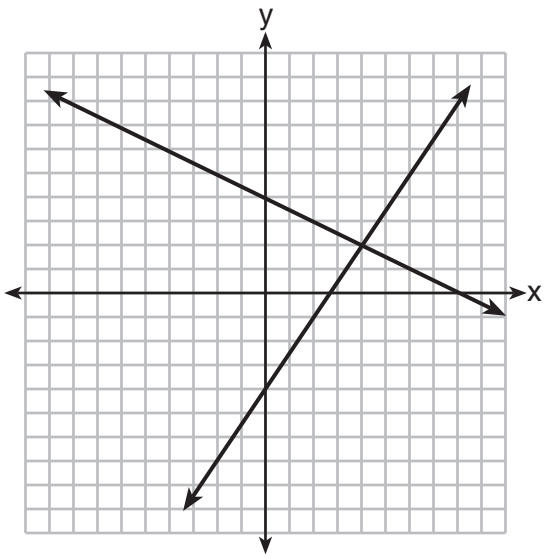
Part I

Answer all 30 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Record your answers on your separate answer sheet. [60]

Use this space for computations.

1 A system of equations is graphed on the set of axes below.



The solution of this system is

(1) (0,4)
(2) (2,4)
(3) (4,2)
(4) (8,0)

2 A cell phone can receive 120 messages per minute. At this rate, how many messages can the phone receive in 150 seconds?

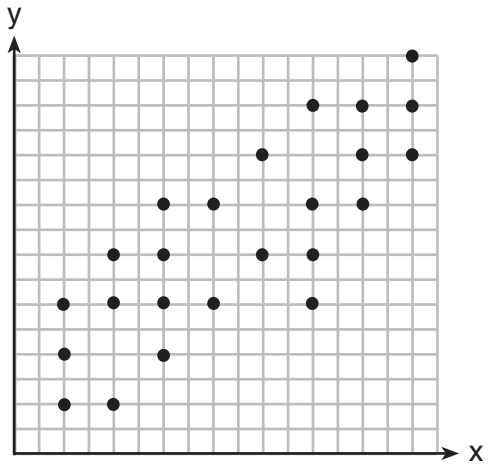
(1) 48
(2) 75
(3) 300
(4) 18,000

3 The value of y in the equation $0.06y + 200 = 0.03y + 350$ is

(1) 500
(2) $1{,}666.\overline{6}$
(3) 5,000
(4) $18{,}333.\overline{3}$

Use this space for computations.

4 The scatter plot shown below represents a relationship between x and y.



This type of relationship is

(1) a positive correlation
(2) a negative correlation
(3) a zero correlation
(4) not able to be determined

5 The sum of $3x^2 + 5x - 6$ and $-x^2 + 3x + 9$ is

(1) $2x^2 + 8x - 15$
(2) $2x^2 + 8x + 3$
(3) $2x^4 + 8x^2 + 3$
(4) $4x^2 + 2x - 15$

6 Jason's part-time job pays him \$155 a week. If he has already saved \$375, what is the minimum number of weeks he needs to work in order to have enough money to buy a dirt bike for \$900?

(1) 8
(2) 9
(3) 3
(4) 4

Use this space for computations.

7 The expression $9a^2 - 64b^2$ is equivalent to

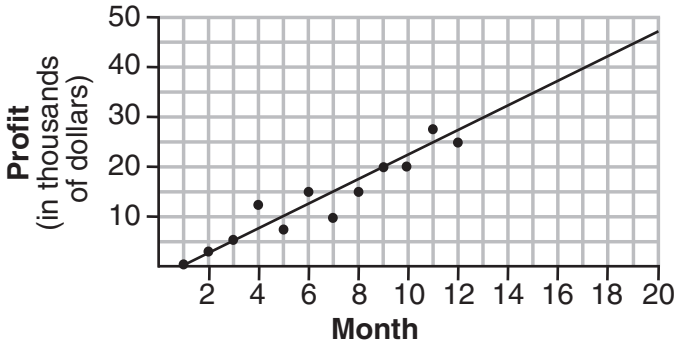
(1) $(9a - 8b)(a + 8b)$

(2) $(9a - 8b)(a - 8b)$

(3) $(3a - 8b)(3a + 8b)$

(4) $(3a - 8b)(3a - 8b)$

8 The scatter plot below shows the profit, by month, for a new company for the first year of operation. Kate drew a line of best fit, as shown in the diagram.



