

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 In a baseball game, the ball traveled 350.7 feet in 4.2 seconds.
What was the average speed of the ball, in feet per second?

- (1) 83.5
(2) 177.5
(3) 354.9
(4) 1,472.9

- 2 A survey is being conducted to determine if a cable company should add another sports channel to their schedule. Which random survey would be the *least* biased?

- (1) surveying 30 men at a gym
(2) surveying 45 people at a mall
(3) surveying 50 fans at a football game
(4) surveying 20 members of a high school soccer team

- 3 The quotient of $\frac{8x^5 - 2x^4 + 4x^3 - 6x^2}{2x^2}$ is

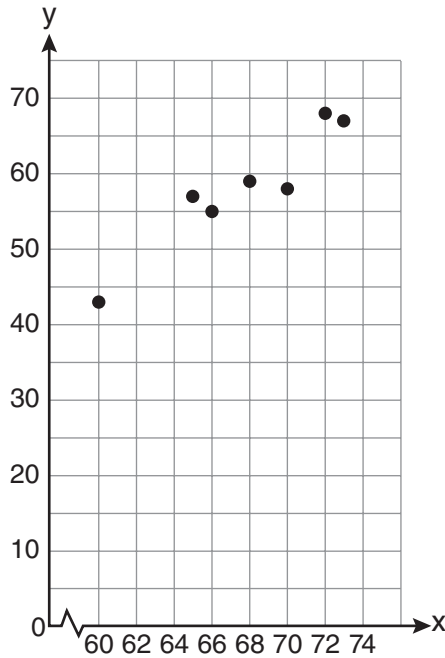
- (1) $16x^7 - 4x^6 + 8x^5 - 12x^4$
(2) $4x^7 - x^6 + 2x^5 - 3x^4$
(3) $4x^3 - x^2 + 2x - 3x$
(4) $4x^3 - x^2 + 2x - 3$

- 4 Marcy determined that her father's age is four less than three times her age. If x represents Marcy's age, which expression represents her father's age?

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

**Use this space for
computations.**

5 A set of data is graphed on the scatter plot below.



This scatter plot shows

- (1) no correlation
- (2) positive correlation
- (3) negative correlation
- (4) undefined correlation

6 Which situation is an example of bivariate data?

- (1) the number of pizzas Tanya eats during her years in high school
- (2) the number of times Ezra puts air in his bicycle tires during the summer
- (3) the number of home runs Elias hits per game and the number of hours he practices baseball
- (4) the number of hours Nellie studies for her mathematics tests during the first half of the school year

Use this space for computations.

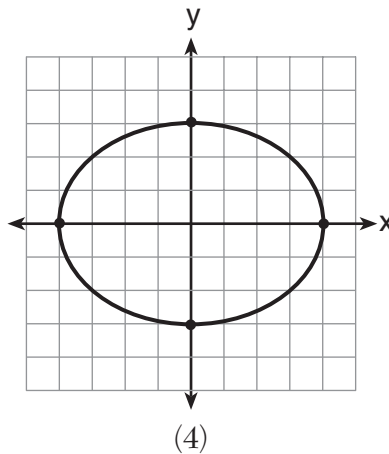
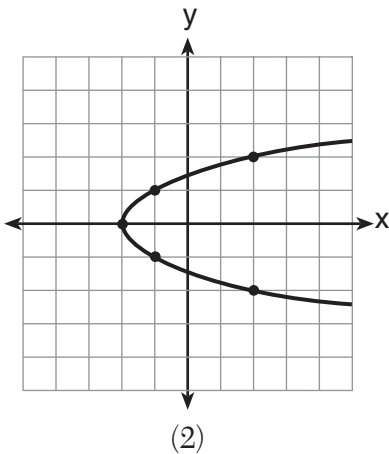
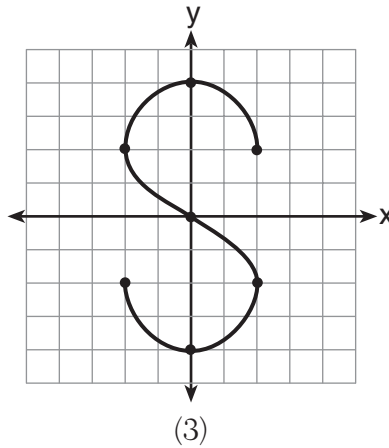
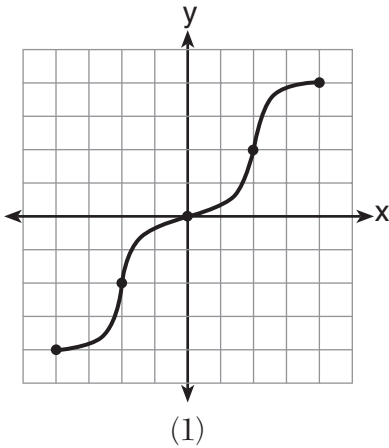
7 Brianna's score on a national math assessment exceeded the scores of 95,000 of the 125,000 students who took the assessment. What was her percentile rank?

