

# I ALGEBRA I

Tuesday, June 12, 2018 — 1:15 to 4:15 p.m., only

Student Name 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 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.

I ALGEBRA I

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. [46]

1 The solution to  $4p + 2 < 2(p + 5)$  is

- (1)  $p > -6$
- (2)  $p < -6$
- (3)  $p > 4$
- (4)  $p < 4$

Use this space for computations.

$$\begin{array}{r} 1) \ 4p + 2 < 2(p + 5) \\ 4p + 2 < 2p + 10 \\ -2p < 8 \\ \hline 2p + 2 < 10 \\ 2p < 8 \\ \hline p < 4 \end{array}$$

2 If  $k(x) = 2x^2 - 3\sqrt{x}$ , then  $k(9)$  is

- (1) 315
- (2) 307
- (3) 159
- (4) 153

3 The expression  $3(6x^2 + 2x - 3) - 4(4x^2 - 7x + 5)$  is equivalent to

- (1)  $-13x - 22x + 11$
- (2)  $-13x^2 + 34x - 29$
- (3)  $19x^2 - 22x + 11$
- (4)  $19x^2 + 34x - 29$

4 The zeros of the function  $p(x) = x^2 - 2x - 24$  are

- (1) -8 and 3
- (2) -6 and 4
- (3) -4 and 6
- (4) -3 and 8

5) replace p(x) with 0 + solve

$$\begin{aligned} p(x) &= x^2 - 2x - 24 \\ 0 &= x^2 - 2x - 24 \\ 0 &= (x - 6)(x + 4) \end{aligned}$$

$x - 6 = 0$	$x + 4 = 0$
$x = 6$	$x = -4$

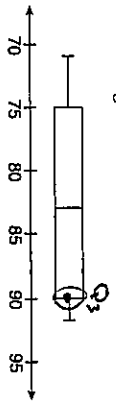
2)  $k(x) = 2x^2 - 3\sqrt{x}$

$$\begin{aligned} k(9) &= 2(9)^2 - 3\sqrt{9} \\ k(9) &= 2 \cdot 81 - 3 \cdot 3 \\ k(9) &= 2 \cdot 81 - 9 \\ k(9) &= 162 - 9 \\ k(9) &= 153 \end{aligned}$$

3)  $3(x^2 + 2x - 3) - 4(4x^2 - 7x + 5)$

$$\begin{aligned} &3x^2 + 6x - 9 - 16x^2 + 28x - 20 \\ &-13x^2 + 34x - 29 \end{aligned}$$

5 The box plot below summarizes the data for the average monthly high temperatures in degrees Fahrenheit for Orlando, Florida.



The third quartile is

- (1) 92
- (2) 90
- (3) 83
- (4) 71

Use this space for computations.

6 Joy wants to buy strawberries and raspberries to bring to a party. Strawberries cost \$1.60 per pound and raspberries cost \$1.75 per pound. If she only has \$10 to spend on berries, which inequality represents the situation where she buys  $x$  pounds of strawberries and  $y$  pounds of raspberries?

- (1)  $1.60x + 1.75y \leq 10$
- (2)  $1.60x + 1.75y \geq 10$
- (3)  $1.75x + 1.60y \leq 10$
- (4)  $1.75x + 1.60y \geq 10$

almost \$10:  $\leq 10$   
 $1.60x + 1.75y \leq 10$   
 cost of strawberries      cost of raspberries

7 On the main floor of the Kodak Hall at the Eastman Theater, the number of seats per row increases at a constant rate. Steven counts 31 seats in row 3 and 37 seats in row 6. How many seats are there in row 20?