Using this line, what is the best estimate for profit in the 18th month?

(1) \$35,000

(2) \$37,750

(3) \$42,500

(4) \$45,000

9 Which statement illustrates the additive identity property?

(1) $6 + 0 = 6$

(2) $-6 + 6 = 0$

(3) $4(6 + 3) = 4(6) + 4(3)$

(4) $(4 + 6) + 3 = 4 + (6 + 3)$

Use this space for computations.

10 Peter walked 8,900 feet from home to school.

1 mile = 5,280 feet

How far, to the *nearest tenth of a mile*, did he walk?

(1) 0.5
(2) 0.6
(3) 1.6
(4) 1.7

11 Is the equation $A = 21000(1 - 0.12)^t$ a model of exponential growth or exponential decay, and what is the rate (percent) of change per time period?

(1) exponential growth and 12%
(2) exponential growth and 88%
(3) exponential decay and 12%
(4) exponential decay and 88%

12 The length of a rectangle is 15 and its width is w. The perimeter of the rectangle is, *at most,* 50. Which inequality can be used to find the longest possible width?

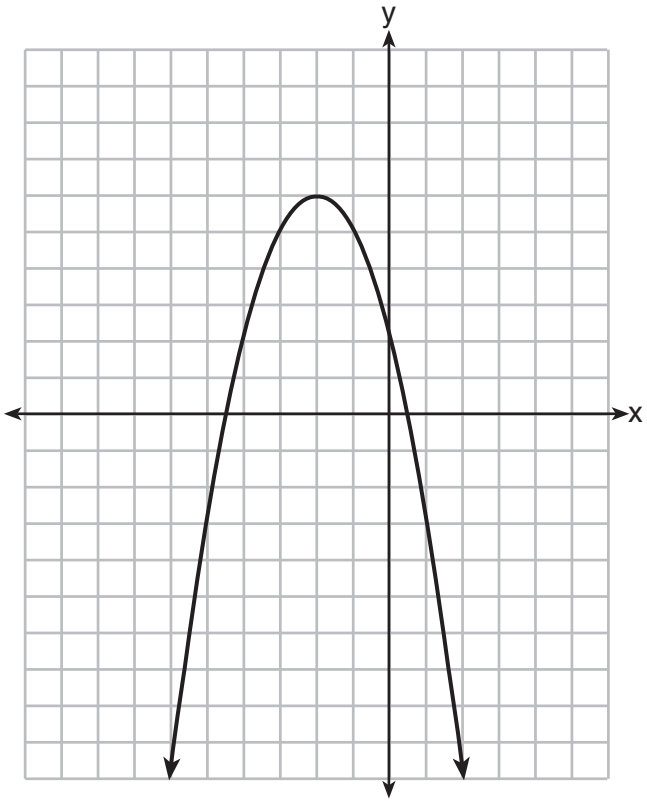
(1) $30 + 2w < 50$
(2) $30 + 2w \leq 50$
(3) $30 + 2w > 50$
(4) $30 + 2w \geq 50$

13 Craig sees an advertisement for a car in a newspaper. Which information would *not* be classified as quantitative?

(1) the cost of the car
(2) the car's mileage
(3) the model of the car
(4) the weight of the car

Use this space for computations.

14 What are the coordinates of the vertex and the equation of the axis of symmetry of the parabola shown in the graph below?



(1) (0,2) and $y = 2$

(2) (0,2) and $x = 2$

(3) $(-2,6)$ and $y = -2$

(4) $(-2,6)$ and $x = -2$

15 A correct translation of "six less than twice the value of x" is

(1) $2x < 6$

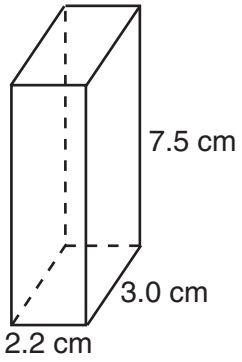
(2) $2x - 6$

(3) $6 < 2x$

(4) $6 - 2x$

Use this space for computations.

16 The rectangular prism shown below has a length of 3.0 cm, a width of 2.2 cm, and a height of 7.5 cm.



What is the surface area, in square centimeters?

