

Algebra I
End of Course

RELEASED ITEMS
COMPILED BY SKILL

2006-2007

COMPILED BY BARBARA BROWN

Patterns, Algebra & Function Strand 2006-2007

Content Standards	Student Learning Expectations
<p>1. Language of Algebra Students will develop the language of algebra, including specialized vocabulary, symbols, and operations.</p>	<ol style="list-style-type: none"> 1. Evaluate algebraic expressions, including radicals, by applying the order of operations. (4) B, 2006 2. Translate word phrases and sentences into expressions, equations, and inequalities and vice versa. (13) 3. Apply the laws of (integral) exponents. (1) 4. Solve problems involving scientific notation. (6) E, 2006 C, 2007 5. Perform polynomial operations (addition, subtraction, multiplication) with and without manipulatives. (8) 8. Simplify radical expressions such as . (3)
<p>2. Solve Equations and inequalities: Students will write, with and without technology, equivalent forms of equations, inequalities, and systems of equations, and solve with fluency.</p>	<ol style="list-style-type: none"> 1. Solve multi-step equations and inequalities with rational coefficients. (5) D, 2006 <ul style="list-style-type: none"> • Numerically (from a table or guess and check) • Algebraically (including the use of manipulatives) • Graphically • Technologically 2. Solve systems of two linear equations. (2) <ul style="list-style-type: none"> • Numerically (from a table or guess and check) • Algebraically (including the use of manipulatives) • Graphically • Technologically 3. Solve linear formulas and literal equations for a specified variable. (2) 4. Solve and graph simple absolute value equations and inequalities. (1) 5. Solve real-world problems that involve a combination of rates, proportions, and percents. (9) A, 2006 E, 2007 6. Solve problems involving direct variation and indirect (inverse) variation to model rates of change. (3) 7. Use coordinate geometry to represent and/or solve problems (midpoint, length of a line segment, and Pythagorean Theorem). (1) 8. Communicate real-world problems graphically, algebraically, numerically, and verbally. (15) C, 2006
<p>3. Linear Functions: Students will analyze functions by investigating rates of change intercepts, and zeros.</p>	<ol style="list-style-type: none"> 1. Distinguish between functions and non-functions/relations by inspecting graphs, ordered pairs, mapping diagrams, and/or tables of data. (5) B, 2007 2. Determine domain and range of a relation from an algebraic expression, graphs, sets of ordered pairs, or table of data. (6) 3. Know and/or use function notation including evaluating functions for given values in their domain. (2) 4. Identify independent variables and dependent variables in various representational modes: Words, symbols, and/or graphs. (1) 5. Interpret the rate of change/slope and intercepts within the context of everyday life. EX: Telephone charges based on base rate plus rate per minute. (1) 6. Calculate the slope given: * two points * graph of a line * equation of a line (1) 7. Determine, by using slope, whether a pair of lines are parallel, perpendicular, or neither. (2) 8. Write an equation in slope-intercept given: * two points * a point and y-intercept * x-intercept and y-intercept * a point and slope * a table of data * the graph of a line (1) 9. Describe the effects of parameter changes, slope, and/or y-intercept on graphs of linear functions and vice versa. (3)

<p>4. Non-Linear Functions: Students will compare the properties in the family of functions.</p>	<ol style="list-style-type: none"> 1. Factor polynomials: Greatest common factor, binomials (difference of squares), trinomials. (10) 2. Determine minimum, maximum, vertex, and zeros, given a graph. (4) 3. Solve quadratic equations using the appropriate methods with and without technology: * Factoring *Quadratic formula with real-number solutions. (1) 4. Recognize function families and their connections including vertical shift and reflection over the x-axis. *quadratics *absolute value * exponential functions (3) D, 2007 5. Communicate real-world problems graphically, algebraically, numerically, and verbally. (2)
<p>5. Data Interpretation and Probability: Students will compare various methods of reporting data to make inferences or predictions.</p>	<ol style="list-style-type: none"> 1. Construct and use scatter plots and line of best fit to make inferences in real-life situations. (1) A, 2007 2. Use simple matrices in addition, subtraction, and scalar multiplication. (6) 3. Construct simple matrices for real-life situations. (1) 4. Determine the effects of changes in the data set on the measure of central tendency. (1) 5. Use two or more box-and-whisker plots to compare data sets. (2) 7. Recognize linear functions and non-linear functions by using a table or graph. (2) 8. Compute simple probability with and without replacement. (1) 9. Recognize patterns using explicitly defined and recursively defined linear functions. (1)

LANGUAGE OF ALGEBRA

Evaluate algebraic expressions, including radicals, by applying the order of operations.
(2006=# 1,8,21, B open response)

1. Simplify:

$$3(20 \cdot 8 + 15 \cdot 14 - 10) \div 2$$

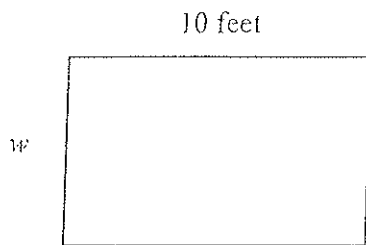
- A. 330
- B. 340
- * C. 540
- D. 685

8. Simplify:

$$2(2 \cdot 4 + 3)^2 + \frac{24 - 4}{8 - 4}$$

- A. 245
- * B. 247
- C. 395
- D. 397

Use the figure below to answer question 2.



Perimeter = 29 feet

(Not drawn to scale.)

21. Simplify:

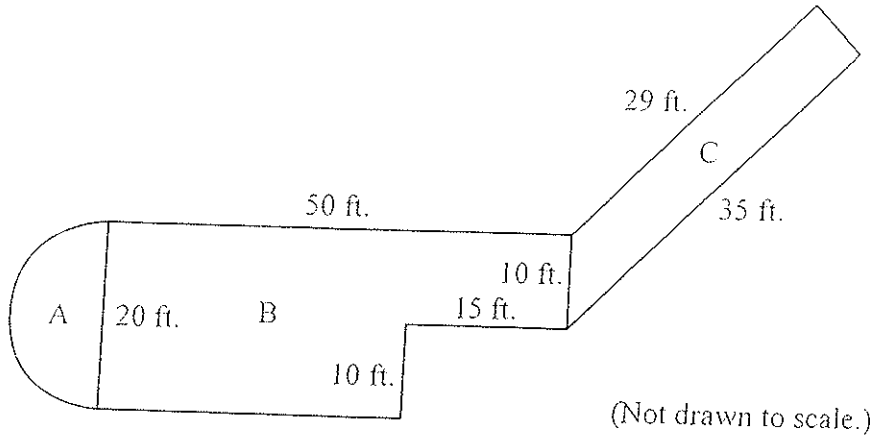
$$\frac{-12 + 4}{2} - 2(8 + 9 \cdot 2)$$

- A. -156
- B. -72
- C. -60
- * D. -56

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LANGUAGE OF ALGEBRA

Evaluate algebraic expressions, including radicals, by applying the order of operations.
(2006=# 1,8,21, B open response)



B. A new platform will be added to an overlook near a park's visitor center. The platform can be broken into 3 different areas:

Area of Section A: $\left(\frac{20}{2}\right)^2 \cdot \frac{\pi}{2}$

Area of Section B: $50 \cdot 20 - 15 \cdot 10$

Area of Section C: $\sqrt{(10^2 - 6^2)} \cdot \frac{(29 + 35)}{2}$

1. Determine the area of each section. Use 3.14 for π . Show all of your steps. Round your answer to the nearest whole number and label it with correct units. Be sure to clearly label each section.
2. Determine the total area of the platform. Show all of your steps. Round your answer to the nearest whole number and label it with correct units.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

RUBRIC FOR ALGEBRA I OPEN-RESPONSE ITEM B

SCORE	DESCRIPTION
4	The student earns 4 points. Correct labels of "sq. ft." for areas of A, B, C, and Total area. The response contains no incorrect work.
3	The student earns 3-3 1/2 points.
2	The student earns 2-2 1/2 points.
1	The student earns 1/2-1 1/2 points or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank - No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

Continues →

Apply the laws of (integral) exponents. (2007= # 33)

33. What is the simplest form of the expression below?

$$\frac{x^5}{x^2(x)}$$

- * A. x^2
- B. x^3
- C. x^7
- D. x^8

Translate word phrases and sentences into expressions, equations, and inequalities and vice versa. (2006=# 12, 19, 29, 35, 39, 41, 43, 50 2007= * 5, 9, 14, 19, 24)

5. Jason measured the length of an eraser (y) and found it was 5 inches less than $\frac{3}{4}$ of the length of the pencil (x). Which equation represents this relationship?
- * A. $\frac{3}{4}x - 5 = y$
- B. $5y + \frac{3}{4} = x$
- C. $5 - \frac{3}{4}x = y$
- D. $\frac{3}{4} - 5x = y$
9. Which inequality represents the statement below?
- The product of a number and -3 , decreased by 4, is greater than or equal to 17.
- A. $3n - 4 \geq 17$
- * B. $-3n - 4 \geq 17$
- C. $-3n - 4 \leq 17$
- D. $3n - 4 \leq 17$
14. At his job, Andre earns \$7.00 an hour plus a commission of 10% of his total sales. If h represents the number of hours worked, and s represents the total sales, which expression shows Andre's total earnings?
- A. $7.00 + h + 0.10s$
- B. $7.00(h + 0.10s)$
- C. $0.10(7.00h + s)$
- * D. $7.00h + 0.10s$
19. Maria buys some CDs at Track One Records. Each CD costs \$12. Which expression would find the price of n CDs?
- A. $n - 12$
- B. $n + 12$
- C. $\frac{n}{12}$
- * D. $12n$
24. The cost of each bottle of juice from a juice machine is \$0.65. Which expression represents the total amount of money collected from the sale of q cans of juice from the machine?
- A. $0.65 + q$
- B. $0.65 - q$
- * C. $0.65 \times q$
- D. $\frac{0.65}{q}$

Translate word phrases and sentences into expressions, equations, and inequalities and vice versa. (2006=# 12,19,29,35,39,41,43,50)

12. Zak ate x bowls of cereal. Brenda ate 1 bowl less than Zak ate. Carlos ate 2 times the total bowls eaten by Zak and Brenda. What does $x - 1$ represent?
- A. bowls of cereal Zak ate
* B. bowls of cereal Brenda ate
C. bowls of cereal Carlos ate
D. total bowls of cereal eaten
19. Teresa measured her bed. She found the length (L) of her bed was 6 feet shorter than twice the width (W). Which equation illustrates this relationship?
- * A. $L = 2W - 6$
B. $L = 6W + 2$
C. $W = 2L - 6$
D. $W = 6L - 2$
29. Kiri received a set of 24 baseball cards as a gift. She plans to buy a packet of 6 new cards each week (x). When Kiri has more than 90 cards, she will need to buy a new album. What sentence represents this situation?
- A. $6 + 24x < 90$
B. $6 + 24x > 90$
C. $24 + 6x < 90$
* D. $24 + 6x > 90$
35. Jenny has a job washing cars. She washes about 8 cars per hour. On Saturday, she washed 20 cars. On Sunday she worked h hours. Which equation gives the total number of cars washed (N) on Saturday and Sunday?
- A. $h = 8 + 20N$
B. $h = 8N + 20$
C. $N = 8 + 20h$
* D. $N = 8h + 20$
39. On Friday, Waylen bought a book on sale. During the sale, the book was \$9 cheaper than 2 times the regular price (p). Which expression represents the sale price of the book?
- A. $2 - 9p$
* B. $2p - 9$
C. $9 - 2p$
D. $9p + 2$
41. Ben purchased some CDs at a local music store. Each CD cost \$14, and he paid a total of \$7 in tax. Which equation describes Ben's cost (C) for x CDs?
- A. $x = 7C + 14$
B. $C = 7x + 14$
C. $x = 14C + 7$
* D. $C = 14x + 7$

Translate word phrases and sentences into expressions, equations, and inequalities and vice versa. (2006=# 12,19,29,35,39,41,43,50)

43. Which equation shows the total wages (w) earned by a worker who is paid \$5.50 per hour for x hours?

- A. $w = 5.50 + x$
- * B. $w = 5.50x$
- C. $w + 5.50 = x$
- D. $5.50w = x$

Use the table below to answer question 50.