- (1) 65
- (2) 67
- (3) 69
- (4) 71

Constant rate =  $\frac{37-31}{6-3} = 2$   
 $n = \frac{y-d}{r}$   
 $n = \frac{37-31}{2} = 3$   
 Constant slope or  $d = 2$   
 $a_n = a_1 + (n-1)d$   
 $a_3 = 31 = a_1 + (3-1)(2)$   
 $31 = a_1 + 4$   
 $a_1 = 27$   
 $a_{20} = 27 + (20-1)(2) = 65$

Row #	# of seats
1	27
2	29
3	31
4	33
5	35
6	37
7	39
8	41
9	43
10	45
11	47
12	49
13	51
14	53
15	55
16	57
17	59
18	61
19	63
20	65

Put equation into  $y = d$  then go to  $x$  solve  
 $f(x) = x^2 - 3x + 4$   
 $6 = (-1)^2 - 3(-1) + 4$   
 $6 = 1 - 3(-1) + 4$   
 $6 = 1 + 3 + 4$   
 $6 = 8$  calc. error

Another way to get  $a_1$ :  
 plug in  $(3, 31)$   $nd = 2$   
 into the explicit formula and solve  
 $a_n = a_1 + (n-1)d$   
 $31 = a_1 + (3-1)2$   
 $31 = a_1 + 4$   
 $31 - 4 = a_1$   
 $27 = a_1$

Algebra 1 - June 18  
 $a_n = a_1 + (n-1)d$   
 $31 = a_1 + (3-1)2$   
 $31 = a_1 + 4$   
 $31 - 4 = a_1$   
 $27 = a_1$

Algebra 1 - June 18  
 $x^2 - 6x + 9 = 12 + \left(\frac{-6}{2}\right)^2$   
 $x^2 - 6x + 9 = 12 + 9$   
 $x^2 - 6x + 9 = 21$   
 $(x-3)^2 = 21$   
 $p = -3$

9 Students were asked to name their favorite sport from a list of basketball, soccer, or tennis. The results are shown in the table below.

	Basketball	Soccer	Tennis	Total
Girls	42	58	20	120
Boys	84	41	5	130
Total	126	99	25	250

- (1) 39.6%
- (2) 41.4%
- (3) 50.4%
- (4) 58.6%

$x^2 - 14x + 49$   
 $(x-7)(x-7)$  or  $(x-7)^2$

$\frac{99}{250} = .396 = 39.6\%$

10 The trinomial  $x^2 - 14x + 49$  can be expressed as

- (1)  $(x-7)^2$
- (2)  $(x+7)^2$
- (3)  $(x-7)(x+7)$
- (4)  $(x-7)(x+9)$

11 A function is defined as  $(0, 1), (2, 3), (5, 8), (7, 2)$ . Isaac is asked to create one more ordered pair for the function. Which ordered pair can he add to the set to keep it a function?

- (1)  $(0, 2)$
- (2)  $(5, 3)$
- (3)  $(7, 0)$
- (4)  $(1, 3)$

$x^2 - 6x + 9 = 12 + \left(\frac{-6}{2}\right)^2$   
 $x^2 - 6x + 9 = 12 + 9$   
 $x^2 - 6x + 9 = 21$   
 $(x-3)^2 = 21$   
 $p = -3$

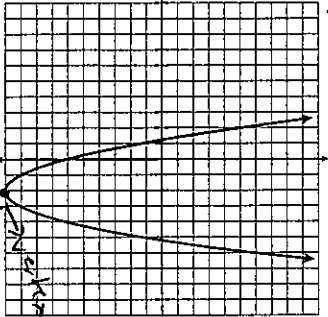
Algebra 1 - June 18  
 $a_n = a_1 + (n-1)d$   
 $31 = a_1 + (3-1)2$   
 $31 = a_1 + 4$   
 $31 - 4 = a_1$   
 $27 = a_1$

look for symmetry  
 \* minimum is the y-value  
 of the vertex

13 Which of the quadratic functions below has the smallest minimum value?

min:  $y = x^2 + 2x - 6$   
 min:  $y = x^2 + 5(x + 2)$   
 min:  $y = x^2 + 5x + 2$

$x$	$h(x)$
-3	-3
-2	-4
-1	-7
0	-6
1	-3
2	2
3	9



$x$	$f(x)$
-1	-2
0	-5
1	-6
2	-5
3	-2

$x$	$k(x)$
-5	0
-4.5	-1.25
-4	-2
-3.5	-2.25
-3	-2
-2.5	-1.25
-2	0

2nd function  
 $\Delta T = 1.5$   
 vertex

(2) min:  $y = -10$

14 Which situation is not a linear function?

- (1) A gym charges a membership fee of \$10.00 down and \$10.00 per month.
- (2) A cab company charges \$2.50 initially and \$3.00 per mile.
- (3) A restaurant employee earns \$12.50 per hour.
- (4) A \$12,000 car depreciates 15% per year.

exponential rate of change!  
 exponential decay

constant rates of change means linear function

Use this space for computations.

