

37 For a class picnic, two teachers went to the same store to purchase drinks. One teacher purchased 18 juice boxes and 32 bottles of water, and spent \$19.92. The other teacher purchased 14 juice boxes and 26 bottles of water, and spent \$15.76.

Write a system of equations to represent the costs of a juice box,  $j$ , and a bottle of water,  $w$ .

$$\begin{cases} 18j + 32w = 19.92 \\ 14j + 26w = 15.76 \end{cases}$$

$$\text{lcm}(18, 14) = 126$$

Nov 29-3:00 PM

Kara said that the juice boxes might have cost 52 cents each and that the bottles of water might have cost 33 cents each. Use your system of equations to justify that Kara's prices are *not* possible.

Equation ①

$$18(0.52) + 32(0.33) \stackrel{?}{=} 19.92$$

$$19.92 \neq 19.92$$

Equation ②

$$14(0.52) + 26(0.33) \stackrel{?}{=} 15.76$$

$$15.86 \neq 15.76$$

Kara's prices do not solve both equations in the system.

Question 37 is continued on page 2

Nov 29-3:01 PM

Solve your system of equations to determine the actual cost, in dollars, of each juice box and each bottle of water.

Equation (1)

$$18j = -32w + 19.92$$

$$j = \frac{-32}{18}w + \frac{19.92}{18}$$

$$j = \frac{-16}{9}w + \frac{9.96}{9}$$

Eq (2)

$$14j + 26w = 15.76$$

$$14\left(\frac{-16}{9}w + \frac{9.96}{9}\right) + 26w = 15.76$$

$$\frac{-224}{9}w + \frac{139.44}{9} + 26w = 15.76$$

Nov 29-3:01 PM

$$\frac{-224}{9}w + \frac{139.44}{9} + 26w = 15.76$$

$$\frac{-224}{9}w + \frac{139.44}{9} + \frac{234}{9}w = 15.76$$

$$\frac{10}{9}w = 15.76 - \frac{139.44}{9}$$

$$10w = 141.84 - 139.44$$

$$10w = 2.4$$

$$w = \$0.24$$

$$j = \frac{-16}{9}(0.24) + \frac{9.96}{9}$$

$$j = \$0.68$$

Nov 29-3:02 PM

$$[A](1,1) = 18$$

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NAMES MATH EDIT

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5:identity(

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8:Matr→list(

9:List→matr(

0:cumSum(

A:ref(

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Nov 29-2:58 PM

36 Janice is asked to solve  $0 = 64x^2 + 16x - 3$ . She begins the problem by writing the following steps:

$$\begin{array}{ll} \text{Line 1} & 0 = 64x^2 + 16x - 3 \\ \text{Line 2} & 0 = B^2 + 2B - 3 \\ \text{Line 3} & 0 = (B + 3)(B - 1) \end{array}$$

Use Janice's procedure to solve the equation for  $x$ .

$$B = -3 \text{ or } B = 1$$

$$\text{Since } B = 8x$$

$$8x = -3 \text{ or } 8x = 1$$

$$x = -\frac{3}{8} \text{ or } x = \frac{1}{8}$$

Nov 29-3:39 PM

Explain the method Janice used to solve the quadratic equation.

She substituted

$$B = 8x$$

Factored, and used the property:

$$\text{If } a \cdot b = 0$$

$$a = 0 \text{ or } b = 0$$

Nov 29-3:40 PM



35 A drama club is selling tickets to the spring musical. The auditorium holds 200 people. Tickets cost \$12 at the door and \$8.50 if purchased in advance. The drama club has a goal of selling at least \$1000 worth of tickets to Saturday's show.

Write a system of inequalities that can be used to model this scenario.

Let  $d$  = # of tickets purchased at the door.  $a + d \leq 200$   
 $a$  = # of advanced sales  $12d + 8.50a \geq 1,000$

If 50 tickets are sold in advance, what is the minimum number of tickets that must be sold at the door so that the club meets its goal? Justify your answer.

$$12d + 8.50(50) \geq 1,000$$

$$12d + 425 \geq 1,000$$

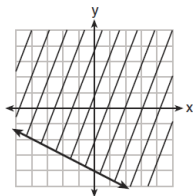
$$12d \geq 575$$

$$d \geq 47.91\bar{6}$$

48 tickets must be sold at the door to meet the goal.

