

MATHEMATICS Exit Level

Administered Spring 2004

Test by Objectives

Mathematics Chart

LENGTH

Metric

1 kilometer = 1000 meters

1 meter = 100 centimeters

1 centimeter = 10 millimeters

Customary

1 mile = 1760 yards

1 mile = 5280 feet

1 yard = 3 feet

1 foot = 12 inches

CAPACITY AND VOLUME

Metric

1 liter = 1000 milliliters

Customary

1 gallon = 4 quarts

1 gallon = 128 ounces

1 quart = 2 pints

1 pint = 2 cups

1 cup = 8 ounces

MASS AND WEIGHT

Metric

1 kilogram = 1000 grams

1 gram = 1000 milligrams

Customary

1 ton = 2000 pounds

1 pound = 16 ounces

TIME

1 year = 365 days

1 year = 12 months

1 year = 52 weeks

1 week = 7 days

1 day = 24 hours

1 hour = 60 minutes

1 minute = 60 seconds

Mathematics Chart

Perimeter	rectangle	$P = 2l + 2w$ or $P = 2(l + w)$
Circumference	circle	$C = 2\pi r$ or $C = \pi d$
Area	rectangle	$A = lw$ or $A = bh$
	triangle	$A = \frac{1}{2}bh$ or $A = \frac{bh}{2}$
	trapezoid	$A = \frac{1}{2}(b_1 + b_2)h$ or $A = \frac{(b_1 + b_2)h}{2}$
	circle	$A = \pi r^2$
Surface Area	cube	$S = 6s^2$
	cylinder (lateral)	$S = 2\pi rh$
	cylinder (total)	$S = 2\pi rh + 2\pi r^2$ or $S = 2\pi r(h + r)$
	cone (lateral)	$S = \pi rl$
	cone (total)	$S = \pi rl + \pi r^2$ or $S = \pi r(l + r)$
	sphere	$S = 4\pi r^2$
Volume	prism or cylinder	$V = Bh^*$
	pyramid or cone	$V = \frac{1}{3}Bh^*$
	sphere	$V = \frac{4}{3}\pi r^3$
<i>*B represents the area of the Base of a solid figure.</i>		
Pi	π	$\pi \approx 3.14$ or $\pi \approx \frac{22}{7}$
Pythagorean Theorem		$a^2 + b^2 = c^2$
Distance Formula		$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Slope of a Line		$m = \frac{y_2 - y_1}{x_2 - x_1}$
Midpoint Formula		$M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$
Quadratic Formula		$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Slope-Intercept Form of an Equation		$y = mx + b$
Point-Slope Form of an Equation		$y - y_1 = m(x - x_1)$
Standard Form of an Equation		$Ax + By = C$
Simple Interest Formula		$I = prt$

Grade 11-2004

Objective 1: The student will describe functional relationships in a variety of ways.

A(b)(1) The student understands that a function represents a dependence

C) The student describes functional relationships for given problem situations and writes equations or inequalities to answer questions arising from the situations.

1 An artist studies human proportions in order to make realistic drawings. He observes that a person's kneeling height, y , is $\frac{3}{4}$ of the person's standing height, x . Which equation best represents this relationship?

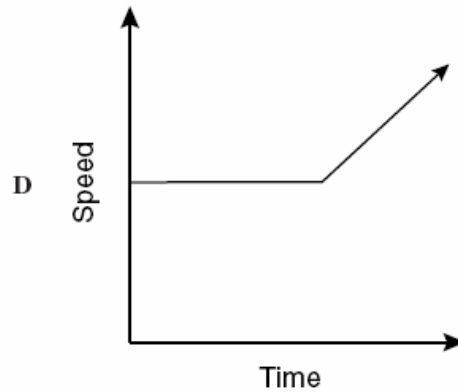
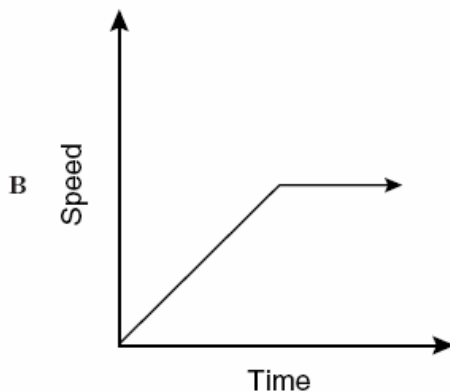
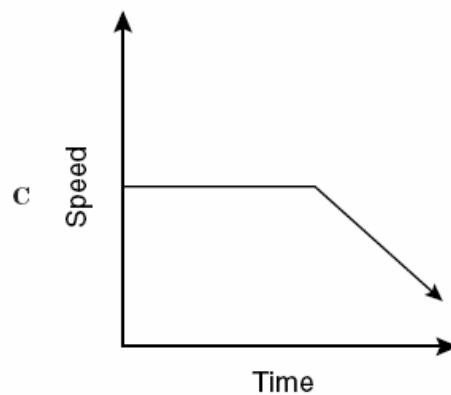
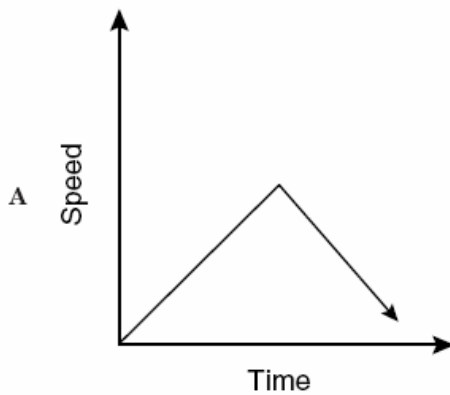
- A $y = \frac{3}{4}x$
- B $y = (-\frac{3}{4})x$
- C $y = x - \frac{3}{4}$
- D $y = x + \frac{3}{4}$

Objective 1: The student will describe functional relationships in a variety of ways.

A(b)(1) The student understands that a function represents a dependence

(E) The student interprets and makes inferences from functional relationships.

3 Karen jogs at a steady pace up a hill in her neighborhood. She then runs down the hill, and her speed increases. Which graph best describes this situation?



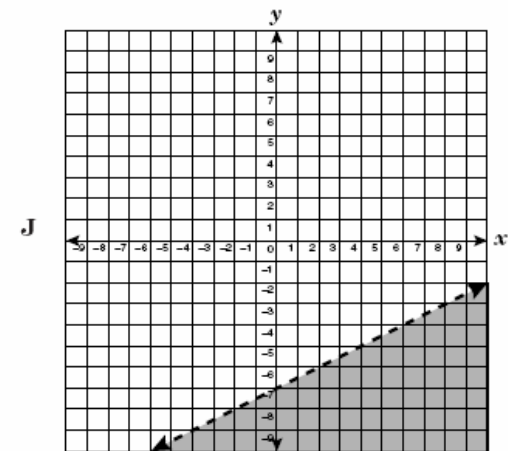
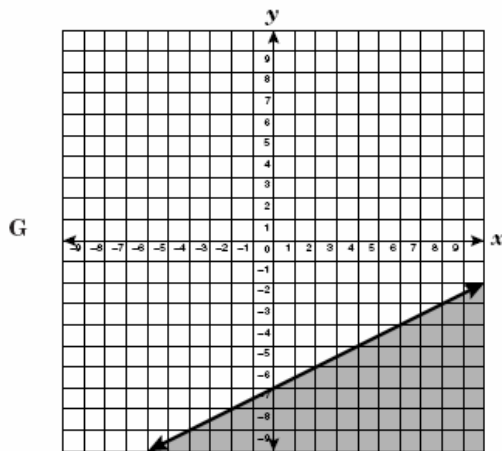
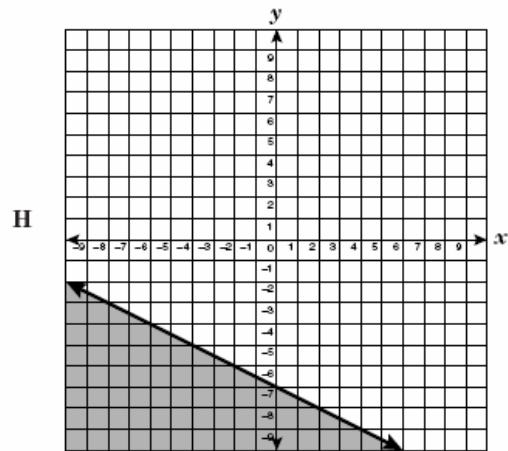
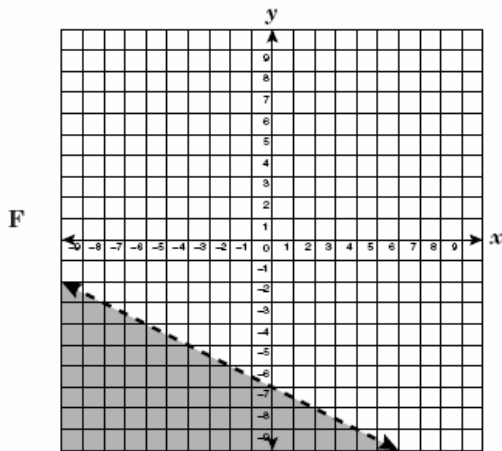
Grade 11-2004

