

## 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 If  $h$  represents a number, which equation is a correct translation of “Sixty more than 9 times a number is 375”?

(1)  $9h = 375$

(3)  $9h - 60 = 375$

(2)  $9h + 60 = 375$

(4)  $60h + 9 = 375$

2 Which expression is equivalent to  $9x^2 - 16$ ?

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

(3)  $(3x + 8)(3x - 8)$

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

(4)  $(3x - 8)(3x - 8)$

3 Which expression represents  $(3x^2y^4)(4xy^2)$  in simplest form?

(1)  $12x^2y^8$

(3)  $12x^3y^8$

(2)  $12x^2y^6$

(4)  $12x^3y^6$

4 An online music club has a one-time registration fee of \$13.95 and charges \$0.49 to buy each song. If Emma has \$50.00 to join the club and buy songs, what is the maximum number of songs she can buy?

(1) 73

(3) 130

(2) 74

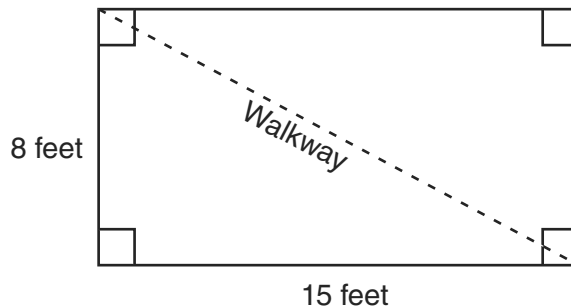
(4) 131

**Use this space for computations.**

5 The local ice cream stand offers three flavors of soft-serve ice cream: vanilla, chocolate, and strawberry; two types of cone: sugar and wafer; and three toppings: sprinkles, nuts, and cookie crumbs. If Dawn does not order vanilla ice cream, how many different choices can she make that have one flavor of ice cream, one type of cone, and one topping?

- (1) 7
- (2) 8
- (3) 12
- (4) 18

6 Nancy's rectangular garden is represented in the diagram below.

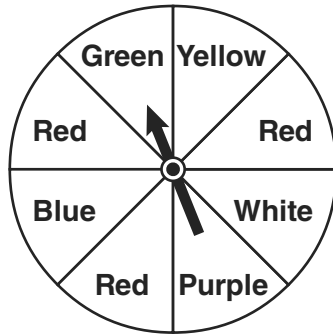


If a diagonal walkway crosses her garden, what is its length, in feet?

- (1) 17
- (2) 22
- (3)  $\sqrt{161}$
- (4)  $\sqrt{529}$

Use this space for  
computations.

- 7 The spinner below is divided into eight equal regions and is spun once. What is the probability of *not* getting red?



- (1)  $\frac{3}{5}$  (3)  $\frac{5}{8}$   
(2)  $\frac{3}{8}$  (4)  $\frac{7}{8}$

- 8 Which relationship can best be described as causal?

- (1) height and intelligence  
(2) shoe size and running speed  
(3) number of correct answers on a test and test score  
(4) number of students in a class and number of students with brown hair

- 9 Solve for  $x$ :  $\frac{3}{5}(x + 2) = x - 4$

- (1) 8 (3) 15  
(2) 13 (4) 23

**Use this space for  
computations.**

**10** Erica is conducting a survey about the proposed increase in the sports budget in the Hometown School District. Which survey method would likely contain the *most* bias?

- (1) Erica asks every third person entering the Hometown Grocery Store.
- (2) Erica asks every third person leaving the Hometown Shopping Mall this weekend.
- (3) Erica asks every fifth student entering Hometown High School on Monday morning.
- (4) Erica asks every fifth person leaving Saturday's Hometown High School football game.

**11** Which equation represents a line parallel to the  $x$ -axis?

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

**12** Given:

$A = \{\text{All even integers from 2 to 20, inclusive}\}$

$B = \{10, 12, 14, 16, 18\}$

What is the complement of set  $B$  within the universe of set  $A$ ?

