Children First Network 603

PRACTICE REGENTS HIGH SCHOOL EXAMINATION

ALGEBRA I (COMMON CORE)

Practice Exam

Student Name: Answer Key

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 graphs and drawings, which should be done in pencil. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. 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.

ALGEBRA I (COMMON CORE)

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?

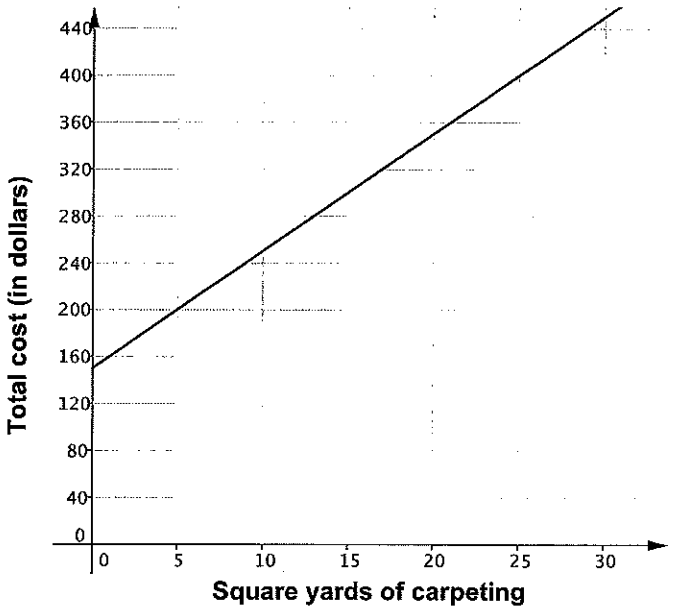
(1) $c = 25p + 1.75n + 5g$

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

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

(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

(2) y-intercept of the graph

(3) Domain of the function

(4) Range of the function

Children First Network 603
Algebra I (Common Core)
Practice Exam

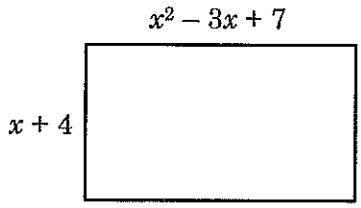
ANSWER KEY

1) 2
2) 1
3) 2
4) 2
5) 4
6) 4
7) 4
8) 1
9) 1
10) 1
11) 3
12) 4
13) 2
14) 2
15) 1
16) 4
17) 3
18) 1
19) 2
20) 1
21) 3
22) 3
23) 3
24) 3

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.

$A = (L)(w)$

$= (x+4)(x^2 - 3x + 7)$

$= x(x^2 - 3x + 7) + 4(x^2 - 3x + 7)$

$= x^3 - 3x^2 + 7x + 4x^2 - 12x + 28$

$= x^3 + x^2 - 5x + 28$

Answer: $x^3 + x^2 - 5x + 28$

26 Determine all zeroes of the function $f(x) = x^3 + 3x^2 - 4x - 12 = (x + 3)(x^2 - 4)$ algebraically.

$f(x) =$

$x^3 + 3x^2 - 4x - 12 = (x+3)(x^2-4)$

$x^3 + 3x^2 - 4x - 12 = x(x^2-4) + 3(x^2-4)$

$= x^3 - 4x + 3x^2 - 12$

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

$= (x+3)(x+2)(x-2)$

$x+3=0$	$x+2=0$	$x-2=0$
$x=-3$	$x=-2$	$x=2$

$\{-3, -2, 2\}$

Answer: $\{-3, -2, 2\}$

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.