Use the conversions to solve the formula page!

15 The Uten Boatermaker is a 15-kilometer road race. Sara is signed up to run this race and has done the following training runs:

- I. 10 miles
- II. 44,880 feet
- III. 15,560 yards

Which run(s) are at least 15 kilometers?

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

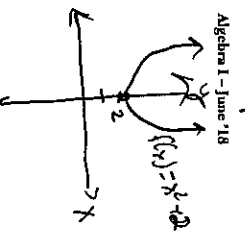
$\geq 15$

16 If  $f(x) = x^2 + 2$ , which interval describes the range of this function?

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

17 The amount Mike gets paid weekly can be represented by the expression  $2,500a + 290$ , where  $a$  is the number of cell phone accessories he sells that week. What is the constant term in this expression and what does it represent?

- (1) 2,500, the amount he is guaranteed to be paid each week
- (2) 2,500, the amount he earns when he sells  $a$  accessories
- (3) 290, the amount he is guaranteed to be paid each week
- (4) 290, the amount he earns when he sells  $a$  accessories



Use this space for computations.

$10 \text{ mi} = \frac{10 \text{ mi}}{1.609 \text{ km}} = \frac{10 \text{ mi}}{X}$

$X = 16.09 \text{ km}$

$10 \text{ mi} = \frac{10 \text{ mi}}{1.609 \text{ km}} = \frac{10 \text{ mi}}{16.09 \text{ km}}$

$\frac{44,880 \text{ ft}}{5,280 \text{ ft}} = \frac{X \text{ mi}}{1.609 \text{ km}}$

$X = 8.5 \text{ mi}$

$\frac{15,560 \text{ yds}}{1,609 \text{ km}} = \frac{X \text{ mi}}{1.609 \text{ km}}$

$X = 13.6765 \text{ km}$

$\frac{44,880 \text{ ft}}{5,280 \text{ ft}} = \frac{1.609 \text{ km}}{5,280 \text{ ft}} = \frac{X \text{ mi}}{1.609 \text{ km}}$

$X = 13.6765 \text{ km}$

$\frac{15,560 \text{ yds}}{1,609 \text{ km}} = \frac{X \text{ mi}}{1.609 \text{ km}}$

$X = 8.8406907 \text{ mi}$

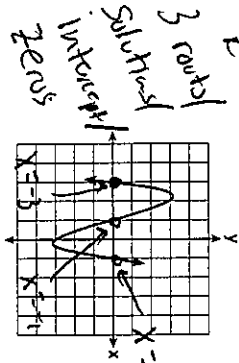
$\frac{15,560 \text{ yds}}{1,609 \text{ km}} = \frac{X \text{ mi}}{1.609 \text{ km}}$

$X = 14.02502273 \text{ km}$

$\frac{15,560 \text{ yds}}{1,609 \text{ km}} = \frac{X \text{ mi}}{1.609 \text{ km}}$

$X = 14.02502273 \text{ km}$

18 A cubic function is graphed on the set of axes below.



Which function could represent this graph?

- (1)  $f(x) = (x - 3)(x - 1)(x + 1)$
- (2)  $g(x) = (x + 3)(x + 1)(x - 1)$
- (3)  $h(x) = (x - 3)(x - 1)(x + 3)$
- (4)  $k(x) = (x + 3)(x + 1)(x - 3)$

Can also put equations into  $[y=]$  to see which one produces the same graph

Use this space for computations.

