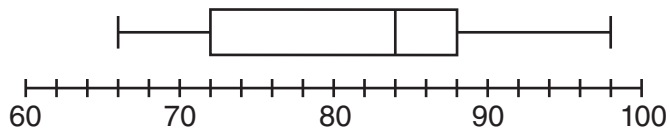


Part I

Answer all 30 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. For each question, write on the separate answer sheet the numeral preceding the word or expression that best completes the statement or answers the question. [60]

Use this space for
computations.

- 1 The box-and-whisker plot below represents the math test scores of 20 students.



What percentage of the test scores are *less than* 72?

- (1) 25 (3) 75
(2) 50 (4) 100
- 2 A bag contains eight green marbles, five white marbles, and two red marbles. What is the probability of drawing a red marble from the bag?
- (1) $\frac{1}{15}$ (3) $\frac{2}{13}$
(2) $\frac{2}{15}$ (4) $\frac{13}{15}$
- 3 Julia went to the movies and bought one jumbo popcorn and two chocolate chip cookies for \$5.00. Marvin went to the same movie and bought one jumbo popcorn and four chocolate chip cookies for \$6.00. How much does one chocolate chip cookie cost?
- (1) \$0.50 (3) \$1.00
(2) \$0.75 (4) \$2.00

Use this space for
computations.

4 Given:

$$Q = \{0, 2, 4, 6\}$$

$$W = \{0, 1, 2, 3\}$$

$$Z = \{1, 2, 3, 4\}$$

What is the intersection of sets Q , W , and Z ?

(1) $\{2\}$

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

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

(4) $\{0, 1, 2, 3, 4, 6\}$

5 Roger is having a picnic for 78 guests. He plans to serve each guest at least one hot dog. If each package, p , contains eight hot dogs, which inequality could be used to determine how many packages of hot dogs Roger will need to buy?

(1) $p \geq 78$

(3) $8 + p \geq 78$

(2) $8p \geq 78$

(4) $78 - p \geq 8$

6 In a science fiction novel, the main character found a mysterious rock that decreased in size each day. The table below shows the part of the rock that remained at noon on successive days.

Day	Fractional Part of the Rock Remaining
1	1
2	$\frac{1}{2}$
3	$\frac{1}{4}$
4	$\frac{1}{8}$

Which fractional part of the rock will remain at noon on day 7?

(1) $\frac{1}{128}$

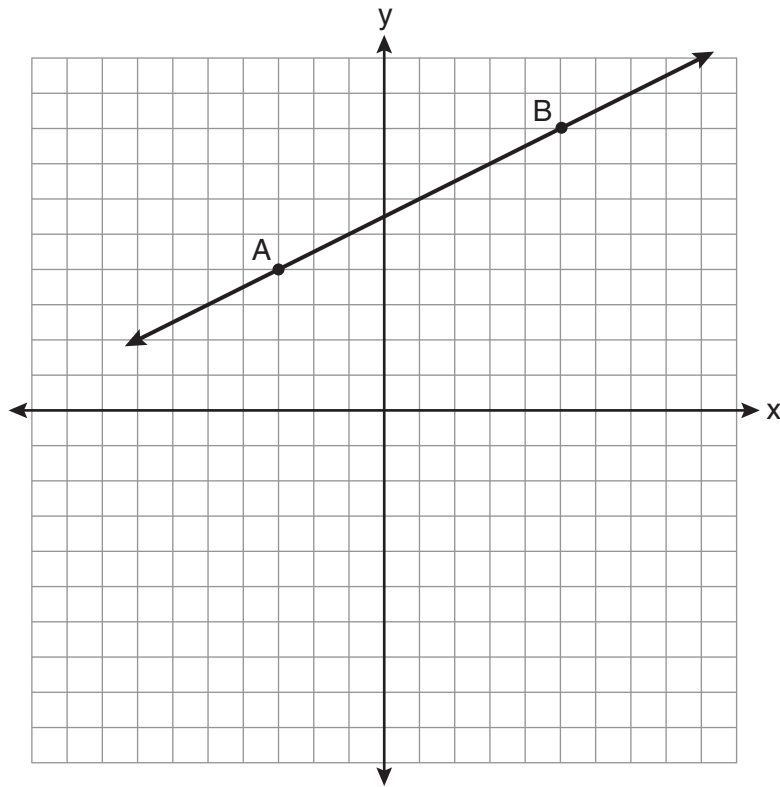
(3) $\frac{1}{14}$

(2) $\frac{1}{64}$

(4) $\frac{1}{12}$

Use this space for computations.

