ALGEBRA 1

EXAM REVIEW

5 DAYS

Date	**Lesson Plan**
M 6/4	**EXAM INFO** Nuts & Bolts for R, 1, 2 ***Assignment:*** *Review Packet #1*
T 6/5	Answer Questions on Review Packet #1 Nuts & Bolts 3, 4, 5 ***Assignment:*** *Review Packet #2*
W 6/6	Answer Questions on Review Packet #2 Nuts & Bolts 6, 7, 8 ***Assignment:*** *Review Packet #3*
Th 6/7	Answer Questions on Review Packet #3 Nuts & Bolts 9, 10, 11 ***Assignment:*** *Review Packet #4*
F 6/8	Answer Questions on Review Packet #4

Common Core High School Math Reference Sheet
(Algebra I, Geometry, Algebra II)

CONVERSIONS

1 inch = 2.54 centimeters	1 kilometer = 0.62 mile	1 cup = 8 fluid ounces
1 meter = 39.37 inches	1 pound = 16 ounces	1 pint = 2 cups
1 mile = 5280 feet	1 pound = 0.454 kilograms	1 quart = 2 pints
1 mile = 1760 yards	1 kilogram = 2.2 pounds	1 gallon = 4 quarts
1 mile = 1.609 kilometers	1 ton = 2000 pounds	1 gallon = 3.785 liters
		1 liter = 0.264 gallon
		1 liter = 1000 cubic centimeters

FORMULAS

Triangle	$A = \frac{1}{2}bh$	Pythagorean Theorem	$a^2 + b^2 = c^2$
Parallelogram	$A = bh$	Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Circle	$A = \pi r^2$	Arithmetic Sequence	$a_n = a_1 + (n-1)d$
Circle	$C = \pi d$ or $C = 2\pi r$	Geometric Sequence	$a_n = a_1 r^{n-1}$
General Prisms	$V = Bh$	Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Cylinder	$V = \pi r^2 h$	Radians	$1 \text{ radian} = \frac{180}{\pi} \text{ degrees}$
Sphere	$V = \frac{4}{3}\pi r^3$	Degrees	$1 \text{ degree} = \frac{\pi}{180} \text{ radians}$
Cone	$V = \frac{1}{3}\pi r^2 h$	Exponential Growth/Decay	$A = A_0 e^{k(t-t_0)} + B_0$
Pyramid	$V = \frac{1}{3}Bh$		

COMMON CORE EXAM INFORMATION:

TUESDAY, JUNE 12TH **12:00 – 3:00**

MAIN GYM (unless you have test modifications)

* Please be here by 11:45! Report directly to the cafeteria.
* You may be dismissed at 2:00 if you have completed the exam.

TRANSPORTATION:

- You can take your normal morning bus to school at its regularly scheduled time (THERE IS NO AFTERNOON BUS TO BRING YOU TO THE EXAM!). Or you can arrange your own transportation to your exam.
- After your exam, there are busses at 2:15 and 3:15 to take you home.

Please bring the following supplies to the exam:

- **Pens (blue or black)**
- **Pencils (mechanical or already sharpened)**
- **Highlighter, if desired**
- **Ruler**
- **Graphing Calculator**

* If you do not have a graphing calculator, try to borrow one from a friend/relative/neighbor for the exam.
* If you still do not have a graphing calculator, get to the exam site early to borrow one. Calculators will be loaned out on a first come, first served basis.

Proctors will tell you to clear the memory in your calculator before the exam starts. **After you clear the memory, turn your diagnostics on!**

The test consists of 37 questions.

Part I – Multiple Choice – 24 questions – 2 points each
Part II – Show Your Work – 8 questions – 2 points each
Part III – Show Your Work – 4 questions – 4 points each
Part IV – Show Your Work – 1 question – 6 points

The exam MUST be done in pen. Only graphs or diagrams may be done in pencil.

If you pass the exam **AND** pass the course, have a great summer and good luck in Geometry next year!

If you fail the course **BUT** pass the exam, I strongly recommend taking Algebra in summer school. Otherwise, you will have to repeat Algebra full year next year.

If you pass the course **BUT** fail the exam, you will repeat the exam in August. It is required that you sign up for the five-day review class for this exam.

If you fail the course **AND** fail the exam, I recommend repeating both in summer school. Otherwise, you will have to repeat Algebra full year next year.

Geometry Supplies for Next Year (Pick these things up over the summer!):

- Compass
- Protractor
- Graphing Calculator

NUTS & BOLTS - ALGEBRA 1

THE BASICS UNIT

- When **Solving an Equation**, your goal is to get the variable alone.
- To get rid of a fraction when it is directly next to a variable, multiply by its reciprocal.
- The coefficient of the first term in a polynomial in standard form is called the lead coefficient
- The **DEGREE** of a polynomial is the highest exponent.
- STUDY YOUR PROPERTIES on note sheet **BASICS-5**.
- **IRRATIONAL NUMBERS** ***cannot*** be made into fractions.
- When using **Interval Notation**, Square Brackets mean "[ ]" included and Parentheses mean "( )" not included
- When **Simplifying a Radical**, put the perfect square on the first branch! $\sqrt{32} = \sqrt{16}\sqrt{2}$
- When working with **Dimensional Analysis**, start with The unit you are trying to find!

UNIT 1

- Sum, Exceeds, More than, Increased by: add
- Difference, Less than, Fewer than, Decreased by, Reduced by: subtract
- Product, Of: multiply
- Quotient: divide
- Be careful when translating ***less than, fewer than, subtracted from***: reverse the order
- Is means equals

- What does an equation have that an expression does not have?
  an equal sign
- To **Add** Polynomials: set up Columns
- To **Subtract** Polynomials: add the opposite
- To **Multiply** Polynomials: separate and distribute
- To **Divide** Polynomials: create fractions and divide each
- An equation that contains more than one variable is called a
  literal equation.
- When solving, get rid of squaring with square roots.
- In a comparison word problem, always let x be whatever is last in the comparison sentence!
- In word problems, always ask yourself
  what am I looking to find?
- In word problems, be sure to answer the question!
- Don't forget that coins have different values. Incorporate these into your equation.
- Consecutive integers go up by 1. $x, x+1, x+2$
- Consecutive even integers go up by 2. $x, x+2, x+4$
- Consecutive odd integers go up by 2. $x, x+2, x+4$

UNIT 2

- The first method of **FACTORING** to look for is GCF.
- To find GCF on the calculator, press math num 9.
- The *Difference of Two Squares* is referred to as DOTS.
- To factor a trinomial with a lead coefficient of 1, use ET.
- To factor a trinomial with a lead coefficient other than 1, use Tricky Tri also called Factor by grouping
- You may also be asked to factor using complete the square.
- **FACTOR COMPLETELY** means more than one.

UNIT 3

- **Rate of Change** = $\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$
- The *rate of change* of a line can also be called the Slope.
- The general form for an equation of a line is $y = mx + b$.
- **Domain**: x
- **Range**: y
- A **Function** passes the VLT.
- A **One-to-One Function** passes the VLT and the HLT.
- $f(x)$= is the same as $y=$.
- To solve a **Linear System of Equations** graphically, graph each line and state the POI Point of intersection

UNIT 4

- To evaluate **Function Notation**, plug it in!
- A **Function** has no repeated X values.
- A **One-to-One Function** has no repeated X values or y values
- To find the ***x*-intercept** algebraically, plug in zero for y.
- To find the ***y*-intercept** algebraically, plug in zero for X.
- To solve a **Linear System of Equations** algebraically, use elimination.

  Remember, you must have Columns and opposites!

UNIT 5

- **At least** means $\geq$
- **At most** means $\leq$
- When **Solving an Inequality**, if you multiply or divide by a negative, you must flip the inequality sign.
- When **Graphing an Inequality**, you must decide on a boundary and you must shade a half-plane.
- Make a dotted boundary for the symbols: $>$ $<$
- Make a solid boundary for the symbols: $\geq$ $\leq$
- Shade the half-plane above the line for the symbols: $>$ $\geq$
- Shade the half-plane below the line for the symbols: $<$ $\leq$
- When graphing a **System of Inequalities**, put an S where the shading overlaps.

UNIT 6

- **Quadratic Equations** have an x^2.
- Solving Quadratics Methods: inspection, ____________, and ____________.
- When using **Inspection**, ____________ the squared term and then ____________ both sides. (Sometimes, you may have to use ____________ first!)
- When using **T-Bar**, get the equation ____________ and then ____________.
- Use the **Quadratic Formula** as a last resort! (on the reference sheet)

UNIT 7

- When you **Graph a Quadratic**, the shape is called a parabola.
- The highest spot on a parabola is the maximum and the lowest spot is the minimum.
- The **VERTEX** can also be called the turning point.
- The line drawn through the vertex is called the axis of symmetry.
- Values the graph crosses the x-axis are called the roots or the zeros.
- A **Quadratic-Linear System of Equations** consists of a parabola and a line.
- A function that is symmetric about the y-axis is even and a function that is symmetric about the origin (upside down test) is called odd.

UNIT 8

- The standard form for a quadratic is $y = ax^2 + bx + c$.
- The vertex form for a quadratic is ______.
- To change a quadratic from standard form to vertex form, you use completing the square.
- The formula for the **AXIS OF SYMMETRY** is: $x = \frac{-b}{2a}$
- When you solve a quadratic, the solutions are called the roots or the zeros. To find the zeros, replace *f(x)* with 0!
- To solve a **Quadratic-Linear System of Equations** algebraically, set the equations equal to each other.

UNIT 9

- The standard form of an **Exponential** is $y = ab^x$.
- In the equation, *a* represents the initial amount, *b* represents the rate of change, and *x* represents time.
- If the exponential is increasing, it represents growth.
- If the exponential is decreasing, it represents decay.
- The rate of change for an exponential will have a common ratio.

UNIT 10

- You should be able to graph **SQUARE ROOT**, **CUBIC**, **CUBE ROOT**, **ABSOLUTE VALUE**, and **PIECEWISE** functions.
- If a sequence has a *common difference*, it is linear.
- If a sequence has a *common ratio*, it is exponential.
- To find the n^{th} term of a sequence, use the formula on the reference sheet!
- In a recursive formula, block out the notation and find the pattern.
- To write an explicit formula, use the reference sheet formula and plug in everything except n, then simplify.
- When $f(x)$ is transformed into $f(x) + k$, this is a vertical shift.
- When $f(x)$ is transformed into $f(x+k)$, this is a horizontal shift.
- When $f(x)$ is transformed into $-f(x)$, this is a reflection over x.
- When $f(x)$ is transformed into $f(-x)$, this is a reflection over y.
- When $f(x)$ is transformed into $k \cdot f(x)$ and $k > 1$, the graph gets taller.
- When $f(x)$ is transformed into $k \cdot f(x)$ and $0 < k < 1$, the graph gets wider.

UNIT 11

- You should know these statistical graphs: **HISTOGRAM, DOT PLOT, BOX PLOT, TWO-WAY FREQUENCY TABLE,** and **SCATTER PLOT**.
- The **Mean** is the average and is represented by $\bar{X}$.
- The **Median** is the middle.
- The **Mode** is the most often.
- The **Range** is the difference between the max and min.
- The **Interquartile Range** (IQR) is $Q_3 - Q_1$.
- **Standard Deviation** is represented by S_x.
- The variable on the *x*-axis is called the Independent variable and the variable on the *y*-axis is called the dependent variable.
- The **Line of Best Fit** can also be called the least squares line.
- When the calculator gives you the equation for the line or curve of best fit, you are performing a regression.
- The **Correlation Coefficient** is represented by r. All correlation coefficients must be between -1 and 1. To find the correlation coefficient on the calculator, Stat calc.
- When a change in one variable produces a change in the other, the variables are said to have a bivariate relationship.
- To find a residual: Subtract predicted - actual
- In a residual plot, a line is the best fit if the points are scattered. A line is not the best fit if the points curved. The closer the residual plots are to the *x*-axis, the stronger the relationship.

REVIEW #1

COMMON CORE EXAM QUESTIONS

BASICS UNIT

PART I (2 points)

1. An equation is given below.

$$4(x-7)=0.3(x+2)+2.11$$

The solution to the equation is

(1) 8.3 (3) 3

(2) 8.7 (4) -3

$4x-28 = .3x + .6 + 2.11$
$4x - 28 = .3x + 2.71$
$-.3x \quad -.3x$
$3.7x - 28 = 2.71$
$+28 \quad +28$
$\frac{3.7x}{3.7} = \frac{30.71}{3.7}$
$x = 8.3$

PART I (2 points)

2. Which value of x satisfies the equation $\frac{5}{6}\left(\frac{3}{8}-x\right)=16$?

(1) -19.575 (3) -16.3125

(2) -18.825 (4) -15.6875

$\left(\frac{6}{5}\right)\frac{5}{6}\left(\frac{3}{8}-x\right)=16\left(\frac{6}{5}\right)$
$\frac{3}{8} - x = \frac{96}{5}$
$-\frac{3}{8} \quad -\frac{3}{8}$
$-x = \frac{96}{5} - \frac{3}{8}$
$-x = 18.825$
$x = -18.825$

PART II (2 points)

3. 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.

$-2x^3+8x^2-4x+5$

Pat is incorrect. -2 is the lead coefficient bc it is the coefficient with the highest exponent.

PART I (2 points)

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

$$Given:\ 2(6x^2-3)=11x^2-x$$

$$Step\ 1:\quad 12x^2-6=11x^2-x$$

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

PART II (2 points)

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

addition

$3\sqrt{2}+4\sqrt{2}=7\sqrt{2}$ ← 9.899494936...

(irr + irr = irr)

cannot be made into a fraction

PART II (2 points)

6. Jakob is working on his math homework. He decides that the sum of the expression $\frac{1}{3}+\frac{6\sqrt{5}}{7}$ must be rational because it is a fraction. Is Jakob correct? Explain your reasoning.