Factors

$$(x+3)(x+1)(x-1)$$

$x = -3, x = -1, x = 1$  opposites

19 Mrs. Allard asked her students to identify which of the polynomials below are in standard form and explain why.

- I.  $15x^4 - 6x + 3x^2 - 1$
- II.  $12x^3 + 8x + 4$
- III.  $2x^5 + 8x^2 + 10x$

descending power order  
exponents are decreasing

Which student's response is correct?

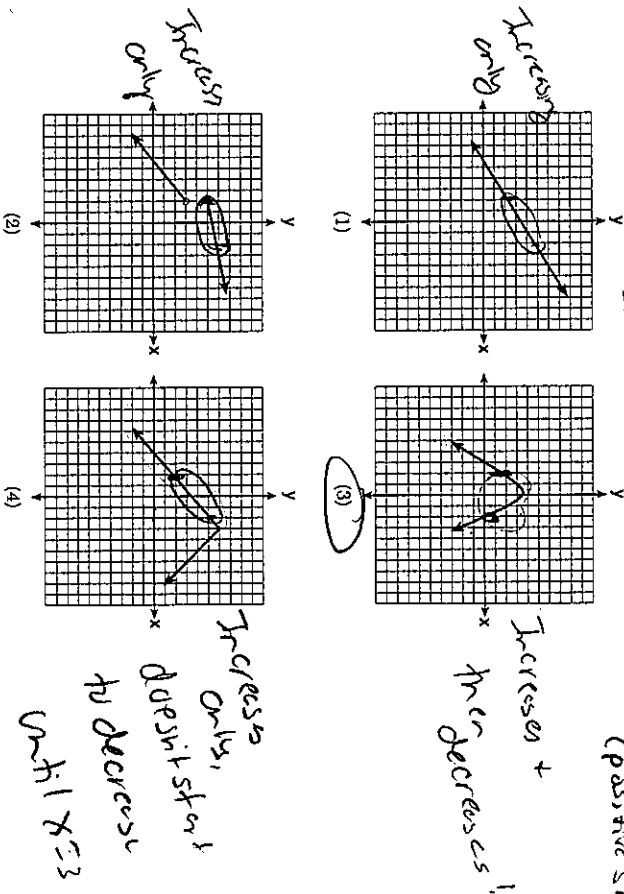
- (1) Tyler said I and II because the coefficients are decreasing.
- (2) Susan said only II because all the numbers are decreasing.
- (3) Fred said II and III because the exponents are decreasing.
- (4) Alyssa said II and III because they each have three terms.

Any like terms should be combined too!

Use this space for computations.

20 Which graph does not represent a function that is always increasing over the entire interval  $-2 < x < 2$ ?

gives up from left to right (positive slope)



Rational #'s include decimals + fractions X  
 Integers include Neg #'s + 0  
 Integers include Neg #'s + 0 + 1 included then!

Use this space for computations.

you can't sell a negative # of cans or a fraction of a can

also natural the roots

22 How many real-number solutions does  $4x^2 + 2x + 5 = 0$  have?  
 O: (1) one  
 P: (2) two  
 D: (3) zero  
 I: (4) infinitely many

discriminant  $b^2 - 4ac$   
 $2^2 - 4(4)(5) = 4 - 80 = -76$   
 No real solutions  
 graph to see  
 parabola opens up  
 x-intercepts? No  
 y-intercept? Yes

23 Students were asked to write a formula for the length of a rectangle by using the formula for its perimeter,  $p = 2\ell + 2w$ . Three of their responses are shown below.