Objective 1: The student will describe functional relationships in a variety of ways.

A(b)(1) The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways.

(D) The student represents relationships among quantities using [concrete] models, tables, graphs, diagrams, verbal descriptions, equations, and inequalities.

20 Which graph best represents the inequality $x + 2y \leq -14$?



Grade 11-2004

Objective 1: The student will describe functional relationships in a variety of ways.

A(b)(1) The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways.

(B) The student [gathers and record data, or] uses data sets, to determine functional (systematic) relationships between quantities.

31 Which equation best describes the relationship between x and y shown in the table below?

x	y
1	3
2	12
4	48
6	108
9	243

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

Objective 1: The student will describe functional relationships in a variety of ways.

A(b)(1) The student understands that a function represents a dependence of one quantity on another and can be described in a variety of ways.

(A)The student describes independent and dependent quantities in functional relationships.

55 A department store had a 20%-off sale on all clothing items. Which statement best represents the functional relationship between the sale price of an article of clothing and the original price?

- A** The original price is dependent on the sale price.
- B** The sale price is dependent on the original price.
- C** The sale price and the original price are independent of each other.
- D** The relationship cannot be determined.

Grade 11-2004

Objective 2: The student will demonstrate an understanding of the properties and attributes of functions.

A(b)(3) The student understands how algebra can be used to express generalizations and recognizes and uses the power of symbols to represent situations.

(A) The student uses symbols to represent unknowns and variables.

11 Let a represent the average speed in miles per hour a car traveled on a trip. Let $f(t)$ represent the distance in miles the car had traveled t hours after the beginning of the trip. The function $f(t)$ is best represented by —

- A** $t^2 + a$
- B** at^2
- C** $t + a$
- D** at

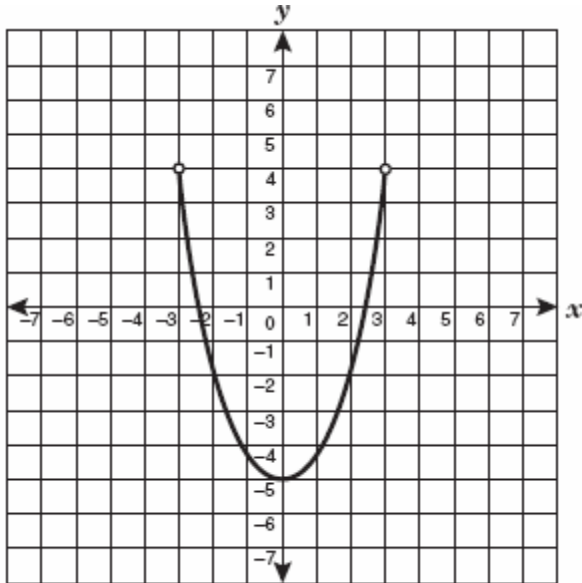
Grade 11-2004

Objective 2: The student will demonstrate an understanding of the properties and attributes of functions.

A(b)(2) The student uses the properties and attributes of functions.

(B) For a variety of situations, the student identifies the mathematical domains and ranges and determines reasonable domain and range values for given situations.

27 What is the domain of the function shown on the graph?



- A $-3 \leq x \leq 3$
- B $-3 < x < 3$
- C $-5 < x \leq 4$
- D $-5 \leq x < 4$

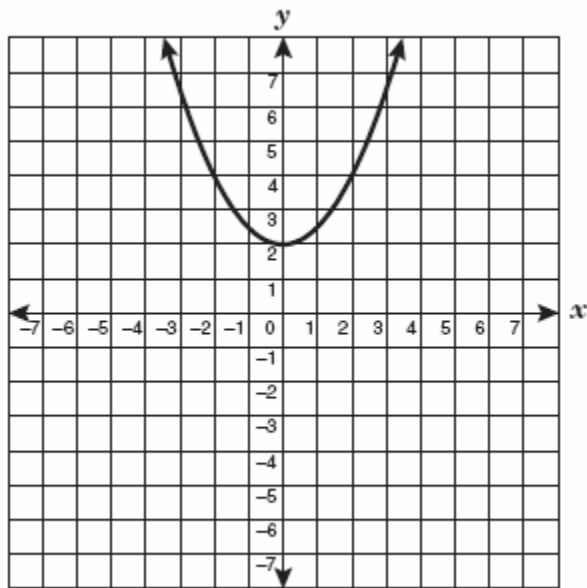
Grade 11-2004

Objective 2: The student will demonstrate an understanding of the properties and attributes of functions.

A(b)(2) The student uses the properties and attributes of functions.

(A) The student identifies [and sketches] the general forms of linear ($y=x$) and quadratic ($y=x^2$) parent functions.

34 Which equation is the parent function of the graph represented below?



- F** $y = |x|$
- G** $y = x$
- H** $y = x^2$
- J** $y = \sqrt{x}$

Grade 11-2004

Objective 2: The student will demonstrate an understanding of the properties and attributes of functions.

A(b)(4) The student understands the importance of the skills required to manipulate symbols in order to solve problems and uses the necessary algebraic skills required to simplify algebraic expressions and solve equations and inequalities in problem situations.

(B) The student uses the commutative, associative, and distributive properties to simplify algebraic expressions.

41 Which expression is equivalent to

$$\frac{2}{3}(3x - 15y) + (9y - 11x)?$$

- A** $-9x - y$
- B** $11x - 21y$
- C** $10x - 4y$
- D** $-9x - 26y$

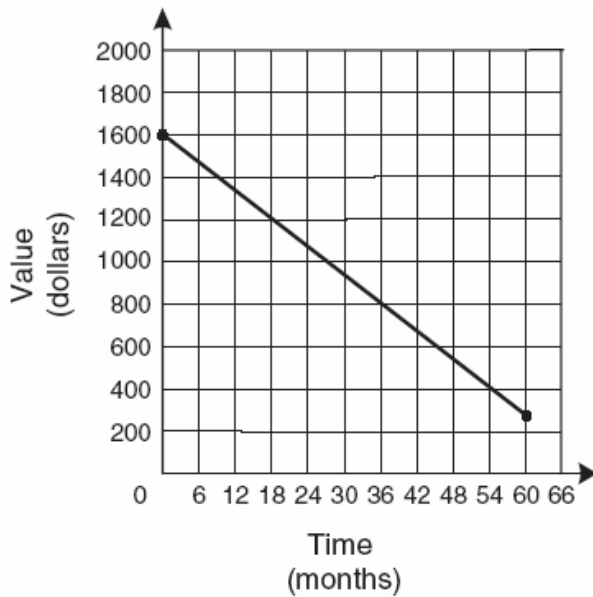
Grade 11-2004

Objective 2: The student will demonstrate an understanding of the properties and attributes of functions.

A(b)(2) The student uses the properties and attributes of functions.

(C) The student interprets situations in terms of given graphs [or creates situations that fit given graphs].