Jakob is not correct. $\frac{6\sqrt{5}}{7}$ is not rational - it is a non repeating, non terminating decimal

PART II (2 points)

7. A teacher wrote the following set of numbers on the board:

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

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

$\sqrt{20}+2.5=4.472135...$

irrational b/c non repeating non terminating

$2.5+\sqrt{225}$

$2.5+15=17.5$ ← $17\frac{1}{2}$ converts to a fraction

PART II (2 points)

8. The distance traveled is equal to the rate of speed multiplied by the time traveled. If the distance is measured in feet and the time is measured in minutes, then the rate of speed is expressed in which units? Explain how you arrived at your answer.

feet per minutes

distance with respect to time

PART I (2 points)

9. A construction worker needs to move 120 ft^3 of dirt by using a wheelbarrow. One wheelbarrow load holds 8 ft^3 of dirt and each load takes him 10 minutes to complete. One correct way to figure out the number of hours he would need to complete this job is

(1) $\frac{120\,ft^3}{1} \times \frac{10\,\text{min}}{1\,load} \times \frac{60\,\text{min}}{1\,hr} \times \frac{1\,load}{8\,ft^3}$

(2) $\frac{120\,ft^3}{1} \times \frac{60\,\text{min}}{1\,hr} \times \frac{8\,ft^3}{10\,\text{min}} \times \frac{1}{1\,load}$

(3) $\frac{120\,ft^3}{1} \times \frac{1\,load}{10\,\text{min}} \times \frac{8\,ft^3}{1\,load} \times \frac{1\,hr}{60\,\text{min}}$

(4) $\frac{120\,\cancel{ft^3}}{1} \times \frac{1\,\cancel{load}}{8\,\cancel{ft^3}} \times \frac{10\,\cancel{\text{min}}}{1\,\cancel{load}} \times \frac{1\,hr}{60\,\cancel{\text{min}}} = \frac{1200\,hrs}{480}$

PART II (2 points)

10. A typical marathon is 26.2 miles. Allan averages 12 kilometers per hour when running in marathons.

* Use reference Sheet for Km. to miles conversion

Determine how long it would take Allan to complete a marathon, to the *nearest tenth of an hour*. Justify your answer.

$$\frac{1\text{ hrs}}{12\,\cancel{\text{Km}}} \cdot \frac{1\,\cancel{\text{Km}}}{.62\,\cancel{\text{miles}}} \cdot \frac{26.2\,\cancel{\text{miles}}}{1\text{ marathon}} = \frac{26.2\text{ hrs}}{12(.62)}$$

$$\frac{26.2}{7.44} = 3.521\approx$$

$$\boxed{3.5\text{ hrs}}$$

UNIT 1

PART II (2 points)

11. Express in simplest form: $(3x^2+4x-8)-(-2x^2+4x+2)$

$$
\begin{array}{rl}
 & 3x^2+\cancel{4x}-8 \\
+ & +2x^2 \mp 4x \mp 2 \\
\hline
 & 5x^2 \quad -10
\end{array}
$$

$\boxed{5x^2-10}$

or

$3x^2+\cancel{4x}-8+2x^2-\cancel{4x}-2$

$\boxed{5x^2-10}$

PART I (2 points)

12. Which expression is equivalent to $2(3g-4)-(8g+3)$?

(1) $-2g-1$
(2) $-2g-5$
(3) $-2g-7$
(4) $-2g-11$

$2(3g-4)-1(8g+3)$

$6g-8-8g-3$

$-2g-11$

PART II (2 points)

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

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

$\boxed{8x^3 + 22x^2 - 4x}$

PART I (2 points)

14. 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) $8x^3+2x^2+3x+18$

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

$8x^3 - 10x^2 + 12x + 12x^2 - 15x + 18$

$\boxed{8x^3 + 2x^2 - 3x + 18}$

PART II (2 points)

15. The formula $F_g = \dfrac{GM_1M_2}{r^2}$ calculates the gravitational force between two objects where G is the gravitational constant, M_1 is the mass of one object, M_2 is the mass of the other object, and r is the distance between them. Solve for the positive value of r in terms of F_g, G, M_1, and M_2.

$$(r^2)F_g = \frac{GM_1M_2\cancel{(r^2)}}{\cancel{r^2}}$$

$$\frac{r^2\cancel{F_g}}{\cancel{F_g}} = \frac{GM_1M_2}{F_g}$$

$$\sqrt{r^2} = \sqrt{\frac{GM_1M_2}{F_g}}$$

$$\boxed{r = \sqrt{\frac{GM_1M_2}{F_g}}}$$

PART II (2 points)

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

$$\left(\frac{3}{1}\right)V = \frac{1}{\cancel{3}}\pi r^2 h\left(\frac{\cancel{3}}{\cancel{1}}\right)$$

$$\frac{3V}{\pi h} = \frac{\cancel{\pi} r^2 \cancel{h}}{\cancel{\pi}\cancel{h}}$$

$$\sqrt{\frac{3V}{\pi h}} = \sqrt{r^2}$$

$$\boxed{r = \sqrt{\frac{3V}{\pi h}}}$$

PART I (2 points)

17. The formula for the surface area of a right rectangular prism is $A = 2lw + 2hw + 2lh$, where l, w, and h represent the length, width, and height, respectively. Which term of this formula is *not* dependent on the height?

~~(1)~~ A needs h

(2) $2lw$

~~(3)~~ $2hw$

~~(4)~~ $2lh$

PART I (2 points)

18. The distance a free falling object has traveled can be modeled by the equation $d = \frac{1}{2}at^2$, where a is acceleration due to gravity and t is the amount of time the object has fallen. What is t in terms of a and d?

$\left(\frac{2}{1}\right)d = \cancel{\frac{1}{2}}at^2\left(\cancel{\frac{2}{1}}\right)$

$\frac{2d}{a} = \frac{\cancel{a}t^2}{\cancel{a}}$

$\sqrt{t^2} = \sqrt{\frac{2d}{a}}$

$t =$

(1) $t = \sqrt{\frac{da}{2}}$

(2) $t = \sqrt{\frac{2d}{a}}$

(3) $t = \left(\frac{da}{d}\right)^2$

(4) $t = \left(\frac{2d}{a}\right)^2$

PART I (2 points)

19. The formula for blood flow rate is given by $F = \frac{p_1 - p_2}{r}$, where F is the flow rate, p_1 the initial pressure, p_2 the final pressure, and r the resistance created by blood vessel size. Which formula can *not* be derived from the given formula?

$(r)F = \frac{p_1 - p_2}{\cancel{r}}(\cancel{r})$

$\frac{r(\cancel{F})}{\cancel{F}} = \frac{p_1 - p_2}{F}$

(1) $p_1 = Fr + p_2$

(2) $p_2 = p_1 - Fr$

(3) $r = F(p_2 - p_1)$

(4) $r = \frac{p_1 - p_2}{F}$

PART IV (6 points)

20. Ian is borrowing $1000 from his parents to buy a notebook computer. He plans to pay them back at the rate of $60 per month. Ken is borrowing $600 from his parents to purchase a snowboard. He plans to pay his parents back at the rate of $20 per month.

Write an equation that can be used to determine after how many months the boys will owe the same amount.

let Ian $= 1000 - 60m$

let Ken $= 600 - 20m$

$1000 - 60m = 600 - 20m$

Determine algebraically and state in how many months the two boys will owe the same amount. State the amount they will owe at this time.

$$1000 - 60m = 600 - 20m$$
$$+60m \qquad\qquad +60m$$
$$1000 = 600 + 40m$$
$$-600 \qquad -600$$
$$\frac{400}{40} = \frac{40m}{40}$$
$$10 = m$$

$\boxed{\text{at 10 months they will each owe \#400}}$

$1000 - 60(10)$

$1000 - 600 = 400$

Ian claims that he will have his loan paid off 6 months after he and Ken owe the same amount. Determine and state if Ian is correct. Explain your reasoning.

10 months
+ 6
16 months

$1000 - 60(16)$

$1000 - 960 = 40$

Ian is not correct. Ian will still owe #40

PART IV (6 points)

21. At Bea's Pet Shop, the number of dogs, *d*, is initially five less than twice the number of cats, *c*. If she decides to add three more of each, the ratio of cats to dogs will be $\frac{3}{4}$.

d=

Write an equation or system of equations that can be used to find the number of cats and dogs Bea has in her pet shop.

$d = 2c - 5$

$\frac{c+3}{d+3} = \frac{3}{4}$

Could Bea's Pet Shop initially have 15 cats and 20 dogs? Explain your reasoning.

$20 = 2(15) - 5$

$20 \neq 25$

Determine algebraically the number of cats and the number of dogs Bea initially had in her pet shop.

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

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

$4c + 12 = 6c - 6$

$-4c \qquad -4c$

$12 = 2c - 6$

$+6 \qquad +6$

$18 = 2c$

$9 = c$

$d = 2(9) - 5$

$18 - 5$

$d = 13$

9 cats
13 dogs

UNIT 2

PART I (2 points)

(DOTS)

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

(1) $(7x-6)^2$

(2) $(24.5x-18)^2$

(3) $(7x-6)(7x+6)$

(4) $(24.5x-18)(24.5x+18)$

PART I (2 points)

23. When factored completely, x^3-13x^2-30x is

(1) $x(x+3)(x-10)$

(2) $x(x-3)(x-10)$

(3) $x(x+2)(x-15)$

(4) $x(x-2)(x+15)$

$x(x^2-13x-30)$

$x(x-\ \ )(x\ \ \ \ )$

PART I (2 points)

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

(1) $4(3x-5)(3x-5)$

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

(3) $2(9x-25)(9x-25)$

(4) $2(9x+25)(9x-25)$

$4(9x^2 - 25)$

$4(3x+5)(3x-5)$

PART I (2 points)

25. Which expression is equivalent to $2x^2 + x - 3$?

(1) $(2x-1)(x+3)$

(2) $(2x+1)(x-3)$

(3) $(2x-3)(x+1)$

(4) $(2x+3)(x-1)$

$-6x^2$

$+3x$
$-2x$
$+x$

$2x^2 - 2x + 3x - 3$

$2x(x-1) + 3(x-1)$

$(2x+3)(x-1)$

REVIEW #2

COMMON CORE EXAM QUESTIONS

UNIT 3

PART II (2 points)

1. A family is traveling from their home to a vacation resort hotel. The table below shows their distance from home as a function of time.

$\frac{480-140}{7-2} = \frac{340}{5} = \frac{68}{1}$

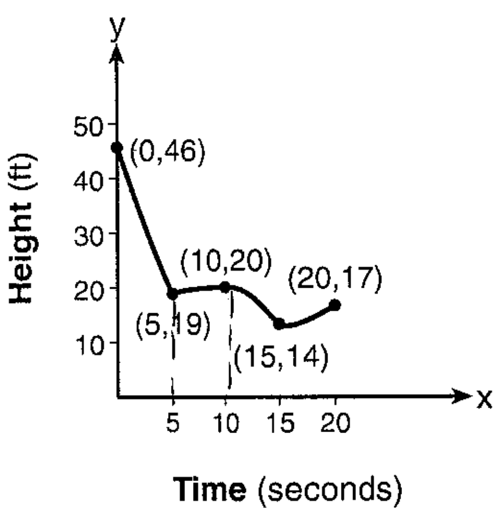
Time (hrs)	0	2	5	7
Distance (mi)	0	140	375	480

Determine the average rate of change between hour 2 and hour 7, including units.

68 miles per hr.

PART I (2 points)

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



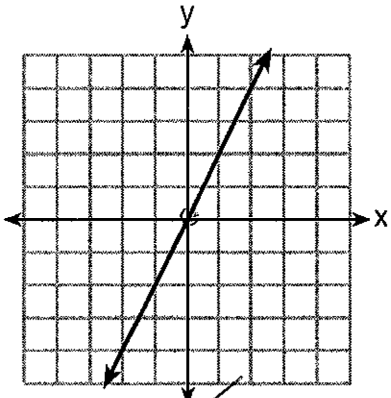
Over which interval does the helicopter have the *slowest* average rate of change?

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

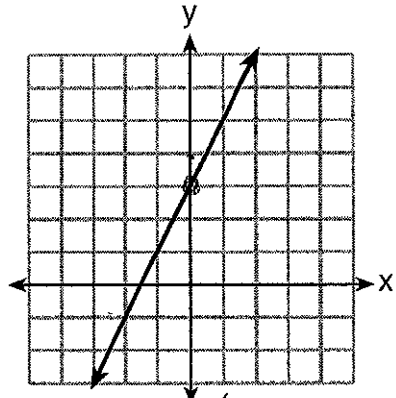
PART I (2 points)

3. Which graph shows a line where each value of y is three more than half of x?

$b=0$



(1)

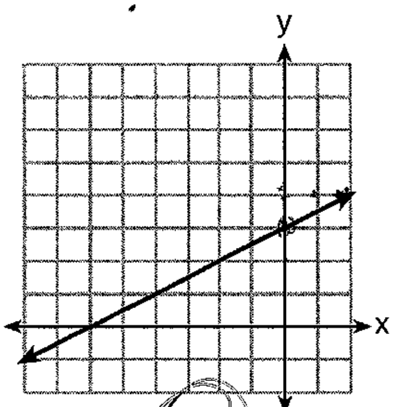


(3)

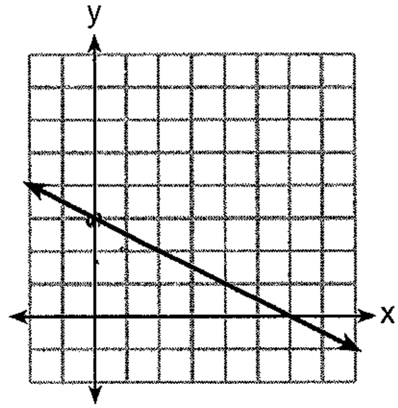
$y = \frac{1}{2}x + 3$

$m = \frac{1}{2}$ (up 1 rt 2)

$b = 3$



(2)



(4)

PART I (2 points)

4. A plumber has a set fee for a house call and charges by the hour for repairs. The total cost of her services can be modeled by $c(t) = 125t + 95$.

Which statements about this function are true?