- I.  $\ell = \frac{1}{2}p - w$
- II.  $\ell = \frac{1}{2}(p - 2w) = \frac{1}{2}p - w$
- III.  $\ell = \frac{p - 2w}{2}$

Which responses are correct?  
 (1) I and II, only  
 (2) II and III, only  
 (3) I and III, only  
 (4) I, II, and III

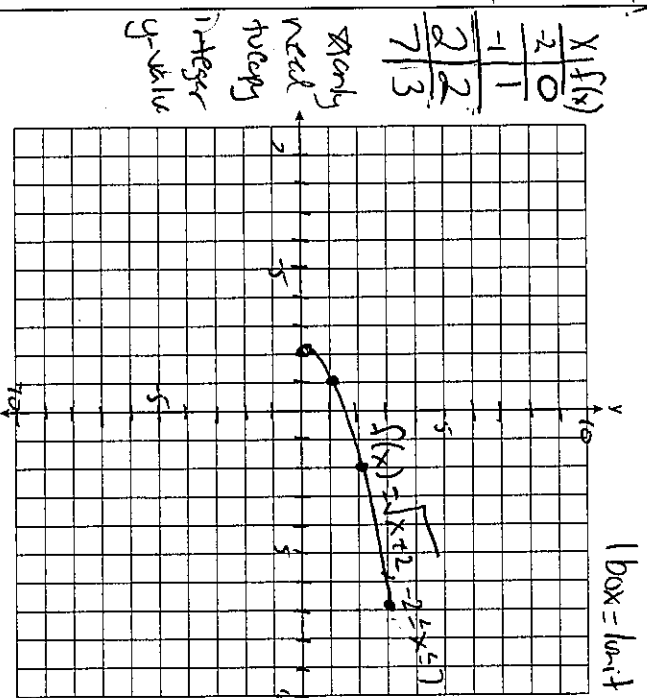
III  $\rightarrow 2\ell = \frac{p - 2w}{2} \text{ OR } \ell = \frac{p - 2w}{2}$   
 I  $\rightarrow 2\ell = p - 2w \text{ OR } \ell = \frac{p - 2w}{2}$   
 II  $\rightarrow 2\ell = p - 2w \text{ OR } \ell = \frac{p - 2w}{2}$

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 Graph  $f(x) = \sqrt{x+2}$  over the domain  $-2 \leq x \leq 7$ .

2 units left from parent function



or arrows  
 bc of constant/slightly given

24 If  $a_n = n(a_{n-1})$  and  $a_1 = 1$ , what is the value of  $a_5$ ?

Recursive sequence

$a_1 = 1$   
 $a_2 = 2(1) = 2$   
 $a_3 = 2(2) = 4$   
 $a_4 = 4(4) = 16$   
 $a_5 = 5(16) = 80$

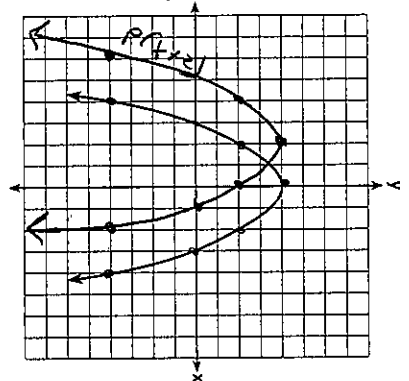
Arithmetic sequence

$a_1 = 1$   
 $a_2 = 2$   
 $a_3 = 3$   
 $a_4 = 4$   
 $a_5 = 5$



28 The graph of the function  $p(x)$  is represented below. On the same set of axes, sketch the function  $p(x + 2)$ .

translated  
2 units  
to the  
LEFT from  
given function



29 When an apple is dropped from a tower 256 feet high, the function  $h(t) = -16t^2 + 256$  models the height of the apple, in feet, after  $t$  seconds. Determine, algebraically, the number of seconds it takes the apple to hit the ground.

means the height  
is zero:  $h(t) = 0$

**4 seconds**

$h(t) = -16t^2 + 256$

$0 = -16t^2 + 256$   
Factor

$16t^2 - 256 = 0$

$16(t^2 - 16) = 0$

$16(t+4)(t-4) = 0$

$t+4 = 0$   
 $t = -4$

$t-4 = 0$   
 $t = 4$

$t = 4$

$16t^2 = 256$   
 $t^2 = 16$   
 $t = \pm\sqrt{16}$

$t = 4$  Neg. Coefficient  
 $t = -4$  Neg. time

once you get  $16t^2 - 256 = 0$   
 $a = 16$   $b = 0$   $c = -256$

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

$x = \frac{-0 \pm \sqrt{0^2 - 4(16)(-256)}}{2(16)}$

$x = 0 \pm \frac{\sqrt{0 + 16384}}{32}$

$x = \pm \frac{\sqrt{16384}}{32}$

$x = 4$

★ Don't do C.T.S. B/c there is no 'b' term!