Jerry's Work Record

Monday	Tuesday	Wednesday	Thursday
7.5 hours	8 hours	8.25 hours	8 hours

50. Jerry works 5 days during the week. The table above shows the number of hours he worked for 4 days. He plans to work a total of 40 hours this week. Which algebraic sentence would Jerry use to find the number of hours he must work on Friday?

- A. $x - (7.5 + 8 + 8.25 + 8) = 40$
- * B. $7.5 + 8 + 8.25 + 8 + x = 40$
- C. $\frac{(7.5 + 8 + 8.25 + 8 + x)}{5} = 40$
- D. $\frac{(7.5 + 8 + 8.25 + 8)}{40} = x$

Solve problems involving scientific notation. (2006=# 4, 60, E 2007= # 29, 37, C)

29. Our galaxy has about one hundred billion stars. How is one hundred billion written in scientific notation?

- A. 1.0×10^9
- B. 1.0×10^{10}
- * C. 1.0×10^{11}
- D. 1.0×10^{14}

37. The Moon is 3.844×10^5 km from Earth. If a spaceship were traveling from Earth to the Moon at an average speed of 5400 km per hour, **approximately** how many hours would it take the spaceship to reach the Moon?

- A. 7.1 hours
- * B. 71 hours
- C. 710 hours
- D. 7,100 hours

C. An ant weighs approximately 4.0×10^{-3} grams.

1. An ant can carry between 15 and 25 times its body weight. Determine the range of weights, in grams, that an ant can carry. Express your answers in scientific notation. Show and/or explain all of your work even if you use mental math or a calculator.

A sandwich at a picnic is made of the ingredients below.

Ingredient	Weight
2 slices of bread	28 grams each
peanut butter	35 grams
jelly	21 grams

2. Determine the total weight of the sandwich, in grams. Express the weight of the sandwich in scientific notation. Determine how many ants it would take to carry the sandwich if each ant carried the minimum amount possible. Show and/or explain all of your work even if you use mental math or a calculator.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

RUBRIC FOR ALGEBRA I OPEN-RESPONSE ITEM C

SCORE	DESCRIPTION
4	The student earns 4 points. The response contains no incorrect work.
3	The student earns 3–3 ½ points.
2	The student earns 2–2 ½ points.
1	The student earns ½–1 ½ points, or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of “B” will be reported as “NA.” (No attempt to answer the item. Score of “0” assigned for the item.)

Solve problems involving scientific notation. (2006=# 4,60, E open response)

4. During the year 2000, Americans spent 6.6×10^9 dollars on ice cream. The U.S. population that year was 2.8×10^8 . Approximately what was the average amount spent on ice cream per American during the year 2000?

- * A. \$24
- B. \$38
- C. \$42
- D. \$94

60. The area of France is 1.63×10^4 square kilometers and the area of Germany is 4.75×10^3 square kilometers. How much larger is France than Germany?

- A. 3.12×10^{-1} square kilometers
- B. 3.12×10^1 square kilometers
- * C. 1.155×10^4 square kilometers
- D. 1.155×10^6 square kilometers

E. In October of 1999, the population of the world was about 6,000,000,000. Suppose there were 6.02×10^{23} pennies on Earth at that time.

1. The pennies are divided equally among the population. Determine the number of pennies that each individual would have in this situation. Express your answer in scientific notation. Show or explain all of your work even if you use mental math or a calculator.
2. Each person spends 1 million pennies per day. Determine how many days it would take each person to spend his or her share of pennies. Express your answer in scientific notation. Show or explain all of your work even if you use mental math or a calculator.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

RUBRIC FOR ALGEBRA I OPEN-RESPONSE ITEM E

SCORE	DESCRIPTION
4	The student earns 4 points. The response contains no incorrect work.
3	The student earns 3 points.
2	The student earns 2 points.
1	The student earns 1 point or some minimal understanding is shown: Ex. Part 1: answer of $1.003333333 \times 10^{14}$ with no other credit. Ex. Divides 6.02 by 6, subtracts powers of 10, but does not combine to get answer.
0	The student earns 0 points. No understanding is shown.
B	Blank – No Response. A score of “B” will be reported as “NA.” (No attempt to answer the item. Score of “0” assigned for the item.)

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Perform polynomial operations (addition, subtraction, multiplication) with and without manipulatives. (2006=# 15,32,38,55,56 2007= # 43,47, 54)

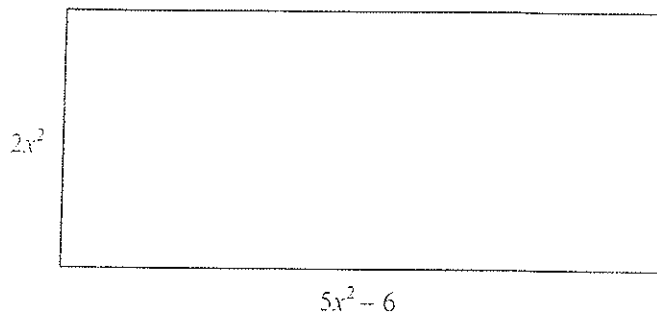
43. Shawn delivered propane to homes for heat during the months of October through December. The amounts, in gallons, that Shawn delivered last year are shown in the table below.

Month	Gallons
October	x
November	$2x + 500$
December	$x^2 - 10x - 800$

Which expression represents the total amount of propane Shawn delivered for these three months?

- A. $-6x - 300$
- B. $-6x^5 - 300$
- * C. $x^2 - 7x - 300$
- D. $4x^2 - 10x - 300$

47. What is the perimeter of the rectangle below?



- * A. $14x^2 - 12$
- B. $14x^8 - 12$
- C. $4x^2 - 12$
- D. $4x^2 - 2$

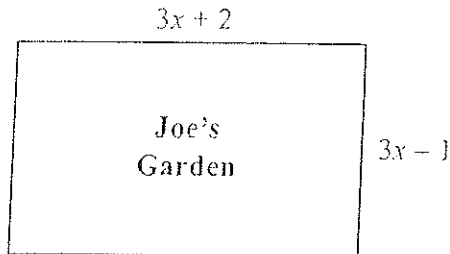
54. What is the sum of the two polynomials below?

$$\begin{array}{r} -3x^2 + 7xy - 6y^2 \\ 5xy + 3y^2 - 4x^2 \end{array}$$

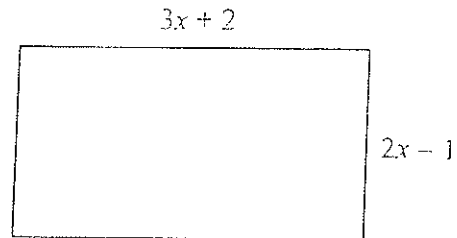
- A. $7x^2 - 12xy + 3y^2$
- * B. $-7x^2 + 12xy - 3y^2$
- C. $-7x^4 + 12x^2y^2 - 3y^4$
- D. $2x^3y^2 + 10xy^3 - 10x^2y^2$

Perform polynomial operations (addition, subtraction, multiplication) with and without manipulatives. (2006=# 15,32,38,55,56)

Use the figure below to answer question 15.



Use the figure below to answer question 32.



15. Joe's rectangular garden is shown above. In order to determine the area, he wrote $(3x + 2)(3x - 1)$. What is this expression in simplified form?

A. $9x^2 - 2$
* B. $9x^2 + 3x - 2$
C. $9x^2 + 9x - 2$
D. $10x$

32. The perimeter of the rectangle above is $2(3x + 2) + 2(2x - 1)$. What is this expression in simplified form?

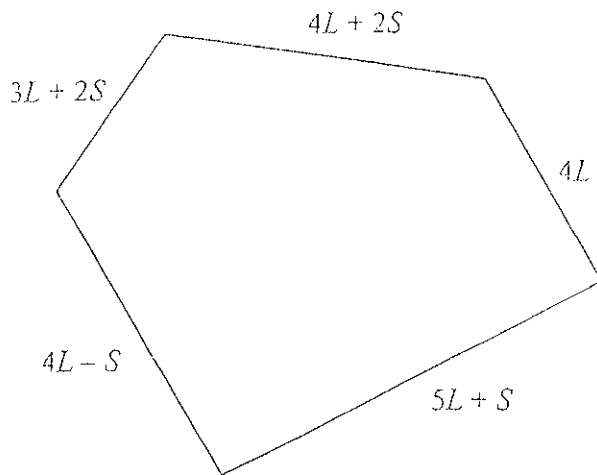
A. $10x + 1$
B. $20x - 4$
* C. $10x + 2$
D. $12x$

38. The volume of a cube is x^3 . The volume of a rectangular box is $x^3 + 5x^2 + 6x$. What is the total volume of the cube and the box?

A. $5x^2 + 6x$
B. $x^3 + 6x^2 + 6x$
* C. $2x^3 + 5x^2 + 6x$
D. $x^6 + 5x^5 + 6x^4$

Perform polynomial operations (addition, subtraction, multiplication) with and without manipulatives. (2006=# 15,32,38,55,56)

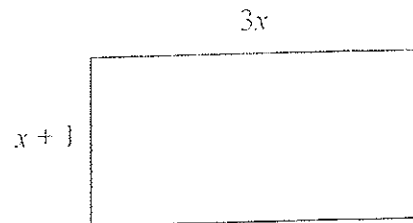
Use the figure below to answer question 55.



55. Alberto, Mary, and Latisha measured the distance around the school yard using the length of a short stick (S) and the length of a long stick (L). Which expression gives the distance around the outside in simplified form?

- A. $24LS$
- * B. $20L + 4S$
- C. $20L + 6S$
- D. $20LS + 4L$

Use the figure below to answer question 56.



56. Which equation represents the area of the rectangle shown above?

- * A. $A = (3x)(x + 1)$
- B. $A = 3x(x) + 1$
- C. $A = 3x^2 + x$
- D. $A = 6x + 2(x + 1)$

Simplify radical expressions such as . (2006=# 3,49 2007= # 39)

39. What is the simplest form of $\frac{\sqrt{15}}{\sqrt{81}}$?

A. $\frac{3\sqrt{5}}{9}$

B. $\frac{5\sqrt{3}}{9}$

* C. $\frac{\sqrt{15}}{9}$

D. $\frac{\sqrt{15}}{\sqrt{81}}$

Simplify radical expressions such as $\sqrt[3]{7}$. (2006=# 3,49)

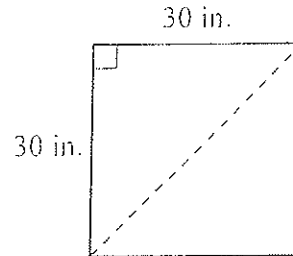
3. Tyrone was given 4 pieces of wood with the following lengths:

$$2\frac{3}{4} \text{ feet} \quad 2.9 \text{ feet} \quad \sqrt{8} \text{ feet} \quad 2\frac{5}{9} \text{ feet}$$

Which lists the pieces of wood from shortest to longest?

- A. $2\frac{5}{9}$ feet, $2\frac{3}{4}$ feet, 2.9 feet, $\sqrt{8}$ feet
B. $2\frac{3}{4}$ feet, $2\frac{5}{9}$ feet, $\sqrt{8}$ feet, 2.9 feet
C. $2\frac{5}{9}$ feet, $\sqrt{8}$ feet, $2\frac{3}{4}$ feet, 2.9 feet
* D. $2\frac{5}{9}$ feet, $2\frac{3}{4}$ feet, $\sqrt{8}$ feet, 2.9 feet

Use the figure below to answer question 49.