47 The graph below shows the decrease in the value of a personal computer over a period of 60 months.



Which is a reasonable conclusion about the value of this personal computer during the time shown on the graph?

- A Its value at 18 months was twice its value at 36 months.
- B Its value at 36 months was half its value at 54 months.
- C It depreciated \$200 every 12 months.
- D It depreciated \$400 every 18 months.

Grade 11-2004

Objective 3: The student will demonstrate an understanding of linear functions.

A(c)(2) Linear Functions. The student understands the meaning of the slope and intercepts of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations.

(E) The student determines the intercepts of linear functions from graphs, tables, and algebraic representations.

8 What are the coordinates of the x -intercept of the equation $-3y = 8 - 2x$?

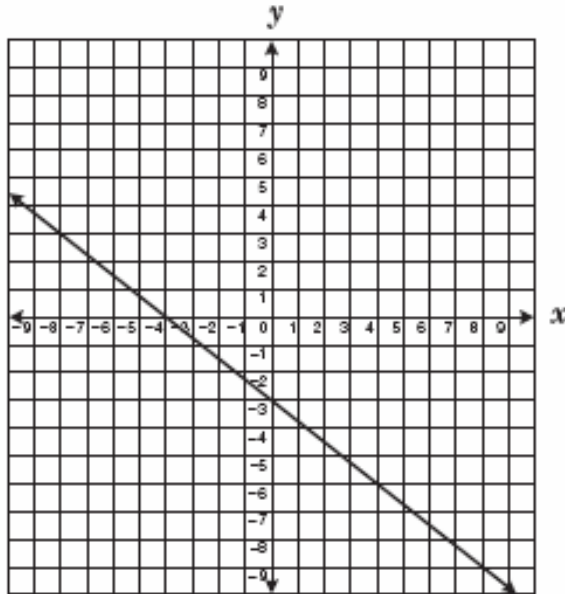
- F** $(-2, 0)$
- G** $(0, -8/3)$
- H** $(2/3, 0)$
- J** $(4, 0)$

Objective 3: The student will demonstrate an understanding of linear functions.

A(c)(2) Linear Functions. The student understands the meaning of the slope and intercepts of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations.

(A) The student develops the concepts of slope as a rate of change and determines slopes from graphs, tables, and algebraic expressions.

13 What are the slope and y-intercept of the equation of the line graphed below?



A $m = -\frac{3}{4}$

$b = -4$

B $m = -\frac{4}{3}$

$b = -4$

C $m = -\frac{4}{3}$

$b = -3$

D $m = -\frac{3}{4}$

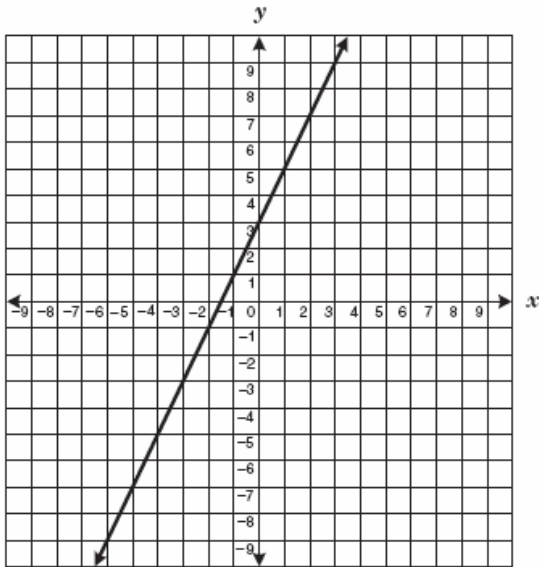
$b = -3$

Objective 3: The student will demonstrate an understanding of linear functions.

A(c)(2) Linear Functions. The student understands the meaning of the slope and intercepts of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations.

(C) The student investigates, describes, and predicts the effects of changes in m and b on the graph of $y=mx+b$.

17 The graph of a line is shown below.



If the slope of this line is multiplied by -1 and the y -intercept decreases by 2 units, which linear equation represents these changes?

- A $y = -2x + 1$
- B $y = -x + 1$
- C $y = -x - 1$
- D $y = -1/2 x - 1$

Grade 11-2004

Objective 3: The student will demonstrate an understanding of linear functions.

A(c)(2) Linear Functions. The student understands the meaning of the slope and intercepts of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations.

(D) The student graphs and writes equations of lines given characteristics such as two points, a point and a slope, or a slope and -intercept.

44 Which equation represents the line that passes through the points $(-1, 4)$ and $(3, 2)$?

F $y = -\frac{1}{2}x + \frac{7}{2}$

G $y = -\frac{1}{2}x + \frac{9}{2}$

H $y = -2x + 7$

J $y = -2x + 3$

Objective 3: The student will demonstrate an understanding of linear functions.

A(c)(2) Linear Functions. The student understands the meaning of the slope and intercepts of linear functions and interprets and describes the effects of changes in parameters of linear functions in real-world and mathematical situations.

(G) The student relates direct variation to linear functions and solves problems involving proportional change.

45 Matt is a speed skater. His coach recorded the following data during a timed practice period.

Time (seconds)	Distance (meters)
4.50	50
9.00	100
11.25	125

If Matt continues to skate at the rate shown in the table, what is the approximate distance in meters he will skate in 25 seconds?

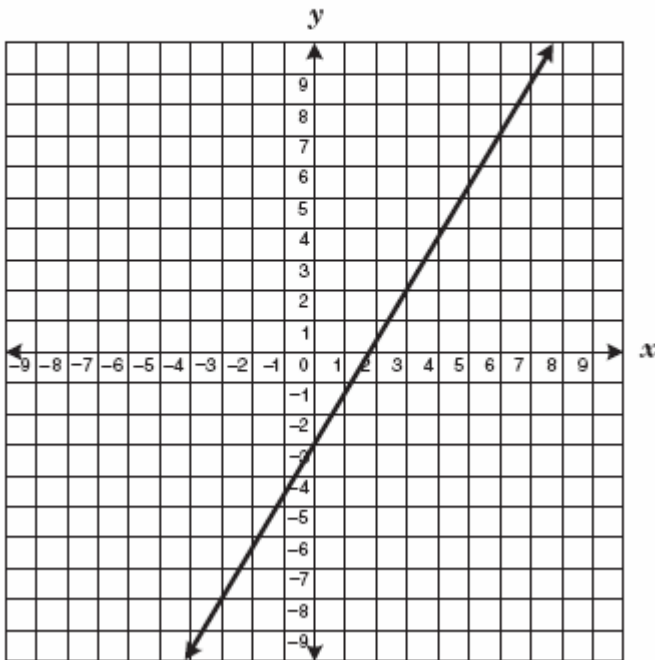
- A** 250 m
- B** 175 m
- C** 150 m
- D** 278 m

Objective 4: The student will formulate and use linear equations and inequalities.

A(c)(4) Linear Functions. The student formulates systems of linear equations from problem situations, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation.

(B) The student solves systems of linear equations using [concrete] models, graphs, tables, and algebraic methods.

- 29 The graph of the equation $y = \frac{5}{3}x - 3$ is given below. Graph $y = x + 1$ on the grid.



What is the solution to this system of equations?

- A (0, 1)
- B (5, 6)
- C (6, 7)
- D No solution

Grade 11-2004

Objective 4: The student will formulate and use linear equations and inequalities.

A(c)(4) Linear Functions. The student formulates systems of linear equations from problem situations, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation.

(A) The student analyzes situations and formulates systems of linear equations to solve problems.

40 At a college bookstore, Carla purchased a math textbook and a novel that cost a total of \$54, not including tax. If the price of the math textbook, m , is \$8 more than 3 times the price of the novel, n , which system of linear equations could be used to determine the price of each book?

F $m + n = 8$
 $m = 3n + 54$

G $m + n = 8$
 $m = 3n - 54$

H $m + n = 54$
 $m = 3n + 8$

J $m + n = 54$
 $m = 3n - 8$

Objective 4: The student will formulate and use linear equations and inequalities.

A(c)(3) The student formulates equations and inequalities based on linear functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation.