(1) 45.6
(2) 49.5
(3) 78.0
(4) 91.2

17 Which set of coordinates is a solution of the equation $2x - y = 11$?

(1) $(-6,-1)$
(2) $(-1,9)$
(3) $(0,11)$
(4) $(2,-7)$

18 The graph of a parabola is represented by the equation $y = ax^2$ where a is a positive integer. If a is multiplied by 2, the new parabola will become

(1) narrower and open downward
(2) narrower and open upward
(3) wider and open downward
(4) wider and open upward

Use this space for computations.

19 Which equation represents a line that has a slope of $\frac{3}{4}$ and passes through the point (2,1)?

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

(2) $3y = 4x + 2$

(3) $4y = 3x - 2$

(4) $4y = 3x + 5$

20 What is the value of $\left|\frac{4(-6) + 18}{4!}\right|$?

(1) $\frac{1}{4}$

(2) $-\frac{1}{4}$

(3) 12

(4) -12

21 Given:

$A = \{1, 3, 5, 7, 9\}$

$B = \{2, 4, 6, 8, 10\}$

$C = \{2, 3, 5, 7\}$

$D = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

Which statement is *false*?

(1) $A \cup B \cup C = D$

(2) $A \cap B \cap C = \{\ \}$

(3) $A \cup C = \{1, 2, 3, 5, 7\}$

(4) $A \cap C = \{3, 5, 7\}$

22 Which expression is equivalent to $\frac{2x^6 - 18x^4 + 2x^2}{2x^2}$?

(1) $x^3 - 9x^2$

(2) $x^4 - 9x^2$

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

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

Use this space for computations.

23 In a given linear equation, the value of the independent variable decreases at a constant rate while the value of the dependent variable increases at a constant rate. The slope of this line is

(1) positive
(2) negative
(3) zero
(4) undefined

24 The volume of a cylindrical can is 32π cubic inches. If the height of the can is 2 inches, what is its radius, in inches?

(1) 8
(2) 2
(3) 16
(4) 4

25 The expression $\frac{14 + x}{x^2 - 4}$ is undefined when x is

(1) -14, only
(2) 2, only
(3) -2 or 2
(4) -14, -2, or 2

26 What is the solution of $\frac{2}{x + 1} = \frac{x + 1}{2}$?

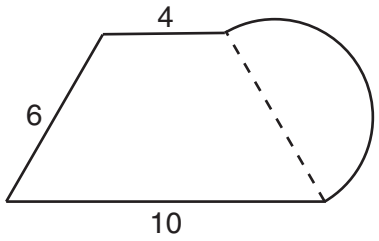
(1) -1 and -3
(2) -1 and 3
(3) 1 and -3
(4) 1 and 3

27 The total score in a football game was 72 points. The winning team scored 12 points more than the losing team. How many points did the winning team score?

(1) 30
(2) 42
(3) 54
(4) 60

Use this space for computations.

28 What is the perimeter of the figure shown below, which consists of an isosceles trapezoid and a semicircle?



(1) $20 + 3\pi$

(2) $20 + 6\pi$

(3) $26 + 3\pi$

(4) $26 + 6\pi$

29 The probability that it will rain tomorrow is $\frac{1}{2}$. The probability that our team will win tomorrow's basketball game is $\frac{3}{5}$. Which expression represents the probability that it will rain and that our team will *not* win the game?