49. Using the Pythagorean Theorem, Terrel calculated the length of the diagonal shown above to be $30\sqrt{2}$ inches. Which is the best estimate of the length of the diagonal?
- A. 31 inches
B. 35 inches
* C. 42 inches
D. 60 inches

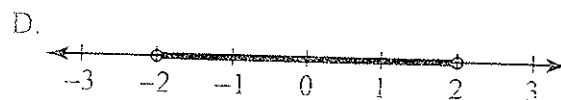
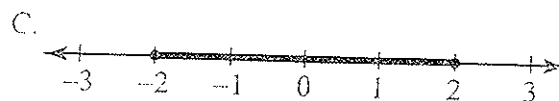
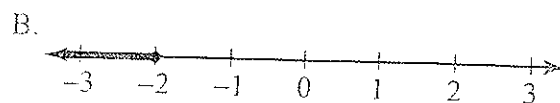
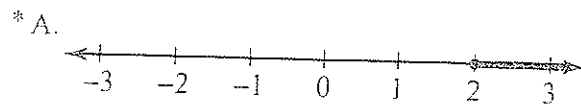
Solve multistep equations and inequalities with rational coefficients: Numerically (from a table or guess and check), Algebraically (including the use of manipulatives), graphically, technologically. (2006=# 9, 28, D) 2007= # 1, 12)

1. What is the value of t in the expression below? 12. Which graph shows the correct solution set to the inequality below?

$$\frac{5}{12}t - 12 = 48$$

- A. $t = 1$
B. $t = 32$
C. $t = 86.4$
* D. $t = 144$

$$2(x + 3) \geq -(x - 12)$$



SOLVING EQUATIONS AND INEQUALITIES

Solve multistep equations and inequalities with rational coefficients: Numerically (from a table or guess and check), Algebraically (including the use of manipulatives), graphically, technologically. (2006=# 9,28, D open response)

Use the inequality below to answer question 9.

$$\frac{123 + 108 + x}{3} \geq 115$$

9. Jamie bowled scores of 123 and 108 on his first 2 games. What score (x) does Jamie need to bowl on his third game to have an average of at least 115?
- A. 38
 B. 102
 * C. 114
 D. 116

Use the inequality below to answer question 28.

$$\frac{5}{6}x + 3 > \frac{3}{2}x + 1$$

28. Which value of x makes the inequality above a true statement?
- * A. 2
 B. 3
 C. 4
 D. 6

- D. Nikki's puppy was 15 cm tall when he was born. The veterinarian gave Nikki the following growth equation where the puppy's height (H), in cm, is a function of the age of the puppy in months (a):

$$H(a) = 15 + 3.2a, 0 < a \leq 18$$

- Identify and label the independent and dependent variables in this function.
- Determine the height Nikki's puppy will be when he is 1 year old. Show or explain all of your work even if you use mental math or a calculator.
- Explain why this growth equation only makes sense for $0 < a \leq 18$.

BE SURE TO LABEL YOUR RESPONSES 1, 2, AND 3.

RUBRIC FOR ALGEBRA I OPEN-RESPONSE ITEM D

SCORE	DESCRIPTION
4	The student earns 4 points. Part 2: correct units: cm. The response contains no incorrect work.
3	The student earns 3–3 ½ points.
2	The student earns 2–2 ½ points.
1	The student earns ½–1 ½ points or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank – No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

Continued →

Solve systems of two linear equations: Numerically (from a table or guess and check), Algebraically (including the use of manipulatives), graphically, technologically.
(2006= # 18 2007= # 6)

6. Which ordered pair satisfies both equations below for x and y ?

$$x + y = 5$$

$$x - y = 3$$

- A. $(-1, -4)$
- B. $(-2, -3)$
- C. $(3, 2)$
- * D. $(4, 1)$

Solve systems of two linear equations: Numerically (from a table or guess and check), Algebraically (including the use of manipulatives), graphically, technologically. (2006+## 18)

18. Shelly needs to send a fax. At the coffee shop, the use of the fax machine is \$2.00 plus \$0.55 per page. At the library, the use of the fax machine is \$0.80 per page. These costs (C) are shown in the equations below, where x is the number of pages to be faxed.

$$\text{Coffee Shop: } C = 2.00 + 0.55x$$

$$\text{Library: } C = 0.80x$$

For how many pages will the fax costs be the same at the coffee shop and the library?

- A. 2
- B. 3
- C. 6
- * D. 8

Solve linear formulas and literal equations for a specified variable. (2007= # 16, 18)

16. The formula for finding the perimeter of a rectangle is $P = 2l + 2w$. Which equation solves for w in terms of l and P ?

A. $w = \frac{P}{2l}$

B. $w = \frac{P+2l}{2}$

* C. $w = \frac{P-2l}{2}$

D. $w = 2(P - 2l)$

28. The formula to find a man's shoe size is $s = 3f - 24$, where s = shoe size, and f = foot length in inches. If a man's shoe size is 9, what is the length of his foot?

A. 3 inches

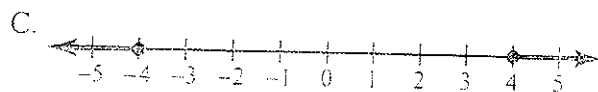
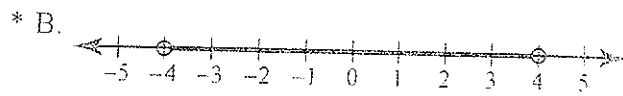
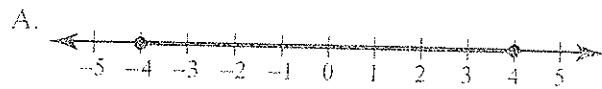
B. 5 inches

* C. 11 inches

D. 15 inches

Solve and graph simple absolute value equations and inequalities. (2007= # 34)

34. Which graph below is the solution to $|x| < 4$?



Solve real-world problems that involve a combination of rates, proportions, and percents.
 (2006=# 26,30,34,45,59, A 2007= # 31,36, E)

31. Tamika's savings account earned \$80.00 in interest. This amount is 2% of her total savings. What was Tamika's original savings?

- A. \$ 81.60
- B. \$ 158.40
- C. \$1,600.00
- * D. \$4,000.00

36. On Monday, a restaurant has 250 pounds of garbage. Of that amount, 60 pounds can be recycled. On Tuesday, the restaurant has 310 pounds of garbage. Based on Monday's garbage, how much of Tuesday's garbage is recyclable?

- A. 48.4 pounds
- * B. 74.4 pounds
- C. 120.0 pounds
- D. 235.6 pounds

E. A charity organization gets 1 pledge for every 15 people it calls.

1. Write a proportion of pledges per people called, where x is the number of pledges, and y is the number of people called.
2. If the organization calls 450 people in one month, how many pledges does it receive? Show your work and/or explain your answer.
3. If the monthly goal is 150 pledges, how many calls will the organization have to make? Show your work and/or explain your answer.

BE SURE TO LABEL YOUR RESPONSES 1, 2, AND 3.

RUBRIC FOR ALGEBRA I OPEN-RESPONSE ITEM E

SCORE	DESCRIPTION
4	The student earns 6 points. The response contains no incorrect work.
3	The student earns 5 points.
2	The student earns 3–4 points.
1	The student earns 1–2 points, or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

Solve real-world problems that involve a combination of rates, proportions, and percents.
(2006=# 26,30,34,45,59, A open response)

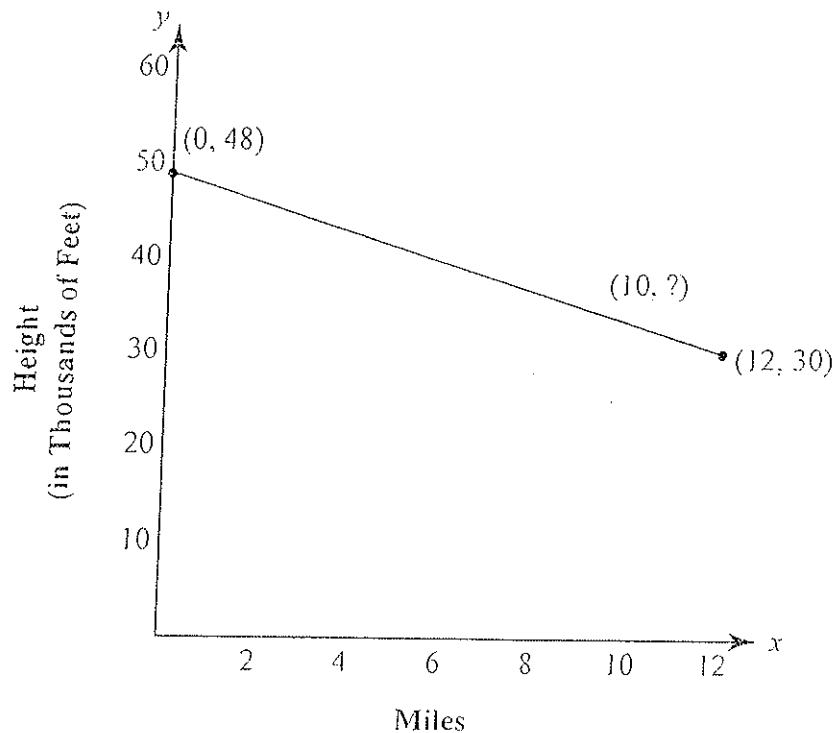
26. Travis traveled 180 miles in 4 hours. He continued at the same rate. How many hours did it take him to travel a total of 576 miles?

- A. 3.2
- B. 8.8
- * C. 12.8
- D. 16.8

30. A total of 550 people attended last year's community bake sale. They bought 132 dozen cookies. This year attendance is expected to increase by 75 people. Based on last year's rate, how many total dozen cookies will be bought this year?

- A. 116
- * B. 150
- C. 207
- D. 312

Use the graph below to answer question 34.



34. An airplane is flying at a height of 48,000 feet. The pilot must decrease the plane's height to 30,000 feet over the next 12 miles, at a uniform rate. What is the height of the plane at the 10-mile mark?

- A. 31,500 feet
- * B. 33,000 feet
- C. 39,000 feet
- D. 41,500 feet

Solve real-world problems that involve a combination of rates, proportions, and percents.
(2006=# 26,30,34,45,59, A open response)

45. A single serving of Crunchy Flakes cereal provides 45% of the daily recommended amount of iron. The daily recommended amount of iron is 18 milligrams. How many milligrams of iron are in a single serving of Crunchy Flakes?

- A. 0.025
- B. 0.4
- C. 2.5
- * D. 8.1

59. Sidone can paint half a wall per hour. How long will it take her to paint more than 4 walls?

- A. less than 2 hours
- B. exactly 2 hours
- C. less than 8 hours
- * D. more than 8 hours

A. Shawn is driving from Little Rock to Siloam Springs, a distance of 212 miles. He averages 50 mph.

1. Determine the amount of time it takes Shawn to drive from Little Rock to Siloam Springs. Show or explain all of your work even if you use mental math or a calculator.

Shawn's friend, George, leaves 1 hour later. George arrives in Siloam Springs at the same time Shawn arrives.

2. Determine George's average speed. Show or explain all of your work even if you use mental math or a calculator.

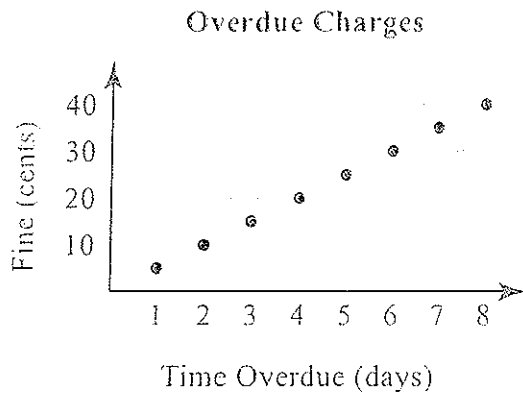
BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

RUBRIC FOR ALGEBRA I OPEN-RESPONSE ITEM A

SCORE	DESCRIPTION
4	The student earns 4 points. Part 1: correct units of hours or hours and minutes. Part 2: correct units of miles per hour. The response contains no incorrect work.
3	The student earns 3 points.
2	The student earns 2 points.
1	The student earns 1 point or some minimal understanding is shown: Ex. Part 1: $212 \div 50 = 4.24$ hrs. and converts incorrectly to 4 hrs. 24 min. with no other credit.
0	The student earns 0 points. No understanding is shown.
B	Blank -- No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

Solve problems involving direct variation and indirect (inverse) variation to model rates of change.
(2006=# 27 2007= # 22,48)

22. Based on the graph below, what would the overdue charge be for 30 days?



- A. \$ 0.15
B. \$ 0.40
* C. \$ 1.50
D. \$15.00

48. George had 3 days to drive 1,500 miles. On the first day, he drove 450 miles. How many miles per day does George need to drive to complete his trip?