$ax^2 + bx = c$

30 Solve the equation below algebraically for the exact value of  $x$  → Fractional form

no distrib NO rounding or decimals! keep in

$$6 - \frac{2}{3}(x + 5) = 4x$$

D  $6 - \frac{2}{3}x - \frac{10}{3} = 4x$

C  $-\frac{2}{3}x + \frac{8}{3} = 4x$

M  $+\frac{2}{3}x$

$$\left(\frac{2}{3}\right) \frac{8}{3} = \frac{14}{3}x \left(\frac{3}{14}\right)$$

$$x = \frac{4}{7}$$

31 Is the product of  $\sqrt{16}$  and  $\frac{4}{7}$  rational or irrational? Explain your reasoning.

multiplies!

Rat. Rat

$$\sqrt{16} \cdot \frac{4}{7} = \frac{16}{7} \leftarrow \text{Rat.}$$

$$4 \cdot \frac{4}{7} = \frac{16}{7}$$

The product is rational b/c the answer  $\frac{16}{7}$  can be written as the ratio of 2 integers where the denominator is NOT equal to zero

OR

The product is rational b/c a rational # times a rational # is always rational!

Careful:  $\sqrt{16} + \frac{4}{7}$  in the calc comes out to 2.285714286... you MUST press **MATH** Enter Enter b/c when you do you will see you get  $\frac{16}{7}$  which is rational + NOT irrational

most people think it's.

Algebra I - June 18

4: E ↔ D



32 On the set of axes below, graph the piecewise function:

open circle

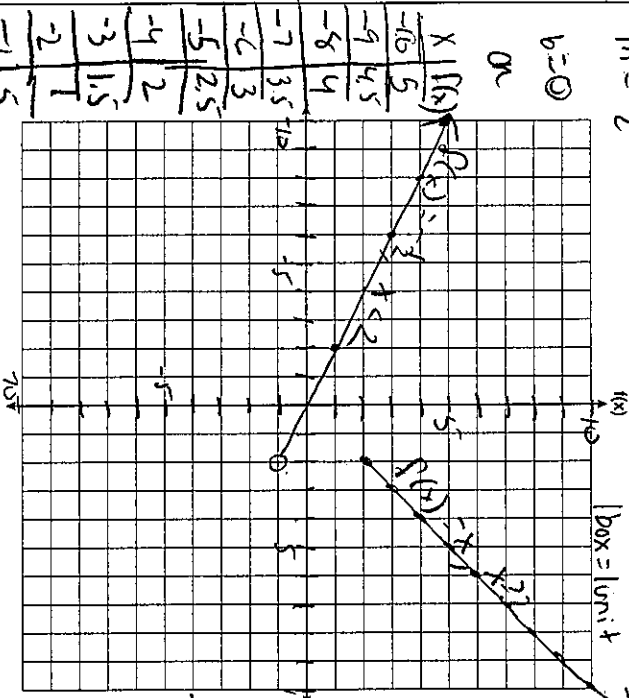
$$f(x) = \begin{cases} -\frac{1}{2}x, & x < 2 \\ x, & x \geq 2 \end{cases}$$

$$f(x) = -\frac{1}{2}x, \quad x < 2$$

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

$$b = 0$$

or



x	f(x)
-10	5
-9	4.5
-8	4
-7	3.5
-6	3
-5	2.5
-4	2
-3	1.5
-2	1
-1	.5
0	0
1	.5
2	1

closed circle

$$f(x) = x$$

$$m = 1$$

$$b = 0$$

x	f(x)
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10

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. 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]

33 A population of rabbits in a lab,  $p(x)$ , can be modeled by the function  $p(x) = 20(1.014)^x$ , where  $x$  represents the number of days since the population was first counted.