(C) For given contexts, the student interprets and determines the reasonableness of solutions to linear equations and inequalities.

48 The amount of an employee's weekly pay, p , including a bonus, can be represented by the inequality $6.00h + 100 < p < 6.50h + 125$, where h represents the number of hours worked by the employee. If an employee worked 25 hours, which of the following is a reasonable amount for that week's pay?

- F** \$118.75
G \$250.00
H \$272.50
J \$290.25

Grade 11-2004

Objective 4: The student will formulate and use linear equations and inequalities.

A(c)(4) Linear Functions. The student formulates systems of linear equations from problem situations, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation.

(A) The student analyzes situations and formulates systems of linear equations to solve problems

53 The price, e , of an entertainment system at Extreme Electronics is \$220 less than twice the price, u , of the same system at Ultra Electronics. The difference in price between the system at Extreme Electronics and Ultra Electronics is \$175. Which system of linear equations can be used to determine the price of the system at each store?

- A** $2e - u = 220$
 $e - u = -175$
- B** $2e - u = 220$
 $e + u = 175$
- C** $2e - 2u = 440$
 $e - u = -175$
- D** $e - 2u = -220$
 $e - u = 175$

Objective 4: The student will formulate and use linear equations and inequalities.

A(c)(3) The student formulates equations and inequalities based on linear functions, uses a variety of methods to solve them, and analyzes the solutions in terms of the situation.

(B) The student investigates methods for solving linear equations and inequalities using [concrete] models, graphs, and the properties of equality, selects a method, and solves the equations and inequalities.

60 Ms. Barton determined that the total cost of her wedding, c , could be represented by the equation $c = 75n + 1500$, where n is the number of people attending the wedding. If Ms. Barton's wedding cost \$8625, how many people attended the wedding?

- F** 135
- G** 95
- H** 115
- J** 75

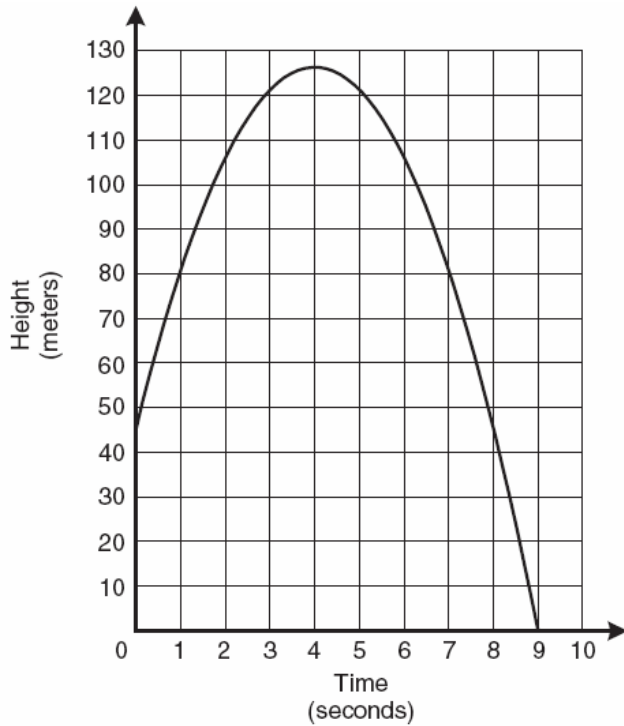
Grade 11-2004

Objective 5: The student will demonstrate an understanding of quadratic and other nonlinear functions.

A(d)(1) **Quadratic and other nonlinear functions.** The student understands that the graphs of quadratic functions are affected by the parameters of the function and can interpret and describe the effects of changes in the parameters of quadratic functions.

(D) For problem situations, the student analyzes graphs of quadratic functions and draws conclusions.

4 The graph below shows the height of a baseball from the time it is thrown from the top of a building to the time it hits the ground.



How much time elapses while the baseball is 80 meters or more above the ground?

- F** 1 sec
- G** 9 sec
- H** 7 sec
- J** 6 sec

Grade 11-2004

Objective 5: The student will demonstrate an understanding of quadratic and other nonlinear functions.

A(d)(2) **Quadratic and other nonlinear functions.** The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods.

(A) The student solves quadratic equations using [concrete] models, tables, graphs, and algebraic methods.

37 The completion of a certain chemical reaction is expressed by the equation $y = 250 - 5x - x^2$, where y is the number of seconds needed to complete the reaction and x is the temperature in degrees Celsius at which the reaction occurs. If the reaction is complete in 200 seconds, what is the temperature at which the reaction occurs?

- A 5°C
- B 7°C
- C 10°C
- D 12°C

Objective 5: The student will demonstrate an understanding of quadratic and other nonlinear functions

A(d)(2) **Quadratic and other nonlinear functions.** The student understands there is more than one way to solve a quadratic equation and solves them using appropriate methods.

(B) The student relates the solutions of quadratic equations to the roots of their functions.

42 Which ordered pair represents one of the roots of the function $f(x) = 2x^2 + 3x - 20$?

- F $(-5/2, 0)$
- G $(-4, 0)$
- H $(-5, 0)$
- J $(-20, 0)$

Objective 5: The student will demonstrate an understanding of quadratic and other nonlinear functions

A(d)(3) **Quadratic and other nonlinear functions.** The student understands there are situations modeled by functions that are neither linear nor quadratic and models the situations.

(A) The student uses [patterns to generate] the laws of exponents and applies them in problemsolving situations.

54 The area of a rectangle is $144j^9k^{15}$ square units. If the width of the rectangle is $8j^4k^5$ units, what is the rectangle's length?

- F $1152j^{13}k^{20}$ units
- G $152j^{13}k^{20}$ units
- H $136j^5k^{10}$ units
- J $18j^5k^{10}$ units

Grade 11-2004

Objective 5: The student will demonstrate an understanding of quadratic and other nonlinear functions.

A(d)(1) **Quadratic and other nonlinear functions.** The student understands that the graphs of quadratic functions are affected by the parameters of the function and can interpret and describe the effects of changes in the parameters of quadratic functions.

B) The student investigates, describes, and predicts the effects of changes in on the graph of $y=ax^2$.

59 Which equation will produce the widest parabola when graphed?

- A** $y = 2x^2$
- B** $y = -6x^2$
- C** $y = -0.6x^2$
- D** $y = 0.2x^2$

Grade 11-2004

Objective 6: The student will demonstrate an understanding of geometric relationships and spatial reasoning.

G(c)(1) **Geometric patterns.** The student identifies, analyzes, and describes patterns that emerge from two- and three-dimensional geometric figures.

(A) The student uses numeric and geometric patterns to make generalizations about geometric properties, including properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles.

5 Use the table to determine the expression that best represents the number of diagonals of any convex polygon having n sides.

Polygon	Number of Sides	Number of Diagonals
Triangle	3	0
Quadrilateral	4	2
Pentagon	5	5
Hexagon	6	9
Heptagon	7	14
Octagon	8	20

A $n - 3$

B $\frac{n - 3}{2}$

C $\frac{n(n - 3)}{2}$

D $n(n - 3)$

Objective 6: The student will demonstrate an understanding of geometric relationships and spatial reasoning.

G(b)(4) **Geometric structure.** The student uses a variety of representations to describe geometric relationships and solve problems.

(A) The student selects an appropriate representation ([concrete,] pictorial, graphical, verbal, or symbolic) in order to solve problems.

7 Doris had a circular garden with a radius of 30 feet. She used all of the fencing from the circular garden to enclose a square garden. The length of each side of Doris's square garden was approximately —

- A 47 feet
- B 94 feet
- C 120 feet
- D 188 feet

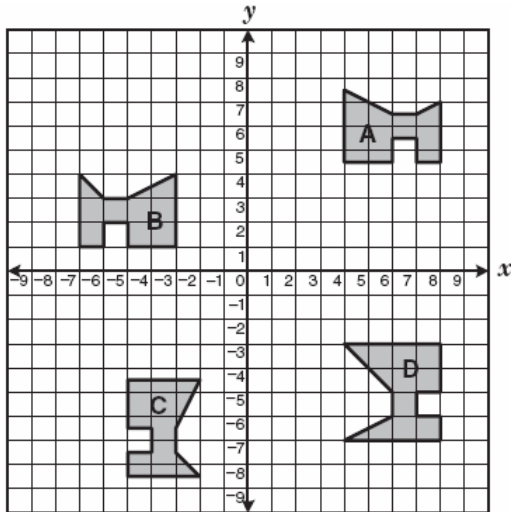
Grade 11-2004

Objective 6: The student will demonstrate an understanding of geometric relationships and spatial reasoning.