- A. 350
* B. 525
C. 650
D. 975

Solve problems involving direct variation and indirect (inverse) variation to model rates of change.
(2006=# 27)

Use the table below to answer question 27.

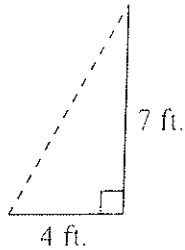
Raft Rental Costs

Hours	Cost
2	\$50
3	\$68
4	\$86
5	\$104

27. The table above shows the cost of renting a raft from Ark River Trips. The pattern continues. What would be the cost to rent a raft for 7 hours?
- A. \$122
 - * B. \$140
 - C. \$148
 - D. \$154

Use coordinate geometry to represent and/or solve problems (midpoint, length of a line segment, and Pythagorean Theorem). (2006=# 40)

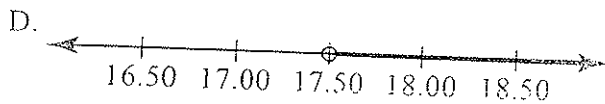
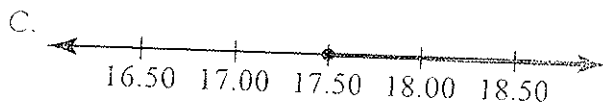
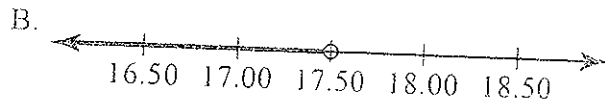
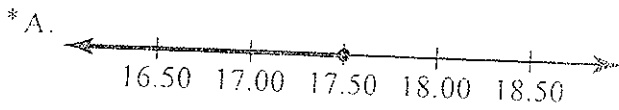
Use the diagram below to answer question 40.



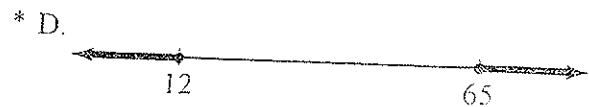
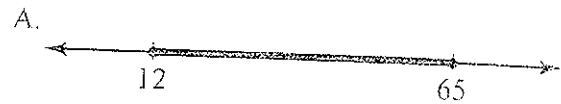
(Not drawn to scale.)

40. The diagram above shows the layout of the water pipes in Wayne's shed. He needs to replace the pipe shown by the dotted line. To the nearest tenth, how many feet of pipe does Wayne need to replace?
- A. 3.0
 - B. 4.6
 - C. 5.7
 - * D. 8.1

52. Maurice received \$90 from relatives for graduation. He wants to buy a new pair of jeans for \$55 and 2 DVDs. He uses the expression $2d + 55 \leq 90$ to determine the amount of money that he can spend on each DVD. Which line graph shows this amount?



59. The general admission price at the movie theater is \$6.50. Children 12 years old and under, and adults who are at least 65, are charged only half price. Which number line represents the ages of people eligible for half-price admission?



57. Every month a company has expenses of \$15,000 plus monthly salaries of \$1,500 per employee. Which inequality shows how much the company will have to earn to make a profit? Let y equal revenue.

- * A. $y > 15,000 + 1,500x$
 B. $y < 15,000 + 1,500x$
 C. $y + 1,500x > 15,000$
 D. $y + 15,000 < 1,500x$

Communicate real-world problems graphically, algebraically, numerically, and verbally. (2006=# 2,7,13,14,22,42,48,51,52,57,58, C open response)

42. Sam ordered a rectangular pizza that was 12 in. wide and 16 in. long. Sam ate $\frac{1}{4}$ of the pizza. What is the area of the pizza Sam ate?

- A. 14 in.²
- * B. 48 in.²
- C. 56 in.²
- D. 192 in.²

48. The length of a rectangle is 4 inches. What equation shows how area (A) depends on width (w)?

- * A. $A = 4w$
- B. $4A = w$
- C. $A = w^2$
- D. $A = w + 4$

Use the table below to answer question 51.

Distance from Little Rock

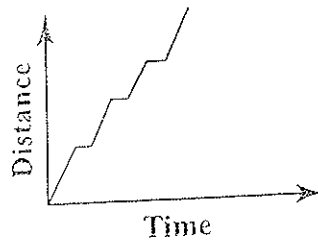
City	Distance (miles)
England	25
Fayetteville	192
Fox	97
Guy	48
Harrison	139

51. Which city is about 4 times as far as Guy is from Little Rock?

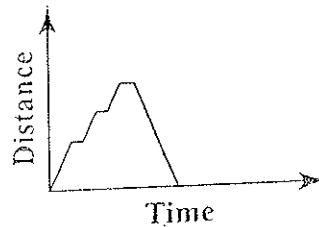
- A. England
- * B. Fayetteville
- C. Fox
- D. Harrison

52. Stacy uses her car to deliver pizzas. She will stop to deliver 3 pizzas and then return to the restaurant. Which graph could model this situation?

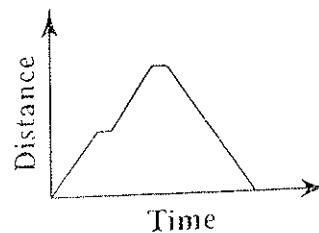
A. Stacy's Distance from Restaurant



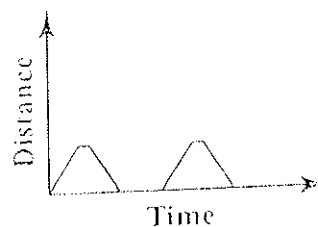
* B. Stacy's Distance from Restaurant



C. Stacy's Distance from Restaurant



D. Stacy's Distance from Restaurant



Communicate real-world problems graphically, algebraically, numerically, and verbally. (2006=#
2,7,13,14,22,42,48,51,52,57,58, C open response)

2. A plan for a rectangular garden includes fencing around the perimeter. The length of the garden must be 10 feet in order to fit on the proposed site. There are 29 feet of fencing available. How wide can the garden be?

- A. $w > 4.5$ feet
 * B. $w \leq 4.5$ feet
 C. $w > 9$ feet
 D. $w \leq 9$ feet

7. Which situation would require finding the product?

- A. finding the distance between the highest (2,753 feet) and lowest (55 feet) points in Arkansas
 B. finding the number of 225 mL cups filled by a 2,000 mL bottle of water
 C. finding the total cost of a restaurant bill of \$22.50 and a \$3.75 tip
 * D. finding the total cost of 6 tickets at \$5.00 each for a movie matinee

13. Suchi's job at the movie theater pays an hourly wage of \$6.50. She will receive a \$250 bonus if she works through the entire summer. The total amount Suchi will make for the entire summer can be modeled by the following equation:

$$y = 6.5x + 250$$

Which represents the number of hours Suchi works?

- * A. x
 B. y
 C. $6.5x$
 D. 250

Use the table below to answer question 14.

Skating Arena Charges

Number of skaters	Total cost
4	\$13.00
5	\$16.25
7	\$22.75
10	\$32.50
12	\$39.00

14. A skating arena employee recorded the number of skaters in each party and the total cost to skate. Using the table above, what is the total cost to skate for a party with 13 skaters?

- A. \$35.50
 B. \$40.00
 * C. \$42.25
 D. \$45.50

22. Mrs. Jackson had a poster in her classroom. The poster was 24 inches wide and 36 inches tall. To make the poster fit in a smaller space, Mrs. Jackson removed x inches from the width and y inches from the height. Which is an expression for the area of the altered poster?

- * A. $(24 - x)(36 - y)$
 B. $(24 - y)(36 - x)$
 C. $(x - 24)(y - 36)$
 D. $(x - 36)(y - 24)$

Communicate real-world problems graphically, algebraically, numerically, and verbally. (2006=2, 7, 13, 14, 22, 42, 48, 51, 52, 57, 58, C open response)

Use the table below to answer question 57.

Arkansas 2001 Legal Occupational Average Annual Income

Lawyers	\$70,750
Administrative Law Judges, Adjudicators, and Hearing Officers	\$43,760
Arbitrators, Mediators, and Conciliators	\$43,480
Judges, Magistrate Judges, and Magistrates	\$31,860
Paralegals and Legal Assistants	\$27,230
Law Clerks	\$25,720
Title Examiners, Abstractors, and Searchers	\$25,450
Court Reporters	\$24,540

57. Joshua is interested in a career in the legal profession. He looked up the annual incomes of various jobs in the legal profession, shown in the table above. Based on the table, which statement correctly represents Joshua's data?
- A. A court reporter earns more than a law clerk.
 - B. A lawyer's annual income is more than twice any other legal occupation's annual income.
 - * C. Judges, magistrate judges, and magistrates earn slightly less than half of what lawyers earn.
 - D. Title examiners, abstractors, and searchers have the lowest annual incomes.

58. Dane Music sells CDs for \$12 each. Music Mania sells CDs for \$10 each after a one-time membership fee of \$16. How many CDs must be purchased for the cost to be the same at both stores?

- A. 2
- B. 3
- * C. 8
- D. 14

Communicate real-world problems graphically, algebraically, numerically, and verbally. (2006=# 2,7,13,14,22,42,48,51,52,57,58, C open response)

- C. Tara had a block of ice. The temperature of the ice was -20°C . She heated the ice block steadily for 20 minutes. She recorded the temperature the first minute and then every 4 minutes as shown in the table below.

Ice Temperature

Time (minutes)	Temperature ($^{\circ}\text{C}$)
0	-20
1	0
4	0
8	0
12	20
16	60
20	100

- Using the grid in your Student Answer Document, create a line graph of the information in the table. Be sure to label all parts of your graph.
- Determine the temperature's rate of change between the 12th and 20th minutes. Show or explain all of your work even if you use mental math or a calculator.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

RUBRIC FOR ALGEBRA I OPEN-RESPONSE ITEM C

SCORE	DESCRIPTION
4	The student earns 4 points. Part 1: graph is titled. Part 2: correct label: $^{\circ}\text{C}/\text{min}$ or $\%/\text{min}$. The response contains no incorrect work.
3	The student earns 3–3 ½ points.
2	The student earns 2–2 ½ points.
1	The student earns ½–1 ½ points or some minimal understanding of graphing is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank – No Response. A score of “B” will be reported as “NA.” (No attempt to answer the item. Score of “0” assigned for the item.)

Distinguish between functions and non-functions/relations by inspecting graphs, ordered pairs, mapping diagrams, and/or tables of data. (2006=# 17,37,54 2007= # 44, B)

44. Which table represents a function?

* A.

Price (dollars)	Sales Tax (dollars)
1	0.07
2	0.14
3	0.21
4	0.28
5	0.35

B.

x	y
-2	6
-2	19
-2	-25
-2	-8
-2	0

C.

Age (years)	Height (inches)
13	60
13	62
14	64
14	66
16	68

D.

x	y
3	6
3	-6
0	0
-5	10
-5	-10

Distinguish between functions and non-functions/relations by inspecting graphs, ordered pairs, mapping diagrams, and/or tables of data. (2006=# 17,37,54 2007= # 44, B)

- B. Maria is buying school pictures. The basic package is \$50 plus \$3 for additional wallet-size pictures. The equation to find her total bill is $50 + 3n = c$, where n = number of additional wallet-size pictures needed, and c = total cost.

1. Copy the table below into your answer document. Complete the table.

n	c
0	
1	
2	
3	

2. On the grid provided in your answer document, graph the coordinates from the table. Does the graph show a function or non-function relationship? Explain your answer.