7 In the diagram below, what is the slope of the line passing through points A and B?



(1) -2

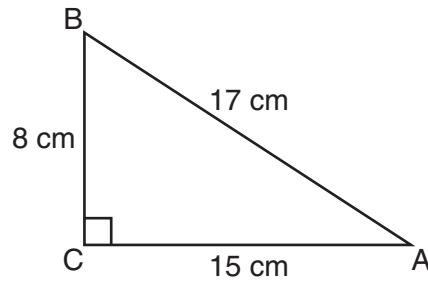
(3) $-\frac{1}{2}$

(2) 2

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

Use this space for computations.

8 Which equation shows a correct trigonometric ratio for angle A in the right triangle below?



(1) $\sin A = \frac{15}{17}$

(3) $\cos A = \frac{15}{17}$

(2) $\tan A = \frac{8}{17}$

(4) $\tan A = \frac{15}{8}$

9 Debbie solved the linear equation $3(x + 4) - 2 = 16$ as follows:

[Line 1] $3(x + 4) - 2 = 16$

[Line 2] $3(x + 4) = 18$

[Line 3] $3x + 4 = 18$

[Line 4] $3x = 14$

[Line 5] $x = 4\frac{2}{3}$

She made an error between lines

(1) 1 and 2

(3) 3 and 4

(2) 2 and 3

(4) 4 and 5

Use this space for computations.

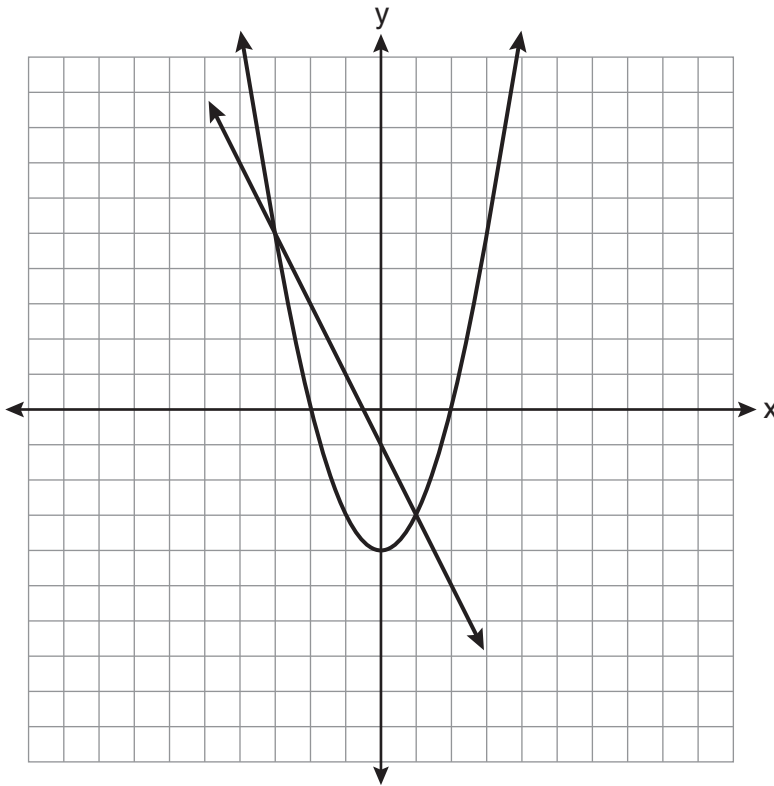
10 The value of the expression $-|a - b|$ when $a = 7$ and $b = -3$ is

- (1) -10
- (2) 10
- (3) -4
- (4) 4

11 Which expression represents $\frac{12x^3 - 6x^2 + 2x}{2x}$ in simplest form?

- (1) $6x^2 - 3x$
- (2) $10x^2 - 4x$
- (3) $6x^2 - 3x + 1$
- (4) $10x^2 - 4x + 1$

12 Which ordered pair is a solution of the system of equations shown in the graph below?



- (1) (-3, 1)
- (2) (-3, 5)
- (3) (0, -1)
- (4) (0, -4)

Use this space for computations.