Explain what 20 and 1.014 represent in the context of the problem.

words:  $y = mx + b$  (initials)  $y = mx + b$  (initials)  $y = mx + b$  (initials)

20 represents the initial # of rabbits  
or the # of rabbits they started with  
(Can say population instead of #)

1.014 represents the rate of growth each day

1.4% represents the % growth per day  
(Can say growth in population per day)

Determine, to the nearest tenth, the average rate of change from day 50 to day 100.

$$\frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

$$x_2 - x_1$$

$$\frac{f(100) - f(50)}{100 - 50}$$

$$100 - 50$$

$$\frac{80.32 - 40.08}{50}$$

$$100 - 50$$

$$\frac{40.24}{50} = .8$$

rabbits

or plug into equation

$$p(x) = 20(1.014)^x$$

$$p(50) = 20(1.014)^{50}$$

$$p(100) = 20(1.014)^{100}$$

$$p(100) = 80.32033208$$

34 There are two parking garages in Beacon Falls. Garage A charges \$7.00 to park for the first 2 hours, and each additional hour costs \$3.00. Garage B charges \$3.25 per hour to park.

When a person parks for at least 2 hours, write equations to model the cost of parking for a total of  $x$  hours in Garage A and Garage B.

Garage A:  $A(x) = 3(x-2) + 7$   
 2 hours diff letters or  $y_1 + y_2 =$   
 Garage B:  $B(x) = 3.25(x-2) + 6.50$   
 or  $B(x) = 3.25x - 0.50$

Determine algebraically the number of hours when the cost of parking at both garages will be the same.

NOTABLE  
 $3(x-2) + 7 = 3.25(x-2) + 6.50$   
 $3x - 6 + 7 = 3.25x - 6.50 + 6.50$   
 $3x + 1 = 3.25x$   
 $-3x \quad -3x$   
 $1 = .25x$   
 $.25 \quad .25$   
 $x = 4$

4 hours

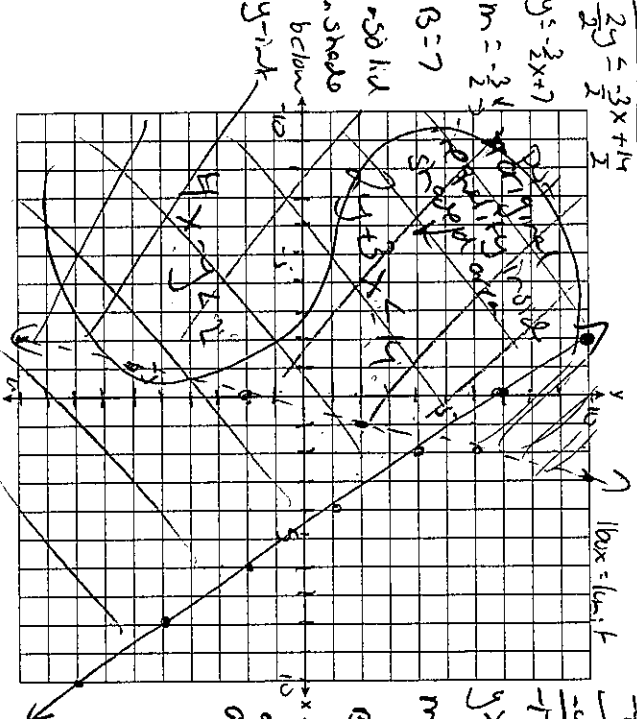
\* Can't be the y-int b/c it doesn't start at 0!

Compare  $f(x)$  + print to  $y_1, y_2$  + go to  $x$  to  $y$  + get graph

$x$	$A(x)$	$B(x)$
2	7	3.25
3	7.75	6.50
4	10	9.75

35 On the set of axes below graph the following system of inequalities:

$2y + 3x \leq 14$   
 $4x - y \leq 2$



$4x - y \leq 2$   
 $-y \leq -4x + 2$   
 $y \geq 4x - 2$   
 $m = 4$   
 $b = -2$   
 solid dotted or shaded above  $y = 4x - 2$

Determine if the point (1, 2) is in the solution set. Explain your answer.