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

RUBRIC FOR ALGEBRA I OPEN-RESPONSE ITEM B

SCORE	DESCRIPTION
4	The student earns 4 points. The response contains no incorrect work.
3	The student earns 3 points.
2	The student earns 2 points.
1	The student earns 1 point, or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of “B” will be reported as “NA.” (No attempt to answer the item. Score of “0” assigned for the item.)

Determine domain and range of a relation from an algebraic expression, graphs, sets of ordered pairs, or table of data. (2006=# 10,20,23,44)

10. What is the domain of

$$f = \{(0, 8), (-1, 5), (5, 2), (4, 2), (-7, 0)\}?$$

- A. $\{0, 2, 5, 8\}$
- B. $\{0, 5\}$
- C. $\{-7, -1, 0, 2, 4, 5, 8\}$
- * D. $\{-7, -1, 0, 4, 5\}$

23. Ben's mother entered his age and weight in his baby book as ordered pairs. This is the set of numbers he found in his baby book: $\{(8, 65), (10, 80), (12, 100), (14, 120), (16, 150)\}$. What is the domain of this set?

- A. $\{x: 8 \leq x \leq 16\}$
- * B. $\{8, 10, 12, 14, 16\}$
- C. $\{y: 65 \leq y \leq 150\}$
- D. $\{65, 80, 100, 120, 150\}$

Use the table below to answer question 20.

Lawyer's Fee Schedule

Hours Worked	Fee
1	\$150
2	\$300
3	\$450
4	\$600

20. A lawyer's fee per hour is shown in the table above. What is the range of this relation?

- A. $\{1, \$600\}$
- B. $\{1, 4, \$150, \$600\}$
- C. $\{1, 2, 3, 4\}$
- * D. $\{\$150, \$300, \$450, \$600\}$

Use the table below to answer question 44.

Tyler's Work Record

Day	Hours Worked
Thursday	5
Friday	7
Saturday	8
Sunday	5

44. The table above shows the number of hours Tyler worked each day. What is the domain of this relationship?

- A. $\{3\}$
- B. $\{5, 7, 8\}$
- C. $\{y: 5 \leq y \leq 8\}$
- * D. $\{\text{Thursday, Friday, Saturday, Sunday}\}$

Know and/or use function notation including evaluating functions for given values in their domain.
(2006=# 16 2007= # 18)

18. Which properly evaluates the function below
by its given values?

$$f(x) = 6x - 4; \text{ for } x = 0, 1, 2, 3$$

- * A. $\{-4, 2, 8, 14\}$
- B. $\{4, 10, 16, 22\}$
- C. $\{56, 57, 58, 59\}$
- D. $\{0, -24, -48, -72\}$

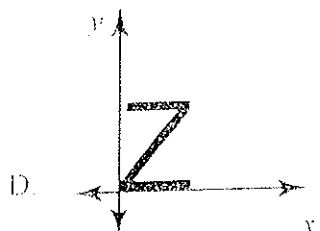
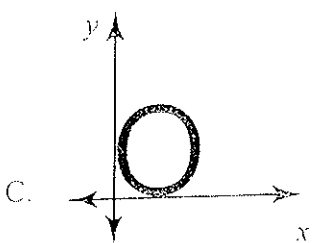
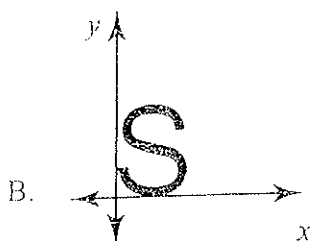
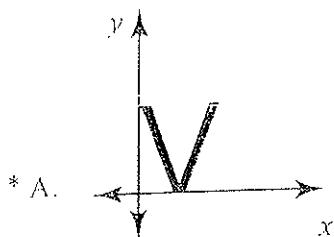
LINEAR FUNCTIONS

Distinguish between functions and non-functions/relations by inspecting graphs, ordered pairs, mapping diagrams, and/or tables of data. (2006=# 17,37,54)

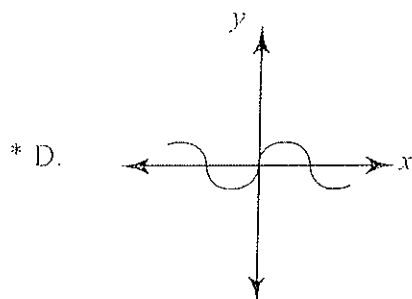
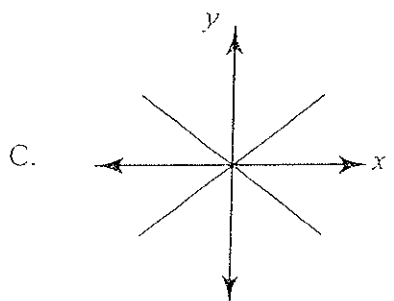
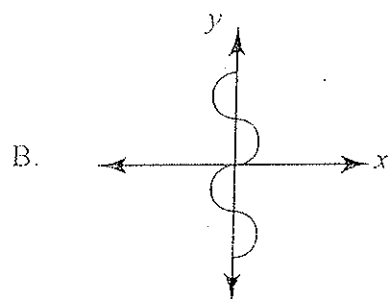
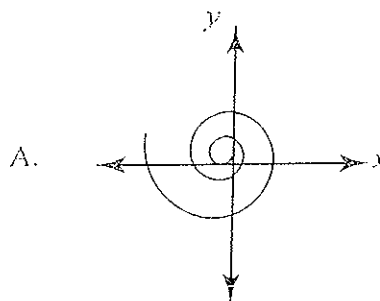
17. The ordered pairs represent the age of a husband and wife (husband's age, wife's age) for 4 different couples. Which relation is a function?

- * A. $\{(72, 68), (75, 76), (23, 22), (37, 31)\}$
- B. $\{(72, 70), (57, 60), (72, 69), (27, 24)\}$
- C. $\{(78, 73), (81, 80), (43, 39), (78, 76)\}$
- D. $\{(81, 84), (62, 62), (62, 58), (81, 76)\}$

37. Which shape represents a function?



54. Which graph shows y as a function of x ?



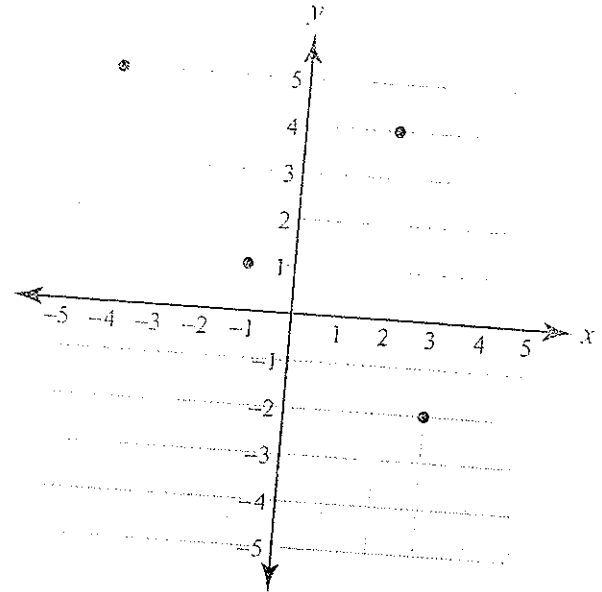
Determine domain and range of a relation from an algebraic expression, graphs, sets of ordered pairs, or table of data. (2006= # 10, 20, 23, 44 2007= # 2, 8)

2. Which is the **correct** domain (d) and range (r) for the table below?

x	y
-1.5	2
3	-4.1
-3.7	-2.6

- A. $d = \{-1.5, -4.1, -2.6\}, r = \{2, 3, -3.7\}$
 * B. $d = \{-1.5, 3, -3.7\}, r = \{2, -4.1, -2.6\}$
 C. $d = \{2, -4.1, -2.6\}, r = \{-1.5, 3, -3.7\}$
 D. $d = \{2, -4.1, -3.7\}, r = \{-1.5, 3, -2.6\}$

8. What is the domain of an ordered pair on the graph below?



- * A. -4
 B. -2
 C. 1
 D. 4

Know and/or use function notation including evaluating functions for given values in their domain.
(2006=≠ 16)

16. The cost of a rental car at Penny's Auto Rentals is \$0.30 per mile driven (m). Which function represents the cost of renting a car from Penny's?

A. $f(m) = 0.30 + m$

* B. $f(m) = 0.30m$

C. $f(m) = \frac{m}{0.30}$

D. $f(m) = \frac{m}{30}$

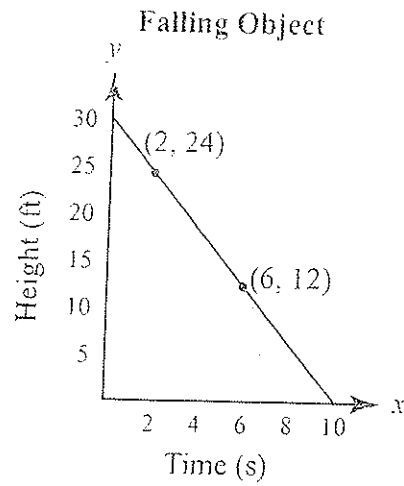
Identify independent variables and dependent variables in various representational modes:
Words, symbols, and/or graphs. (2006=# 36)

36. The area of a region is given by the formula
 $A = 3s^2 + 7s + 4$. What is the independent
variable?

- * A. s
- B. A
- C. s^2
- D. $7s$

Interpret the rate of change/slope and intercepts within the context of everyday life. EX: Telephone charges based on base rate plus rate per minute. (2007= # 13)

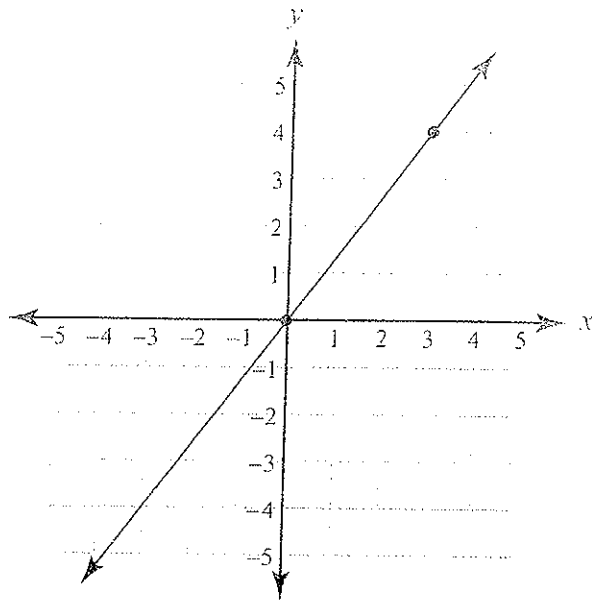
13. According to the graph shown below, at what rate is the object falling?