13 Which equation represents the line that passes through the points $(-3,7)$ and $(3,3)$?

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

(3) $y = -\frac{2}{3}x + 5$

(2) $y = \frac{2}{3}x + 9$

(4) $y = -\frac{2}{3}x + 9$

14 Which data table represents univariate data?

Side Length of a Square	Area of Square
2	4
3	9
4	16
5	25

(1)

Age Group	Frequency
20–29	9
30–39	7
40–49	10
50–59	4

(3)

Hours Worked	Pay
20	\$160
25	\$200
30	\$240
35	\$280

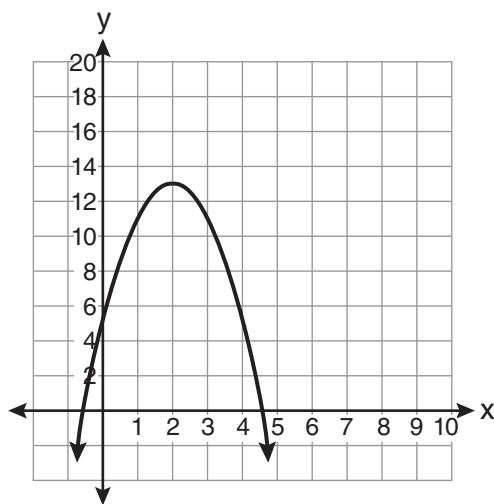
(2)

People	Number of Fingers
2	20
3	30
4	40
5	50

(4)

15 What is the equation of the axis of symmetry of the parabola shown in the diagram below?

Use this space for computations.



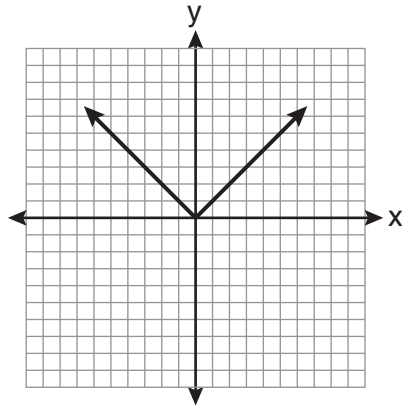
- (1) $x = -0.5$ (3) $x = 4.5$
(2) $x = 2$ (4) $x = 13$

16 The members of the senior class are planning a dance. They use the equation $r = pn$ to determine the total receipts. What is n expressed in terms of r and p ?

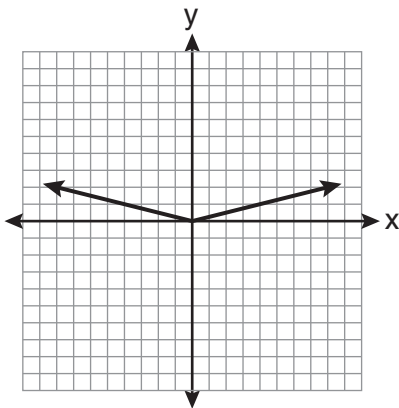
- (1) $n = r + p$ (3) $n = \frac{p}{r}$
(2) $n = r - p$ (4) $n = \frac{r}{p}$

17 The graph of the equation $y = |x|$ is shown in the diagram below.

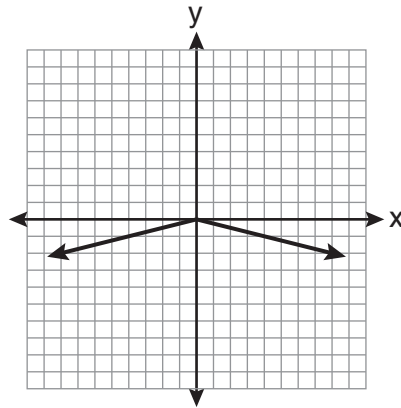
Use this space for
computations.