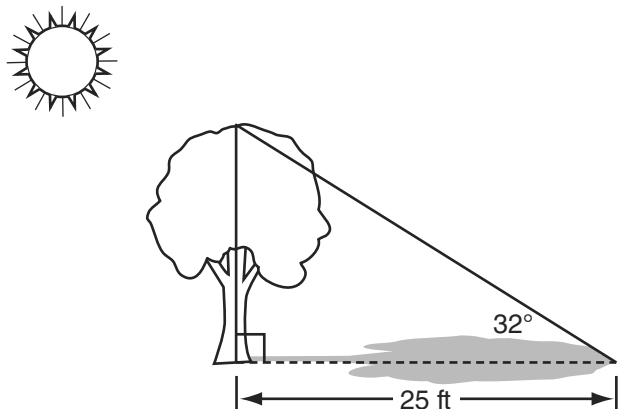
- (1)  $\{4, 6, 8\}$
- (2)  $\{2, 4, 6, 8\}$
- (3)  $\{4, 6, 8, 20\}$
- (4)  $\{2, 4, 6, 8, 20\}$

**13** Which value of  $x$  is in the solution set of the inequality  $-2(x - 5) < 4$ ?

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

Use this space for  
computations.

- 14 A tree casts a 25-foot shadow on a sunny day, as shown in the diagram below.



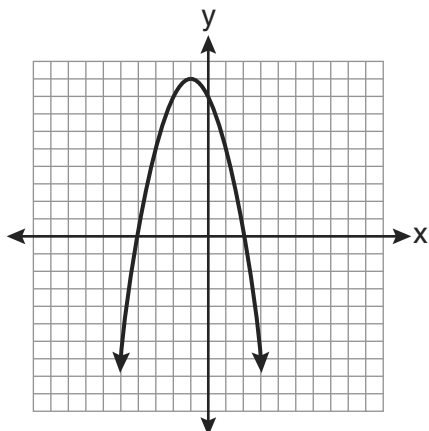
If the angle of elevation from the tip of the shadow to the top of the tree is  $32^\circ$ , what is the height of the tree to the *nearest tenth of a foot*?

- (1) 13.2                                      (3) 21.2  
(2) 15.6                                      (4) 40.0
- 15 What is the slope of the line that passes through the points  $(-5,4)$  and  $(15,-4)$ ?

- (1)  $-\frac{2}{5}$                                       (3)  $-\frac{5}{2}$   
(2) 0    (4) undefined

16 The equation  $y = -x^2 - 2x + 8$  is graphed on the set of axes below.

Use this space for computations.



Based on this graph, what are the roots of the equation  $-x^2 - 2x + 8 = 0$ ?

- (1) 8 and 0
- (2) 2 and -4
- (3) 9 and -1
- (4) 4 and -2

17 What is the sum of  $\frac{3}{2x}$  and  $\frac{4}{3x}$  expressed in simplest form?

- (1)  $\frac{12}{6x^2}$
- (2)  $\frac{17}{6x}$
- (3)  $\frac{7}{5x}$
- (4)  $\frac{17}{12x}$

**Use this space for  
computations.**

- 18** Which value of  $x$  makes the expression  $\frac{x^2 - 9}{x^2 + 7x + 10}$  undefined?
- (1)  $-5$                                       (3)  $3$   
(2)  $2$                                         (4)  $-3$

- 19** Which relation is *not* a function?

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

- 20** What is the value of the  $y$ -coordinate of the solution to the system of equations  $x - 2y = 1$  and  $x + 4y = 7$ ?

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

- 21** The solution to the equation  $x^2 - 6x = 0$  is

- (1)  $0$ , only                                (3)  $0$  and  $6$   
(2)  $6$ , only                                (4)  $\pm\sqrt{6}$

**Use this space for computations.**

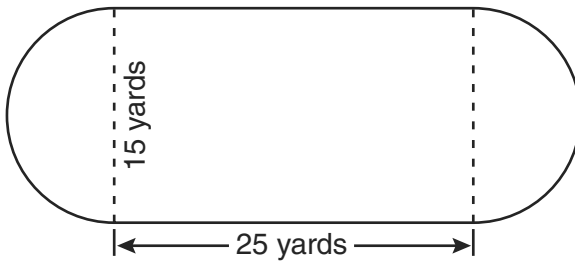
**22** When  $5\sqrt{20}$  is written in simplest radical form, the result is  $k\sqrt{5}$ . What is the value of  $k$ ?

- (1) 20  
(2) 10  
(3) 7  
(4) 4

**23** What is the value of the expression  $|-5x + 12|$  when  $x = 5$ ?

- (1) -37  
(2) -13  
(3) 13  
(4) 37

**24** A playground in a local community consists of a rectangle and two semicircles, as shown in the diagram below.



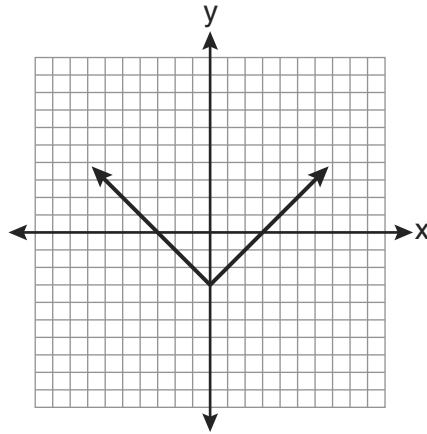
Which expression represents the amount of fencing, in yards, that would be needed to completely enclose the playground?