- A. 2 feet per second
- * B. 3 feet per second
- C. 4 feet per second
- D. 5 feet per second

Calculate the slope given: * two points * graph of a line *equation of a line (2007= # 46)

46. What is the slope of the line on the graph below?



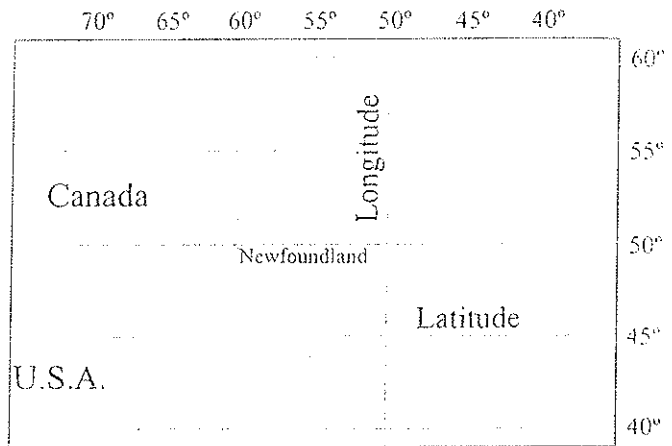
- A. $-\frac{4}{3}$
- B. $-\frac{3}{4}$
- C. $\frac{3}{4}$
- * D. $\frac{4}{3}$

Determine, by using slope, whether a pair of lines are parallel, perpendicular, or neither.
(2007= # 21, 51)

21. Which pair of lines is parallel?

- A. $y = 2, x = 2$
- * B. $y = x + 3, y = x - 4$
- C. $y = 2x + 6, y = -3x + 6$
- D. $y = -4x - 3, y = 4x + 4$

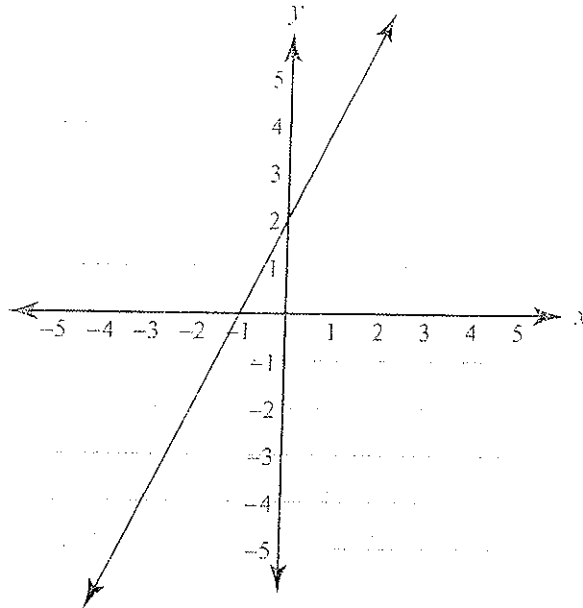
51. On a map, the longitude lines run north and south and have an undefined slope. The latitude lines run east and west and have a slope of zero. Together, the longitude and latitude lines on a graph form what type of lines?



- A. skew lines
- B. parallel lines
- * C. perpendicular lines
- D. non-intersecting lines

Write an equation in slope-intercept given: * two points * a point and y-intercept
* x-intercept and y-intercept * a point and slope * a table of data * the graph of a line
(2007= # 56)

56. Which linear equation describes the line on the graph below?



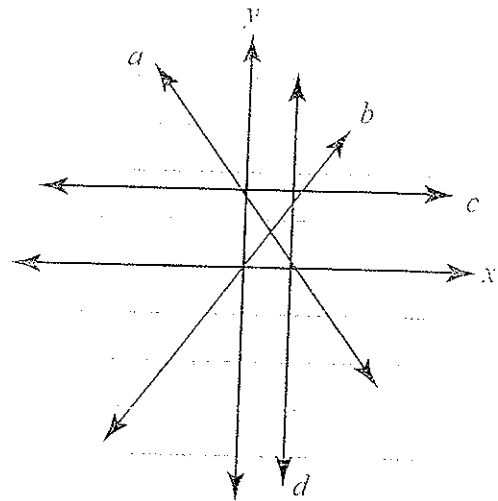
- A. $y = \frac{1}{2}x - 1$
- B. $y = \frac{1}{2}x + 2$
- C. $y = 2x - 1$
- * D. $y = 2x + 2$

Describe the effects of parameter changes, slope, and/or y -intercept on graphs of linear functions and vice versa. (2007= 25, 40, 55)

25. When the equation $y = 3x + 6$ is changed to $y = -3x + 6$, what effect does this change have on its graph?

- A. The line moves to the left on the x -axis.
- B. The line moves downward on the y -axis.
- C. The line slants upward, from left to right, instead of downward.
- * D. The line slants downward, from left to right, instead of upward.

55. Which line on the graph below shows a positive slope?

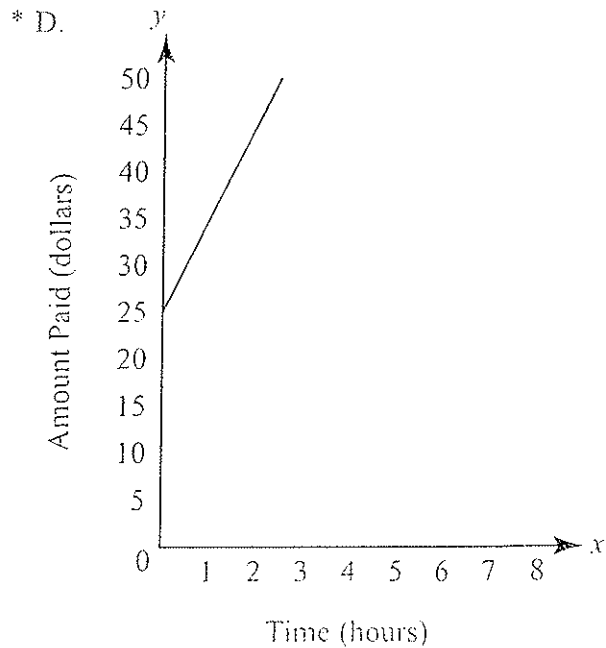
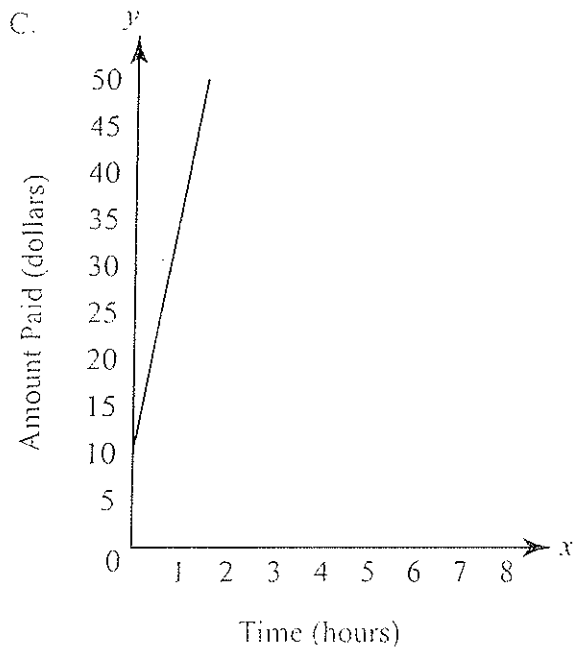
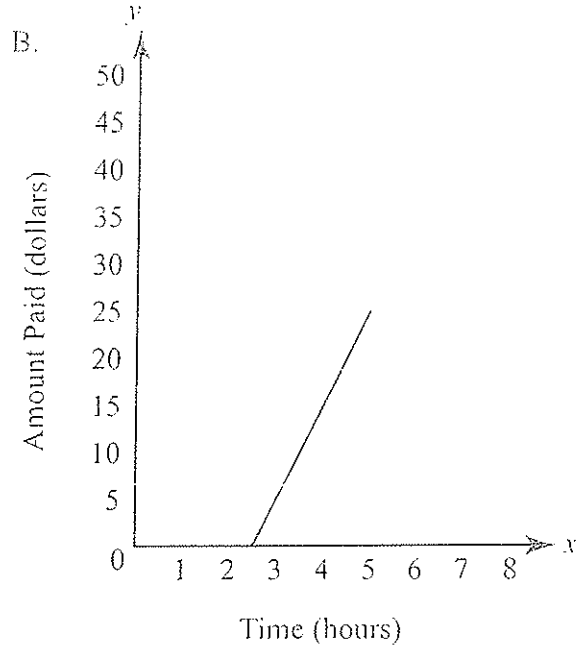
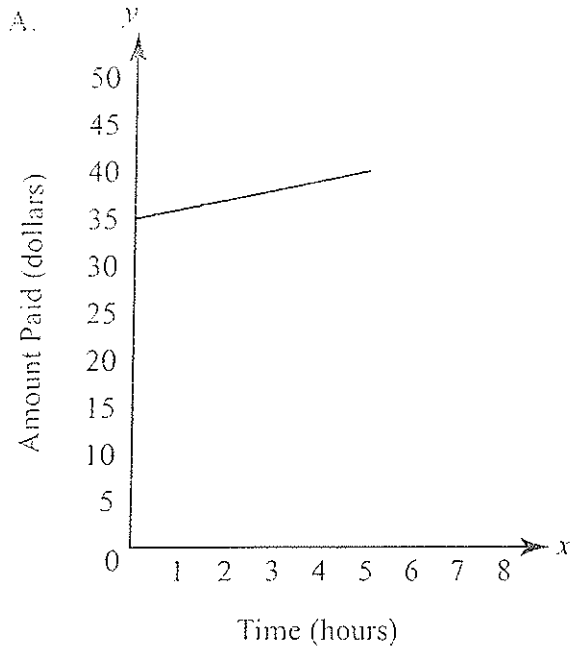


- A. line a
- * B. line b
- C. line c
- D. line d

40 or next page

Describe the effects of parameter changes, slope, and/or y-intercept on graphs of linear functions and vice versa. (2007= 25, 40, 55)

40. Jan's family rented a boat at Lake Ouachita. They paid a rental fee of \$25 plus \$10 per hour. Which graph shows the total amount the family paid, as a function of time?



Factor polynomials: Greatest common factor, binomials (difference of squares), trinomials.
(2006=# 6, 11, 24, 25, 47, 53 2007= # 4, 15, 32, 53)

4. What is the greatest common factor of the expressions $36x^8y^2$ and $18x^4y^3$?

A. $2x^2y^2$
B. $3x^4y$
C. $9x^2y$
* D. $18x^4y^2$

32. What is the complete factorization of the expression below?

$$2x + xy + xyz$$

A. $2x(y(z))$
B. $2x(y + yz)$
C. $x(2 + y + z)$
* D. $x(2 + y + yz)$

15. The total daily sales at a video store are shown in the expression below, where x is the number of tapes sold.

$$21x - 3x^2$$

Which shows this expression completely factored?

* A. $3x(7 - x)$
B. $3x^2(7 - x)$
C. $x(21 - 3x)$
D. $(x - 3)(7 - x)$

53. What is the complete factorization of the polynomial below?

$$25z^2 + 10z + 1$$

* A. $(5z + 1)^2$
B. $(5z - 1)^2$
C. $(5z + 1)(5z - 1)$
D. $(25z + 1)(z + 1)$

NON -LINEAR FUNCTIONS

Factor polynomials: Greatest common factor, binomials (difference of squares), trinomials.
(2006=# 6,11,24,25,47,53)

6. The supply of tomatoes at Latisha's Supermarket for the past 12 months is represented in the expression below, where t is the month from 1 to 12.

$$\text{Supply: } 6t^2 + 7t + 2$$

Which shows this expression completely factored?

- * A. $(3t + 2)(2t + 1)$
- B. $2(3t + 1)(t + 1)$
- C. $(6t + 2)(t + 1)$
- D. $(6t + 1)(t + 2)$

11. Completely factor:

$$16p^2 + 8p + 1$$

- A. $(4p)^2$
- B. $(8p)^2$
- * C. $(4p + 1)^2$
- D. $(8p + 1)^2$

24. Fred bought 10 DVDs (d dollars each) and 20 VCR tapes (v dollars each) at a local movie store. The total bill was $10d + 20v$. What is another way to write this expression?