G(e)(3) Congruence and the geometry of size. The student applies the concept of congruence to justify properties of figures and solve problems.

(A) The student uses congruence transformations to make conjectures and justify properties of geometric figures.

10 Which pair of the following polygons is congruent?



- F** Polygon A and Polygon C
- G** Polygon B and Polygon D
- H** Polygon A and Polygon B
- J** Polygon B and Polygon C

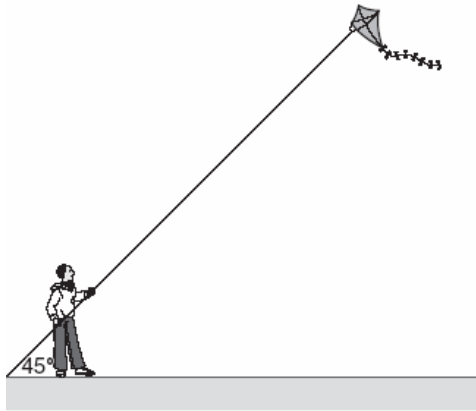
Grade 11-2004

Objective 6: The student will demonstrate an understanding of geometric relationships and spatial reasoning.

G(c)(1) **Geometric patterns.** The student identifies, analyzes, and describes patterns that emerge from two- and three-dimensional geometric figures.

(C) The student identifies and applies patterns from right triangles to solve problems, including special right triangles (45-45-90 and 30-60-90) and triangles whose sides are Pythagorean triples.

12 A kite string is 220 feet long from the kite to the ground. The string makes a 45° angle with the ground.



About how high off the ground is the kite?

- F** 110 ft
- G** 127 ft
- H** 156 ft
- J** 311 ft

Objective 6: The student will demonstrate an understanding of geometric relationships and spatial reasoning.

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(C) The student identifies and applies patterns from right triangles to solve problems, including special right triangles (45-45-90 and 30-60-90) and triangles whose sides are Pythagorean triples.

19 Megan is using an equilateral triangle as part of a design on a sweatshirt. Each side of the triangle is 12 inches long. Megan is sewing a line of sequins from the midpoint of one side of this triangle to the opposite vertex. Approximately how long will the line of sequins be?

- A** 13.4 in.
- B** 10.4 in.
- C** 8.5 in.
- D** 5.2 in.

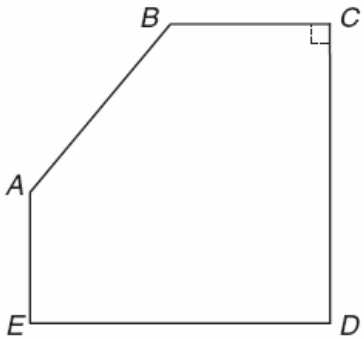
Grade 11-2004

Objective 6: The student will demonstrate an understanding of geometric relationships and spatial reasoning.

G(c)(1) **Geometric patterns.** The student identifies, analyzes, and describes patterns that emerge from two- and three-dimensional geometric figures.

(A) The student uses numeric and geometric patterns to make generalizations about geometric properties, including properties of polygons, ratios in similar figures and solids, and angle relationships in polygons and circles.

21 In the figure shown below, BC is parallel to ED , and AE is perpendicular to ED . The measure of $\angle ABC$ is 130° .



What is the measure of $\angle BAE$ in degrees?

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

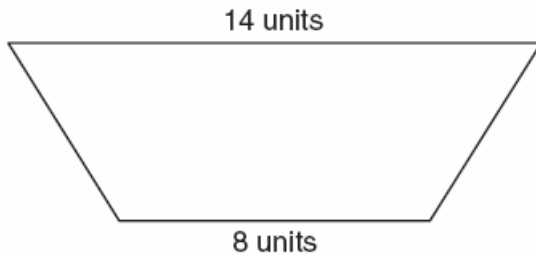
Grade 11-2004

Objective 6: The student will demonstrate an understanding of geometric relationships and spatial reasoning.

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(C) The student identifies and applies patterns from right triangles to solve problems, including special right triangles (45-45-90 and 30-60-90) and triangles whose sides are Pythagorean triples.

46 The lengths of the bases of an isosceles trapezoid are shown below.



If the perimeter of this trapezoid is 32 units, what is its area?

- F** 44 square units
- G** 110 square units
- H** 88 square units
- J** 55 square units

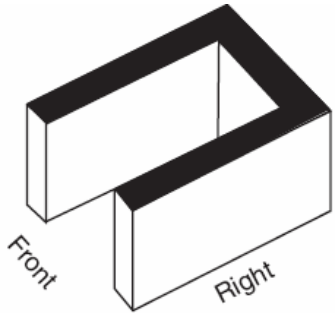
Grade 11-2004

Objective 7: The student will demonstrate an understanding of two- and three-dimensional representations of geometric relationships and shapes.

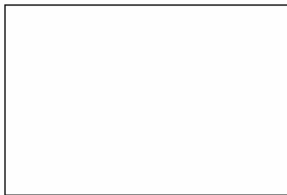
G(d)(1) Dimensionality and the geometry of location. The student analyzes the relationship between three-dimensional objects and related two-dimensional representations and uses these representations to solve problems.

(C) The student uses top, front, side, and corner views of three-dimensional objects to create accurate and complete representations and solve problems.

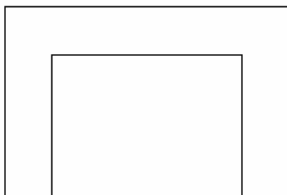
15 Which of the following best represents the front view of the solid shown below?



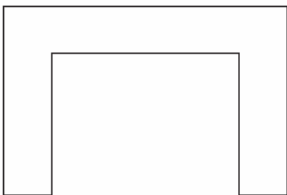
A



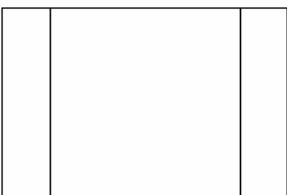
B



C



D



Grade 11-2004

Objective 7: The student will demonstrate an understanding of two- and three-dimensional representations of geometric relationships and shapes.

G(d)(2) Dimensionality and the geometry of location. The student understands that coordinate systems provide convenient and efficient ways of representing geometric figures and uses them accordingly.

(B) The student uses slopes and equations of lines to investigate geometric relationships, including parallel lines, perpendicular lines, and [special segments of] triangles and other polygons.

16 Which of the following best describes the graph of the equations below?

$$2y = 3x + 2$$

$$4y = 6x + 1$$

- F** The lines have the same y -intercept.
- G** The lines have the same x -intercept.
- H** The lines are perpendicular.
- J** The lines are parallel.

Objective 7: The student will demonstrate an understanding of two- and three-dimensional representations of geometric relationships and shapes

G(e)(2) Congruence and the geometry of size. The student analyzes properties and describes relationships in geometric figures.

(D) The student analyzes the characteristics of three-dimensional figures and their component parts.

24 Which two 3-dimensional figures have the same number of faces?

- F** A triangular prism and a square pyramid
- G** A triangular prism and a rectangular prism
- H** A triangular pyramid and a square pyramid
- J** A triangular pyramid and a rectangular prism

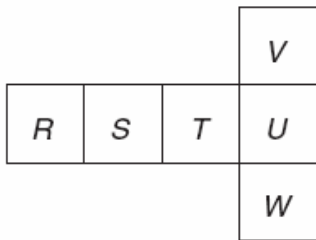
Grade 11-2004

Objective 7: The student will demonstrate an understanding of two- and three-dimensional representations of geometric relationships and shapes

G(d)(1) Dimensionality and the geometry of location. The student analyzes the relationship between three-dimensional objects and related two-dimensional representations and uses these representations to solve problems.