(1) $\frac{1}{2} + \frac{3}{5}$

(2) $\frac{1}{2} + \frac{2}{5}$

(3) $\frac{1}{2} \times \frac{3}{5}$

(4) $\frac{1}{2} \times \frac{2}{5}$

30 The formula for the volume of a pyramid is $V = \frac{1}{3}Bh$. What is h expressed in terms of B and V?

(1) $h = \frac{1}{3}VB$

(2) $h = \frac{V}{3B}$

(3) $h = \frac{3V}{B}$

(4) $h = 3VB$

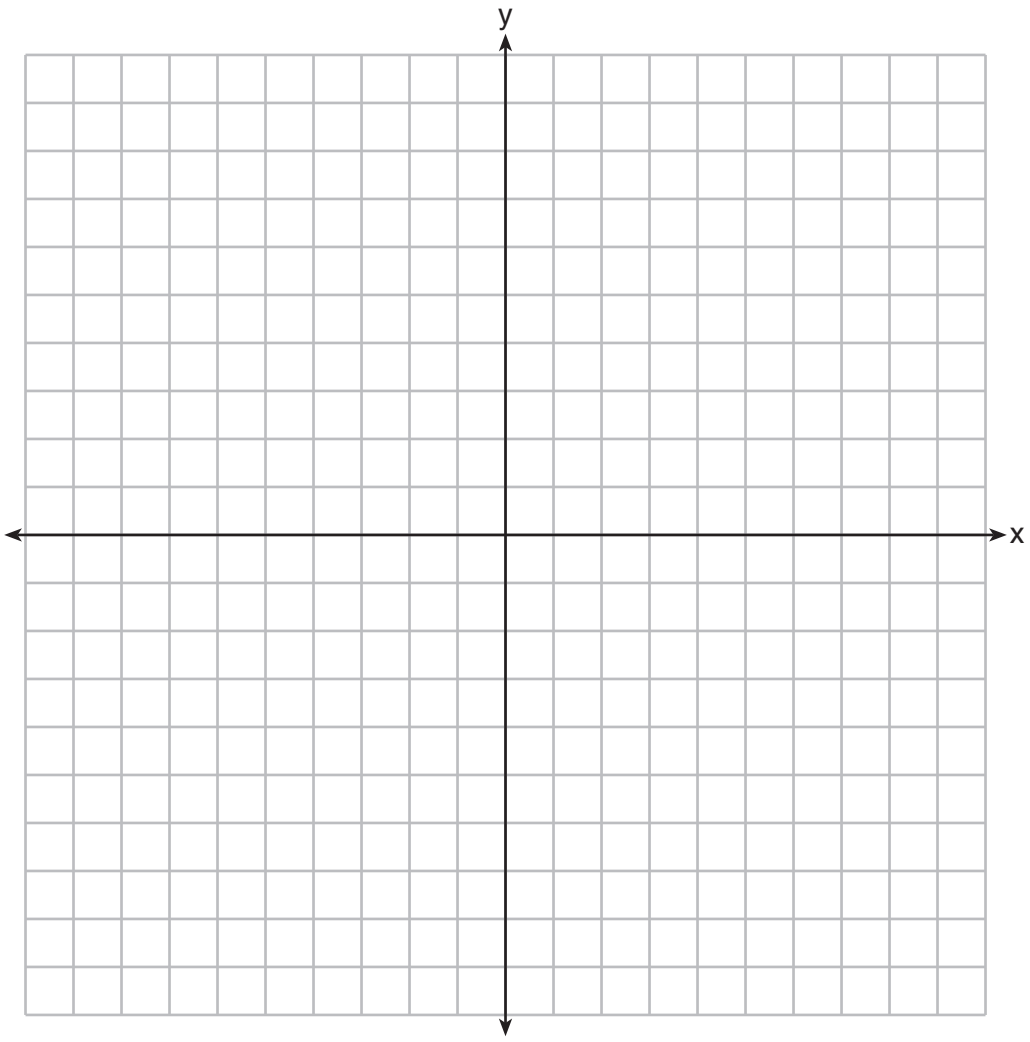
Part II

Answer all 3 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [6]

31 State the value of the expression $\frac{(4.1 \times 10^2)(2.4 \times 10^3)}{(1.5 \times 10^7)}$ in scientific notation.