- (1)  $15\pi + 50$   
(2)  $15\pi + 80$   
(3)  $30\pi + 50$   
(4)  $30\pi + 80$



Use this space for  
computations.

25 Which equation is represented by the graph below?



(1)  $y = x^2 - 3$

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

(3)  $y = |x| - 3$

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

26 Carrie bought new carpet for her living room. She calculated the area of the living room to be 174.2 square feet. The actual area was 149.6 square feet. What is the relative error of the area to the nearest ten-thousandth?

(1) 0.1412

(2) 0.1644

(3) 1.8588

(4) 2.1644

27 What is an equation of the line that passes through the point (3,-1) and has a slope of 2?

(1)  $y = 2x + 5$

(2)  $y = 2x - 1$

(3)  $y = 2x - 4$

(4)  $y = 2x - 7$

Use this space for computations.

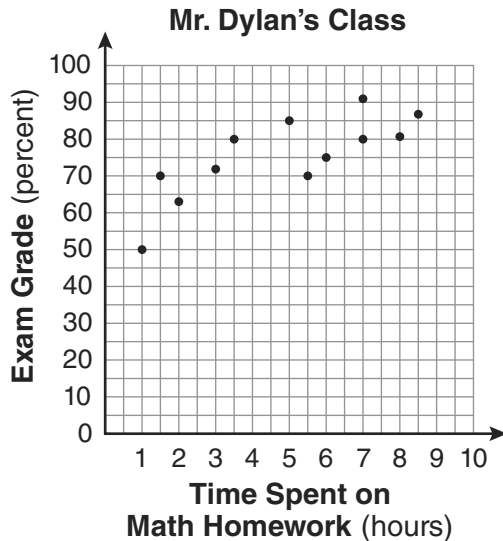
28 The ages of three brothers are consecutive even integers. Three times the age of the youngest brother exceeds the oldest brother's age by 48 years. What is the age of the *youngest* brother?

- (1) 14
- (2) 18
- (3) 22
- (4) 26

29 Cassandra bought an antique dresser for \$500. If the value of her dresser increases 6% annually, what will be the value of Cassandra's dresser at the end of 3 years to the *nearest dollar*?

- (1) \$415
- (2) \$590
- (3) \$596
- (4) \$770

30 The number of hours spent on math homework each week and the final exam grades for twelve students in Mr. Dylan's algebra class are plotted below.



Based on a line of best fit, which exam grade is the best prediction for a student who spends about 4 hours on math homework each week?

- (1) 62
- (2) 72
- (3) 82
- (4) 92

## 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 Chad complained to his friend that he had five equations to solve for homework. Are all of the homework problems equations? Justify your answer.

### Math Homework

1.  $3x^2 \cdot 2x^4$

2.  $5 - 2x = 3x$

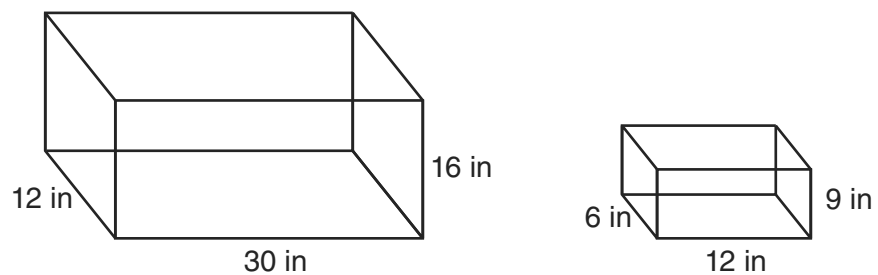
3.  $3(2x + 7)$

4.  $7x^2 + 2x - 3x^2 - 9$

5.  $\frac{2}{3} = \frac{x+2}{6}$

Name Chad

32 The diagram below represents Joe's two fish tanks.



Joe's larger tank is completely filled with water. He takes water from it to completely fill the small tank. Determine how many cubic inches of water will remain in the larger tank.

**33** Clayton has three fair coins. Find the probability that he gets two tails and one head when he flips the three coins.

### 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 algebraically the equation of the axis of symmetry and the coordinates of the vertex of the parabola whose equation is  $y = -2x^2 - 8x + 3$ .