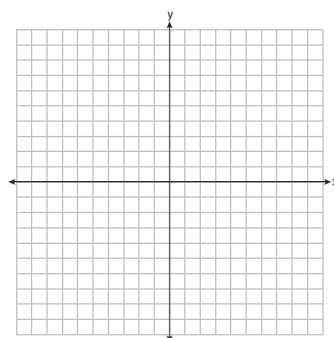
Nov 29-3:48 PM

34 Shawn incorrectly graphed the inequality  $-x - 2y \geq 8$  as shown below.



Explain Shawn's mistake.

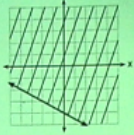
Graph the inequality correctly on the set of axes below.



Nov 29-4:04 PM

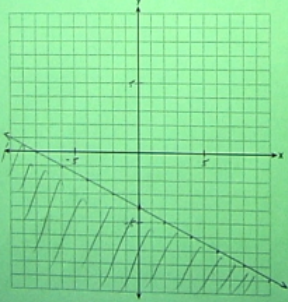
34 Shawn incorrectly graphed the inequality  $-x - 2y \geq 8$  as shown below.

$-2y \geq x + 8$   
 $y \leq -\frac{1}{2}x - 4$



Explain Shawn's mistake:  
 He shaded the wrong half-plane because he neglected to reverse the inequality sign when dividing both sides by a negative.

Graph the inequality correctly on the set of axes below.



Dec 6-2:28 PM

33 The data table below shows the median diameter of grains of sand and the slope of the beach for 9 naturally occurring ocean beaches.

Median Diameter of Grains of Sand, in Millimeters (x)	0.17	0.19	0.22	0.235	0.235	0.3	0.35	0.42	0.85
Slope of Beach, in Degrees (y)	0.63	0.7	0.82	0.88	1.15	1.5	4.4	7.3	11.3

Write the linear regression equation for this set of data, rounding all values to the *nearest thousandth*.

Using this equation, predict the slope of a beach, to the *nearest tenth of a degree*, on a beach with grains of sand having a median diameter of 0.65 mm.

Dec 6-2:30 PM

Median Diameter of Grains of Sand, in Millimeters (x)	0.17	0.19	0.22	0.235	0.235	0.3	0.35	0.42	0.85
Slope of Beach, in Degrees (y)	0.63	0.7	0.82	0.88	1.15	1.5	4.4	7.3	11.3

Write the linear regression equation for this set of data, rounding all values to the nearest thousandth.

$y = 17.159x - 2.476$

Using this equation, predict the slope of a beach, to the nearest tenth of a degree, on a beach with grains of sand having a median diameter of 0.65 mm.

Find y  
 Given:  $x = 0.65$   
 Use:  $y = 17.159x - 2.476$   
 $y = 17.159(0.65) - 2.476$   
 $y \approx 8.67735$

$y \approx 8.7 \text{ Degrees}$

STAT EDIT

L1	L2	L3	L4	L5	2
.17	.63				
.19	.7				
.22	.82				
.235	.88				
.3	1.15				
.35	1.5				
.42	4.4				
.85	7.3				
	11.3				

2nd Y=

STAT CALC

LinReg

$y = ax + b$   
 $a = 17.15936928$   
 $b = -2.475925196$

X=.65 Y=11.3

Dec 6-2:31 PM

32 Solve the equation below for  $x$  in terms of  $a$ .

$$4(ax + 3) - 3ax = 25 + 3a$$

Dec 6-2:40 PM

32 Solve the equation below for  $x$  in terms of  $a$ .

$$4(ax + 3) - 3ax = 25 + 3a$$

$$4ax + 12 - 3ax = 25 + 3a$$

$$ax + 12 = 25 + 3a$$

$$ax = 3a + 13$$

$$x = \frac{3a + 13}{a}$$

Dec 6-2:41 PM

31 Find the zeros of  $f(x) = (x - 3)^2 - 49$ , algebraically.

Dec 6-2:42 PM

31 Find the zeros of  $f(x) = (x - 3)^2 - 49$ , algebraically.

$$0 = (x - 3)^2 - 49$$

$$49 = (x - 3)^2$$

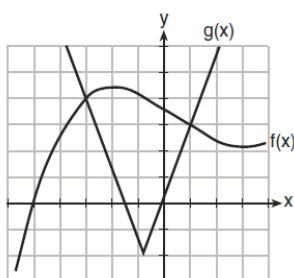
$$x - 3 = \pm \sqrt{49}$$

$$x = 3 \pm 7$$

$$\{-4, 10\}$$

Dec 6-2:43 PM

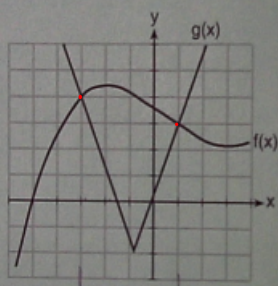
30 The graph below shows two functions,  $f(x)$  and  $g(x)$ . State all the values of  $x$  for which  $f(x) = g(x)$ .