- (1) 6
- (2) 24
- (3) 31
- (4) 76

8 If $A = \{0, 1, 3, 4, 6, 7\}$, $B = \{0, 2, 3, 5, 6\}$, and $C = \{0, 1, 4, 6, 7\}$, then $A \cap B \cap C$ is

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

9 Which graph represents a function?



**Use this space for
computations.**

10 What is the product of $(3x + 2)$ and $(x - 7)$?

(1) $3x^2 - 14$

(3) $3x^2 - 19x - 14$

(2) $3x^2 - 5x - 14$

(4) $3x^2 - 23x - 14$

11 If five times a number is less than 55, what is the greatest possible integer value of the number?

(1) 12

(3) 10

(2) 11

(4) 9

12 The line represented by the equation $2y - 3x = 4$ has a slope of

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

(3) 3

(2) 2

(4) $\frac{3}{2}$

13 What is the solution set of the system of equations $x + y = 5$ and $y = x^2 - 25$?

(1) $\{(0,5), (11,-6)\}$

(3) $\{(-5,0), (6,11)\}$

(2) $\{(5,0), (-6,11)\}$

(4) $\{(-5,10), (6,-1)\}$

**Use this space for
computations.**

14 What is the vertex of the parabola represented by the equation

$$y = -2x^2 + 24x - 100?$$

- (1) $x = -6$ (3) $(6, -28)$
(2) $x = 6$ (4) $(-6, -316)$

15 If $k = am + 3mx$, the value of m in terms of a , k , and x can be expressed as

- (1) $\frac{k}{a + 3x}$ (3) $\frac{k - am}{3x}$
(2) $\frac{k - 3mx}{a}$ (4) $\frac{k - a}{3x}$

16 Which expression represents $\frac{x^2 - 3x - 10}{x^2 - 25}$ in simplest form?

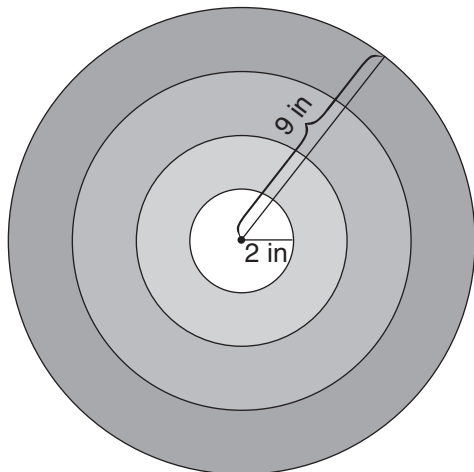
- (1) $\frac{2}{5}$ (3) $\frac{x - 2}{x - 5}$
(2) $\frac{x + 2}{x + 5}$ (4) $\frac{-3x - 10}{-25}$

17 Which interval notation describes the set $S = \{x | 1 \leq x < 10\}$?

- (1) $[1, 10]$ (3) $[1, 10)$
(2) $(1, 10]$ (4) $(1, 10)$

Use this space for computations.

- 18** The bull's-eye of a dartboard has a radius of 2 inches and the entire board has a radius of 9 inches, as shown in the diagram below.

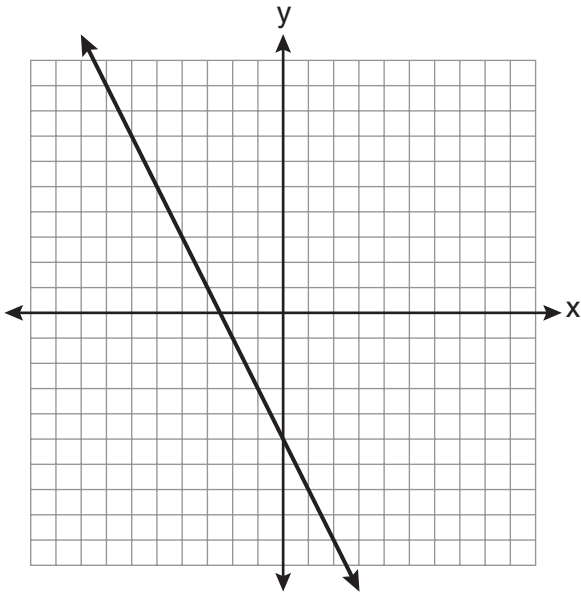


If a dart is thrown and hits the board, what is the probability that the dart will land in the bull's-eye?