32 Express the product of $\frac{x+2}{2}$ and $\frac{4x+20}{x^2+6x+8}$ in simplest form.

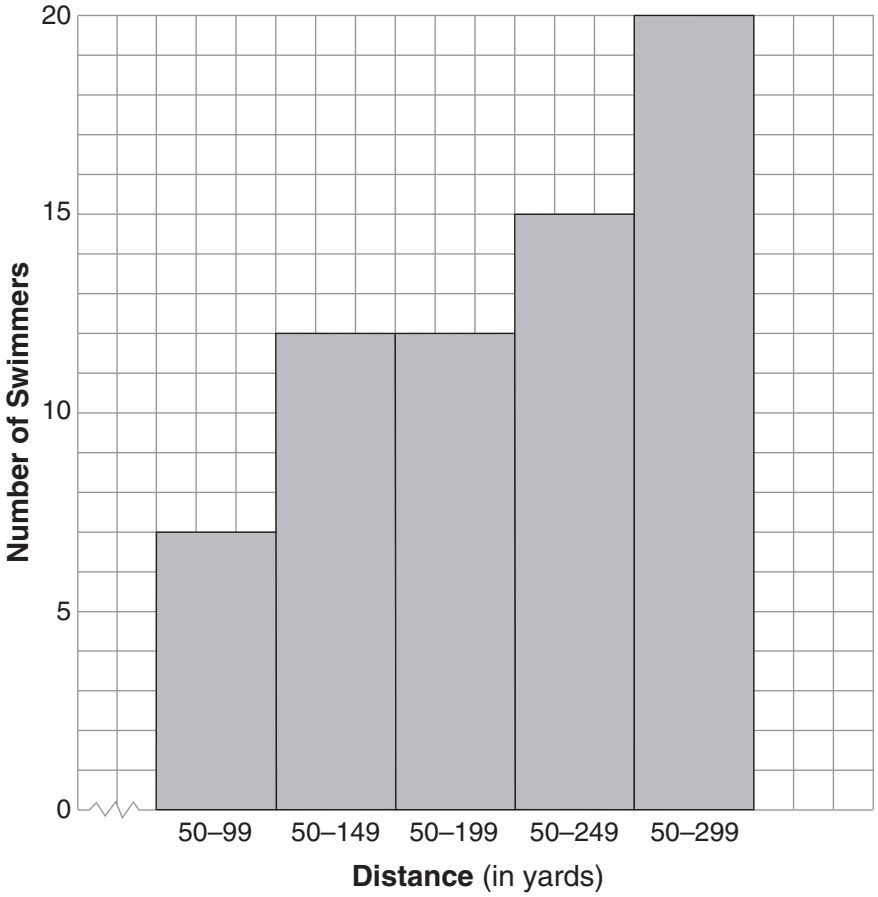
33 On the set of axes below, graph $y = 3^x$ over the interval $-1 \leq x \leq 2$.



Part III

Answer all 3 questions in this part. Each correct answer will receive 3 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [9]

34 The following cumulative frequency histogram shows the distances swimmers completed in a recent swim test.



Based on the cumulative frequency histogram, determine the number of swimmers who swam between 200 and 249 yards.

Determine the number of swimmers who swam between 150 and 199 yards.

Determine the number of swimmers who took the swim test.

35 Ashley measured the dimensions of a rectangular prism to be 6 cm by 10 cm by 1.5 cm. The actual dimensions are 5.9 cm by 10.3 cm by 1.7 cm. Determine the relative error, to the *nearest thousandth*, in calculating the volume of the prism.

36 Solve the following system of equations algebraically for *all* values of x and y.

$$y = x^2 + 2x - 8$$
$$y = 2x + 1$$

Part IV

Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [12]

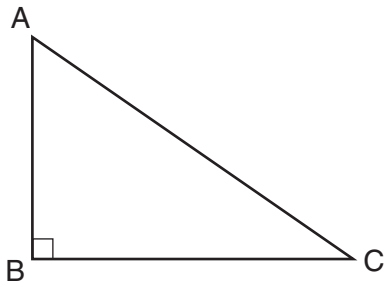
37 A company is running a contest and offering a first, second, and third prize. First prize is a choice of a car or $15,000 cash. Second prize is a choice of a motorbike, a trip to New York City, or $2,000 cash. Third prize is a choice of a television or $500 cash.

If each prize is equally likely to be selected, list the sample space or draw a tree diagram of *all* possible different outcomes of first, second, and third prizes.

Determine the number of ways that *all* three prizes selected could be cash.

Determine the number of ways that *none* of the three prizes selected could be cash.

38 In right triangle ABC shown below, $AC = 29$ inches, $AB = 17$ inches, and $m\angle ABC = 90$. Find the number of degrees in the measure of angle BAC, to the *nearest degree*.