I. A house call fee costs $95. True

II. The plumber charges $125 per hour. True

III. The number of hours the job takes is represented by t. True

(1) I and II, only

(2) I and III, only

(3) II and III, only

(4) I, II, and III

PART I (2 points)

5. What is the domain of the relation shown below? X values

$$\{(4,2),(1,1),(0,0,),(1,-1),(4,-2)\}$$

(1) $\{0,1,4\}$

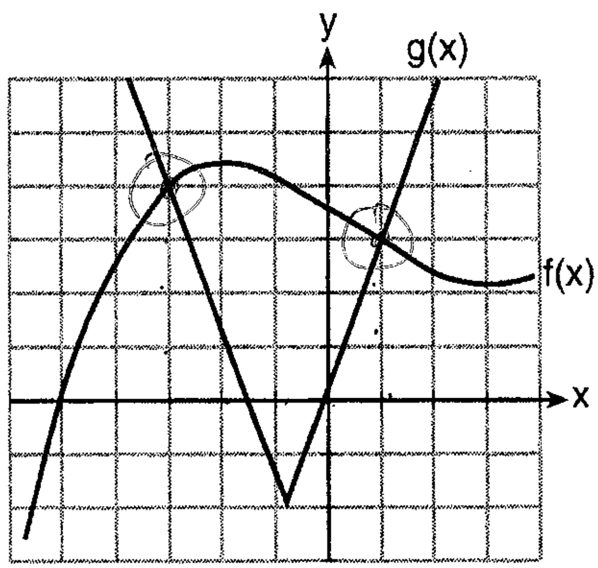
(2) $\{-2,-1,0,1,2\}$

(3) $\{-2,-1,0,1,2,4\}$

(4) $\{-2,-1,0,0,1,1,1,2,4,4\}$

PART II (2 points)

6. 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 and x = 1

PART IV (6 points)

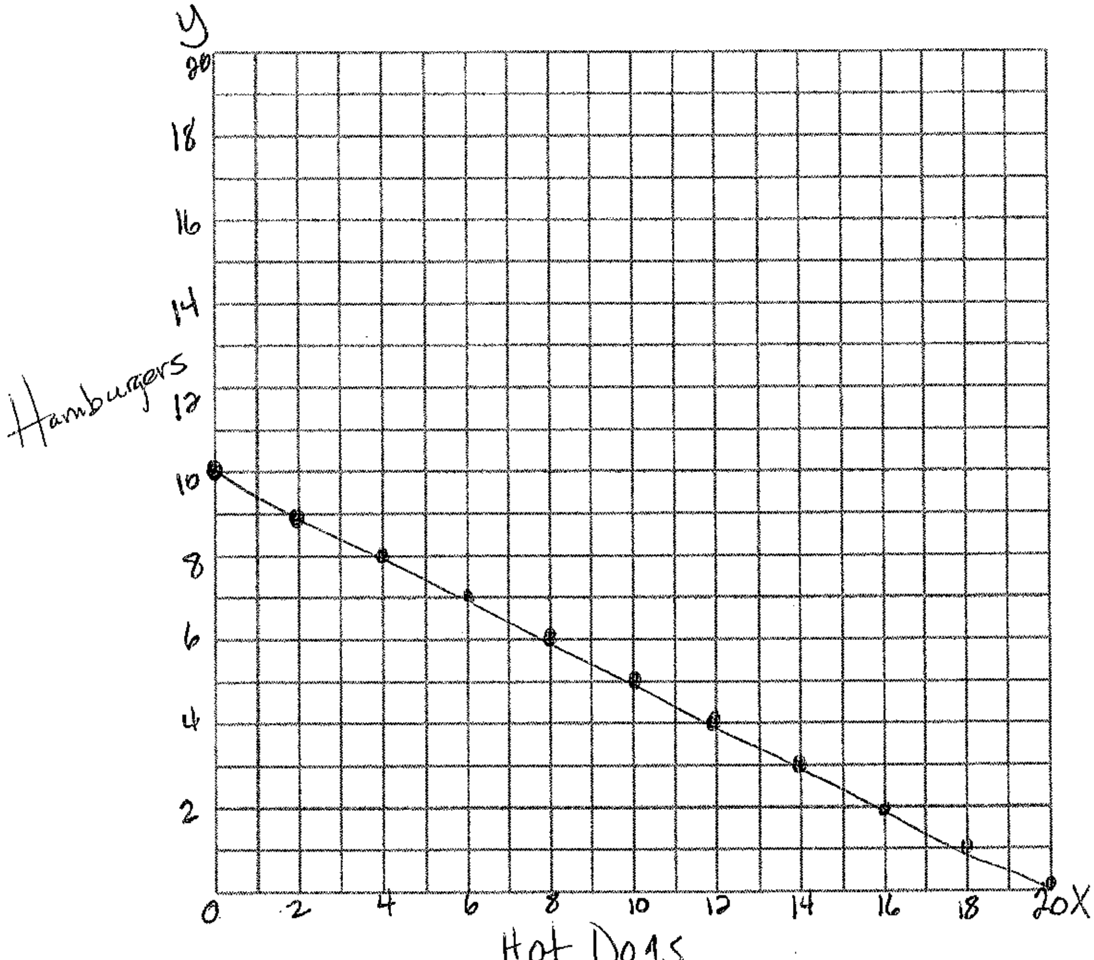
7. Zeke and six of his friends are going to a baseball game. Their combined money totals \$28.50. At the game, hot dogs cost \$1.25 each, hamburgers cost \$2.50 each, and sodas cost \$0.50 each. Each person buys one soda. They spend all \$28.50 on food and soda.

Write an equation that can determine the number of hot dogs, x, and hamburgers, y, Zeke and his friends can buy.

$$1.25x + 2.50y + .5(7) = 28.50$$

$$\boxed{1.25x + 2.50y = 25.00}$$

Graph your equation on the grid below.



$$\frac{2.50y}{2.50} = \frac{-1.25x + 25}{2.50}$$

$$y = \frac{-1.25x + 25}{2.50}$$

x	y
0	10
2	9
4	8
6	7
8	6
10	5
12	4
14	3
16	2
18	1
20	0

Determine how many different combinations, including those combinations containing zero, of hot dogs and hamburgers Zeke and his friends can buy, spending all \$28.50. Explain your answer.

11 different combinations

PART IV (6 points)

8. Franco and Caryl went to a bakery to buy desserts. Franco bought 3 packages of cupcakes and 2 packages of brownies for \$19. Caryl bought 2 packages of cupcakes and 4 packages of brownies for \$24. Let x equal the price of one package of cupcakes and y equal the price of one package of brownies.

Write a system of equations that describes the given situation.

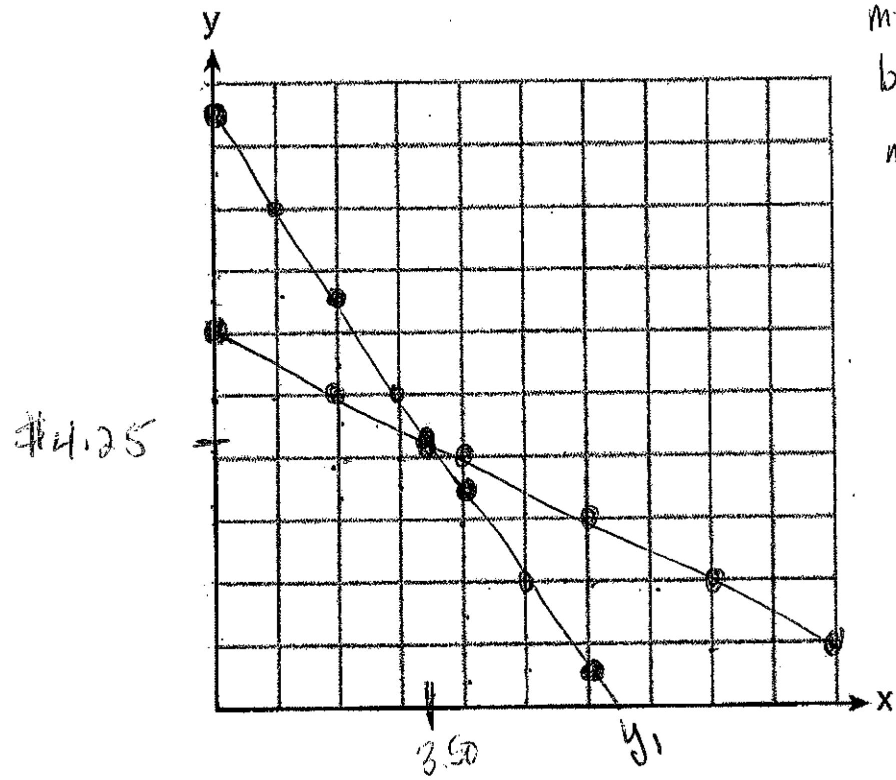
$y_1: \; 3x + 2y = 19 \Rightarrow 2y = -3x + 19 \Rightarrow y = \frac{-3x+19}{2}$

$y_2: \; 2x + 4y = 24 \Rightarrow 4y = -2x + 24 \Rightarrow y = \frac{-2x+24}{4}$

Graph the system of equations.

$m = -\frac{3}{2}$, $b = 9.5$ $\quad y_1: \; y = -\frac{3}{2}x + 9.5$

$m = -\frac{1}{2}$, $b = 6$ $\quad y_2: \; y = -\frac{1}{2}x + 6$



Determine the exact cost of one package of cupcakes and the exact cost of one package of brownies in dollars and cents. Justify your solution.

\$4.25 brownie

\$3.50 cupcake

used calc to find intersection

PART IV (6 points)

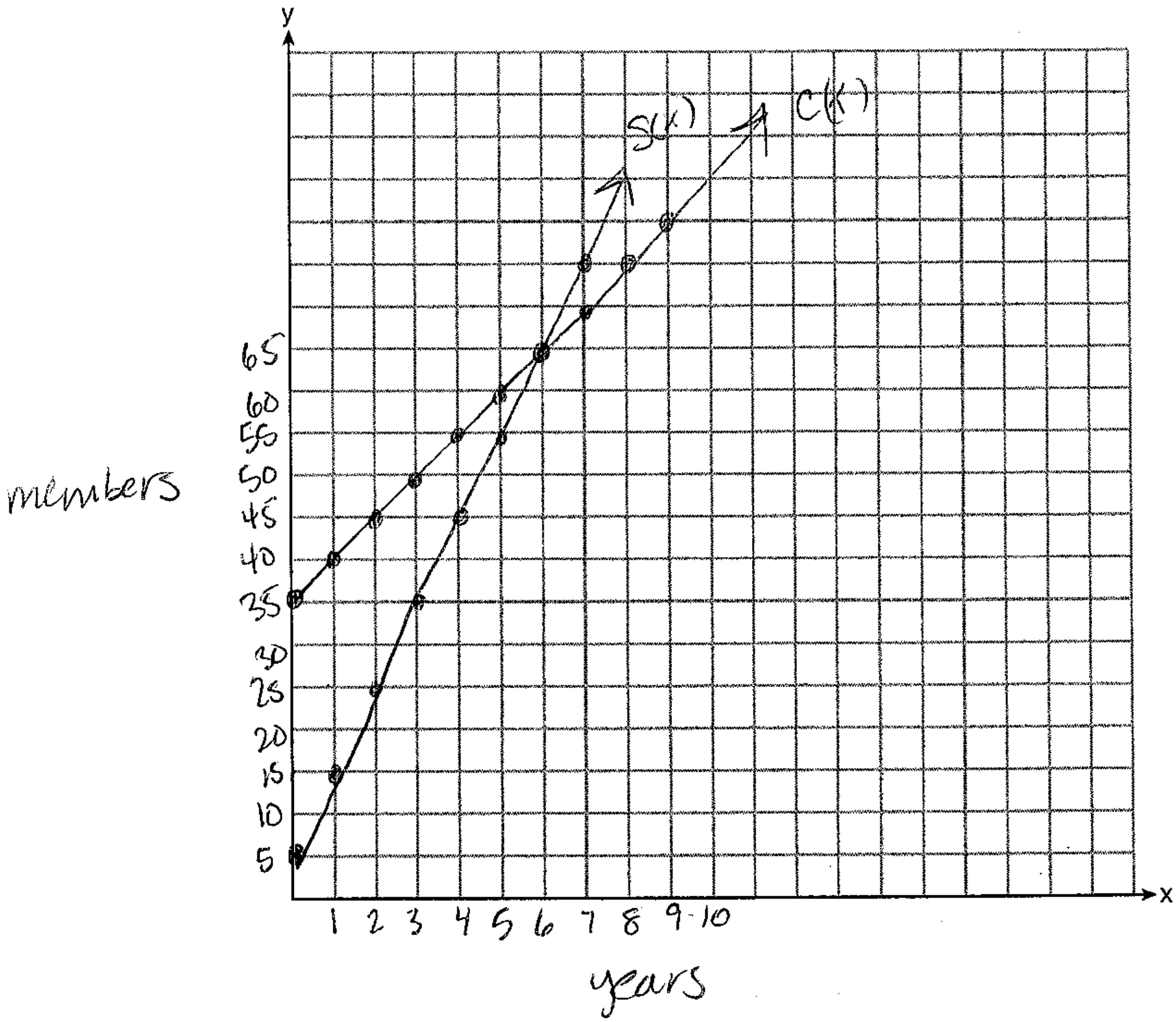
9. Central High School had five members on their swim team in 2010. Over the next several years, the team increased by an average of 10 members per year. The same school had 35 members in their chorus in 2010. The chorus saw an increase of 5 members per year.

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

$S(x) = 10x + 5$

$C(x) = 5x + 35$

Graph this system of equations on the set of axes below.



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

(6, 65) at 6 years each team

UNIT 4

PART I (2 points)

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

$\frac{1}{2}(8^2) - \left(\frac{1}{4}(8) + 3\right)$
$32 - 5$
27

(1) 11 (3) 27

(2) 17 (4) 33

PART I (2 points)

11. Lynn, Jude, and Anne were given the function $f(x) = -2x^2 + 32$, and they were asked to find $f(3)$. Lynn's answer was 14, Jude's answer was 4, and Anne's answer was ± 4. Who is correct?

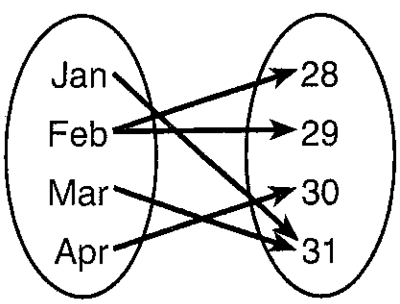
$-2(3^2) + 32$
$-2(9) + 32$
$-18 + 32$
14

(1) Lynn, only (3) Anne, only

(2) Jude, only (4) Both Lynn and Jude

PART I (2 points)

12. A mapping is shown in the diagram below.



1 31
2 28
2 29
3 31
4 30

X values repeat
not a function

This mapping is

~~(1)~~ a function, because Feb has two outputs, 28, and 29
~~(2)~~ a function, because two inputs, Jan & Mar, result in the output 31
(3) not a function, because Feb has two outputs, 28 and 29
~~(4)~~ not a function, because two inputs, Jan & Mar, result in the output 31

PART I (2 points)

13. What is the solution to the system of equations below?

$$y = 2x + 8$$

$$3(-2x + y) = 12$$

$y = 2x + 8$ $m = 2/1$ $b = 8$

$y = 2x + 4$ $m = 2/1$ $b = 4$

$-6x + 3y = 12$

$3y = 6x + 12$

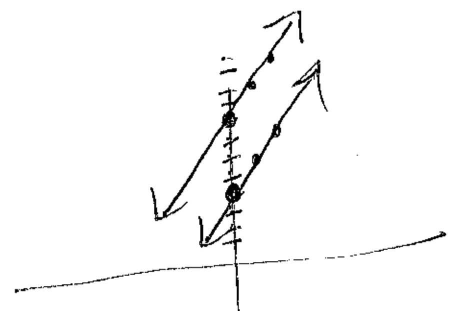
$\frac{3y}{3} = \frac{6x}{3} + \frac{12}{3}$

(1) no solution

(2) infinite solutions

(3) $(-1,6)$

(4) $\left(\frac{1}{2}, 9\right)$



lines are // and will never intersect

PART I (2 points)

14. A system of equations is given below.

$$x + 2y = 5$$
$$2x + y = 4$$

Which system of equations does *not* have the same solution?

(1) $3x + 6y = 15$, $2x + y = 4$

(2) $4x + 8y = 20$, $2x + y = 4$

(3) $x + 2y = 5$, $6x + 3y = 12$

(4) $x + 2y = 5$, $4x + 2y = 12$

PART III (4 points)

15. Two friends went to a restaurant and ordered one plain pizza and two sodas. Their bill totaled \$15.95. Later that day, five friends went to the same restaurant. They ordered three plain pizzas and each person had one soda. Their bill totaled \$45.90.

Write and solve a system of equations to determine the price of one plain pizza. [Only an algebraic solution can receive full credit.]