$S + M = 26$

$1.25S + 2.75M = 55$

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

$S = 26 - M$

$1.25(26 - M) + 2.75M = 55$

$32.5 - 1.25M + 2.75M = 55$

$32.5 + 1.5M = 55$

$-32.5 \quad -32.5$

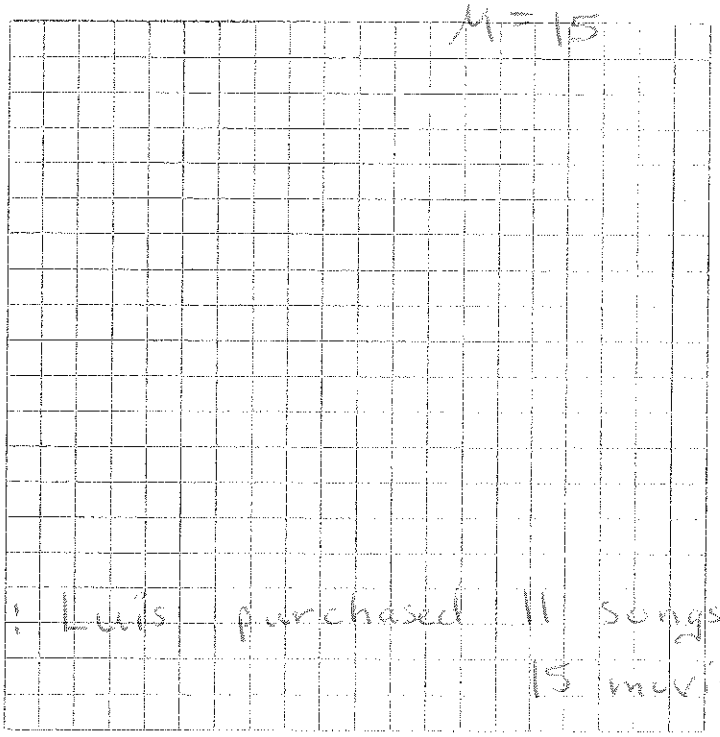
$\frac{1.5M}{1.5} = \frac{22.5}{1.5}$

$M = 15$

$S = 26 - M$

$= 26 - 15$

$S = 11$



Answer: Luis purchased 11 songs & 15 movies.

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

$$ax = 15 + bx$$
$$-bx \quad -bx$$

$$ax - bx = 15$$
$$\frac{x(a-b)}{a-b} = \frac{15}{a-b}$$
$$x = \frac{15}{a-b}$$

Answer: $x = \frac{15}{a-b}$

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

$$x^2 + 10 = 5x$$
$$-5x \quad -5x$$

$$x^2 - 5x + 10 = 0$$

$a = 1 \quad b = -5 \quad c = 10$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(10)}}{2(1)}$$

$$= \frac{5 \pm \sqrt{25 - 40}}{2}$$

$$= \frac{5 \pm \sqrt{-15}}{2}$$

$\therefore$ no real solutions

Answer: Yes, Terry is correct.

30 Tyona is performing a biology experiment in which she is studying how the number of bacteria in a dish changes over time. The initial number of bacteria in the dish was 1150, and after several hours of monitoring, Tyona was able to determine that the number of bacteria was doubling at the end of each hour.

Write a function, b(t), that Tyona can use to determine the number of bacteria in the dish after t hours.

$b(t) = 1150(1+.5)^t$

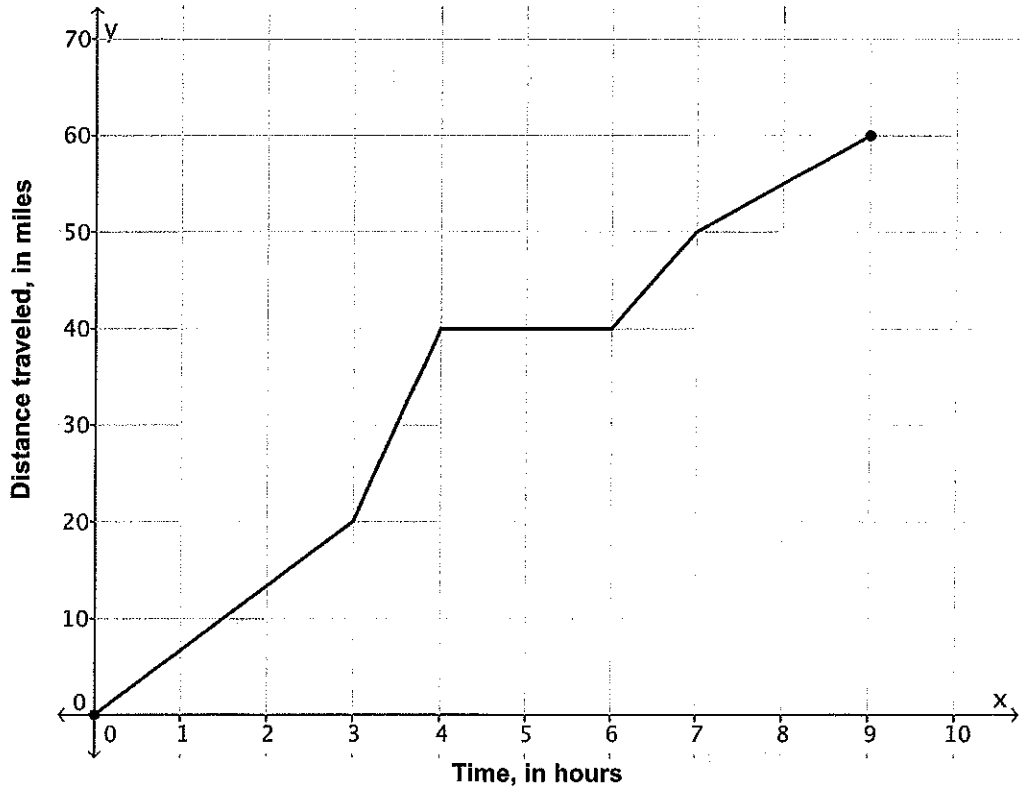
Use the function to determine how many bacteria Tyona can expect after 10 hours.