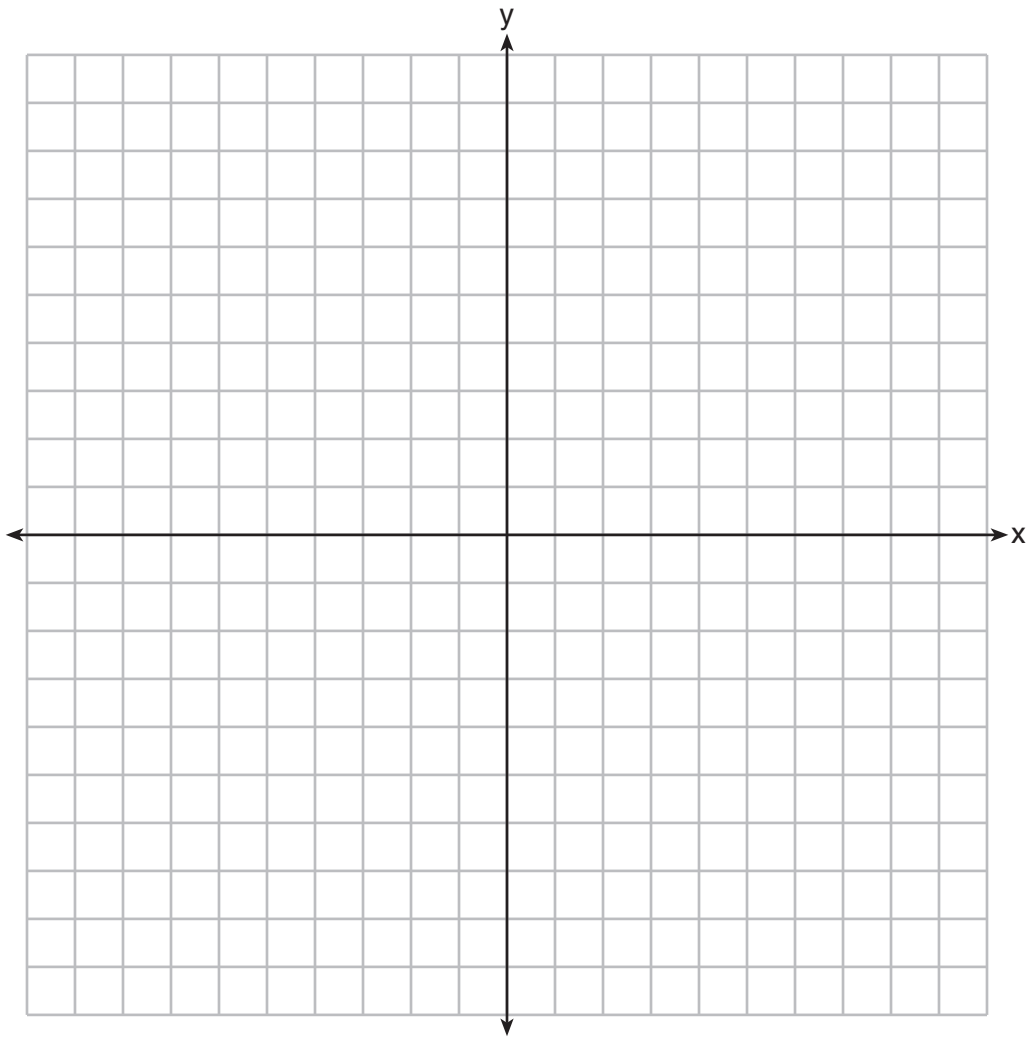


Find the length of $\overline{BC}$ to the *nearest inch*.

39 On the set of axes below, graph the following system of inequalities.

$$y + x \geq 3$$
$$5x - 2y > 10$$

State the coordinates of *one* point that satisfies $y + x \geq 3$, but does *not* satisfy $5x - 2y > 10$.



Part I

Allow a total of 60 credits, 2 credits for each of the following.

1 . . . . . 3	11 . . . . . 3	21 . . . . . 3 . . . . .
2 . . . . . 3	12 . . . . . 2	22 . . . . . 4 . . . . .
3 . . . . . 3	13 . . . . . 3	23 . . . . . 2 . . . . .
4 . . . . . 1	14 . . . . . 4	24 . . . . . 4 . . . . .
5 . . . . . 2	15 . . . . . 2	25 . . . . . 3 . . . . .
6 . . . . . 4	16 . . . . . 4	26 . . . . . 3 . . . . .
7 . . . . . 3	17 . . . . . 4	27 . . . . . 2 . . . . .
8 . . . . . 3	18 . . . . . 2	28 . . . . . 1 . . . . .
9 . . . . . 1	19 . . . . . 3	29 . . . . . 4 . . . . .
10 . . . . . 4	20 . . . . . 1	30 . . . . . 3 . . . . .