**35** At the end of week one, a stock had increased in value from \$5.75 a share to \$7.50 a share. Find the percent of increase at the end of week one to the *nearest tenth of a percent*.

At the end of week two, the same stock had decreased in value from \$7.50 to \$5.75. Is the percent of decrease at the end of week two the same as the percent of increase at the end of week one? Justify your answer.

**36** The chart below compares two runners.

| <b>Runner</b> | <b>Distance,<br/>in miles</b> | <b>Time,<br/>in hours</b> |
|---------------|-------------------------------|---------------------------|
| Greg          | 11                            | 2                         |
| Dave          | 16                            | 3                         |

Based on the information in this chart, state which runner has the faster rate. Justify your answer.



### Part IV

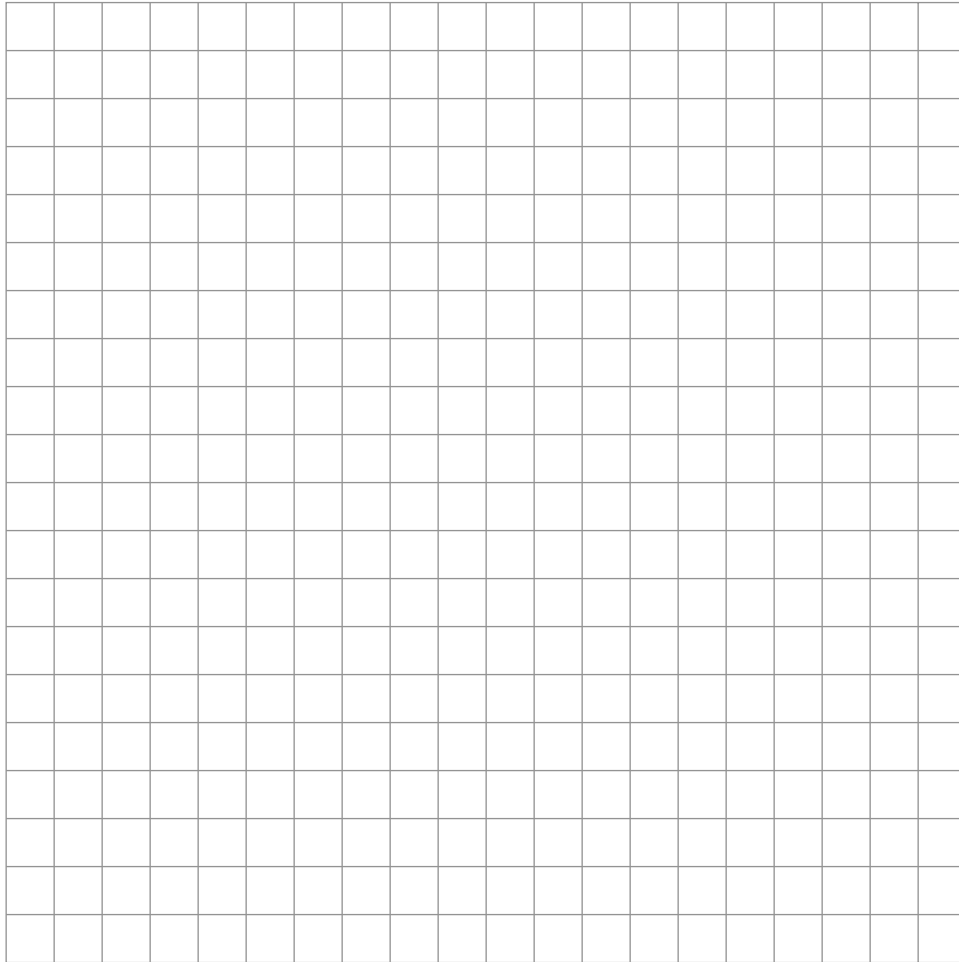
Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [12]

37 Express in simplest form:  $\frac{2x^2 - 8x - 42}{6x^2} \div \frac{x^2 - 9}{x^2 - 3x}$

38 On the grid below, solve the system of equations graphically for  $x$  and  $y$ .

$$4x - 2y = 10$$

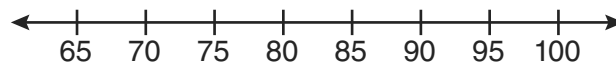
$$y = -2x - 1$$



**39** The test scores from Mrs. Gray's math class are shown below.

72, 73, 66, 71, 82, 85, 95, 85, 86, 89, 91, 92

Construct a box-and-whisker plot to display these data.



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