$b(10) = 1150(1+.5)^{(10)}$

$= 66314.79492$

≈ 66315

31 Sarah went on a bike ride. The graph below shows the distance, y, in miles, that she had traveled after biking for x hours.



State the domain and range of the function shown in the graph.

Domain $0 \leq x \leq 9$

Range $0 \leq y \leq 60$

State the interval of time during which Sarah was riding the fastest, and explain how you know.

between 3 & 4 hours

because in that 1 hour time frame Sarah rode 20 miles

32 Use a method of completing the square in order to rewrite the function $f(x) = x^2 + 5x - 2$ in vertex form, $f(x) = a(x - h)^2 + k$, where (h, k) is the vertex of the parabola.

$x^2 + 5x - 2 = 0$

$\left(\frac{5}{2}\right)^2 = \frac{25}{4}$

$x^2 + 5x + \frac{25}{4} = 2 + \frac{25}{4}$

$\sqrt{(x + 2.5)^2} = \pm\sqrt{8.25}$

$x + 2.5 = \pm\sqrt{8.25}$

$x^2 + 5x - 2 = 0$

$x^2 + 5x + 6.25 - 2 - 6.25 = 0$

$(x + 2.5)^2 - 8.25 = 0$

$f(x) = (x + 2.5)^2 - 8.25$

State the exact value of the vertex.