Dec 6-2:43 PM



30 The graph below shows two functions,  $f(x)$  and  $g(x)$ . State all the values of  $x$  for which  $f(x) = g(x)$ .



$$x = -3 \text{ or } x = 1$$

Dec 6-2:44 PM

29 Is the sum of  $3\sqrt{2}$  and  $4\sqrt{2}$  rational or irrational? Explain your answer.

Dec 6-2:46 PM

29 Is the sum of  $3\sqrt{2}$  and  $4\sqrt{2}$  rational or irrational? Explain your answer.

$$3\sqrt{2} + 4\sqrt{2}$$

$$(3 + 4)\sqrt{2}$$

$7\sqrt{2}$  is irrational since it cannot be expressed as  $\frac{a}{b}$  where  $a$  and  $b$  are integers

Dec 6-2:46 PM

28 When multiplying polynomials for a math assignment, Pat found the product to be  $-4x + 8x^2 - 2x^3 + 5$ . He then had to state the leading coefficient of this polynomial. Pat wrote down  $-4$ . Do you agree with Pat's answer? Explain your reasoning.

No, the leading coefficient is  $-2$   
the coefficient of  $x$   
to the highest power

Dec 6-2:47 PM

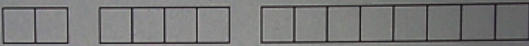
27 Consider the pattern of squares shown below:



Which type of model, linear or exponential, should be used to determine how many squares are in the  $n$ th pattern? Explain your answer.

Dec 6-2:48 PM

27 Consider the pattern of squares shown below:



Which type of model, linear or exponential, should be used to determine how many squares are in the  $n$ th pattern? Explain your answer.

Handwritten student work:

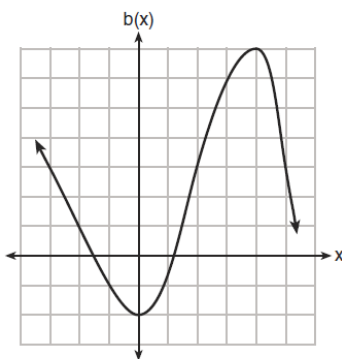
$n$	$f(n)$
1	2
2	4
3	8
4	16
$\vdots$	
$n$	

$\Delta y = 2$   
 $\Delta y = 4$

$\Delta y$  is not constant  
The model is exponential  
 $y = 2^n$

Dec 6-2:49 PM

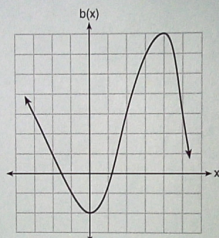
26 Richard is asked to transform the graph of  $b(x)$  below.



The graph of  $b(x)$  is transformed using the equation  $h(x) = b(x - 2) - 3$ . Describe how the graph of  $b(x)$  changed to form the graph of  $h(x)$ .

Dec 6-2:50 PM

26 Richard is asked to transform the graph of  $b(x)$  below.

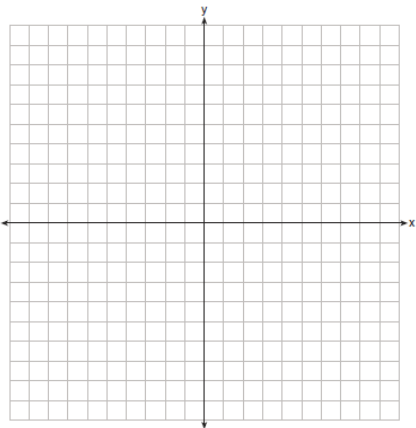


The graph of  $b(x)$  is transformed using the equation  $h(x) = b(x - 2) - 3$ . Describe how the graph of  $b(x)$  changed to form the graph of  $h(x)$ .

