frac{1}{3}$ for x .

$$\frac{3}{5}x + \frac{1}{3} < \frac{4}{5}x - \frac{1}{3}$$

$$\frac{1}{3} < \frac{1}{5}x - \frac{1}{3}$$

$$\left(\frac{5}{7} \right) \frac{2}{3} < \frac{1}{5}x \quad (5)$$

10 < x. careful when switching order, switch sign and so

$$x > \frac{10}{3}, \text{ or } x > 3 \frac{1}{3}$$

inverts the original

$$\frac{3}{5}x + \frac{1}{3} < \frac{4}{5}x - \frac{1}{3}$$

$$\frac{3}{5}x + \frac{2}{3} < \frac{4}{5}x - \frac{2}{3}$$

$$\left(\frac{5}{5} \right) \frac{2}{3} < \frac{1}{5}x \quad (5)$$

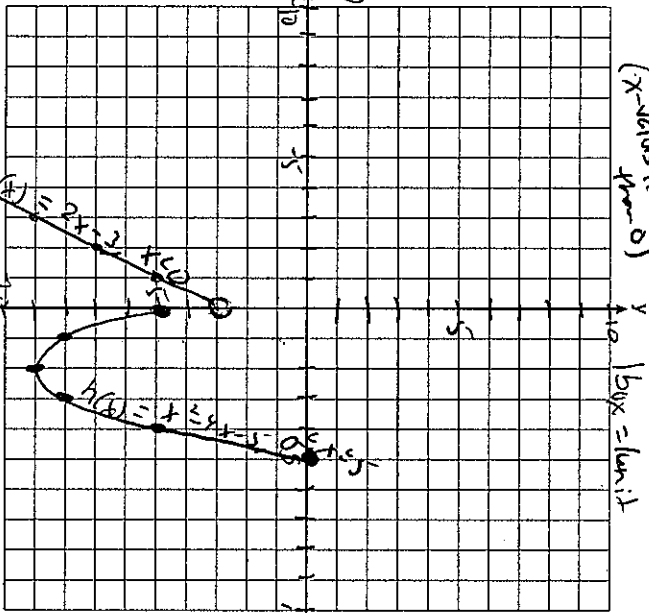
$$\frac{10}{3} < x$$

Cor Calc 111
 32
 Math

Part III

32 Graph the function: $h(x) = (2x-3)(x-5)$
 $h(x) = 2x^2 - 13x + 15$

$x < 3$ opp use dots left of 0
 $m: \frac{2}{1} \rightarrow$
 $B: -3$
 OR
 $x < 5$ opp use dots left of 0
 $m: \frac{2}{1} \rightarrow$
 $B: -3$



x	h(x)
0	-5
1	-8
2	-9
3	-8
4	-5
5	0

closed

OR The graph is a function
 It is not continuous
 it is discontinuous b/c
 there is a break. You must
 pick up your pencil to
 graph/trace it

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. 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]

33 On the set of axes below, graph the following system of inequalities:

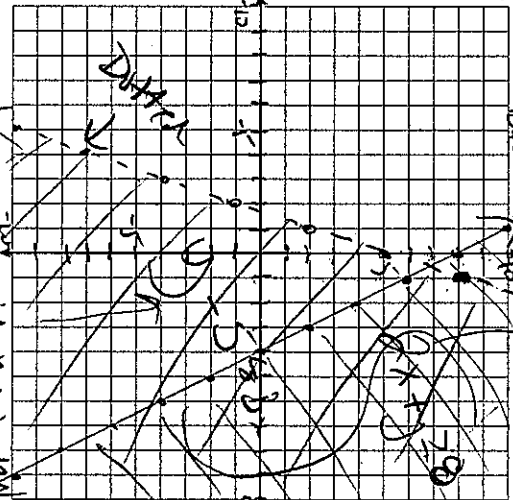
$2x + y \geq 8$
 $y \geq -2x + 8$

$2x + y \geq 8$
 $y - 5 < 3x$

$-5 < 3x$
 $y + 5 < 3x$

$y \geq -2x + 8$
 $m = -2, b = 8$
 • shade above
 $y - 1x$

$y < 3x + 5$
 $m = 3, b = 5$
 • shade below
 $y - 1x$



Determine if the point (1, 8) is in the solution set. Explain your answer.
 NO (1, 8) is not a solution point b/c it is on the dotted line and a dotted line means not equality, so therefore any point on that line is not a solution because it

Does not satisfy both inequalities.

$2x + y \geq 8$
 $2(1) + 8 \geq 8$
 $10 \geq 8$
 ✓

$y - 5 < 3x$
 $8 - 5 < 3(1)$
 $3 < 3$
 ✗

of the time $A = P(1 + r)^t$ P r t time interest

34 On the day Alexander was born, his father invested \$5000 in an account with a 1.2% annual growth rate. Write a function, $A(t)$, that represents the value of this investment t years after Alexander's birth.

positive x

$$A(t) = 5000(1 + 0.012)^t$$

$$A(t) = 5000(1 + 0.012)^t$$

$$A(t) = 5000(1.012)^t$$

100% $n=t$

Determine, to the nearest dollar, how much more the investment will be worth when Alexander turns 32 than when he turns 17.

nearest \$ $x=32$ $x=17$

Subtraction

$$A(32) = 5000(1.012)^{32}$$

$$A(17) = 5000(1.012)^{17}$$

$$A(32) - A(17) = 7323.967433 - 6129.049644$$

at age 32 $x=32$ $x=17$

17	6129
32	7324

7323.967433 - 6129.049644 = 1199.917587

round up to next dollar \rightarrow \$1200 more

Pen Show $5000(1.012)^{32} - 5000(1.012)^{17} = 1200$

Algebra I - Aug '19 OS appropriate work no. 0.012

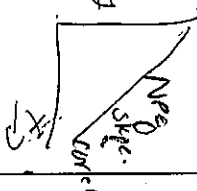
35 Stephen collected data from a travel website. The data included a hotel's distance from Times Square in Manhattan and the cost of a room for one weekend night in August. A table containing these data appears below.