$(-2.5, -8.25)$

or

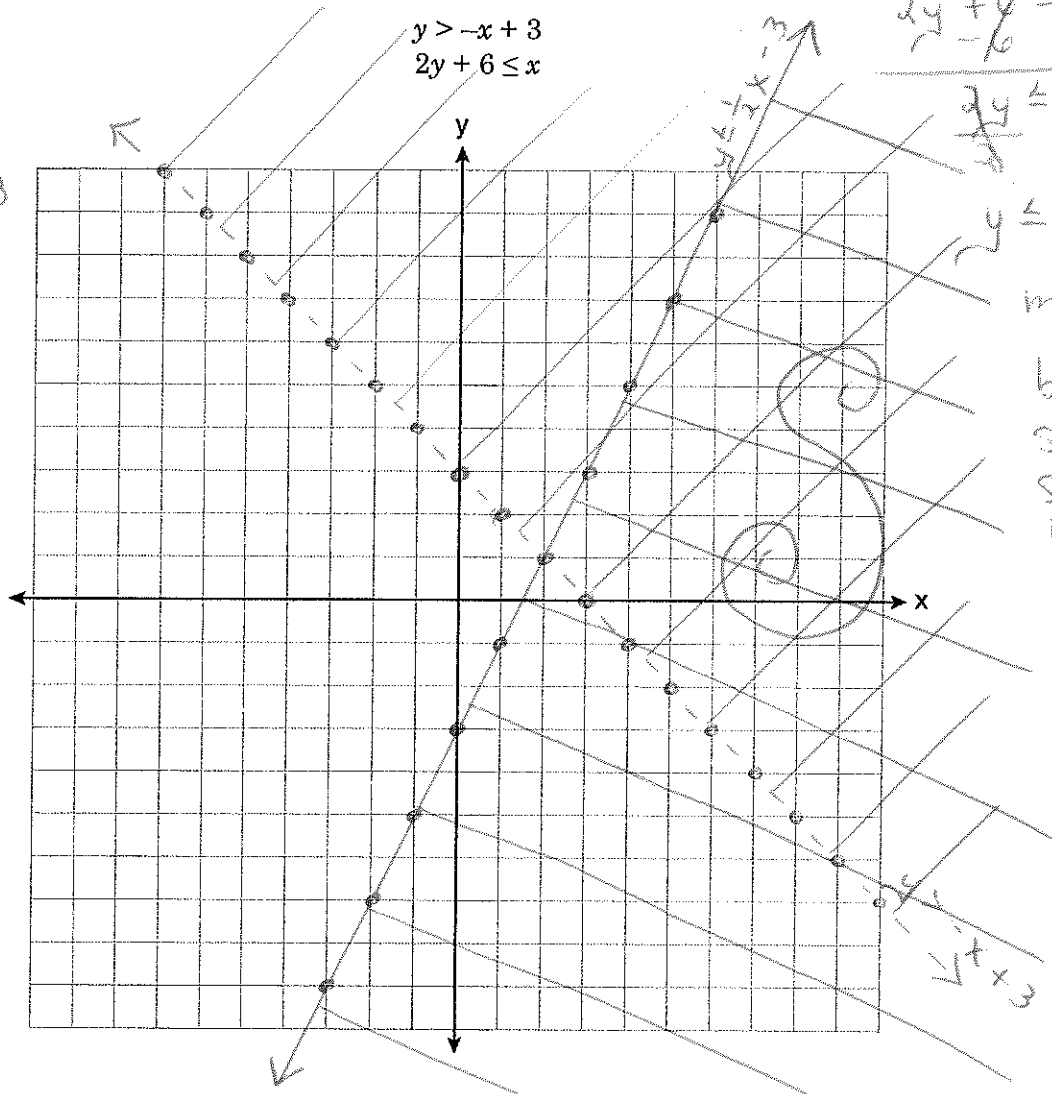
$\left(-\frac{5}{2}, -\frac{33}{4}\right)$

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.

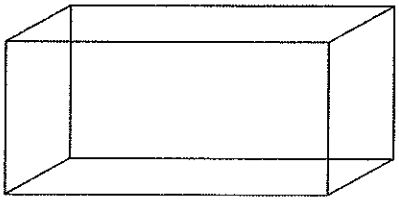
$y > -x + 3$
$2y + 6 \leq x$



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

No Larry is not correct. The point (4, –1) sits on the line for the inequality $y > -x + 3$ but because that point is not in the solution set for that inequality (because > indicates none of the points on the line are included in its solution set) it is not in the solution set for the inequality

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.

$w = l + 6$

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

$V = (l)(w)(h)$

$60 = (l)(l+6)(3)$

$l(l+6)(3) - 60 = 0$

$3(l^2+6l) - 60 = 0$

$3l^2 + 18l - 60 = 0$

$3(l^2 + 6l - 20) = 0$

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

$3(l^2 + 6l - 20) = 0$

$a = 1$

$b = 6$

$c = -20$

$$l = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-6 \pm \sqrt{36 - 4(-20)}}{2}$$

$$= \frac{-6 \pm \sqrt{36 + 80}}{2}$$

$$= \frac{-6 \pm \sqrt{116}}{2}$$

$$= \frac{-6 \pm 2\sqrt{29}}{2}$$

$$= -3 \pm \sqrt{29}$$

$-3 - \sqrt{29}$ Reject because length can't be negative

Answer: $l = -3 + \sqrt{29}$

35 Find the first five terms of the recursive sequence defined by the function below.

$f(n) = 2f(n-1) + 3n$, where $f(1) = -2$

$f(1) = -2$

① $f(n) = 2f(n-1) + 3n$
$f(2) = 2f(2-1) + 3(2)$
$= 2f(1) + 6$
$= 2(-2) + 6$
$= -4 + 6$
$f(2) = 2$