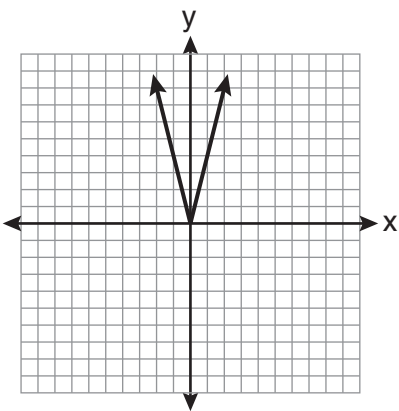
Which diagram could represent a graph of the equation $y = a|x|$ when $-1 < a < 0$?



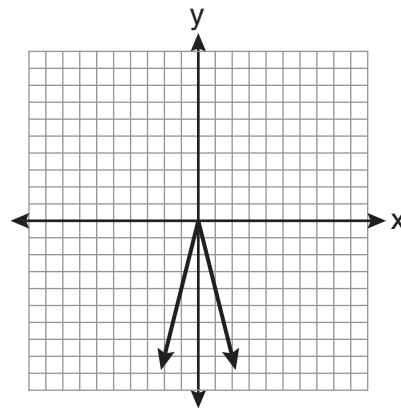
(1)



(3)



(2)



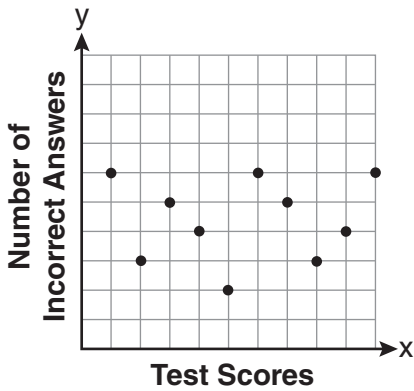
(4)

Use this space for computations.

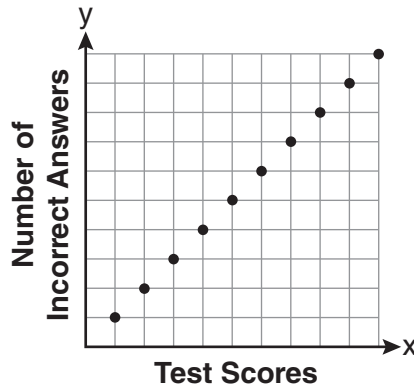
18 Which relation represents a function?

- (1) $\{(0,3), (2,4), (0,6)\}$
- (2) $\{(-7,5), (-7,1), (-10,3), (-4,3)\}$
- (3) $\{(2,0), (6,2), (6,-2)\}$
- (4) $\{(-6,5), (-3,2), (1,2), (6,5)\}$

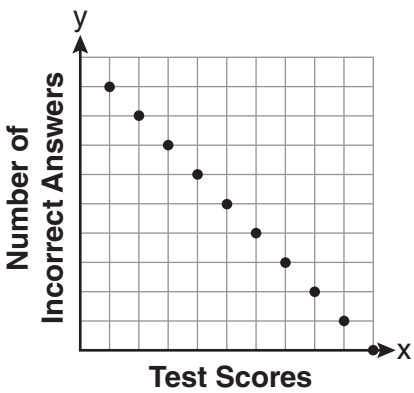
19 Which scatter plot shows the relationship between x and y if x represents a student score on a test and y represents the number of incorrect answers a student received on the same test?



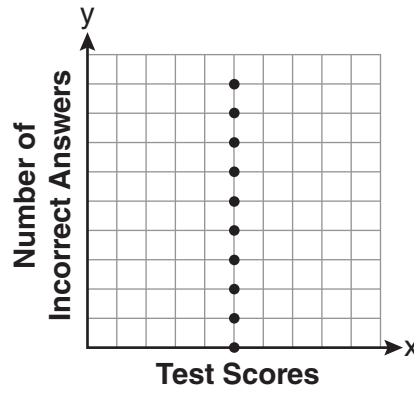
(1)



(3)



(2)



(4)

**Use this space for
computations.**

20 Which expression is equivalent to $3^3 \cdot 3^4$?

(1) 9^{12}

(3) 3^{12}

(2) 9^7

(4) 3^7

21 Which point is on the line $4y - 2x = 0$?

(1) $(-2, -1)$

(3) $(-1, -2)$

(2) $(-2, 1)$

(4) $(1, 2)$

22 If Ann correctly factors an expression that is the difference of two perfect squares, her factors could be

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

(3) $(x - 4)(x - 4)$

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

(4) $(2y - 5)(y - 5)$

23 Which ordered pair is in the solution set of the following system of linear inequalities?

$$y < 2x + 2$$

$$y \geq -x - 1$$

(1) $(0, 3)$

(3) $(-1, 0)$

(2) $(2, 0)$

(4) $(-1, -4)$

Use this space for
computations.