1 pizza + 2 sodas = 15.95
3 pizzas + 5 sodas = 45.90

$-3(1p + 2s = 15.95)$
$3p + 5s = 45.90$

$-3p - 6s = -47.85$
$3p + 5s = 45.90$

$-s = -1.95$
$s = 1.95$

$1p + 2(1.95) = 15.95$
$p + 3.90 = 15.95$
$p = \quad -3.90 \quad -3.90$
12.05

$\boxed{\text{pizza} = \$12.05}$

UNIT 5

PART I (2 points)

16. Jordan works for a landscape company during his summer vacation. He is paid \$12 per hour for mowing lawns and \$14 per hour for planting gardens. He can work a maximum of 40 hours per week, and would like to earn at least \$250 this week. If m represents the number of hours mowing lawns and g represents the number of hours planting gardens, which system of inequalities could be used to represent the given conditions?

$m + g \le 40$
$12m + 14g \ge 250$

(1) $m + g \le 40$, $12m + 14g \ge 250$

(3) $m + g \le 40$, $12m + 14g \le 250$

(2) $m + g \ge 40$, $12m + 14g \le 250$

(4) $m + g \ge 40$, $12m + 14g \ge 250$

PART I (2 points)

17. Which value would be a solution for x in the inequality $47-4x<7$?

$$-47 \quad -47$$

$$-4x < -40$$

$$\div -4 \quad \div -4$$

$$x > 10$$

(1) -13 (3) 10

(2) -10 (4) 11

PART I (2 points)

18. Which point is a solution to the system below?

$$2y<-12x+4$$
$$y<-6x+4$$

(1) $\left(1,\frac{1}{2}\right)$ (3) $\left(-\frac{1}{2},5\right)$

(2) $(0,6)$ (4) $(-3,2)$

PART II (2 points)

19. Solve the inequality below:

$$1.8-0.4y\geq 2.2-2y$$
$$+2y \qquad +2y$$
$$1.8+1.6y\geq 2.2$$
$$-1.8 \qquad -1.8$$
$$1.6y \geq .4$$
$$\frac{1.6y}{1.6} \geq \frac{.4}{1.6}$$
$$y \geq .25$$

$\frac{9}{9}x - \frac{4}{9}x = \frac{5}{9}x$

PART I (2 points)

20. What is the solution to the inequality $2+\frac{4}{9}x \geq 4+x$?

$-\frac{4}{9}x \qquad -\frac{4}{9}x$?

(1) $x \leq -\frac{18}{5}$

(2) $x \geq -\frac{18}{5}$

(3) $x \leq \frac{54}{5}$

(4) $x \geq \frac{54}{5}$

$2 \geq 4 + \frac{5}{9}x$

$-4 \quad -4$

$\left(\frac{9}{5}\right) -2 \geq \frac{5}{9}x\left(\frac{9}{5}\right)$

$-\frac{18}{5} \geq x$

$x \leq -\frac{18}{5}$

PART III (4 points)

21. The drama club is running a lemonade stand to raise money for its new production. A local grocery store donated cans of lemonade and bottles of water. Cans of lemonade sell for \$2 each and bottles of water sell for \$1.50 each. The club needs to raise at least \$500 to cover the cost of renting costumes. The students can accept a maximum of 360 cans and bottles.

Write a system of inequalities that can be used to represent this situation.

$2c + 1.50b \geq 500$

$c + b \leq 360$

The club sells 144 cans of lemonade. What is the *least* number of bottles of water that must be sold to cover the cost of renting costumes? Justify your answer.

$2(144) + 1.50b \geq 500$

$288 + 1.50b \geq 500$

$-288 \qquad -288$

$1.50b \geq 212$

$b \geq 141.\overline{3}$

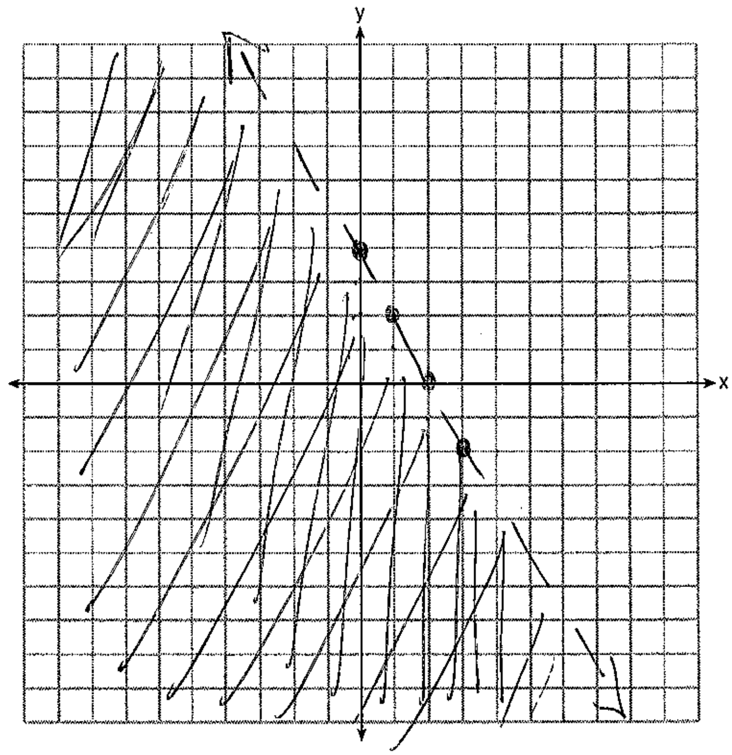
$\boxed{142 \text{ bottles}}$

$y < -2x + 4 \quad m = -2/1 \quad b = 4$

PART II (2 points)

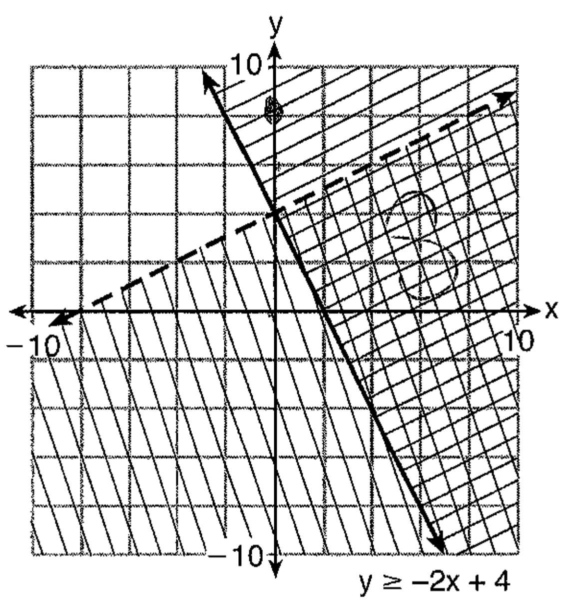
$y + 4 < -2x + 8$

22. Graph the inequality $y+4<-2(x-4)$ on the set of axes below.



PART II (2 points)

23. Determine if the point $(0,4)$ is a solution to the system of inequalities graphed below. Justify your answer.



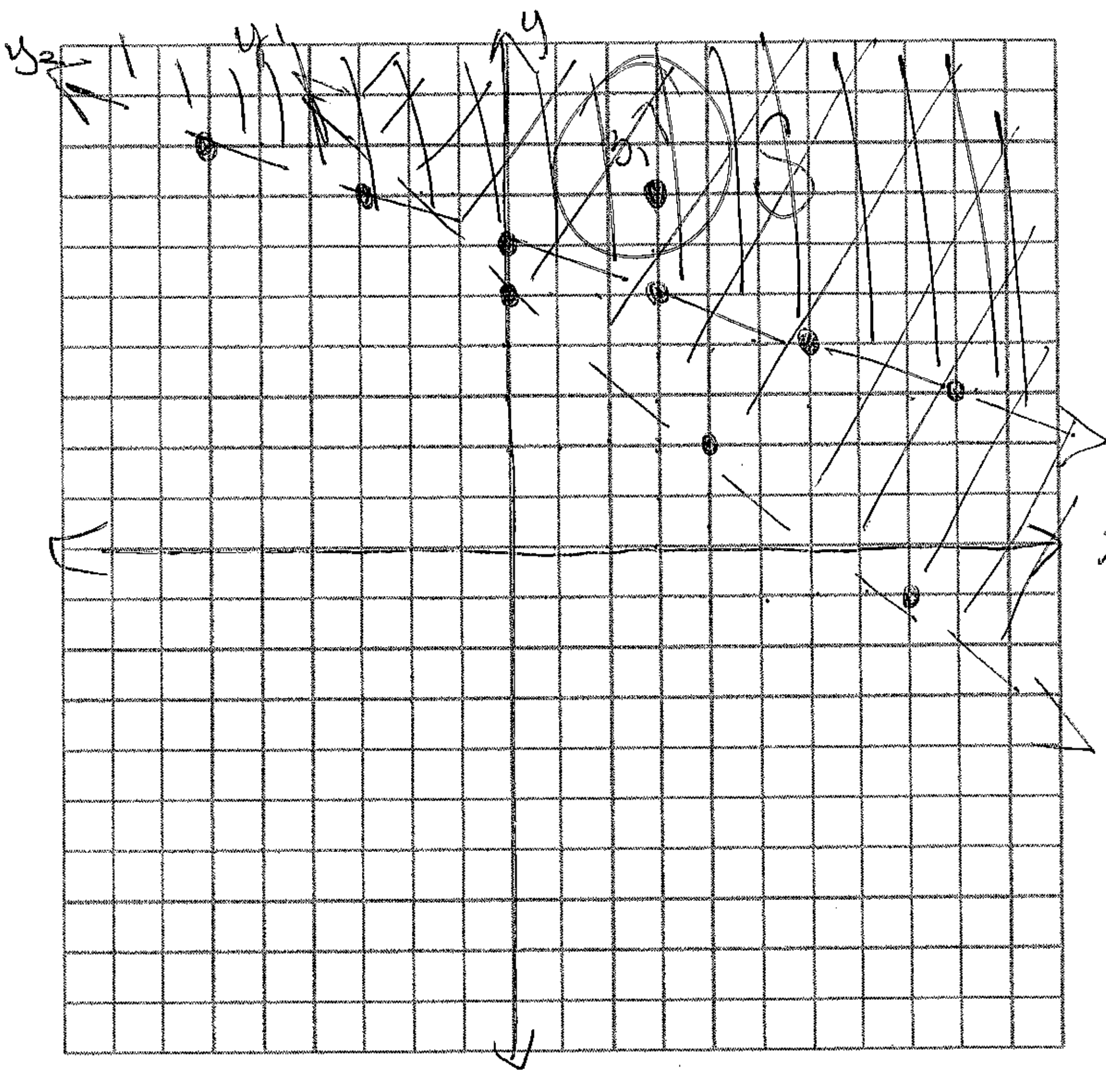
No (0,4) is not in the double shaded region

PART III (4 points)

24. Solve the following system of inequalities graphically on the grid below and label the solution S.

y_1: $m = -3/4$ $b = 5$ $3x + 4y > 20$ $\Rightarrow$ $\frac{4y}{4} > \frac{-3x}{4} + \frac{20}{4}$ $y > \frac{-3}{4}x + 5$

y_2: $m = 1/3$ $b = 6$ $x < 3y - 18$ $\Rightarrow$ $\frac{-3y}{-3} < \frac{-x}{-3} - \frac{18}{-3}$ $\Rightarrow$ $y > \frac{1}{3}x + 6$



Is the point (3,7) in the solution set? Explain your answer.

yes it is in the overlapped shaded region

PART IV (6 points)

25. The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost $12.50 and child tickets cost $6.25. The cinema's goal is to sell at least $1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x, and child tickets, y, that would satisfy the cinema's goal.

$m = -2$ $b = 240$

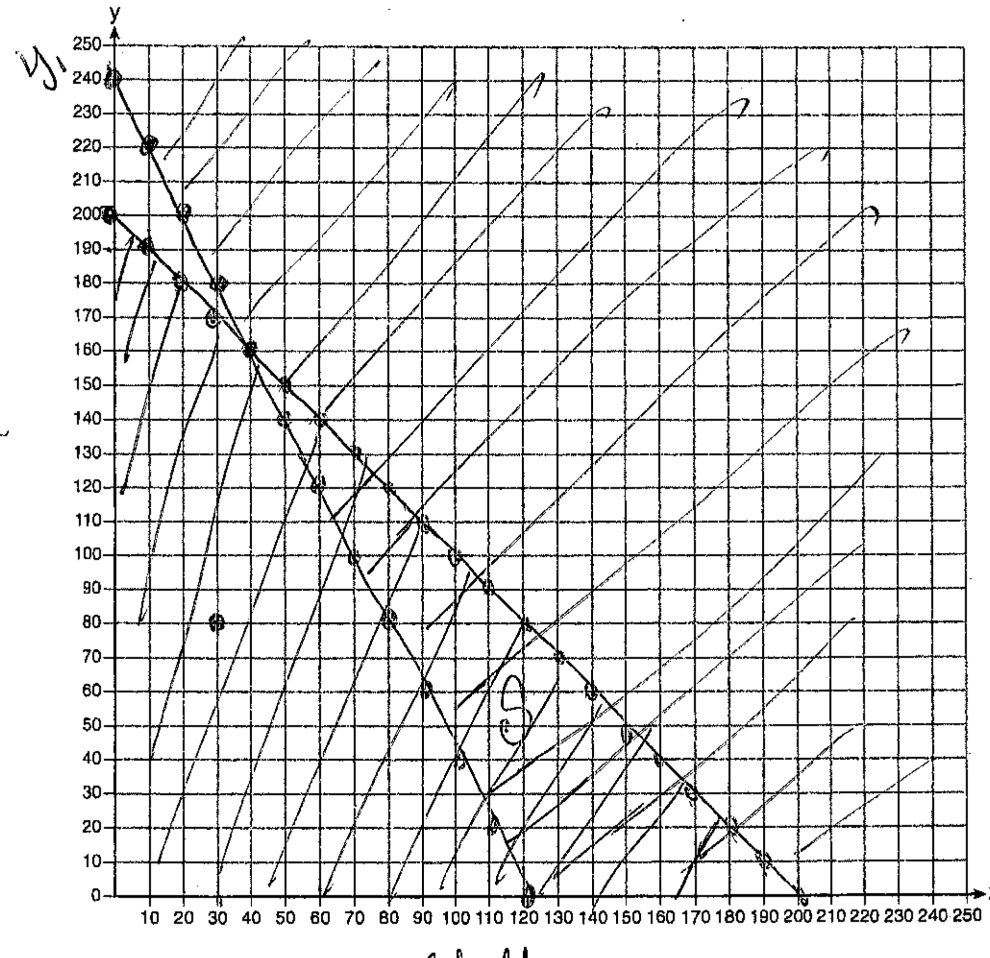
y_1: $m = -\frac{8}{10}$

$12.50a + 6.25c \geq 1500 \Rightarrow \frac{6.25c}{6.25} \geq \frac{-12.50a + 1500}{6.25}$ $\quad -2a + 243.2$

$a + c \leq 200 \Rightarrow c \leq -a + 200$

$m = -1/1$ $b = 200$

Graph the solution to the system of inequalities on the set of axes. Label the solution with an S.



Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.

NO (30, 80) is not in the double shaded region

REVIEW #3

COMMON CORE EXAM QUESTIONS

UNIT 6

PART I (2 points)

1. Which value of x is a solution to the equation $13-36x^2=-12$?

(1) $\frac{36}{25}$ (3) $-\frac{6}{5}$

(2) $\frac{25}{36}$ (4) $-\frac{5}{6}$

$13-36\left(-\frac{5}{6}\right)^2=-12$

$-12=-12$

PART I (2 points)

2. What is the solution set of the equation $(x-2)(x-a)=0$?

(1) -2 and a (3) 2 and a

(2) -2 and -a (4) 2 and -a

$(x-2)(x-a)=0$

$x-2=0$ | $x-a=0$

$x=2$ | $x=a$

PART II (2 points)

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

$+24 \nearrow 9$

$x^2 - 6x - 15 = 0$

$(x-3)^2 - 24 = 0$

$+24 \quad +24$

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

$x - 3 = \pm\sqrt{4}\sqrt{3}$

$x - 3 = \pm 2\sqrt{3}$

$+3 \quad +3$

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

PART I (2 points)

4. What are the solutions to the equation $x^2 - 8x = 10$?

(1) $4 \pm \sqrt{10}$ (3) $-4 \pm \sqrt{10}$

(2) $4 \pm \sqrt{26}$ (4) $-4 \pm \sqrt{26}$

$+26 \nearrow 16$

$x^2 - 8x - 10 = 0$

$(x-4)^2 - 26 = 0$

$+26 \quad +26$

$\sqrt{(x-4)^2} = \sqrt{26}$

$x - 4 = \pm\sqrt{26}$

$+4 \quad +4$

$x = 4 \pm \sqrt{26}$

+6 9

$2(x^2-6x+3)=0$

$(x-3)^2-6=0$

PART I (2 points)

5. The method of completing the square was used to solve the equation $2x^2-12x+6=0$. Which equation is a correct step when using this method?

(1) $(x-3)^2=6$ (3) $(x-3)^2=3$

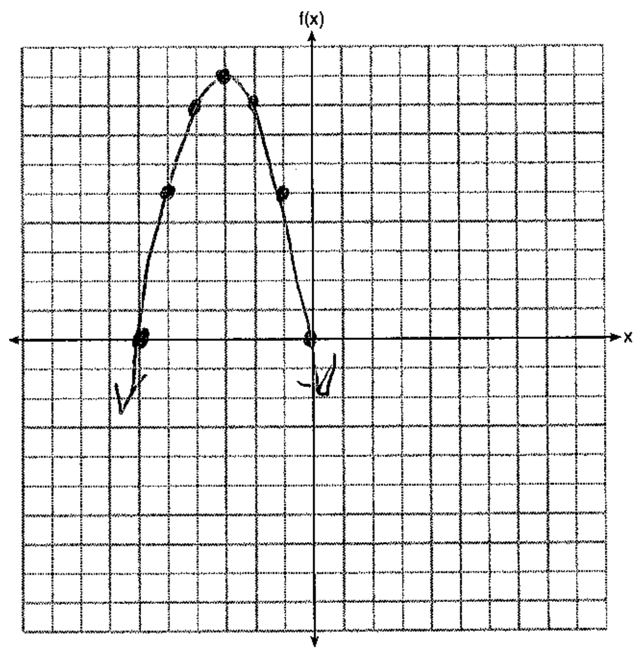
(2) $(x-3)^2=-6$ (4) $(x-3)^2=-3$

UNIT 7

PART II (2 points)

6. Graph the function $f(x)=-x^2-6x$ on the set of axes below.

x	y
-6	0
-5	5
-4	8
-3	9
-2	8
-1	5
0	0



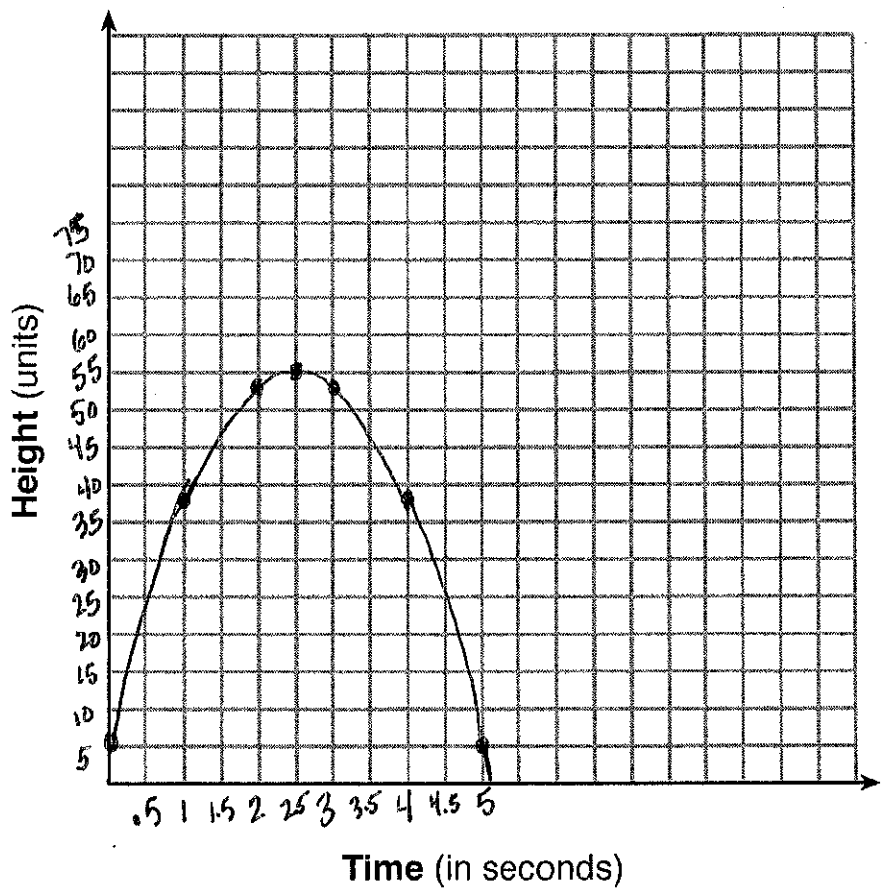
State the coordinates of a vertex of the graph.

$(-3, 9)$

PART III (4 points)

7. Alex launched a ball into the air. The height of the ball can be represented by the equation $h = -8t^2 + 40t + 5$, where h is the height, in units, and t is the time, in seconds, after the ball was launched. Graph the equation from $t = 0$ to $t = 5$ seconds.

x	y
0	5
1	37
2	53
2.5	55
3	53
4	37
5	5



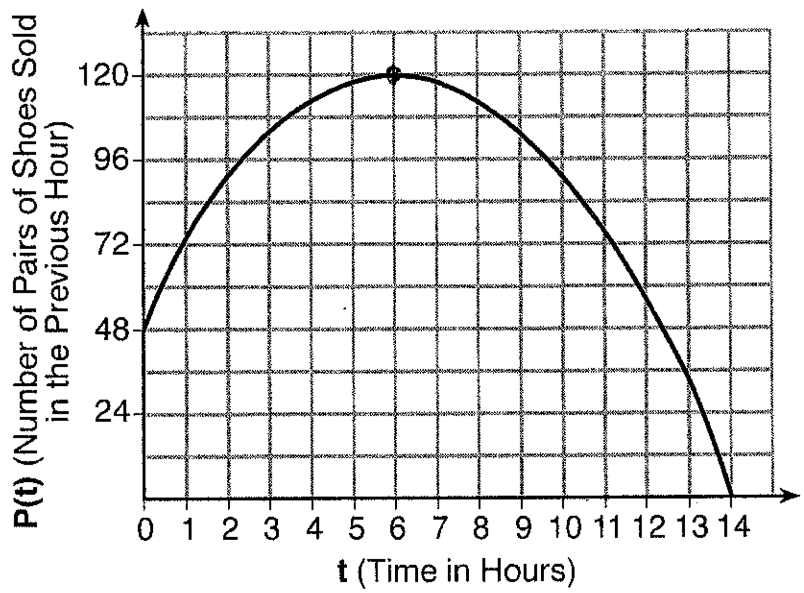
State the coordinates of the vertex and explain its meaning in the context of the problem

(2.5, 55)

at 2.5 seconds the ball will be 55 units high

PART III (4 points)

8. A manager wanted to analyze the online shoe sales for his business. He collected data for the number of pairs of shoes sold each hour over a 14-hour time period. He created a graph to model the data, as shown below.



The manager believes the set of integers would be the most appropriate domain for this model. Explain why he is *incorrect.*

The most appropriate set would be positive real numbers because time can be represented as any positive value in any form.

State the entire time interval for which the number of pairs of shoes sold is increasing.

$0 < X < 6$

Determine the average rate of change between the sixth and fourteenth hours, and explain what it means in the context of the problem.

$$\frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{0 - 120}{14 - 6} = \frac{-120}{8} = \boxed{-15}$$

PART III (4 points)

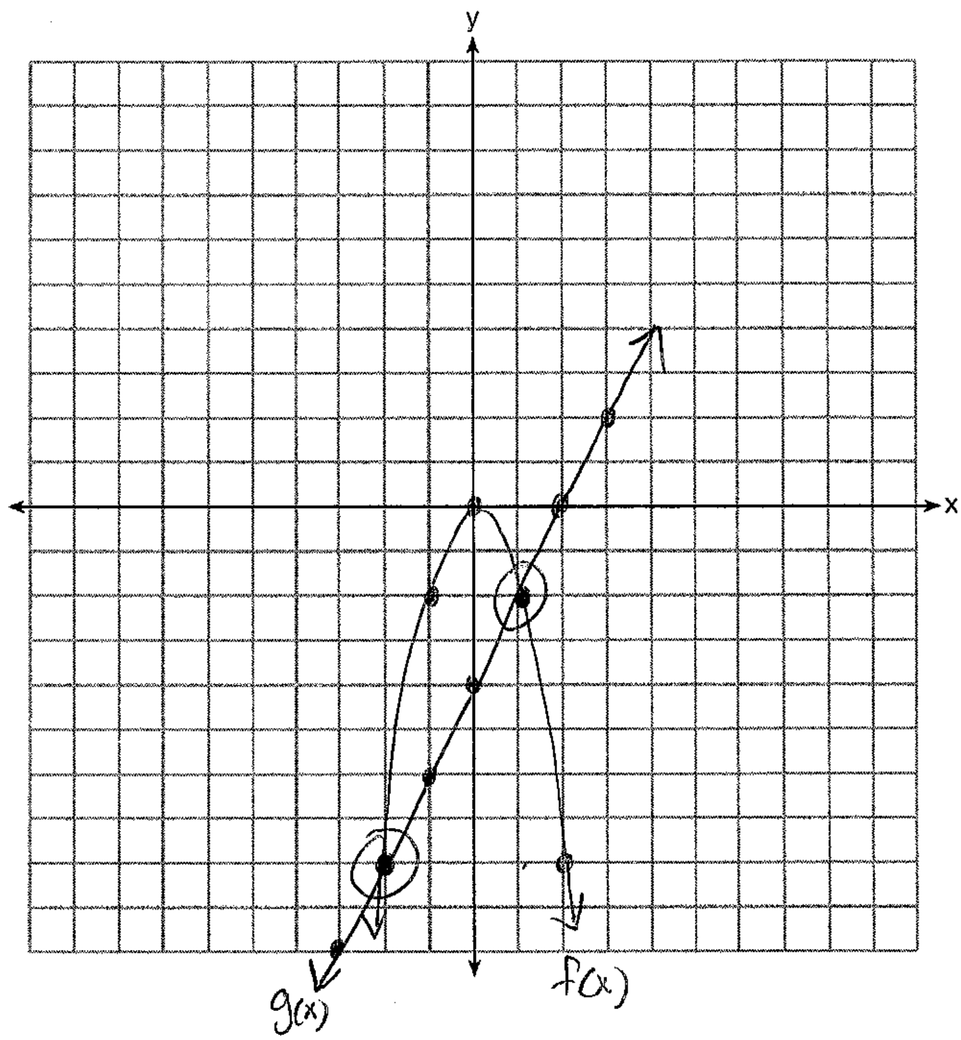
9. Let $f(x) = -2x^2$ and $g(x) = 2x - 4$. On the set of axes below, draw the graphs of $y = f(x)$ and $y = g(x)$.

$f(x)$

x	y
-3	-18
-2	-8
-1	-2
0	0
1	-2
2	-8
3	-18

$g(x)$

x	y
-3	-10
-2	-8
-1	-6
0	-4
1	-2
2	0
3	2



Using this graph determine the state *all* values of *x* for which $f(x) = g(x)$.

{-2, 1}

UNIT 8

PART I (2 points)

10. Which statement is true about the quadratic functions *g(x)*, shown in the table below, and $f(x) = (x-3)^2 + 2$?

x	g(x)	f(x)
0	4	11
1	–1	6
2	–4	3
3	–5	2
4	–4	3
5	–1	6
6	4	11

T.P

(1) They have the same vertex.
(2) They have the same zeros.
(3) They have the same axis of symmetry.
(4) They intersect at two points.

PART I (2 points)

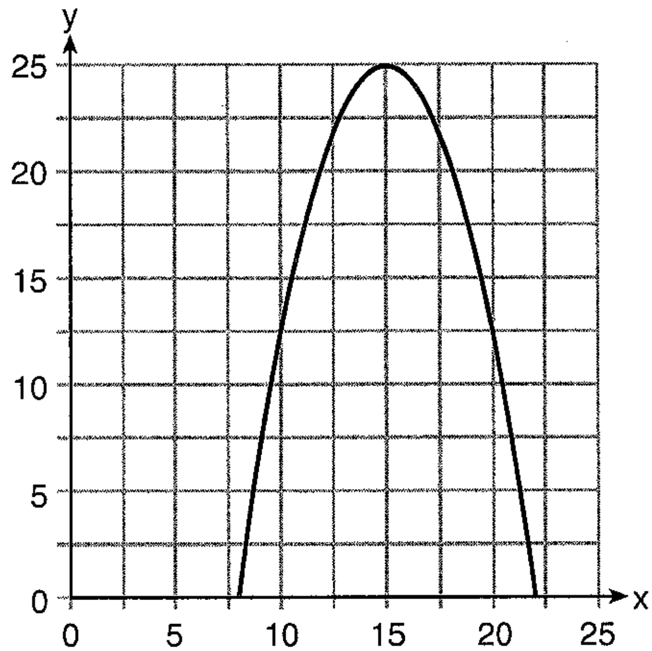
11. Morgan throws a ball up into the air. The height of the ball above the ground, in feet, is modeled by the function $h(t) = -16t^2 + 24t$, where t represents the time, in seconds, since the ball was thrown. What is the appropriate domain for this situation?