(B) The student uses nets to represent [and construct] three-dimensional objects.

38 Which of the following is a true statement about the net of the cube shown?



- F** Faces *R* and *S* are parallel.
- G** Faces *R* and *U* are parallel.
- H** Faces *S* and *U* are perpendicular.
- J** Faces *T* and *U* are perpendicular.

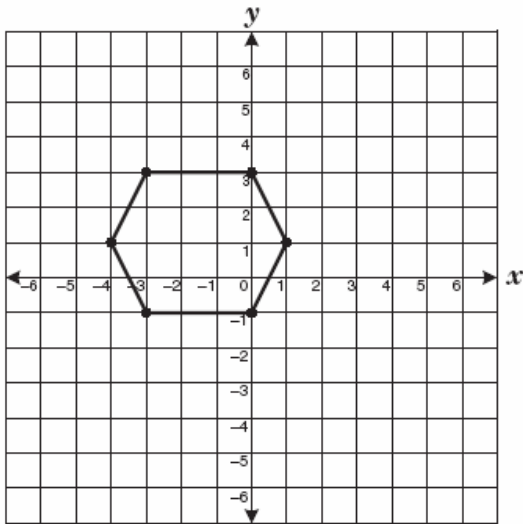
Grade 11-2004

Objective 7: The student will demonstrate an understanding of two- and three-dimensional representations of geometric relationships and shapes.

G(d)(2) Dimensionality and the geometry of location. The student understands that coordinate systems provide convenient and efficient ways of representing geometric figures and uses them accordingly.

(A) The student uses one- and two-dimensional coordinate systems to represent points, lines, line segments, and figures.

50 A hexagon is graphed on the coordinate grid.



Which two coordinate points lie on the same line of symmetry on this hexagon?

- F** $(-3, -1)$ and $(0, 3)$
- G** $(-1, 3)$ and $(-1, -1)$
- H** $(0, 3)$ and $(0, -1)$
- J** $(-4, 1)$ and $(1, 1)$

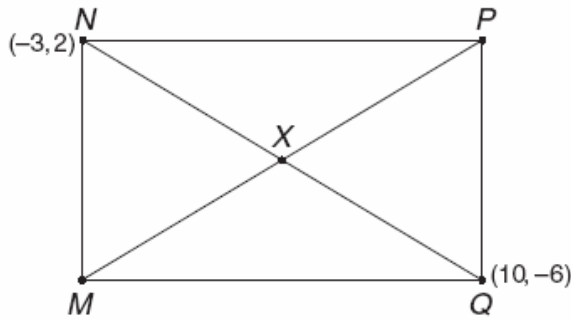
Grade 11-2004

Objective 7: The student will demonstrate an understanding of two- and three-dimensional representations of geometric relationships and shapes.

G(d)(2) Dimensionality and the geometry of location. The student understands that coordinate systems provide convenient and efficient ways of representing geometric figures and uses them accordingly.

(C) The student [develops and] uses formulas including distance and midpoint.

56 Rectangle $MNPQ$ has diagonals that intersect at point X .



Which of the following represents point X ?

F $(\frac{7}{2}, -2)$

G $(\frac{13}{2}, 4)$

H $(-\frac{13}{2}, -4)$

J $(-\frac{7}{2}, 2)$

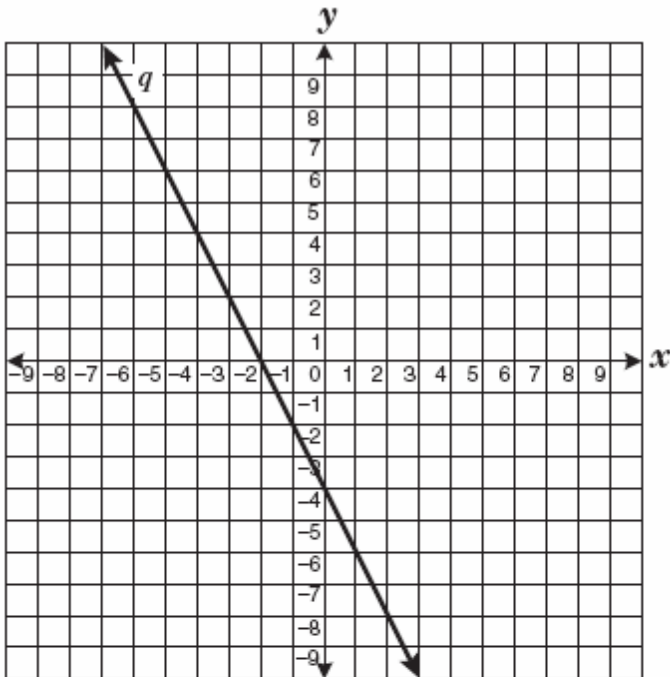
Grade 11-2004

Objective 7: The student will demonstrate an understanding of two- and three-dimensional representations of geometric relationships and shapes.

G(d)(2) Dimensionality and the geometry of location. The student understands that coordinate systems provide convenient and efficient ways of representing geometric figures and uses them accordingly.

(B) The student uses slopes and equations of lines to investigate geometric relationships, including parallel lines, perpendicular lines, and [special segments of] triangles and other polygons.

57 Line q is shown below.



Which equation best represents a line parallel to line q ?

A $y = -\frac{1}{2}x + 4$

B $y = \frac{1}{2}x - 3$

C $y = 2x - 5$

D $y = -2x + 1$

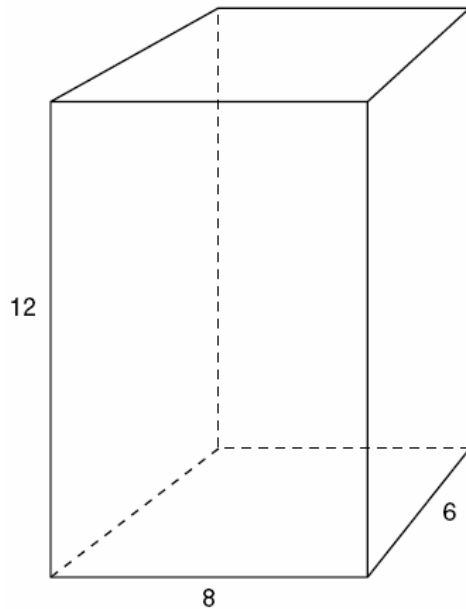
Grade 11-2004

Objective 8: The student will demonstrate an understanding of the concepts and uses of measurement and similarity.

G(f)(1) Similarity and the geometry of shape. The student applies the concepts of similarity to justify properties of figures and solve problems.

(A) The student uses similarity properties and transformations to [explore and] justify conjectures about geometric figures.

6 Which set of dimensions corresponds to a rectangular prism similar to the one shown below?



- F** 2 units by 3 units by 4 units
- G** 4 units by 2 units by 8 units
- H** 2 units by 1 unit by 6 units
- J** 4 units by 3 units by 6 units

Grade 11-2004

Objective 8: The student will demonstrate an understanding of the concepts and uses of measurement and similarity.

G(f)(1) Similarity and the geometry of shape. The student applies the concepts of similarity to justify properties of figures and solve problems.

(B) The student uses ratios to solve problems involving similar figures.

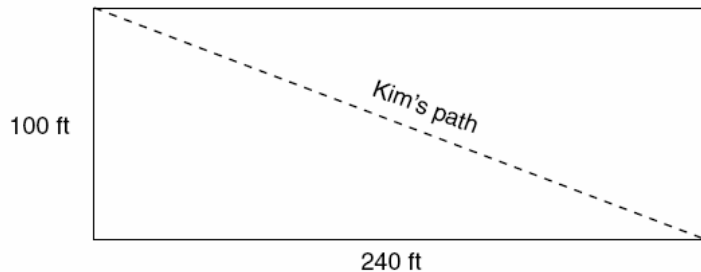
23 A rectangle has a length of 4 feet and a perimeter of 14 feet. What is the perimeter of a similar rectangle with a width of 9 feet?