Distance From Times Square (city blocks) (x)	Cost of a Room (dollars) (y)
0	293
0	263
1	244
1	224
3	185
4	170
7	219
11	153
14	136
19	111

Write the linear regression equation for this data set. Round all values to the nearest hundredth.

$$y = -7.76x + 246.34$$

$$r = -0.88$$



State the correlation coefficient for this data set, to the nearest hundredth.

Put #s in to calc $r = -0.88$

STAT $r = -0.88$

Y-axis Cost X-axis Distance

Distance \rightarrow X-axis Cost \rightarrow Y-axis

NEG slope \rightarrow NEG correlation

Explain what the sign of the correlation coefficient suggests in the context of the problem.

must use words from the problem. don't make it up.

The negative sign suggests a negative correlation. As the distance from Times Square increases, the cost of a room decreases.

The correlation coeff. shows a strong negative linear relationship.

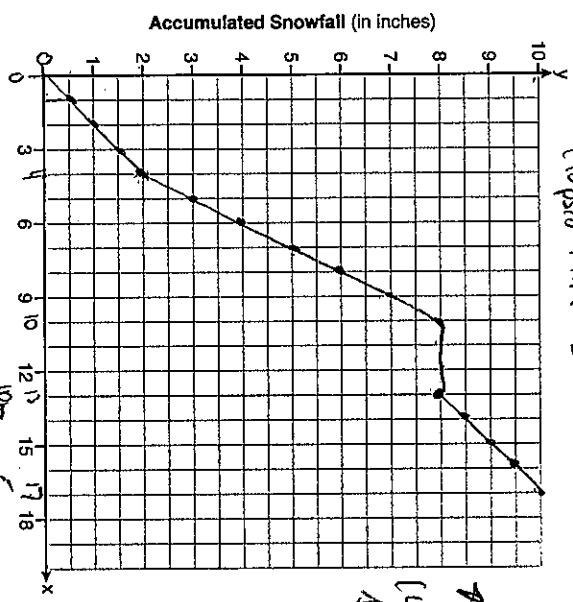
Algebra I - Aug '19

For also say that "the cost of a hotel room gets down the further it is away from Times Square"

4 hrs 6 hrs
 0-4 hrs 4-10 hrs
 1/2 in per hr 1 in per hr
 hr 4 = 2 in per hr hr 10 = 8 in per hr
 snow 2 in snow 6 in snow 10 in snow 12 in
 snow 2 in snow 6 in snow 10 in snow 12 in
 snow 2 in snow 6 in snow 10 in snow 12 in

30" snowstorm started at midnight. For the first 4 hours, it snowed at an average rate of one-half inch per hour.
 hr 4 = 2 inches
 The snow then started to fall at an average rate of one inch per hour for the next 6 hours. hr 10 = 8 in
 Then it stopped snowing for 3 hours. hr 13 = 8 in
 Then it started snowing again at an average rate of one-half inch per hour for the next 4 hours until the storm was over.

On the set of axes below, graph the amount of snow accumulated over the time interval of the storm.



Elapsed Time vs Accumulated Snowfall

Determine the average rate of snowfall over the length of the storm. State the rate, to the nearest hundredth of an inch per hour.
 A.P.O.C.
 Start to finish $x_2 = 17$
 $f(x_2) - f(x_1)$ $x_1 = 0$
 $f(17) - f(0)$
 $10 - 0$
 $17 - 0$
 $\frac{10}{17} \approx 0.59$
 -59 in/hr

3.75(12-D) + 2.50D = 35
 45 - 3.75D + 2.50D = 35
 45 - 1.25D = 35
 -1.25D = -10
 D = 8
 Part IV
 1.25
 -1.25
 D = 8

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 Alysa spent \$35 to purchase 12 chickens. She bought two different types of chickens. Americana chickens cost \$3.75 each and Delaware chickens cost \$2.50 each.

Write a system of equations that can be used to determine the number of Americana chickens (A) and the number of Delaware chickens (D) she purchased.

$A + D = 12$
 $3.75A + 2.50D = 35$

Determine algebraically how many of each type of chicken Alysa purchased.

$3.75(A + D) = 35$
 $3.75A + 3.75D = 35$
 $-1(3.75A + 2.50D = 35)$
 $\rightarrow 3.75A + 3.75D = 35$
 $\rightarrow -3.75A - 2.50D = -35$
 $1.25D = 10$
 $D = 8$

$A + D = 12$
 $A + 8 = 12$
 $-A = -4$
 $A = 4$

4 Americana Chickens
8 Delaware Chickens

Each Americana chicken lays 2 eggs per day and each Delaware chicken lays 1 egg per day. Allisa only sells eggs by the full dozen for \$2.50. Determine how much money she expects to take in at the end of the first week with her 12 chickens.

Americana Chickens
 4 Chickens
 8 Chickens
 16(2) = 32
 8(1) = 8
 12 eggs = 1 full dozen
 12(2.50) = 30
 9 full dozen
 9(30) = 270
 270 + 30 = 300
 She will make \$300 at the end of the first week.

$4(2) = 8 \rightarrow 8 \times 7 = 56$
 $8(1) = 8 \rightarrow 8 \times 7 = 56$
 total
 112