(1) $0 \le t \le 1.5$ (3) $0 \le h(t) \le 1.5$

(2) $0 \le t \le 9$ (4) $0 \le h(t) \le 9$

PART I (2 points)

12. The graph of a quadratic function is shown below.



An equation that represents the function could be

(1) $q(x)=\frac{1}{2}(x+15)^2-25$

(2) $q(x)=-\frac{1}{2}(x+15)^2-25$

(3) $q(x)=\frac{1}{2}(x-15)^2+25$

(4) $q(x)=-\frac{1}{2}(x-\underline{15})^2+\underline{25}$

(15, 25)
vertex

PART II (2 points)

13. Determine all the zeros of $m(x) = x^2 - 4x + 3$, algebraically.

$x^2 - 4x + 3 = 0$

$(x-3)(x-1) = 0$

$x-3=0$	$x-1=0$
$x=3$	$x=1$

$\boxed{\{1, 3\}}$

PART III (4 points)

14. The function $r(x)$ is defined by the expression $x^2 + 3x - 18$. Use factoring to determine the zeros of $r(x)$.

$x^2 + 3x - 18 = 0$

$(x-3)(x+6) = 0$

$x-3=0$	$x+6=0$
$x=3$	$x=-6$

$\boxed{\{-6, 3\}}$

Explain what the zeros represent on the graph of $r(x)$.

The zeros are where the parabola crosses the x axis

PART I (2 points)

15. The zeros of the function $f(x) = 2x^3 + 12x - 10x^2$ are

(1) $\{2,3\}$

(2) $\{-1,6\}$

(3) $\{0,2,3\}$

(4) $\{0,-1,6\}$

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

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

$2x(x-3)(x-2)$

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

PART I (2 points)

16. Which polynomial function has zeros at -3, 0, and 4?

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

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

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

$x=0 \quad x=-3 \quad x=4$

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

PART I (2 points)

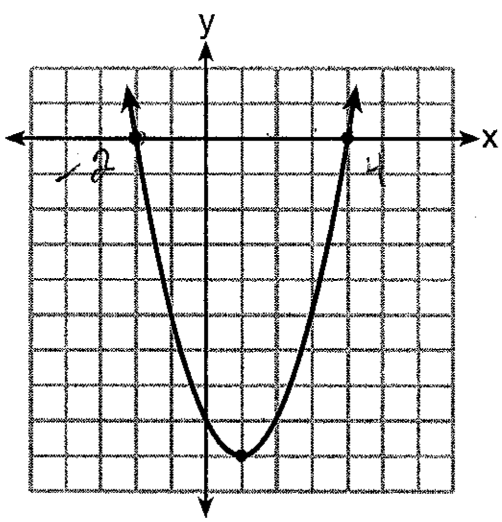
17. Which function has zeros of -4 and 2?

$f(x) = x^2 + 7x - 8$

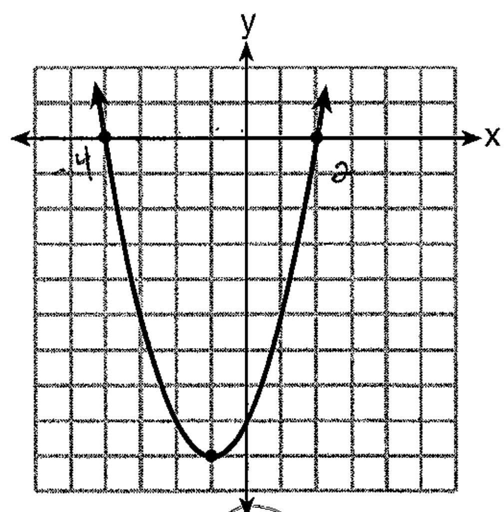
(1)

$g(x) = x^2 - 7x - 8$

(3)



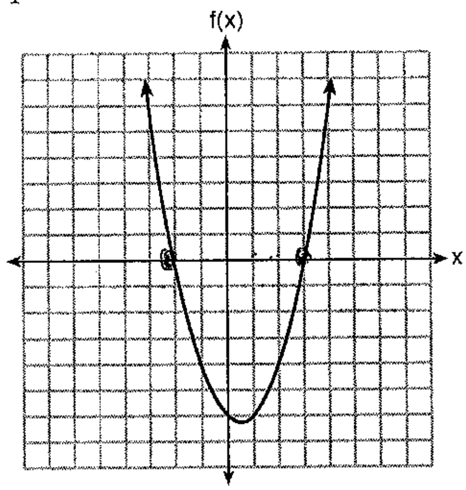
(2)



(4)

PART II (2 points)

18. The graph of the function $f(x) = ax^2 + bx + c$ is given below.



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

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

$x=-2 \quad x=3$

Could the factors of $f(x)$ be $(x+2)$ and $(x-3)$? Based on the graph, explain why or why *not*.

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

$x=-2 \quad | \quad x=3$

yes the zeros are the solutions to the factors.

PART II (2 points)

19. If the zeros of a quadratic function, F, are -3 and 5, what is the equation of the axis of symmetry of F? Justify your answer.

$x=-3 \quad x=5$

$(x+3)(x-5)=0$

$x(x-5)+3(x-5)=0$

$x^2-5x+3x-15=0$

$x^2-2x-15=0$

$a=1$

$b=-2$

$c=-15$

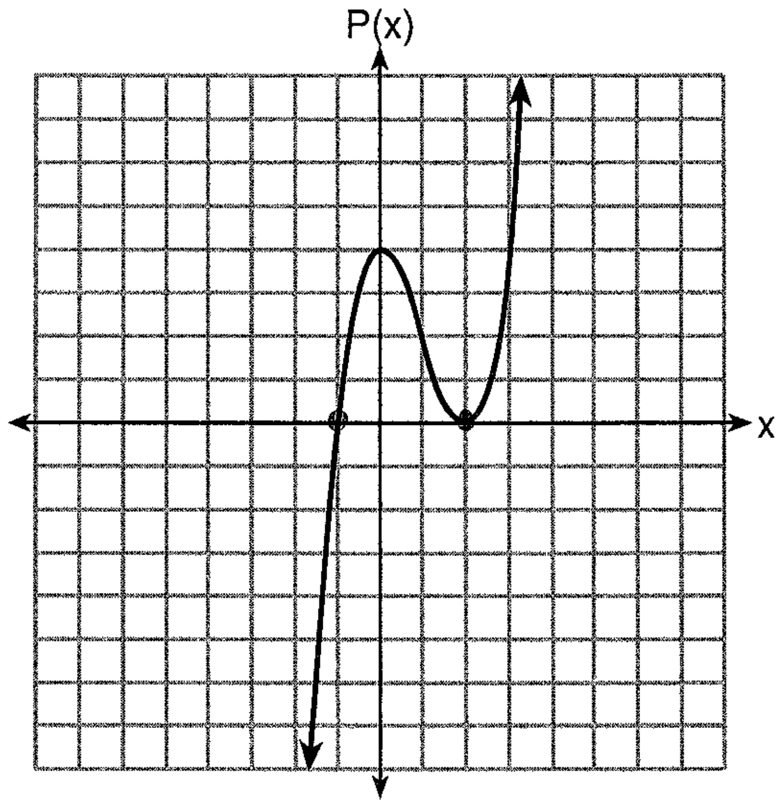
$x=\frac{-b}{2a}$

$x=\frac{--2}{2(1)}=\frac{2}{2}=1$

$\boxed{x=1}$

PART I (2 points)

20. Wenona sketched the polynomial $P(x)$ as shown on the axes below.



Which equation could represent $P(x)$?

(1) $P(x) = (x+1)(x-2)^2$

(2) $P(x) = (x-1)(x+2)^2$

(3) $P(x) = (x+1)(x-2)$

(4) $P(x) = (x-1)(x+2)$

PART I (2 points)

21. 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) $(x+1)^2 - 8x = 17$

(2) $(x-1)^2 - 8x = 17$

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

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

Abigail $= X-1$

Gina $= X$

$X^2 - 8(X-1) = 17$

PART II (2 points)

22. If $f(x) = x^2$ and $g(x) = x$, determine the value(s) of x that satisfy the equation $f(x) = g(x)$.

$X^2 = X$

$-X \quad -X$

$X^2 - X = 0$

$X(X-1) = 0$

$X = 0$ | $X - 1 = 0$

$X = 1$

PART III (4 points)

23. Given:

$$g(x) = 2x^2 + 3x + 10$$
$$k(x) = 2x + 16$$

Solve the equation $g(x) = 2k(x)$ algebraically for x, to the *nearest tenth*.

$$2x^2 + 3x + 10 = 2(2x + 16)$$
$$2x^2 + 3x + 10 = 4x + 32$$
$$-4x \qquad -4x$$
$$2x^2 - x + 10 = 32$$
$$-32 \qquad -32$$
$$2x^2 - x - 22 = 0$$

$a = 2$
$b = -1$
$c = -22$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$= \frac{1 \pm \sqrt{(-1)^2 - 4(2)(-22)}}{2(2)}$$
$$= \frac{1 \pm \sqrt{177}}{4}$$

$3.576 \approx 3.6$

$-3.076 \approx -3.1$

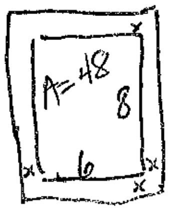
Explain why you chose the method you used to solve this quadratic equation.

The equation was not factorable since the answers were in decimal form

PART IV (6 points)

24. A rectangular picture measures 6 inches by 8 inches. Simon wants to build a wooden frame for the picture so that the framed picture takes up an area of 100 square inches on his wall. The pieces of wood that he uses to build the frame all have the same width.

Write an equation that could be used to determine the width of the pieces of wood for the frame Simon could create.



$(2x+6)(2x+8)=100$

Explain how your equation models the situation.

2x + 6 represents unknown frame width plus the 6 inches of the picture

2x + 8 represents the unknown frame width plus the 8 inches of the picture

Solve the equation to determine the width of the pieces of wood used for the frame, to the *nearest tenth of an inch*.

$(2x+6)(2x+8)=100$

$2x(2x+8)+6(2x+8)=100$

$4x^2+16x+12x+48=100$

$4x^2+28x+48=100$
$\quad\quad\quad\quad -100 \quad -100$

$4x^2+28x-52=0$

$a=4$
$b=28$
$c=-52$

$x=\dfrac{-28\pm\sqrt{28^2-4(4)(-52)}}{2(4)}$

$=\dfrac{-28\pm\sqrt{784+832}}{8}$

$=\dfrac{-28\pm\sqrt{1616}}{8}$

$1.524 \approx \boxed{1.5}$

-8.524 reject

NAME ______ ____________________ **REVIEW #4**

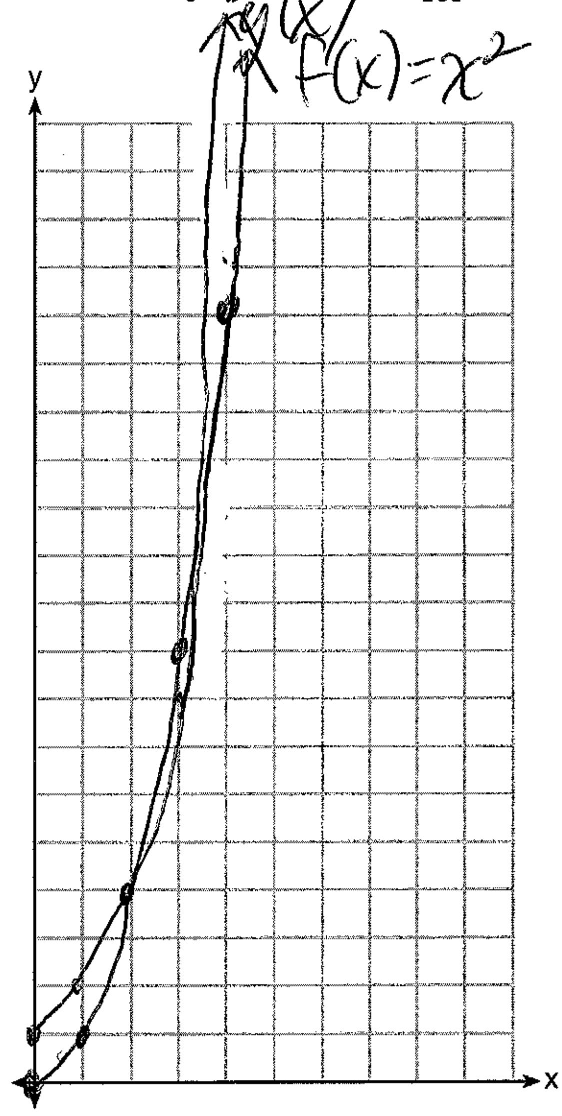
DATE ____________________ SCORE ______out of 74

COMMON CORE EXAM QUESTIONS

UNIT 9

PART III (4 points)

1. Graph $f(x) = x^2$ and $g(x) = 2^x$ for $x \geq 0$ on the set of axes below.



x	f(x)
0	0
1	1
2	4
3	9
4	16

x	g(x)
0	1
1	2
2	4
3	8
4	32

State which function, *f(x)* or *g(x)*, has a greater value when $x = 20$. Justify your reasoning.

$20^2 = 400$, $2^{20} = 1048576$

, so g(x) is greater

PART I (2 points)

2. The range of the function defined as $y = 5^x$ is

asymptote at $y=0$

(1) $y < 0$

(3) $y \leq 0$

(2) $y > 0$

(4) $y \geq 0$

PART II (2 points)

3. The value, *v(t)*, of a car depreciates according to the function $v(t) = P(.85)^t$, where *P* is the purchase price of the car and *t* is the time, in years, since the car was purchased. State the percent that the value of the car *decreases* by each year. Justify your answer.

$100 - 15 = \frac{85}{100} = .85$

15% decrease

PART I (2 points)

4. The 2014 winner of the Boston Marathon runs as many as 120 miles per week. During the last few weeks of his training for an event, his mileage can be modeled by $M(w) = 120(.90)^{w-1}$, where *w* represents the number of weeks since training began. Which statement is true about the model $M(w)$?

$100 - 10 = 90$

$\frac{90}{100} = .9$

~~(1) The number of miles he runs will increase by 90% each week.~~

~~(2)~~ The number of miles he runs will be 10% of the previous week.

(3) $M(w)$ represents the total mileage run in a given week.

~~(4) w represents the number of weeks left until his marathon.~~

initial amount exponential

PART I (2 points)

5. If a population of 100 cells triples every hour, which function represents *p(t)*, the population after *t* hours?

$y = ab^x$

$100(3)^t$

100
300
900
2700

(1) $p(t) = 3(100)^t$

~~(3)~~ $\cancel{p(t) = 3t + 100}$

(2) $\boxed{p(t) = 100(3)^t}$

~~(4)~~ $\cancel{p(t) = 100t + 3}$

PART I (2 points)

6. Anne invested \$1000 in an account with a 1.3% annual interest rate. She made no deposits or withdrawals on the account for 2 years. If interest was compounded annually, which equation represents the balance in the account after the 2 years?