- A** 36 ft
- B** 42 ft
- C** 108 ft
- D** 126 ft

G(e)(1) Congruence and the geometry of size. The student extends measurement concepts to find area, perimeter, and volume in problem situations.

(C) The student [develops, extends and] uses the Pythagorean Theorem.

25 Kim walked diagonally across a rectangular field that measured 100 feet by 240 feet.



Which expression could be used to determine how far Kim walked?

- A** $2(100 + 240)$
- B** $\sqrt{100} + \sqrt{240}$
- C** $\frac{100 \times 240}{2}$
- D** $\sqrt{(100^2) + (240^2)}$

Grade 11-2004

Objective 8: The student will demonstrate an understanding of the concepts and uses of measurement and similarity.

G(f)(1) **Similarity and the geometry of shape.** The student applies the concepts of similarity to justify properties of figures and solve problems.

(D) The student describes the effect on perimeter, area, and volume when length, width, or height of a three-dimensional solid is changed and applies this idea in solving problems.

26 If the surface area of a cube is increased by a factor of 4, what is the change in the length of the sides of the cube?

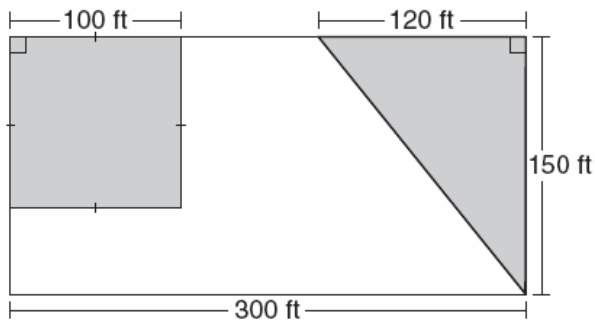
- F** The length is 2 times the original length.
- G** The length is 4 times the original length.
- H** The length is 6 times the original length.
- J** The length is 8 times the original length.

Objective 8: The student will demonstrate an understanding of the concepts and uses of measurement and similarity.

G(e)(1) **Congruence and the geometry of size.** The student extends measurement concepts to find area, perimeter, and volume in problem situations.

(A) The student finds area of polygons and composite figures.

43 What is the area of the unshaded part of the rectangle below?



- A** 19,000 ft²
- B** 45,000 ft²
- C** 28,000 ft²
- D** 26,000 ft²

Grade 11-2004

Objective 8: The student will demonstrate an understanding of the concepts and uses of measurement and similarity.

G(e)(1) Congruence and the geometry of size. The student extends measurement concepts to find area, perimeter, and volume in problem situations.

(C) The student [develops, extends and] uses the Pythagorean Theorem.

51 About how many feet of fencing are needed to enclose a rectangular garden with a 30-foot-long side and a 40-foot-long diagonal?

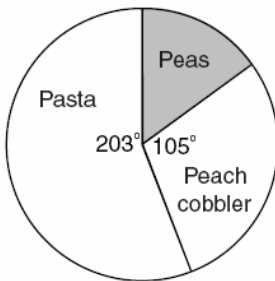
- A** 113 ft
- B** 133 ft
- C** 140 ft
- D** 160 ft

Objective 8: The student will demonstrate an understanding of the concepts and uses of measurement and similarity.

G(e)(1) Congruence and the geometry of size. The student extends measurement concepts to find area, perimeter, and volume in problem situations.

(B) The student finds areas of sectors and arc lengths of circles using proportional reasoning.

52 A frozen dinner is divided into 3 sections on a circular plate with a 12-inch diameter.



What is the approximate length of the arc of the section containing peas?

- F** 3 in.
- G** 21 in.
- H** 16 in.
- J** 5 in.

Grade 11-2004

Objective 9: The student will demonstrate an understanding of percents, proportional relationships, probability, and statistics in application problems.

(8.11) The student applies concepts of theoretical and experimental probability to make predictions. The student is expected to

(A) find the probabilities of compound events (dependent and independent)

2 In a high school auditorium, 1 junior and 2 sophomores are seated randomly together in a row. What is the probability that the 2 sophomores are seated next to each other?

- F** $\frac{1}{9}$
- G** $\frac{1}{3}$
- H** $\frac{2}{3}$
- J** $\frac{5}{6}$

Objective 9: The student will demonstrate an understanding of percents, proportional relationships, probability, and statistics in application problems.

(8.11) **Probability and statistics.** The student applies the concepts of theoretical and experimental probability to make predictions. The student is expected to

(A) find the probabilities of compound events (dependent and independent)

14 Jamal has a game with 2 groups of tiles. The first group of 26 tiles is labeled with all the letters of the alphabet. The second group of 10 tiles is numbered 0 through 9. If Jamal draws 1 letter tile and 1 number tile at random, what is the probability that he will draw a letter in his name and an odd number?

- F** $\frac{1}{13}$
- G** $\frac{5}{52}$
- H** $\frac{1}{4}$
- J** $\frac{7}{26}$

Objective 9: The student will demonstrate an understanding of percents, proportional relationships, probability, and statistics in application problems

(8.3) **Patterns, relationships, and algebraic thinking.** The student identifies proportional relationships in problem situations and solves problems. The student is expected to

(B) estimate and find solutions to application problems involving percents and proportional relationships such as similarity and rates.

35 Two race cars travel at constant speeds in the same direction around a track. The faster car travels 186 miles per hour and completes 50 laps each time the slower car completes 47.6 laps. Which is a reasonable estimate of the slower driver's speed?

- A** Between 180 mph and 185 mph
- B** Between 175 mph and 180 mph
- C** Between 145 mph and 150 mph
- D** Between 135 mph and 140 mph

Grade 11-2004

Objective 9: The student will demonstrate an understanding of percents, proportional relationships, probability, and statistics in application problems.

(8.3) **Patterns, relationships, and algebraic thinking.** The student identifies proportional relationships in problem situations and solves problems. The student is expected to

(B) estimate and find solutions to application problems involving percents and proportional relationships such as similarity and rates.

39 Amber is making a patchwork quilt using 3 different types of fabric. Each type of fabric is cut into rectangles. The first fabric is cut into pieces measuring 3 inches by 5 inches. The dimensions of the rectangles of the second type of fabric are 125% those of the first type, and the dimensions of the third type of fabric are 125% those of the second. What are the approximate dimensions of the third type of fabric?

- A** 3.75 in. by 6.25 in.
- B** 4.69 in. by 7.81 in.
- C** 5.50 in. by 7.50 in.
- D** 4.25 in. by 6.25 in.

Objective 9: The student will demonstrate an understanding of percents, proportional relationships, probability, and statistics in application problems.

(8.13) **Probability and statistics.** The student evaluates predictions and conclusions based on statistical data. The student is expected to

(B) recognize misuses of graphical or numerical information and evaluate predictions and conclusions based on data analysis.

49 The table below shows the cost of fertilizer, depending on the amount purchased.

Cost of Fertilizer

Number of Pounds	Cost
5	\$1.95
20	\$6.95
50	\$15.95
100	\$28.95

Which conclusion can be made based on information in the table?

- A** The cost of 10 pounds of fertilizer would be more than \$4.00.
- B** The cost of 200 pounds of fertilizer would be less than \$57.00.
- C** The cost of fertilizer is always more than \$0.35 per pound.
- D** The cost of fertilizer is always less than \$0.30 per pound.

Grade 11-2004

Objective 10: The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.

(8.14) **Underlying processes and mathematical tools.** The student applies Grade 8 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to

(C) select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem.

9 How many 2-inch cubes can be placed completely inside a box that is 8 inches long, 2 inches wide, and 6 inches tall?

- A 8
- B 12
- C 24
- D 48

Objective 10: The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.

(8.16) **Underlying processes and mathematical tools.** The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to

(B) validate his/her conclusions using mathematical properties and relationships.

18 Given: Two angles are supplementary. The measure of one angle is 20° more than the measure of the other angle.

Conclusion: The measures of the angles are 70° and 90° .