② $f(n) = 2f(n-1) + 3n$
$f(3) = 2f(3-1) + 3(3)$
$= 2f(2) + 9$
$= 2(2) + 9$
$= 4 + 9$
$f(3) = 13$

③ $f(n) = 2f(n-1) + 3n$
$f(4) = 2f(4-1) + 3(4)$
$= 2f(3) + 12$
$= 2(13) + 12$
$= 26 + 12$
$f(4) = 38$

④ $f(n) = 2f(n-1) + 3n$
$f(5) = 2f(5-1) + 3(5)$
$= 2f(4) + 15$
$= 2(38) + 15$
$= 76 + 15$
$= 91$

⑤ $f(n) = 2f(n-1) + 3n$
$f(6) = 2f(6-1) + 3(6)$
$= 2f(5) + 18$
$= 2(91) + 18$
$= 182 + 18$
$= 200$

200

Is the sequence arithmetic, geometric, or neither? Explain your response.

increases by same amount each time

~~multiplied~~ by the same value each time

neither

2 13 38

+11 +25

$\times \frac{13}{2}$ $\times \frac{38}{13}$

ON CALC:

MODE

FUNC PAR POL SEQ

Y=

nMin = 1

u(n) = 2u(n-1) + 3n

x, T, Θ, n

u(nMin) = -2

2nd GRAPH to get to table

36 Tom lives in a town 360 miles directly north of New York City, and one Saturday, he takes the train from his town to the city. The train travels at a constant speed, and after 2.5 hours, he sees a sign that states, "New York City: 210 miles."

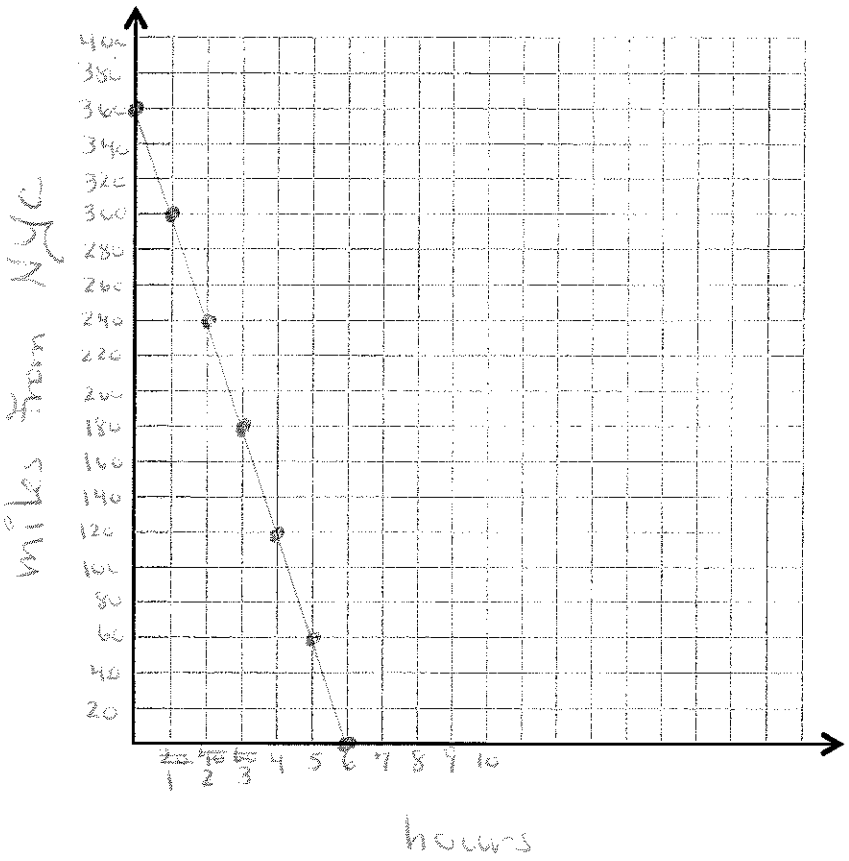
Write an equation to represent d(x), the distance Tom is from New York City after x hours.

hrs (x) | miles (y)
0 | 360
2.5 | 210

linear regression

$y = -60x + 360$

Graph and label d(x) on the set of axes below.