$a = 1000$

$b =$

$100 + 1.3 = 101.3$

$\frac{101.3}{100} = 1.013$

~~(1)~~ $\cancel{A = 1000(1 - 0.013)^2}$

~~(3)~~ $A = 1000(1 - 1.3)^2$

(2) $A = 1000(1 + 0.013)^2$

(4) $\cancel{A = 1000(1 + 1.3)^2}$

$A = 1000(1.013)^2$

PART I (2 points)

7. Marco's \$15,000 car depreciates in value at a rate of 19% per year. The value, *V*, after *t* years can be modeled by the function $V = 15,000(0.81)^t$. Which function is equivalent to the original function?

$a = 15000$

$b = 100 - 19 = 81$

(1) $V = 15,000(0.9)^{9t}$

(3) $V = 15,000(0.9)^{\frac{t}{9}}$

(2) $V = 15,000(0.9)^{2t}$

(4) $V = 15,000(0.9)^{\frac{t}{2}}$

Same table values

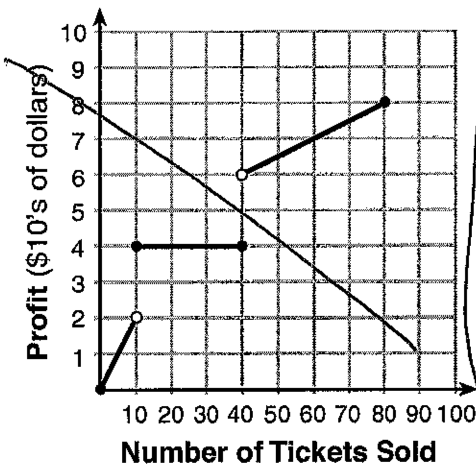
$\boxed{y_1 =}$

$\boxed{y_2 =}$

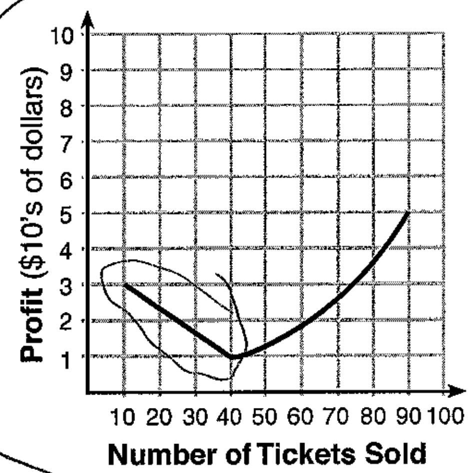
UNIT 10

PART I (2 points)

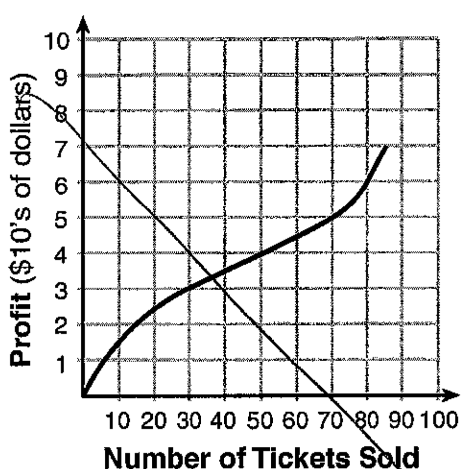
8. To keep track of his profits, the owner of a carnival booth decided to model his ticket sales on a graph. He found that his profits only declined when he sold between 10 and 40 tickets. Which graph could represent his profits?



(1)



(3)



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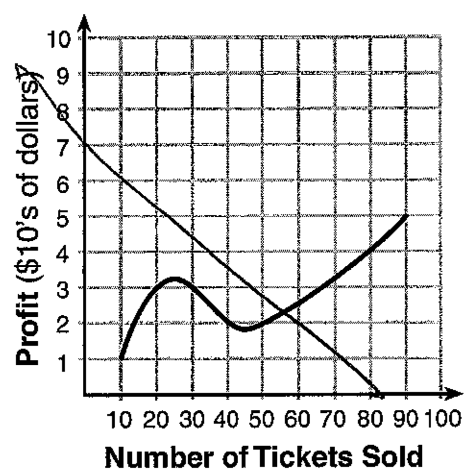
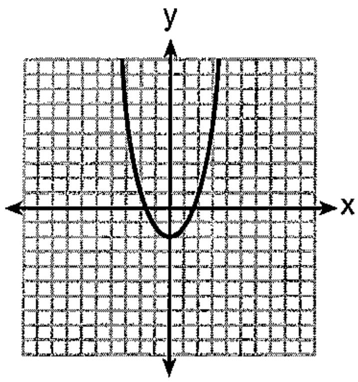


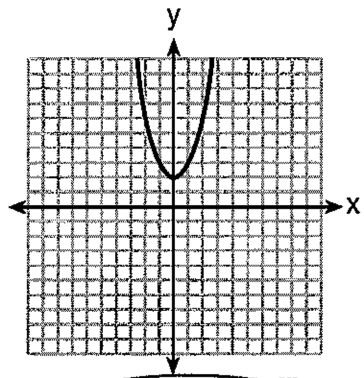
(4)

PART I (2 points)

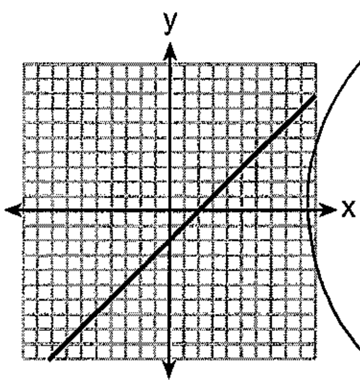
9. Which graph represents $y = \sqrt{x-2}$? Right 2



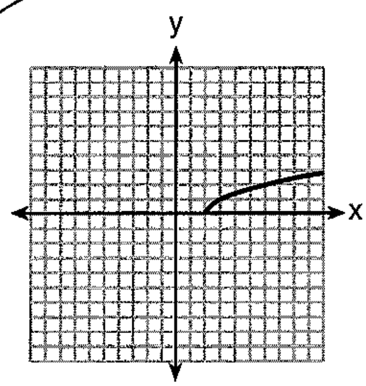
(1)



(3)



(2)



(4)

PART I (2 points)

10. What is the *minimum* value of the function $y = |x+3| - 2$?

(1) -2

(2) 2

(3) 3

(4) -3

Vertex (-3, -2)

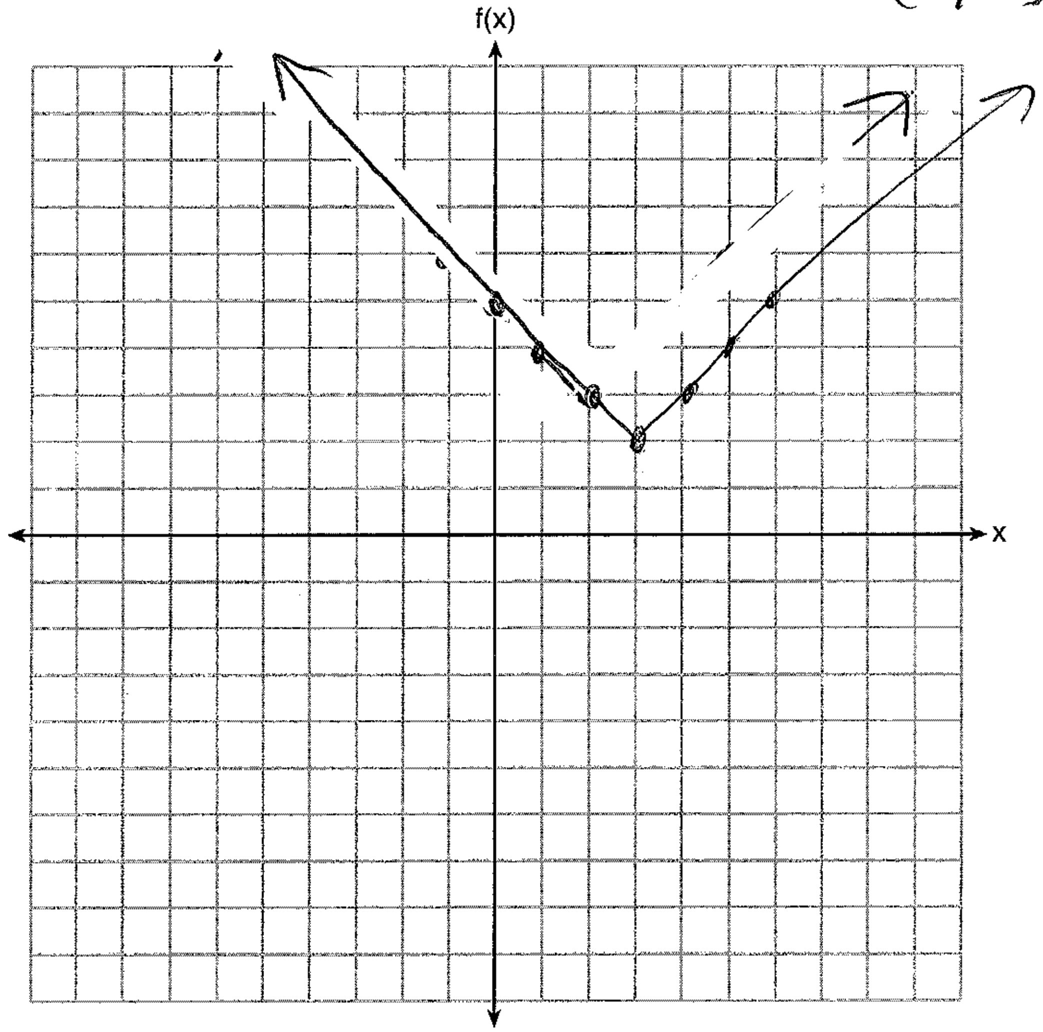
Right 3 up 2

PART III (4 points)

11. On the set of axes below, graph $f(x) = |x - 3| + 2$.

Vertex (3, 2)

x	f(x)
-1	6
0	5
1	4
2	3
3	2
4	3
5	4
6	5
7	6

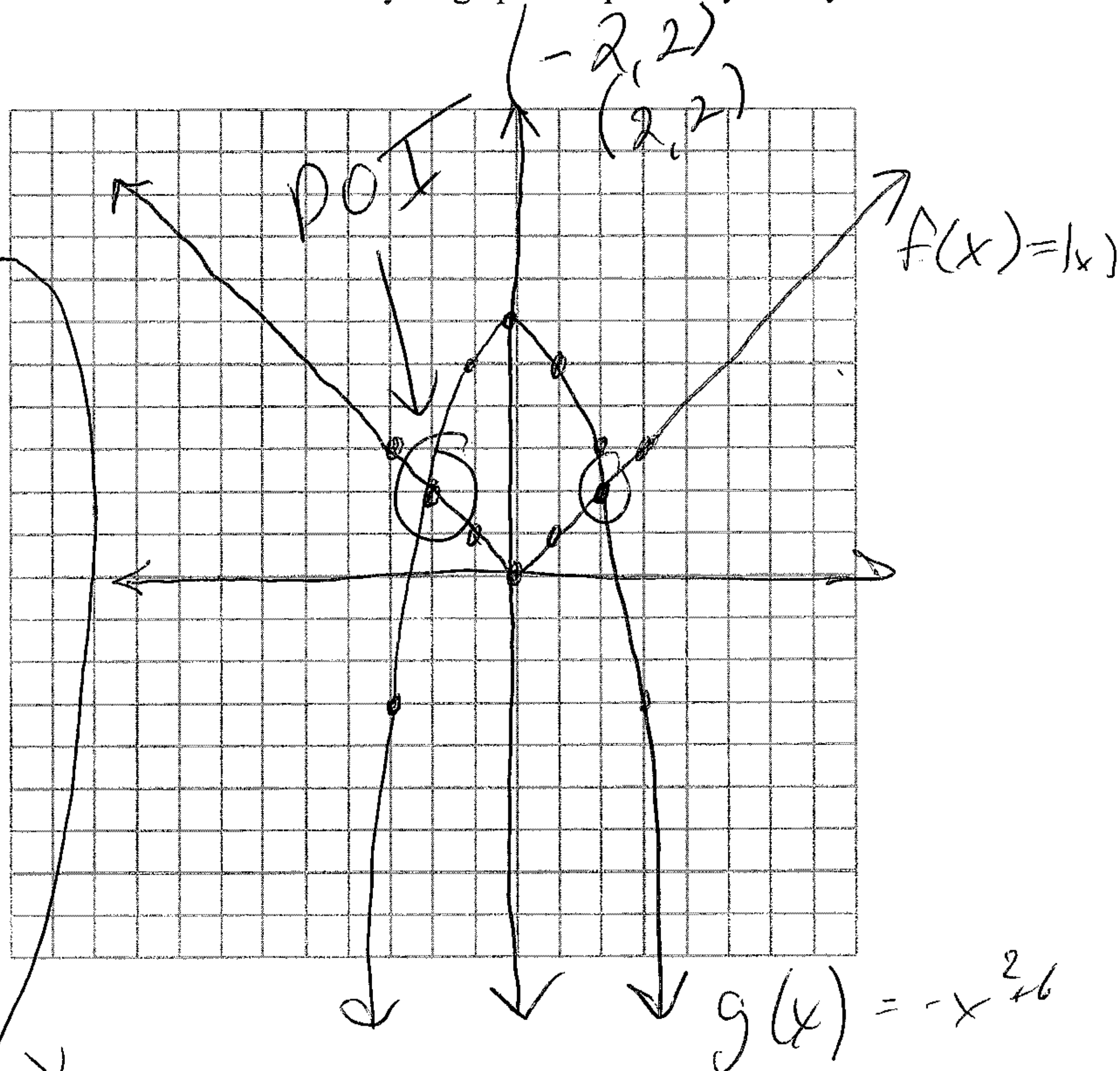


PART III (4 points)

12. Graph $f(x)=|x|$ and $g(x)=-x^2+6$ on the grid below.

Does $f(-2)=g(-2)$? Use your graph to explain why or why not.

x	f(x)
-3	3
-2	2
-1	1
0	0
1	1
2	2
3	3



x	g(x)
-4	-10
-3	-3
-2	2
-1	5
0	6
1	5
2	2
3	-3
4	-10

Yes same yvalues

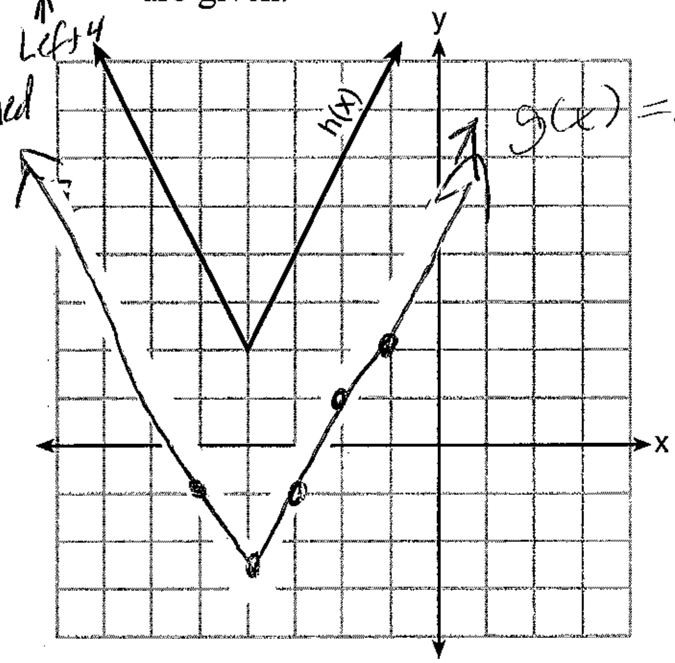
PART I (2 points)

13. The function $h(x)$, which is graphed below, and the function $g(x) = 2|x+4| - 3$ are given.

down 3

Left 4

Stretched



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

g(x)

x	g(x)
-9	7
-8	5
-7	3
-6	1
-5	-1
-4	-3
-3	-1
-2	1
-1	3
0	5
1	7

Which statements about these functions are true?