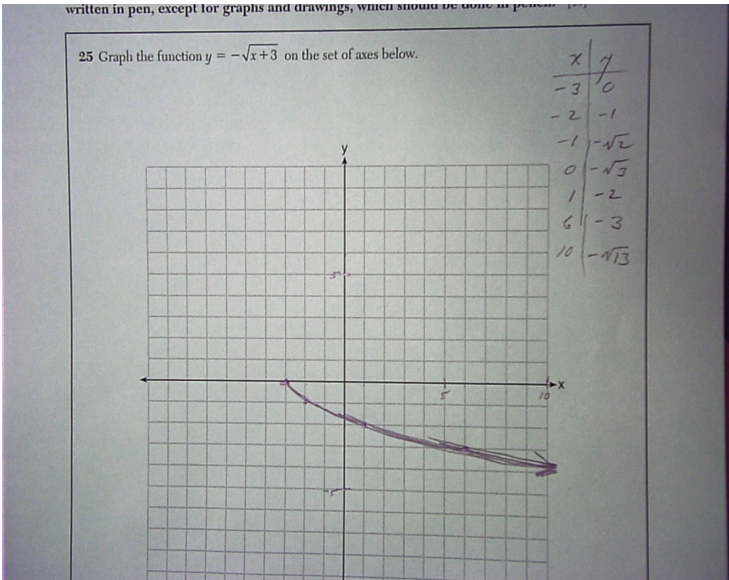
$h(x)$  is a rigid transformation of  $b(x)$   
2 units right and 3 units down.

Dec 6-2:50 PM

25 Graph the function  $y = -\sqrt{x+3}$  on the set of axes below.



Dec 6-2:51 PM



Dec 6-2:52 PM



Survivor Algebra Motivational Quotes

Before class starts each day, while the kids are coming in, I write one of these down on the overhead. You'll find that many students will look forward to them and will write them down. If I ever forget, they remind me!

- The most powerful weapon on earth is the human soul on fire. -- Ferdinand Foch
- Make your mistakes work for you by learning from them. -- Donald Trump
- If one advances confidently in the directions of his dreams, and endeavors to live the life which he has imagined, he will meet with a success unexpected in common hours. -- Henry David Thoreau
- Don't worry about things you can't control.
- Everybody needs some inspiration, Everybody needs some motivation, mix it up with some imagination, and use your natural gifts. -- The Kinks
- Most of us have lives too small for our spirits. -- Studs Terkel
- Don't worry about moving slowly, worry about standing still. -- Chinese proverb
- Be careful with whom you associate. Loser's rub off! -- Donald Trump
- I hope to die young at a very old age.

Dec 6-2:59 PM

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. [48]

1 The graph below shows the distance in miles,  $m$ , hiked from a camp in  $h$  hours.

Use this space for computations.

Which hourly interval had the greatest rate of change?

(1) hour 0 to hour 1      (3) hour 2 to hour 3  
 (2) hour 1 to hour 2      (4) hour 3 to hour 4

Dec 20-12:54 PM

2 The solution of an equation with two variables,  $x$  and  $y$ , is

- (1) the set of all  $x$  values that make  $y = 0$
- (2) the set of all  $y$  values that make  $x = 0$
- (3) the set of all ordered pairs,  $(x, y)$ , that make the equation true
- (4) the set of all ordered pairs,  $(x, y)$ , where the graph of the equation crosses the  $y$ -axis

3 Which statistic can *not* be determined from a box plot representing the scores on a math test in Mrs. DeRidder's algebra class?

- (1) the lowest score
- (2) the median score
- (3) the highest score
- (4) the score that occurs most frequently

Algebra I (Common Core) – Aug. '16

[2]

Dec 20-12:58 PM

4 Which chart could represent the function  $f(x) = -2x + 6$ ?

$x$	$f(x)$
0	6
2	10
4	14
6	18

(1)

$x$	$f(x)$
0	8
2	10
4	12
6	14

(3)

$x$	$f(x)$
0	4
2	6
4	8
6	10

(2)

$x$	$f(x)$
0	6
2	2
4	-2
6	-6

(4)

$$\frac{\Delta y}{\Delta x} = \frac{-4}{2} = -2$$

$$6 = 6$$

Dec 20-1:00 PM

5 If  $f(n) = (n-1)^2 + 3n$ , which statement is true?

(1)  $f(3) = -2$  (3)  $f(-2) = -15$   
 (2)  $f(-2) = 3$  (4)  $f(-15) = -2$

6 The table below shows 6 students' overall averages and their averages in their math class.

Overall Student Average	92	98	84	80	75	82
Math Class Average	91	95	85	85	75	78

If a linear model is applied to these data, which statement best describes the correlation coefficient?