NO! (1, 2) is NOT a solution b/c (1, 2) is on the dotted line which means it is NOT equal to and any point on that line is NOT a solution point b/c it would not satisfy both inequalities

$2y + 3x \leq 14$   
 $2(2) + 3(1) \leq 14$   
 $4 + 3 \leq 14$   
 $7 \leq 14$

$4x - y \leq 2$   
 $4(1) - 2 \leq 2$   
 $4 - 2 \leq 2$   
 $2 \leq 2$

36 The percentage of students scoring 85 or better on a mathematics final exam and an English final exam during a recent school year for seven schools is shown in the table below.

Percentage of Students Scoring 85 or Better	
Mathematics, x	English, y
27	46
12	28
13	45
10	34
30	56
45	67
20	42

4: Linkley

Write the linear regression equation for these data, rounding all values to the nearest hundredth.

$$y = .96x + 23.95$$

State the correlation coefficient of the linear regression equation, to the nearest hundredth. Explain the meaning of this value in the context of these data.

$$r = .92 \rightarrow \text{positive correlation}$$

The correlation coeff. shows a strong positive linear relationship between the % of students scoring 85 or better on a math final exam vs. an English final exam. The corr. coeff. is close to +1. As the % of students scoring on 85 or better on a math final exam increases, students scoring on 85 or better on an English final exam increases.

Since it says context you must say % of students scoring 85 or better on a math final and an English final

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 Dylan has a bank that sorts coins as they are dropped into it. A panel on the front displays the total number of coins inside as well as the total value of these coins. The panel shows 90 coins with a value of \$17.55 inside of the bank.

If Dylan only collects dimes and quarters, write a system of equations in two variables or an equation in one variable that could be used to model this situation.

Systems

$$\begin{cases} x + y = 90 \\ .10x + .25y = 17.55 \end{cases}$$

$$y = 90 - x$$

Using your equation or system of equations, algebraically determine the number of quarters Dylan has in his bank.

$$\begin{aligned} .10(x + y) + .25y &= 17.55 \\ .10x + .10y + .25y &= 17.55 \\ .10x + .35y &= 17.55 \end{aligned}$$

$$y = 57$$

$$x = 33$$

Dylan has 57 quarters

Question 37 is continued on the next page.

Algebra I - June '18

Can also do substitution of systems!

$$\begin{aligned} x + y &= 90 \\ .10x + .25y &= 17.55 \end{aligned}$$

$$\begin{aligned} .10x + .25(90 - x) &= 17.55 \\ .10x + 22.5 - .25x &= 17.55 \\ -.15x + 22.5 &= 17.55 \\ -.15x &= -4.95 \\ x &= 33 \end{aligned}$$

$$\begin{aligned} x + y &= 90 \\ 33 + y &= 90 \\ y &= 57 \end{aligned}$$

quarters

57

Dylan has

33

Question 37 continued

Dylan's mom told him that she would replace each one of his dimes with a quarter. If he uses all of his coins, determine if Dylan would then have enough money to buy a game priced at \$20.98 if he must also pay an 8% sales tax. Justify your answer.

33 dimes  $\rightarrow$  33 quarters  
 + 57 quarters  
 90 quarters initial  
 90 coins initial =  
 90  $\phi$ 's initial

90  
 $\times 22.50$   
 -----  
 \$22.50  
 ↑  
 how much  
 \$ Dylan  
 has

20.98  
 $\times 0.08$   
 -----  
 \$1.68  
 ↑  
 sales tax

20.98  
 $+ 1.68$   
 -----  
 \$22.66  
 ↑  
 price of  
 game after  
 8% tax

No, Dylan will not have enough \$  
 b/c the game will cost \$22.66  
 including tax + Dylan only has  
 \$22.50 which is not enough. He  
 is short by \$.16

Can also do ↓ to get \$22.50  
 $33(.25) = 8.25$   
 $57(.25) = 14.25$   
 -----  
 22.50