24 The expression $6\sqrt{50} + 6\sqrt{2}$ written in simplest radical form is

- (1) $6\sqrt{52}$ (3) $17\sqrt{2}$
(2) $12\sqrt{52}$ (4) $36\sqrt{2}$

25 What is the sum of $\frac{3x^2}{x-2}$ and $\frac{x^2}{x-2}$?

- (1) $\frac{3x^4}{(x-2)^2}$ (3) $\frac{4x^2}{(x-2)^2}$
(2) $\frac{3x^4}{x-2}$ (4) $\frac{4x^2}{x-2}$

26 Which equation represents a line parallel to the graph of $2x - 4y = 16$?

- (1) $y = \frac{1}{2}x - 5$ (3) $y = -2x + 6$
(2) $y = -\frac{1}{2}x + 4$ (4) $y = 2x + 8$

27 An example of an algebraic expression is

- (1) $\frac{2x+3}{7} = \frac{13}{x}$ (3) $4x - 1 = 4$
(2) $(2x+1)(x-7)$ (4) $x = 2$

**Use this space for
computations.**

28 What is the solution set of $\frac{x+2}{x-2} = \frac{-3}{x}$?

- (1) $\{-2, 3\}$ (3) $\{-1, 6\}$
(2) $\{-3, -2\}$ (4) $\{-6, 1\}$

29 How many square inches of wrapping paper are needed to entirely cover a box that is 2 inches by 3 inches by 4 inches?

- (1) 18 (3) 26
(2) 24 (4) 52

30 Which situation describes a correlation that is *not* a causal relationship?

- (1) the length of the edge of a cube and the volume of the cube
(2) the distance traveled and the time spent driving
(3) the age of a child and the number of siblings the child has
(4) the number of classes taught in a school and the number of teachers employed
-

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. [6]

- 31 Angela wants to purchase carpeting for her living room. The dimensions of her living room are 12 feet by 12 feet. If carpeting is sold by the square yard, determine how many square yards of carpeting she must purchase.

$$3 \text{ feet} = 1 \text{ yard}$$

$$9 \text{ square feet} = 1 \text{ square yard}$$

32 In right triangle ABC , $AB = 20$, $AC = 12$, $BC = 16$, and $m\angle C = 90$.

Find, to the *nearest degree*, the measure of $\angle A$.

33 Jon is buying tickets for himself for two concerts. For the jazz concert, 4 tickets are available in the front row, and 32 tickets are available in the other rows. For the orchestra concert, 3 tickets are available in the front row, and 23 tickets are available in the other rows. Jon is randomly assigned one ticket for each concert.

Determine the concert for which he is more likely to get a front-row ticket. Justify your answer.

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. [9]

34 Find the roots of the equation $x^2 - x = 6$ algebraically.

35 Ms. Mosher recorded the math test scores of six students in the table below.

Student	Student Score
Andrew	72
John	80
George	85
Amber	93
Betty	78
Roberto	80

Determine the mean of the student scores, to the *nearest tenth*.

Determine the median of the student scores.

Describe the effect on the mean and the median if Ms. Mosher adds 5 bonus points to each of the six students' scores.

36 Using his ruler, Howell measured the sides of a rectangular prism to be 5 cm by 8 cm by 4 cm. The actual measurements are 5.3 cm by 8.2 cm by 4.1 cm. Find Howell's relative error in calculating the volume of the prism, to the *nearest thousandth*.