- A. $10(d2v)$
- * B. $10(d + 2v)$
- C. $(d + v)(10 + 20)$
- D. $10(d + 20v)$

25. Completely factor:

$$18x^3 + 4x^2 - 2x$$

- * A. $2x(9x^2 + 2x - 1)$
- B. $3x(6x^2 + x - 1)$
- C. $6x(3x^2 + 4x - 2)$
- D. $9x(2x^2 + 4x - 2)$

47. Completely factor:

$$n^2 + n - 42$$

- A. $(n - 2)(n + 21)$
- B. $(n + 2)(n - 21)$
- * C. $(n - 6)(n + 7)$
- D. $(n + 6)(n - 7)$

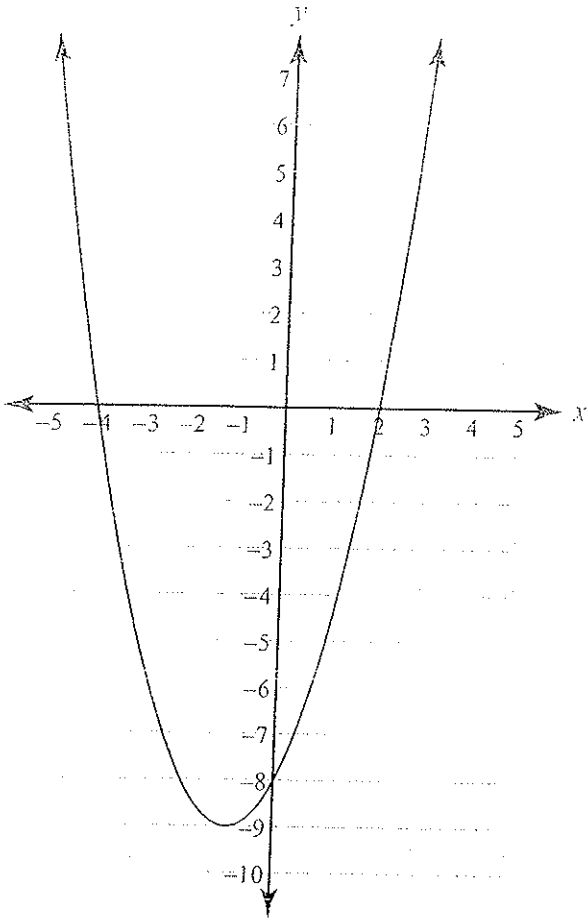
53. Factor:

$$x^2 - 8x - 33$$

- A. $8x(x - 33)$
- B. $(x + 2)(x - 4)$
- * C. $(x + 3)(x - 11)$
- D. $(x - 8)(x - 33)$

Determine minimum, maximum, vertex, and zeros, given a graph. (2007= # 20, 27, 38, 58)

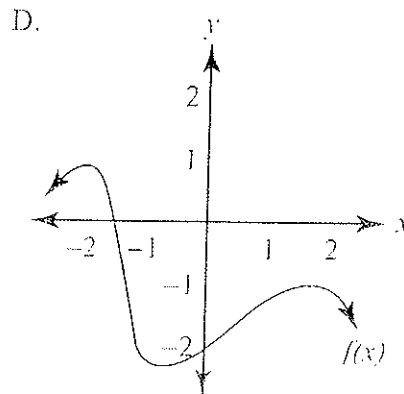
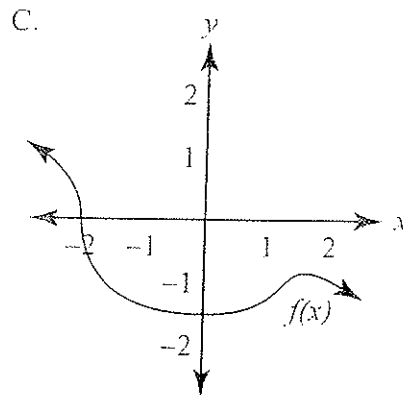
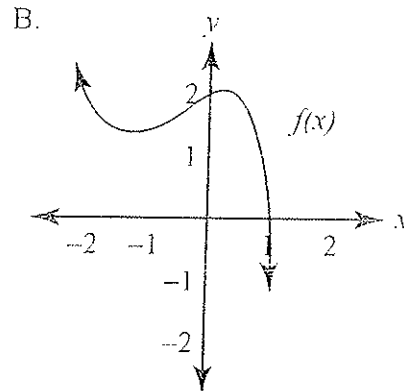
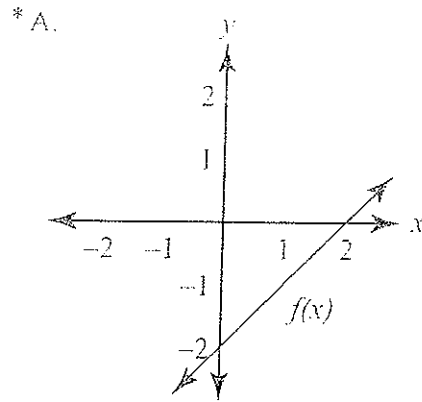
20. The quadratic function $y = x^2 + 2x - 8$ is graphed below.



What is the minimum y -value of this equation?

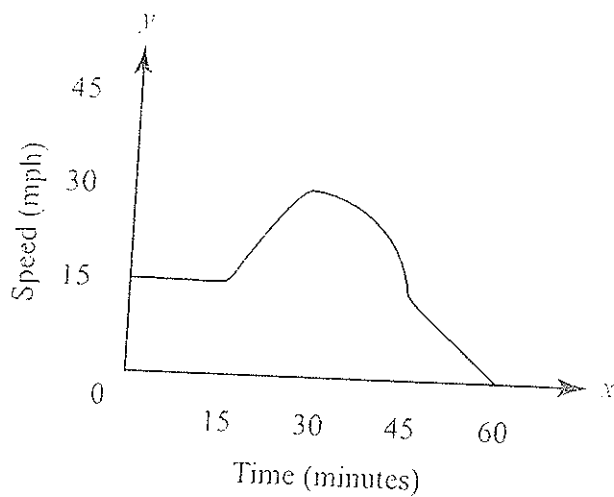
- * A. -9
- B. -5
- C. -4
- D. -1

27. Which graph of a function $f(x)$ has a zero at $x = 2$?



Determine minimum, maximum, vertex, and zeros, given a graph. (2007= # 20, 27, 38, 58)

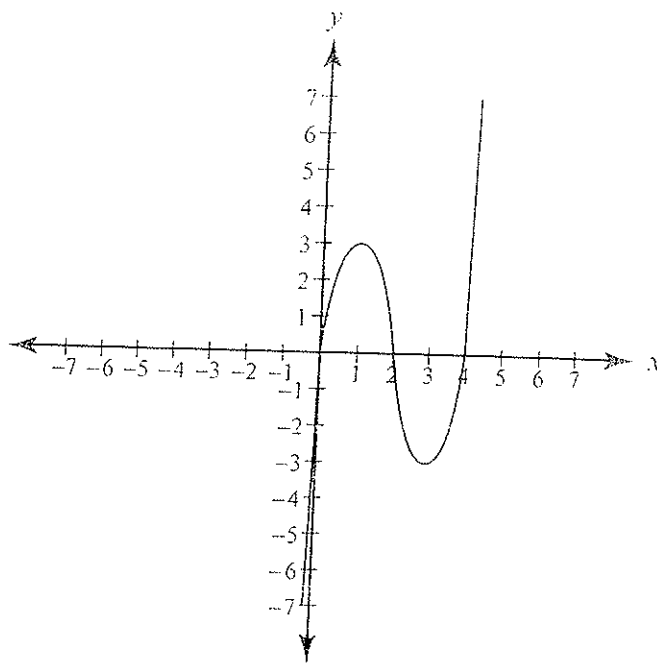
38. The graph below shows the speed of a car after t minutes.



After how many minutes is the car's speed zero?

- A. 15
- B. 30
- C. 45
- * D. 60

58. A manufacturer needs to know the zeroes of the graph below in order to provide the appropriate mixture of compounds in a solution.



What are all the zeroes of the graph?

- A. $(0, 0)$
- B. $(0, 0)$ and $(0, 4)$
- * C. $(0, 0)$, $(2, 0)$, and $(4, 0)$
- D. $(0, 0)$, $(0, 2)$, and $(0, 4)$

Solve quadratic equations using the appropriate methods with and without technology: *
Factoring *Quadratic formula with real-number solutions. (2007= # 49)

49. Cally's Candle Shop uses the equation below to determine how much to charge for candles.

Cost = $2t^2 - 7t + 5$, where t is the burning time, in hours.

Which expression completely factors the cost equation?

- A. $(2t^2 - 1)(t - 5)$
- B. $(2t + 1)(t - 5)$
- * C. $(2t - 5)(t - 1)$
- D. $(2t + 5)(t + 1)$

Recognize function families and their connections including vertical shift and reflection over the x-axis. *quadratics *absolute value * exponential functions (2007= # 10, 30, D)

10. Which transformation would map the graph of $y = 3x^2 + 4$ to the graph of $y = 3x^2 - 3$?

- A. a vertical shift upward
- * B. a vertical shift downward
- C. a horizontal shift to the left
- D. a horizontal shift to the right

30. When graphed, which equation would result in a parabola that opens downward?

- A. $y = 4x^2$
- B. $y = 4x^3$
- * C. $y = -4x^2$
- D. $y = -4|x|$

D. A corporation offered its new president a salary of \$50,000.00 per year for 5 years. In addition to the yearly salary, the president can choose one of the two incentive plans below.

- a yearly increase in salary of 5.5% each year, beginning the 2nd year
 - a yearly increase in salary of 2,900.00 each year, beginning the 2nd year
1. The president needs help in deciding which incentive plan to take. Make a table showing the amount the president would make each year for 5 years under each of the incentive plans. Show all of your work.
 2. What would the president's total salary be under each plan, cumulatively, for the entire 5-year period? Which plan would you recommend?

BE SURE TO LABEL YOUR RESPONSES 1 AND 2.

RUBRIC FOR ALGEBRA I OPEN-RESPONSE ITEM D

SCORE	DESCRIPTION
4	The student earns 5 points. The response contains no incorrect work.
3	The student earns 4 points.
2	The student earns 2-3 points.
1	The student earns 1 point, or some minimal understanding is shown. Ex: Correct totals for each plan are given in Part 2 but recommendation is missing or incorrect.
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of "B" will be reported as "NA." (No attempt to answer the item. Score of "0" assigned for the item.)

Communicate real-world problems graphically, algebraically, numerically, and verbally.
(2006=# 31 2007= # 42)

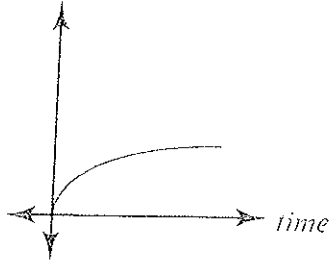
42. The function $f(x) = 6x^2$ represents the amount of wrapping paper needed to wrap a cube having a length of x feet. The length of Janine's cube is 3 feet. How much paper is needed to wrap her cube?

- A. 36 ft^2
- * B. 54 ft^2
- C. 108 ft^2
- D. 324 ft^2

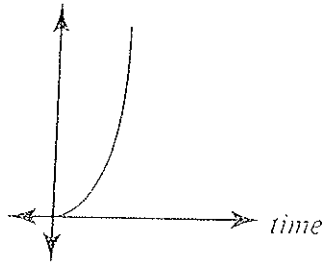
Communicate real-world problems graphically, algebraically, numerically, and verbally.
(2006=# 31)

31. A candle loses 2 inches of height for every hour it is lit. Which graph represents the height of the candle with respect to time?

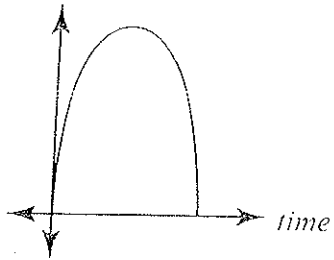
A. *height*



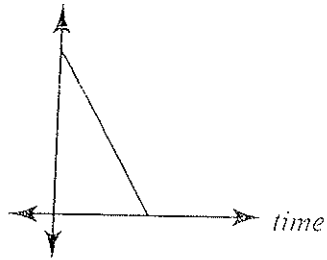
B. *height*



C. *height*



* D. *height*



Construct and use scatter plots and line of best fit to make inferences in real-life situations.
(2007= # A)

- A. Ten students were asked to estimate the number of minutes they spent studying for the last chapter test. The table below shows the data.

Time Spent Studying (minutes)	10	15	15	20	25	30	30	40	45	45
Test Scores (percent)	67	64	72	74	80	80	76	84	90	82

- On the grid provided in your answer document, plot the data in a scatterplot. Let x represent the time spent studying and y represent the test scores. Draw a line of best fit for your scatterplot.
- Describe the correlation of the data as being either a strong positive, weak positive, strong negative, weak negative, or having no correlation. Give reasons for your answer.
- Estimate** the test score of a student who studied for one hour. Explain your answer.

BE SURE TO LABEL YOUR RESPONSES 1, 2, AND 3.