- (1) $\frac{2}{9}$ (3) $\frac{4}{81}$
(2) $\frac{7}{9}$ (4) $\frac{49}{81}$
- 19** What is one-third of 3^6 ?
- (1) 1^2 (3) 3^5
(2) 3^2 (4) 9^6
- 20** The expression $\frac{2x + 13}{2x + 6} - \frac{3x - 6}{2x + 6}$ is equivalent to
- (1) $\frac{-x + 19}{2(x + 3)}$ (3) $\frac{5x + 19}{2(x + 3)}$
(2) $\frac{-x + 7}{2(x + 3)}$ (4) $\frac{5x + 7}{4x + 12}$

Use this space for computations.

21 Which equation is represented by the graph below?



(1) $2y + x = 10$

(2) $y - 2x = -5$

(3) $-2y = 10x - 4$

(4) $2y = -4x - 10$

22 Which coordinates represent a point in the solution set of the system of inequalities shown below?

$$y \leq \frac{1}{2}x + 13$$

$$4x + 2y > 3$$

(1) $(-4,1)$

(2) $(-2,2)$

(3) $(1,-4)$

(4) $(2,-2)$

**Use this space for
computations.**

23 The length of one side of a square is 13 feet. What is the length, to the *nearest foot*, of a diagonal of the square?

(1) 13

(3) 19

(2) 18

(4) 26

24 In $\triangle ABC$, $m\angle C = 90$. If $AB = 5$ and $AC = 4$, which statement is *not* true?

(1) $\cos A = \frac{4}{5}$

(3) $\sin B = \frac{4}{5}$

(2) $\tan A = \frac{3}{4}$

(4) $\tan B = \frac{5}{3}$

25 If n is an odd integer, which equation can be used to find three consecutive odd integers whose sum is -3 ?

(1) $n + (n + 1) + (n + 3) = -3$

(2) $n + (n + 1) + (n + 2) = -3$

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

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

26 When $8x^2 + 3x + 2$ is subtracted from $9x^2 - 3x - 4$, the result is

(1) $x^2 - 2$

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

(2) $17x^2 - 2$

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

**Use this space for
computations.**

27 Factored completely, the expression $3x^3 - 33x^2 + 90x$ is equivalent to

- (1) $3x(x^2 - 33x + 90)$ (3) $3x(x + 5)(x + 6)$
(2) $3x(x^2 - 11x + 30)$ (4) $3x(x - 5)(x - 6)$

28 Elizabeth is baking chocolate chip cookies. A single batch uses $\frac{3}{4}$ teaspoon of vanilla. If Elizabeth is mixing the ingredients for five batches at the same time, how many tablespoons of vanilla will she use?

$3 \text{ teaspoons} = 1 \text{ tablespoon}$
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- (1) $1\frac{1}{4}$ (3) $3\frac{3}{4}$
(2) $1\frac{3}{4}$ (4) $5\frac{3}{4}$

29 A car depreciates (loses value) at a rate of 4.5% annually. Greg purchased a car for \$12,500. Which equation can be used to determine the value of the car, V , after 5 years?

- (1) $V = 12,500(0.55)^5$ (3) $V = 12,500(1.045)^5$
(2) $V = 12,500(0.955)^5$ (4) $V = 12,500(1.45)^5$

**Use this space for
computations.**

30 The cumulative frequency table below shows the length of time that 30 students spent text messaging on a weekend.

Minutes Used	Cumulative Frequency
31–40	2
31–50	5
31–60	10
31–70	19
31–80	30

Which 10-minute interval contains the first quartile?

- (1) 31–40 (3) 51–60
(2) 41–50 (4) 61–70
-

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 Solve the following system of equations algebraically for y :

$$2x + 2y = 9$$

$$2x - y = 3$$

32 Three storage bins contain colored blocks. Bin 1 contains 15 red and 14 blue blocks. Bin 2 contains 16 white and 15 blue blocks. Bin 3 contains 15 red and 15 white blocks. All of the blocks from the three bins are placed into one box.

If one block is randomly selected from the box, which color block would most likely be picked? Justify your answer.