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. [12]

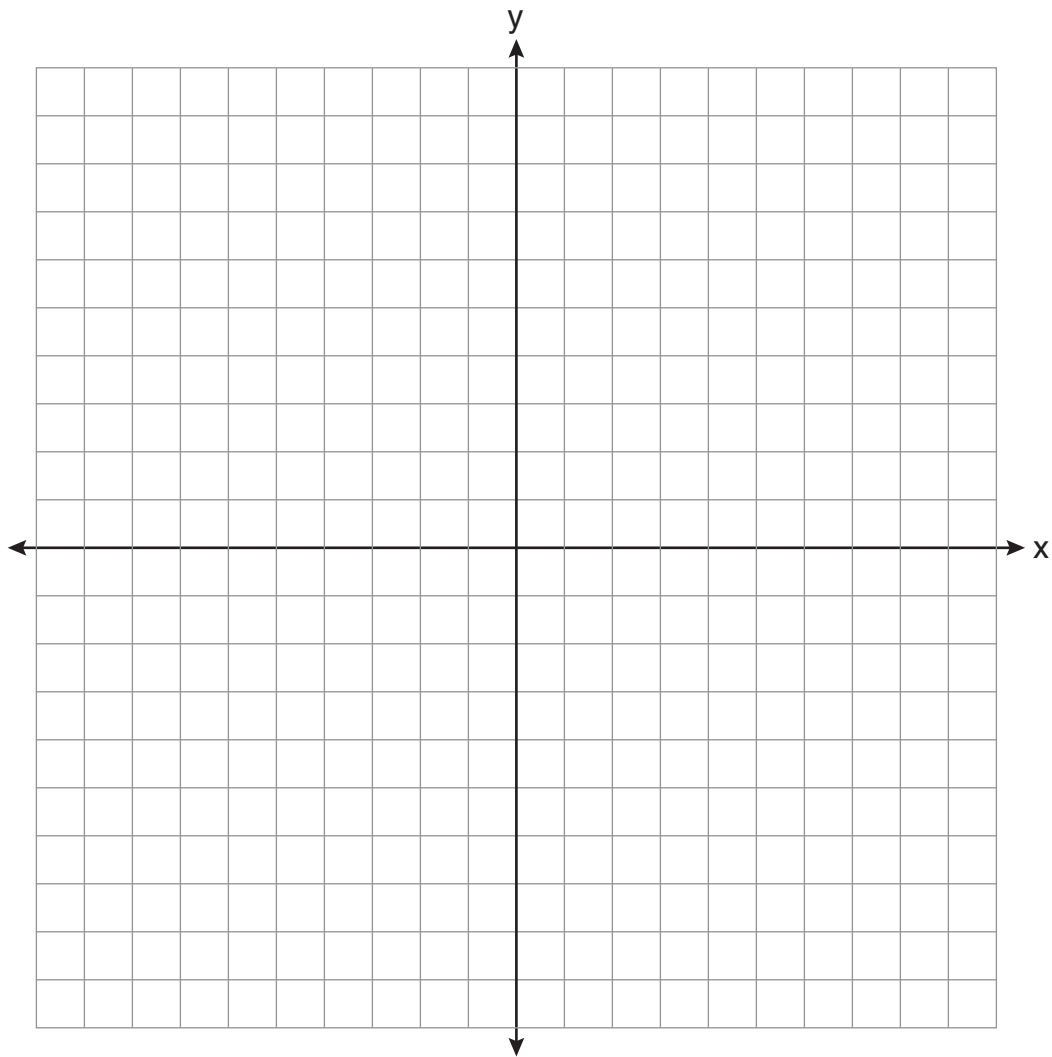
37 A password consists of three digits, 0 through 9, followed by three letters from an alphabet having 26 letters.

If repetition of digits is allowed, but repetition of letters is not allowed, determine the number of different passwords that can be made.

If repetition is not allowed for digits or letters, determine how many fewer different passwords can be made.

38 Graph the solution set for the inequality $4x - 3y > 9$ on the set of axes below.

Determine if the point $(1, -3)$ is in the solution set. Justify your answer.



39 Find three consecutive positive even integers such that the product of the second and third integers is twenty more than ten times the first integer. [Only an algebraic solution can receive full credit.]

Part I

Allow a total of 60 credits, 2 credits for each of the following. Allow credit if the student has written the correct answer instead of the numeral 1, 2, 3, or 4.

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