RUBRIC FOR ALGEBRA I OPEN-RESPONSE ITEM A

SCORE	DESCRIPTION
4	The student earns 4 points. The response contains no incorrect work.
3	The student earns 3–3 ½ points.
2	The student earns 2–2 ½ points.
1	The student earns ½–1 ½ points, or some minimal understanding is shown.
0	The student earns 0 points. No understanding is shown.
B	Blank—No Response. A score of “B” will be reported as “NA.” (No attempt to answer the item. Score of “0” assigned for the item.)

Use simple matrices in addition, subtraction, and scalar multiplication. (2006=# 5,33,46
2007= # 7, 17, 23)

7. Frank Dewey, John Smith, and Bill Howe manage three different used-car lots. The inventory of each brand of truck, van, and car is shown in the matrices below.

Dewey			Smith			Howe		
Trucks	Vans	Cars	Trucks	Vans	Cars	Trucks	Vans	Cars
Brand A	$\begin{bmatrix} 10 & 12 & 14 \end{bmatrix}$		Brand A	$\begin{bmatrix} 6 & 7 & 10 \end{bmatrix}$		Brand A	$\begin{bmatrix} 6 & 12 & 14 \end{bmatrix}$	
Brand B	$\begin{bmatrix} 5 & 10 & 15 \end{bmatrix}$		Brand B	$\begin{bmatrix} 10 & 12 & 14 \end{bmatrix}$		Brand B	$\begin{bmatrix} 12 & 12 & 12 \end{bmatrix}$	
Brand C	$\begin{bmatrix} 3 & 6 & 9 \end{bmatrix}$		Brand C	$\begin{bmatrix} 6 & 5 & 4 \end{bmatrix}$		Brand C	$\begin{bmatrix} 10 & 8 & 6 \end{bmatrix}$	

If they combined their businesses, how many trucks would they have altogether?

- A. 18
- B. 22
- C. 27
- * D. 68

17. Given the matrices below, what is the solution to $2A + 3B$?

$$A = \begin{bmatrix} 1 & 4 \\ 6 & 0 \end{bmatrix} \quad B = \begin{bmatrix} -2 & 4 \\ 3 & -5 \end{bmatrix}$$

- A. $\begin{bmatrix} 8 & 20 \\ 21 & 15 \end{bmatrix}$
- * B. $\begin{bmatrix} -4 & 20 \\ 21 & -15 \end{bmatrix}$
- C. $\begin{bmatrix} -1 & 8 \\ 9 & -5 \end{bmatrix}$
- D. $\begin{bmatrix} -4 & 21 \\ 20 & -15 \end{bmatrix}$

23. What is $2A - 3B$ given the matrices below?

$$A = \begin{bmatrix} 1 & 4 \\ 6 & 0 \end{bmatrix} \quad B = \begin{bmatrix} -2 & 4 \\ 3 & -5 \end{bmatrix}$$

- A. $\begin{bmatrix} 3 & 0 \\ 3 & 5 \end{bmatrix}$
- B. $\begin{bmatrix} -1 & 0 \\ 3 & 5 \end{bmatrix}$
- * C. $\begin{bmatrix} 8 & -4 \\ 3 & 15 \end{bmatrix}$
- D. $\begin{bmatrix} 8 & 3 \\ -4 & 15 \end{bmatrix}$

Use simple matrices in addition, subtraction, and scalar multiplication. (2006=# 5,33,46)

Use the matrix below to answer question 33.

$$\text{Matrix A} \\ \begin{bmatrix} 68 & 43 \\ 52 & 35 \end{bmatrix}$$

33. What is $2A$?

- A. $\begin{bmatrix} 396 \end{bmatrix}$
B. $\begin{bmatrix} 240 & 156 \end{bmatrix}$
C. $\begin{bmatrix} 222 \\ 174 \end{bmatrix}$
* D. $\begin{bmatrix} 136 & 86 \\ 104 & 70 \end{bmatrix}$

Use the matrices below to answer question 46.

$$\begin{array}{c} \text{Amount Earned} \\ \text{Kari} \quad \text{Sam} \\ \text{Day 1} \begin{bmatrix} 16 & 10 \end{bmatrix} \\ \text{Day 2} \begin{bmatrix} 8 & 12 \end{bmatrix} \end{array}$$

$$\begin{array}{c} \text{Amount Spent} \\ \text{Kari} \quad \text{Sam} \\ \text{Day 1} \begin{bmatrix} 4 & 5 \end{bmatrix} \\ \text{Day 2} \begin{bmatrix} 4 & 6 \end{bmatrix} \end{array}$$

46. The amounts Kari and Sam earned and spent for 2 days are shown in the matrices above. Which matrix represents the amount saved each day?

$$\begin{array}{c} \text{Kari} \quad \text{Sam} \\ \text{A. Day 1} \begin{bmatrix} 11 & 6 \end{bmatrix} \\ \text{Day 2} \begin{bmatrix} 2 & 8 \end{bmatrix} \end{array}$$

$$\begin{array}{c} \text{Kari} \quad \text{Sam} \\ \text{B. Day 1} \begin{bmatrix} 12 & 6 \end{bmatrix} \\ \text{Day 2} \begin{bmatrix} 3 & 6 \end{bmatrix} \end{array}$$

$$\begin{array}{c} \text{Kari} \quad \text{Sam} \\ \text{* C. Day 1} \begin{bmatrix} 12 & 5 \end{bmatrix} \\ \text{Day 2} \begin{bmatrix} 4 & 6 \end{bmatrix} \end{array}$$

$$\begin{array}{c} \text{Kari} \quad \text{Sam} \\ \text{D. Day 1} \begin{bmatrix} 12 & 3 \end{bmatrix} \\ \text{Day 2} \begin{bmatrix} 6 & 6 \end{bmatrix} \end{array}$$

Use simple matrices in addition, subtraction, and scalar multiplication. (2006=# 5,33,46)

Use the matrices below to answer question 5.

MANUFACTURING				SALES			
	Car	Light Truck	Commercial Truck		Car	Light Truck	Commercial Truck
Economy	90	70	60	Economy	41	38	36
Standard	60	50	42	Standard	25	24	19
Super	30	25	20	Super	15	17	16

5. A manufacturing plant makes economy, standard, and super grade tires for cars, light trucks, and commercial trucks. The matrices above show manufacturing output and sales. Which matrix represents the difference between the 2 matrices?

		Car	Light Truck	Commercial Truck		Car	Light Truck	Commercial Truck	
A.	Economy	131	108	96	B.	Economy	49	31	14
	Standard	85	74	61		Standard	36	26	17
	Super	45	42	36		Super	25	14	4
* C.	Economy	49	32	24	D.	Economy	49	45	45
	Standard	35	26	23		Standard	22	26	25
	Super	15	8	4		Super	6	6	4

Construct simple matrices for real-life situations. (2007= # 11)

11. Jordan has 3 paint colors in stock for painting houses. He keeps a record of his paint supply by the color and size of the paint can. The matrix below indicates his current paint supply.

Jordan's Paint Supply

	Half Gallon	Gallon
White	12	20
Blue	4	12
Brown	8	16

He needs to increase his entire paint supply by 25%. Which matrix represents Jordan's increased paint supply?

Jordan's Paint Supply

	Half Gallon	Gallon
White	9	15
Blue	3	9
Brown	6	12

A.

Jordan's Paint Supply

	Half Gallon	Gallon
White	3	5
Blue	1	3
Brown	2	4

B.

Jordan's Paint Supply

	Half Gallon	Gallon
White	15	25
Blue	5	15
Brown	10	20

* C.

Jordan's Paint Supply

	Half Gallon	Gallon
White	37	45
Blue	29	37
Brown	33	41

D.

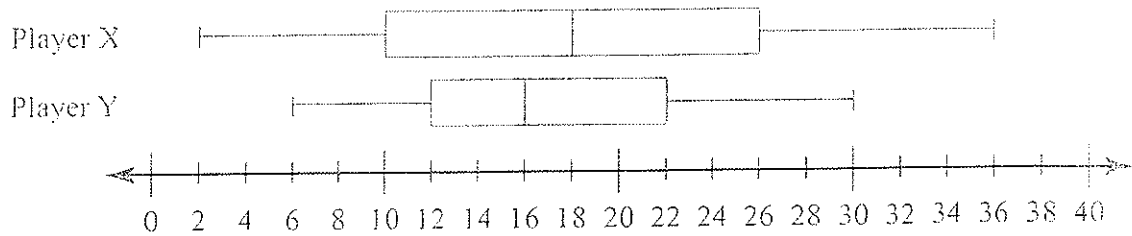
Determine the effects of changes in the data set on the measure of central tendency.
(2007= # 41)

41. Nancy scored 75, 83, and 79 on her first 3 algebra tests. If she wants her mean score for the first 4 tests to be at least 80, what is the minimum she must score on the next test?

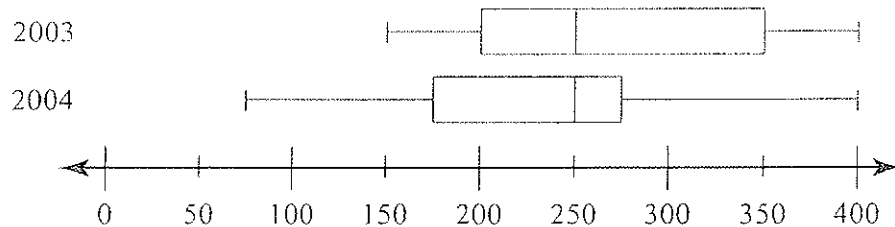
- A. 79
- B. 80
- * C. 83
- D. 85

Use two or more box-and-whisker plots to compare data sets. (2007= # 45, 60)

45. Based on the box-and-whisker plot shown below, which statement is true?



- * A. The median score for Player X is greater than the median score for Player Y.
 - B. The minimum score for Player Y is less than the minimum score for Player X.
 - C. The range of scores for Player Y is greater than the range of scores for Player X.
 - D. The interquartile range for Player X is less than the interquartile range for Player Y.
60. The box-and-whisker plot below represents the number of people who attended Coolsville Water Park each day during the summer seasons of 2003 and 2004.



Which statement accurately describes the data?

- A. The minimum number of attendees was in 2003.
- B. The interquartile range in 2004 was greater than it was in 2003.
- C. The maximum number of attendees was greater in 2003 than it was in 2004.
- * D. The median number of people who attended the Water Park was the same for both years.

Recognize linear functions and non-linear functions by using a table or graph. (2007= # 3, 50)

3. Based on the table below, which statement best describes the data?

Cost of Renting Equipment at the Jet Ski Company

Time, x (in hours)	1	2	3	4	5	6
Rental Cost, y (in dollars)	45	60	75	90	105	120

- * A. The data represent a linear function.
- B. The data do not represent a function.
- C. The data represent a quadratic function.
- D. The data represent an exponential decay function.

50. Which table demonstrates that monthly cell phone charges are a linear function of the number of minutes used?

A.

Minutes Used	Monthly Charge
0	\$25.00
100	\$30.00
200	\$40.00
300	\$60.00

* B.

Minutes Used	Monthly Charge
0	\$25.00
100	\$30.00
200	\$35.00
300	\$40.00

C.

Minutes Used	Monthly Charge
0	\$25.00
100	\$26.00
200	\$28.00
300	\$29.00

D.

Minutes Used	Monthly Charge
0	\$25.00
100	\$26.00
200	\$29.00
300	\$34.00

Compute simple probability with and without replacement. (2007= # 26)

26. Manny created a computer program that randomly generates a letter from the word "Arkansas." What is the probability that the computer program will generate a letter that only appears once in the word?

- A. $\frac{1}{8}$
- B. $\frac{2}{8}$
- * C. $\frac{3}{8}$
- D. $\frac{5}{8}$

Recognize patterns using explicitly defined and recursively defined linear functions.
(2007= # 35)

35. A motel gets 100 customers per night when the rate is \$70 per customer. For each \$5 by which the manager raises the rate, the motel loses 4 customers. How much money will the motel earn in one night when the rate is \$85 per customer?
- A. \$6,160
 - B. \$7,200
 - * C. \$7,480
 - D. \$8,160