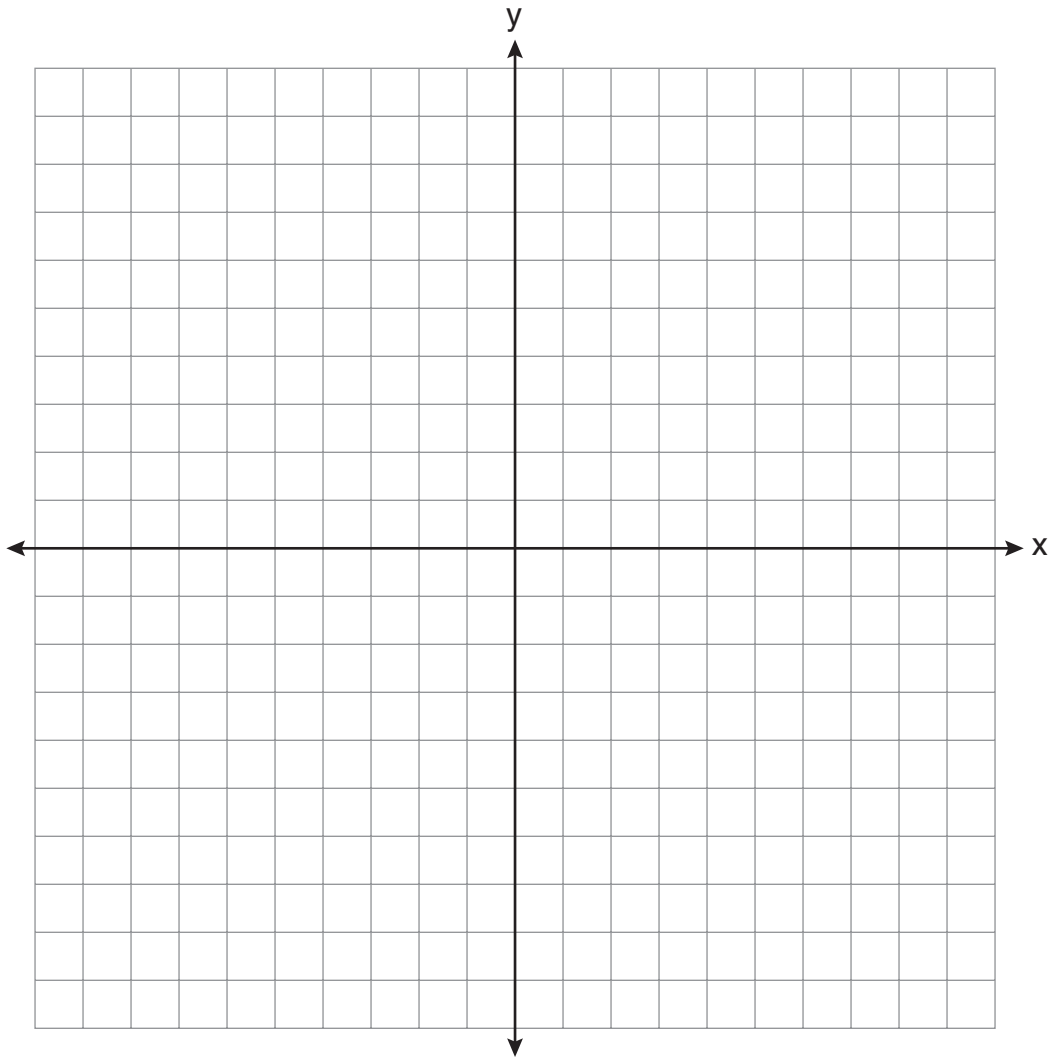
33 Students calculated the area of a playing field to be 8,100 square feet. The actual area of the field is 7,678.5 square feet. Find the relative error in the area, to the *nearest thousandth*.

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 On the set of axes below, graph the equation $y = x^2 + 2x - 8$.

Using the graph, determine and state the roots of the equation $x^2 + 2x - 8 = 0$.



35 A 28-foot ladder is leaning against a house. The bottom of the ladder is 6 feet from the base of the house. Find the measure of the angle formed by the ladder and the ground, to the *nearest degree*.

36 Express $\frac{3\sqrt{75} + \sqrt{27}}{3}$ in simplest radical form.

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 Mike buys his ice cream packed in a rectangular prism-shaped carton, while Carol buys hers in a cylindrical-shaped carton. The dimensions of the prism are 5 inches by 3.5 inches by 7 inches. The cylinder has a diameter of 5 inches and a height of 7 inches.

Which container holds more ice cream? Justify your answer.

Determine, to the *nearest tenth of a cubic inch*, how much *more* ice cream the larger container holds.

38 Solve algebraically for x : $3(x + 1) - 5x = 12 - (6x - 7)$

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