Using either your equation or your graph, determine how many hours it takes the train to get to New York City.

table

x	y
0	360
1	300
2	240
3	180
4	120
5	60
6	0

OR

$y = -60x + 360$

$0 = -60x + 360$

$-360 \quad -360$

$\frac{-360}{-60} = \frac{-60x}{-60}$

$x = 6$

Answer: 6 hours

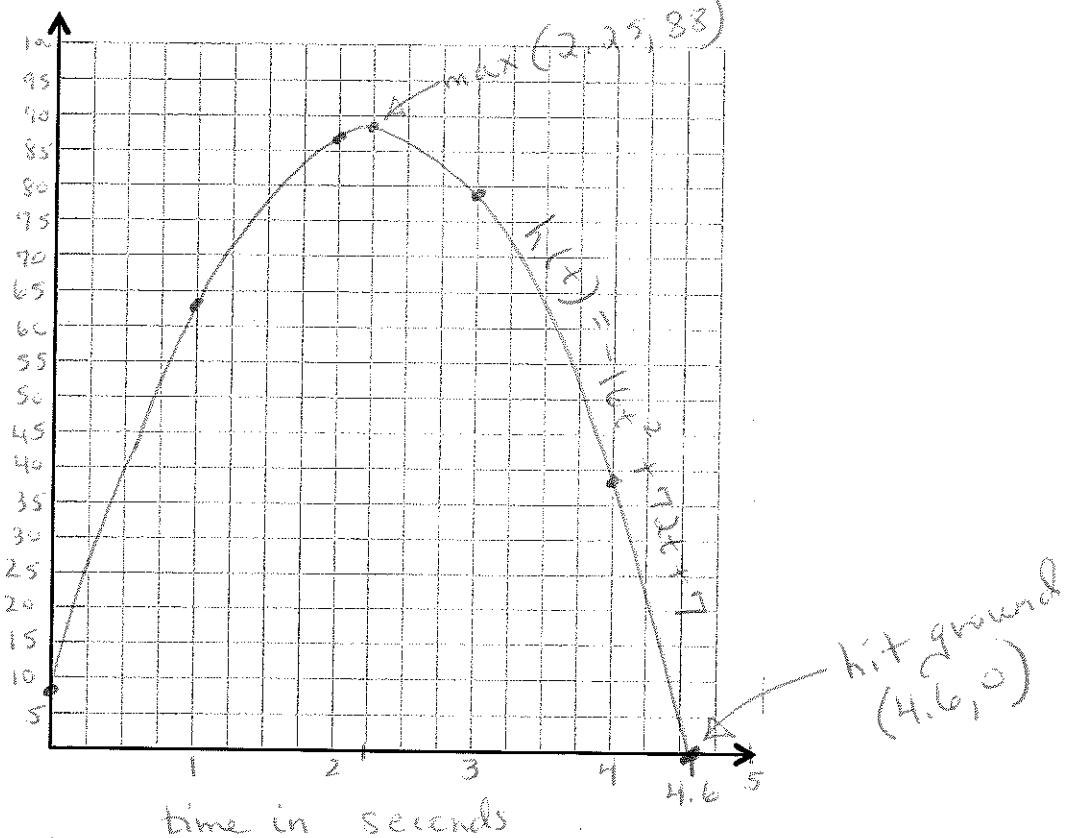
Part IV

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. A correct numerical answer with no work shown will receive only 1 credit. The answer should be written in pen, except for graphs and drawings, which should be done in pencil. [6]

37 As part of his science fair project, Jordan launched a model rocket from a platform in the middle of a field. The function $h(t) = -16t^2 + 72t + 7$ represents the height, in feet, of the rocket, and t represents the time, in seconds, since the rocket was launched.

Graph and label $h(t)$ on the grid below from the time the rocket is launched ($t = 0$) until it hits the ground.

x	y
0	7
1	63
2	87
3	79
4	39
5	-33
4.595	0



Determine the maximum height of the rocket *and* the time it takes the rocket to reach that height. Label the point on your graph that represents when this occurs.

(2.2499991, 88)

max height = 88 feet

2nd CALC 4: max

State how long it takes the rocket to hit the ground *to the nearest tenth of a second.* Label the point on your graph that represents when this occurs.

$x = 4.595$ seconds

$x \approx$ 4.6 seconds

2nd CALC 2: zero

Tear Here

Tear Here

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