This conclusion —

- F is contradicted by the first statement given
- G is verified by the first statement given
- H invalidates itself because a 90° angle cannot be supplementary to another
- J verifies itself because 90° is 20° more than 70°

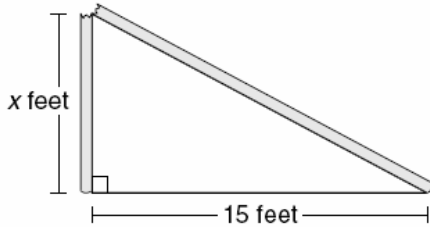
Grade 11-2004

Objective 10: The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.

(8.14) **Underlying processes and mathematical tools.** The student applies Grade 8 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to

(B) validate his/her conclusions using mathematical properties and relationships.

22 A wooden pole was broken during a windstorm. Before it broke, the total height of the pole above the ground was 25 feet. After it broke, the top of the pole touched the ground 15 feet from the base.



How tall was the part of the pole that was left standing?

- F** 8 ft
- G** 10 ft
- H** 17 ft
- J** 20 ft

Objective 10: The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.

(8.14) **Underlying processes and mathematical tools.** The student applies Grade 8 mathematics to solve problems connected to everyday experiences, investigations in other disciplines, and activities in and outside of school. The student is expected to

(C) select or develop an appropriate problem-solving strategy from a variety of different types, including drawing a picture, looking for a pattern, systematic guessing and checking, acting it out, making a table, working a simpler problem, or working backwards to solve a problem.

28 Marsha brought cookies to school. She gave a third of her cookies to Ana. Ana then gave a fourth of her cookies to Cybil. Cybil gave half of her cookies to Betsy. If Betsy has 2 cookies, how many cookies did Marsha have in the beginning?

- F** 18
- G** 24
- H** 36
- J** 48

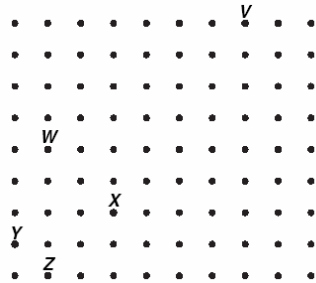
Grade 11-2004

Objective 10: The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.

(8.15) **Underlying processes and mathematical tools.** The student communicates about Grade 8 mathematics through informal and mathematical language, representations, and models. The student is expected to

(A) communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical models.

30 As part of a classroom assignment, Kimberly was given this geoboard to model the slope of $\frac{2}{3}$.



If the peg in the lower left-hand corner represents the origin on a coordinate plane, where could Kimberly place a rubber band to represent the given slope?

- F** From peg *V* to peg *W*
- G** From peg *V* to peg *X*
- H** From peg *V* to peg *Y*
- J** From peg *V* to peg *Z*

Objective 10: The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.

(8.15) **Underlying processes and mathematical tools.** The student communicates about Grade 8 mathematics through informal and mathematical language, representations, and models. The student is expected to

(A) communicate mathematical ideas using language, efficient tools, appropriate units, and graphical, numerical, physical, or algebraic mathematical models.

32 Chase wanted to find 3 consecutive whole numbers that add up to 81. He wrote the equation $(n - 1) + n + (n + 1) = 81$. What does the variable n represent in the equation?

- F** The least of the 3 whole numbers
- G** The middle of the 3 whole numbers
- H** The greatest of the 3 whole numbers
- J** The difference between the least and greatest of the 3 whole numbers

Grade 11-2004

Objective 10: The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.

(8.16) **Underlying processes and mathematical tools.** The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to

(A) make conjectures from patterns or sets of examples and nonexamples;

33 A leap year occurs when the number of a year is a multiple of 4. However, year numbers that are multiples of 100 are not leap years unless they are multiples of 400. Which is not an example of a leap year?

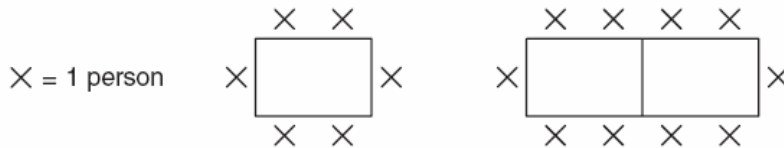
- A** 2440
- B** 2400
- C** 2340
- D** 2300

Objective 10: The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.

(8.16) **Underlying processes and mathematical tools.** The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to

(A) make conjectures from patterns or sets of examples and nonexamples

36 For a sports banquet Coach Mackey must use the rectangular tables in the school cafeteria. The diagram below shows the seating arrangements that Coach Mackey can use at 1 and 2 tables.



Which expression can be used to determine the number of people who can sit as a group if y tables are joined to form 1 long table?

- F** $6y$
- G** $4(y + 1)$
- H** $3(y + 1)$
- J** $2(2y + 1)$

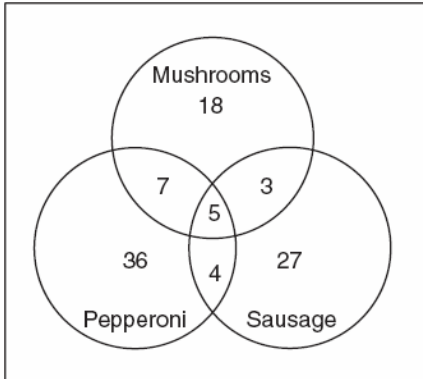
Grade 11-2004

Objective 10: The student will demonstrate an understanding of the mathematical processes and tools used in problem solving.

(8.16) **Underlying processes and mathematical tools.** The student uses logical reasoning to make conjectures and verify conclusions. The student is expected to

(A) make conjectures from patterns or sets of examples and nonexamples

58 A pizza parlor surveyed 100 customers to determine their favorite pizza topping or combination of toppings. The results are shown below.



How many of the customers surveyed picked a combination of only 2 toppings as their favorite?

- F** 5
- G** 7
- H** 14
- J** 19

**Grade: 11 Subject: Mathematic
Administration: April 2004**

Item Number	Correct Answer	Objective Measured	Student Expectations
01	A	01	A.B1 (C)
02	H	09	8.11 (A)
03	D	01	A.B1 (E)
04	J	05	A.D1 (D)
05	C	06	G.C1 (A)
06	J	08	G.F1 (A)
07	A	06	G.B4 (A)
08	J	03	A.C2 (E)
09	B	10	8.14 (C)
10	J	06	G.E3 (A)
11	D	02	A.B3 (A)
12	H	06	G.C1 (C)
13	D	03	A.C2 (A)
14	F	09	8.11 (A)
15	D	07	G.D1 (C)
16	J	07	G.D2 (B)
17	A	03	A.C2 (C)
18	F	10	8.16 (B)
19	B	06	G.C1 (C)
20	H	01	A.B1 (D)
21	140	06	G.C1 (A)
22	F	10	8.14 (B)
23	B	08	G.F1 (B)
24	F	07	G.E2 (D)
25	D	08	G.E1 (C)
26	F	08	G.F1 (D)
27	B	02	A.B2 (B)
28	J	10	8.14 (C)
29	C	04	A.C4 (B)
30	F	10	8.15 (A)
31	D	01	A.B1 (B)
32	G	10	8.15 (A)
33	D	10	8.16 (A)
34	H	02	A.B2 (A)
35	B	09	8.3 (B)
36	J	10	8.16 (A)
37	A	05	A.D2 (A)
38	J	07	G.D1 (B)
39	B	09	8.3 (B)
40	H	04	A.C4 (A)
41	A	02	A.B4 (B)
42	G	05	A.D2 (B)
43	D	08	G.E1 (A)
44	F	03	A.C2 (D)
45	D	03	A.C2 (G)
46	F	06	G.C1 (C)
47	D	02	A.B2 (C)
48	H	04	A.C3 (C)
49	B	09	8.13 (B)
50	J	07	G.D2 (A)
51	A	08	G.E1 (C)
52	J	08	G.E1 (B)
53	D	04	A.C4 (A)
54	J	05	A.D3 (A)
55	B	01	A.B1 (A)
56	F	07	G.D2 (C)
57	D	07	G.D2 (B)
58	H	10	8.16 (A)
59	D	05	A.D1 (B)
60	G	04	A.C3 (B)