I. $g(x)$ has a lower minimum value than $h(x)$.

~~II.~~ For all values of x, $h(x) < g(x)$.

III. For any value of x, $g(x) \neq h(x)$.

(1) I and II, only (3) II and III, only

(2) I and III, only (4) I, II, and III

PART II (2 points)

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

Yes because this a geometric sequence with a common ratio of r=3. Exponential equations have a common ratio.

PART I (2 points)

15. One characteristic of all linear functions is that they change by

exponential

(1) ~~equal factors~~ over equal intervals
(2) unequal factors over equal intervals
(3) equal differences over equal intervals
(4) unequal differences over equal intervals

x	y
0	3
1	6
2	9
3	12

+1 +3

PART I (2 points)

16. Which scenario represents exponential growth?

(1) A water tank is filled at a rate of 2 gallons/minute. +2 +2
(2) A vine grows 6 inches every week. +6 +6
(3) A species of fly doubles its population every month during the summer. times 2
(4) A car increases its distance from a garage as it travels at a constant speed of 25 miles per hour. +25

PART III (4 points)

17. Michael has $10 in his savings account. Option 1 will add $100 to his account each week. Option 2 will double the amount in his account at the end of each week.

Write a function in terms of x to model each option of saving.

Linear

option 1

$y = 100x + 10$

option 2 Exponential

$y = 10(2)^x$

Michael wants to have at least $700 in his account at the end of 7 weeks to buy a mountain bike. Determine which option(s) will enable him to reach his goal. Justify your answer.

$y = 100(7) + 10$

$710

yes

$10(2)^7$

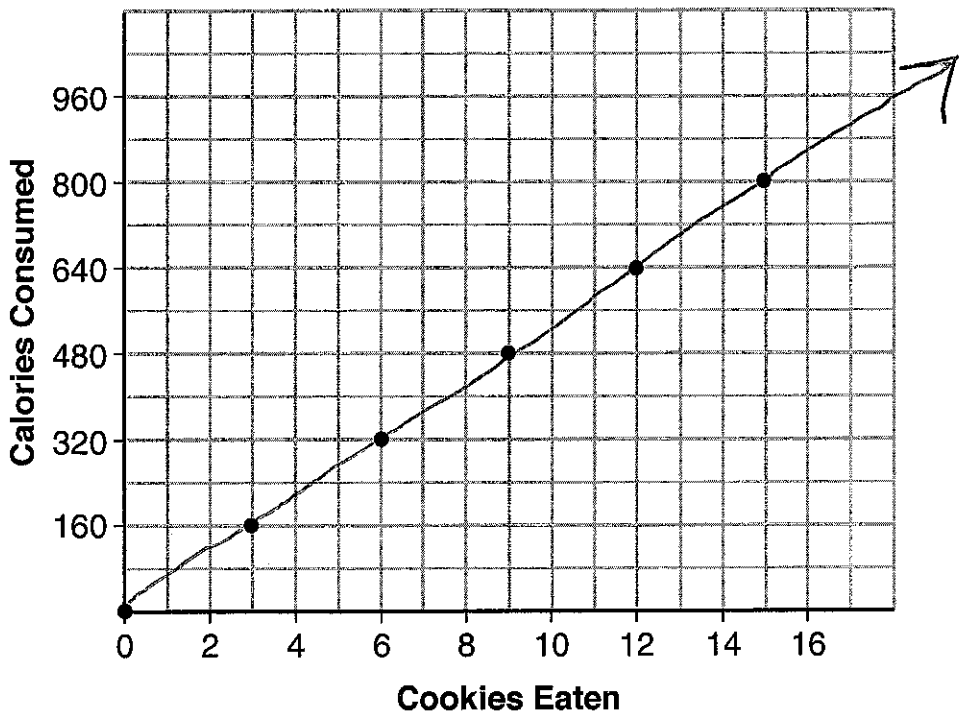
$1280

yes

Both option 1 and option 2

PART II (2 points)

18. 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 below showing the number of cookies eaten and the number of Calories consumed.



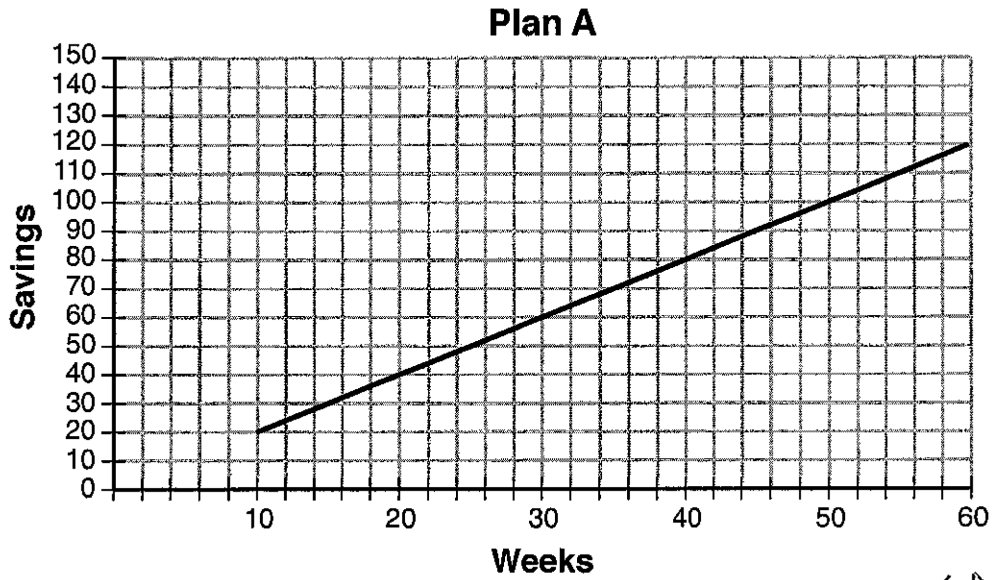
Explain why it is appropriate for Samantha to draw a line through the points on the graph.

Linear relationship starts with 0 caloris then increases +160 with every 3 cookies.

$$y = \frac{160}{3}x$$

PART I (2 points)

19. Nancy works for a company that offers two types of savings plans. Plan A is represented on the graph below.



linear

Plan B is represented by the function $f(x) = 0.01 + 0.05x^2$ quadratic, where x is the number of weeks. Nancy wants to have the highest savings possible after a year. Nancy picks Plan B.

Her decision is

(1) correct, because Plan B is an exponential function and will increase at a faster rate.
(2) correct, because Plan B is a quadratic function and will increase at a faster rate.
(3) incorrect, because Plan A will have a higher value after 1 year
(4) incorrect, because Plan B is a quadratic function and will increase at a slower rate

PART I (2 points)

20. In 2014, the cost to mail a letter was 49 cents for up to one ounce. Every additional ounce cost 21 cents. Which recursive function could be used to determine the cost of a 3-ounce letter, in cents?

(1) $a_1 = 49;\ a_n = a_{n-1} + 21$
previous
Start at 49 add +21

(2) $a_1 = 0;\ a_n = 49a_{n-1} + 21$

(3) $a_1 = 21;\ a_n = a_{n-1} + 49$

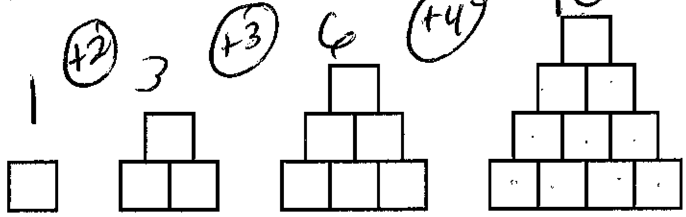
(4) $a_1 = 0;\ a_n = 21a_{n-1} + 49$

Ounce	cost
0	0
1	.49
+1 2	.70 +.21
3	.91
4	1.02

PART I (2 points)

21. A sequence of blocks is shown in the diagram below.

1 (+2) 3 (+3) 6 (+4) 10 (+5) 15 (+6) 21 (+7) 28



n=1 n=2 n=3 n=4 n=5 n=6 n=7

This sequence can be defined by the recursive function $a_1 = 1$ and $a_n = a_{n-1} + n$. Assuming the pattern continues, how many blocks will there by when $n = 7$?

(1) 13

(2) 21

(3) 28

(4) 36

$y = x^2$
$y = \frac{1}{2}x^2$
$y = |x|$
$y = |\frac{1}{2}x|$

PART I (2 points)

24. In the functions $f(x) = kx^2$ and $g(x) = |kx|$, k is a positive integer.

wider

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.
~~(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.

$y = x^2$ $y = 5x^2$

PART I (2 points)

25. When the function $f(x) = x^2$ is multiplied by the value of a, where $a > 1$, the graph of the new function, $g(x) = ax^2$

~~(1) opens upward and is wider~~
(2) opens upward and is narrower
~~(3) opens downward and is wider~~
~~(4) opens downward and is narrower~~

UNIT 11

PART I (2 points)

26. The heights, in inches, of 12 students are listed below.

Stat Edit

Stat Calc 1

won

61, 67, 72, 62, 65, 59, 60, 79, 60, 61, 64, 63

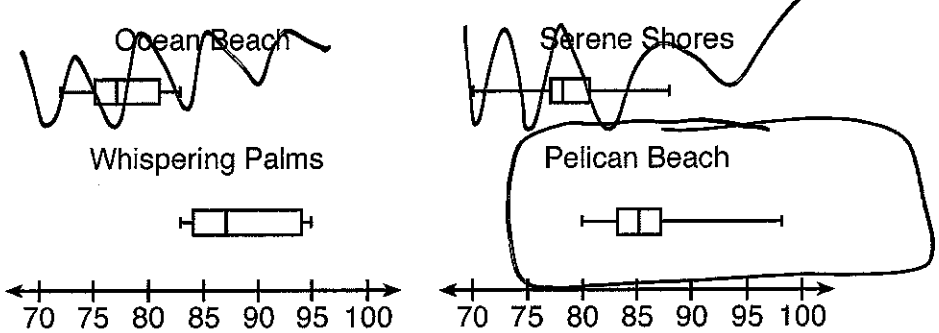
Which statement best describes the spread of these data?

$\bar{x} = 64.4$
$Q_1 = 60.5$
$med = 62.5$
$Q_3 = 66$
$min = 59$, $max = 79$

~~(1)~~ The set of data is evenly spread.
~~(2)~~ The median of the data is 59.5.
~~(3)~~ The set of data is skewed because 59 is the only value below 60.
(4) 79 is an outlier, which would affect the standard deviation of these data.

PART I (2 points)

27. Corinne is planning a beach vacation in July and is analyzing daily high temperatures for her potential destination. She would like to choose a destination with a high median temperature and a small interquartile range. She constructed box plots shown in the diagram below.

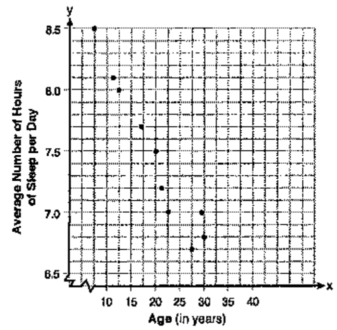


Which destination has a median temperature above 80 degrees and the smallest interquartile range?

(1) Ocean Beach
(2) Whispering Palms
(3) Serene Shores
(4) Pelican Beach

PART I (2 points)

28. A student plotted the data from a sleep study as shown in the graph below.



The student used the equation of the line $y = -0.09x + 9.24$ to model the data. What does the rate of change represent in terms of these data?

(1) The average number of hours of sleep per day ~~increases~~ 0.09 hour per year of age.

(2) The average number of hours of sleep per day decreases 0.09 hour per year of age.

(3) The average number of hours of sleep per day increases 9.24 hours per year of age.

(4) The average number of hours of sleep per day decreases 9.24 hours per year of age.

PART III (4 points)

29. Omar has a piece of rope. He ties a knot in the rope and measures the new length of the rope. He then repeats this process several times. Some of the data collected are listed in the table below. Stat Edit

Stat Calc 4

Number of Knots L1	4	5	6	7	8
Length of Rope (cm) L2	64	58	49	39	31

State, to the *nearest tenth*, the linear regression equation that approximates the length, y, of the rope after tying x knots.

$y = -8.5x + 99.2$

Explain what the y-intercept means in the context of the problem.

The initial rope was 99.2 cm long

Explain what the slope means in the context of the problem.

The rate of change. decreases 8.5 cm per knot

PART I (2 points)

30. Jill invests \$400 in a savings bond. The value of the bond, *V(x)*, in hundreds of dollars after *x* years is illustrated in the table below.

years $ hundreds

x	V(x)
0	4
1	5.4
2	7.29
3	9.84

Which equation and statement illustrate the approximate value of the bond in hundreds of dollars over time in years?

$\boxed{y=}$ check table

decay

(1) $V(x)=4(0.65)^x$, and it grows.

decay

(2) $V(x)=4(0.65)^x$, and it ~~decays~~.

(3) $V(x)=4(1.35)^x$, and it grows.

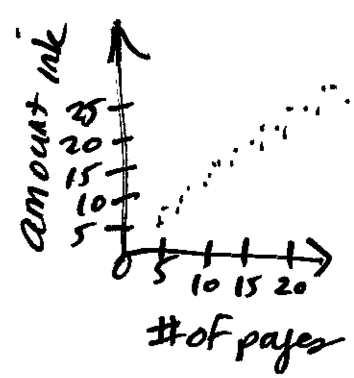
growth

(4) $V(x)=4(1.35)^x$, and it ~~decays~~.

PART I (2 points)

31. What type of relationship exists between the number of pages printed on a printer and the amount of ink used by that printer?

(1) positive correlation, but not causal
(2) positive correlation, and causal
(3) negative correlation, but not causal
(4) negative correlation, and causal



PART I (2 points)

32. Bella recorded data and used her graphing calculator to find the equation for the line of best fit. She then used the correlation coefficient to determine the strength of the linear fit.

r =

Which correlation coefficient represents the strongest linear relationship?

(1) 0.9	(3) -0.3
(2) 0.5	(4) -0.8