(1) It is close to  $-1$ . (3) It is close to  $0$ .  
 (2) It is close to  $1$ . (4) It is close to  $0.5$ .

$f(n) = (n-1)^2 + 3n$   
 (1)  $f(7) = 4 + 9$  false  
 (2)  $f(-2) = 9 - 6 = 3$  True  
 (3)  $f(-2) =$  false  
 (4)  $f(-15) = (-16)^2 + 3(-15) = 211$

Calculator screen showing LinReg results:

```

LinReg(ax+b)
Xlist:L1
Ylist:L2
FrcList:
Store RegEQ:Y1
Calculate

y=mx+b
a=.8308927728
b=14.06896552
r^2=.8552020991
r=.9247713767
    
```

Scatter plot showing a positive linear correlation.

Dec 20-1:01 PM

7 What is the solution to  $2h + 8 > 3h - 6$ ?

(1)  $h < 14$  (3)  $h > 14$   
 (2)  $h < \frac{14}{5}$  (4)  $h > \frac{14}{5}$

8 Which expression is equivalent to  $36x^2 - 100$ ?

(1)  $4(3x-5)(3x-5)$  (3)  $2(9x-25)(9x-25)$   
 (2)  $4(3x+5)(3x-5)$  (4)  $2(9x+25)(9x-25)$

9 Patricia is trying to compare the average rainfall of New York to that of Arizona. A comparison between these two states for the months of July through September would be best measured in

(1) feet per hour (3) inches per month  
 (2) inches per hour (4) feet per month

Use this space for computations.

$-h + 8 > -6$   
 $-h > -14$   
 $h < 14$

$(6x-10)(6x+10)$   
 $2(3x-5) \cdot 2(3x+5)$   
 $4(3x+5)(3x-5)$

Dec 20-1:07 PM



10 Which function defines the sequence  $-6, -10, -14, -18, \dots$ , where  $f(6) = -26$ ?

(1)  $f(x) = -4x - 2$  (3)  $f(x) = -x + 32$   
 (2)  $f(x) = 4x - 2$  (4)  $f(x) = x - 26$

11 Which function has the greatest  $y$ -intercept?

(1)  $f(x) = 3x$   
 (2)  $2x + 3y = 12$   
 (3) the line that has a slope of 2 and passes through  $(1, -4)$

(4)

Handwritten work for Question 10:

$$f(1) = -6$$

n	f(n)
1	-6
2	-10
3	-14

$$\frac{\Delta y}{\Delta x} = \frac{-4}{1}$$

$$y - y_1 = m(x - x_1)$$

$$y - -26 = -4(x - 6)$$

$$y + 26 = -4x + 24$$

$$y = -4x - 2$$

Handwritten work for Question 11:

(1)  $y\text{-int} = b$   
 (1)  $b = 0$

(2)  $3y = -2x + 12$   
 $y = -\frac{2}{3}x + 4$   
 $b = 4$

(3)  $y - -4 = 2(x - 1)$   
 $y + 4 = 2x - 2$   
 $y = 2x - 6$   
 $b = -6$

Dec 20-1:12 PM

- 12 What is the product of  $2x + 3$  and  $4x^2 - 5x + 6$ ?
- (1)  $8x^3 - 2x^2 + 3x + 18$  (3)  $8x^3 + 2x^2 - 3x + 18$   
 (2)  $8x^3 - 2x^2 - 3x + 18$  (4)  $8x^3 + 2x^2 + 3x + 18$

Use this space for computations.

$$(2x+3)(4x^2-5x+6)$$

$$8x^3 - 10x^2 + 12x$$

$$12x^2 - 15x + 18$$

$$8x^3 + 2x^2 - 3x + 18$$

- 13 The height of a rocket, at selected times, is shown in the table below.

Time (sec)	0	1	2	3	4	5	6	7
Height (ft)	180	260	308	324	308	260	180	68

Based on these data, which statement is *not* a valid conclusion?

- (1) The rocket was launched from a height of 180 feet.  
 (2) The maximum height of the rocket occurred 3 seconds after launch.  
 (3) The rocket was in the air approximately 6 seconds before hitting the ground.  
 (4) The rocket was above 300 feet for approximately 2 seconds.

- 14 A parking garage charges a base rate of \$3.50 for up to 2 hours, and an hourly rate for each additional hour. The sign below gives the prices for up to 5 hours of parking.

Dec 20-1:13 PM