

Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers on your separate answer sheet. [48]

Use this space for computations.

- 1 The operator of the local mall wants to find out how many of the mall's employees make purchases in the food court when they are working. She hopes to use these data to increase the rent and attract new food vendors. In total, there are 1023 employees who work at the mall. The best method to obtain a random sample of the employees would be to survey
- (1) all 170 employees at each of the larger stores
 - (2) 50% of the 90 employees of the food court
 - (3) every employee
 - (4) every 30th employee entering each mall entrance for one week

- 2 What is the solution set for x in the equation below?

$$\sqrt{x+1} - 1 = x$$

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

- 3 For the system shown below, what is the value of z ?

$$\begin{aligned}y &= -2x + 14 \\3x - 4z &= 2 \\3x - y &= 16\end{aligned}$$

- (1) 5
- (2) 2
- (3) 6
- (4) 4

Use this space for computations.

4 The hours of daylight, y , in Utica in days, x , from January 1, 2013 can be modeled by the equation $y = 3.06\sin(0.017x - 1.40) + 12.23$. How many hours of daylight, to the *nearest tenth*, does this model predict for February 14, 2013?

- (1) 9.4 (3) 12.1
(2) 10.4 (4) 12.2

5 A certain pain reliever is taken in 220 mg dosages and has a half-life of 12 hours. The function $A = 220\left(\frac{1}{2}\right)^{\frac{t}{12}}$ can be used to model this situation, where A is the amount of pain reliever in milligrams remaining in the body after t hours.

According to this function, which statement is true?

- (1) Every hour, the amount of pain reliever remaining is cut in half.
(2) In 12 hours, there is no pain reliever remaining in the body.
(3) In 24 hours, there is no pain reliever remaining in the body.
(4) In 12 hours, 110 mg of pain reliever is remaining.

6 The expression $(x + a)(x + b)$ can *not* be written as

- (1) $a(x + b) + x(x + b)$ (3) $x^2 + (a + b)x + ab$
(2) $x^2 + abx + ab$ (4) $x(x + a) + b(x + a)$

7 There are 440 students at Thomas Paine High School enrolled in U.S. History. On the April report card, the students' grades are approximately normally distributed with a mean of 79 and a standard deviation of 7. Students who earn a grade less than or equal to 64.9 must attend summer school. The number of students who must attend summer school for U.S. History is closest to

- (1) 3 (3) 10
(2) 5 (4) 22

**Use this space for
computations.**

8 For a given time, x , in seconds, an electric current, y , can be represented by $y = 2.5(1 - 2.7^{-.10x})$. Which equation is *not* equivalent?

(1) $y = 2.5 - 2.5(2.7^{-.10x})$

(2) $y = 2.5 - 2.5((2.7^2)^{-.05x})$

(3) $y = 2.5 - 2.5\left(\frac{1}{2.7^{.10x}}\right)$

(4) $y = 2.5 - 2.5(2.7^{-2})(2.7^{.05x})$

9 What is the quotient when $10x^3 - 3x^2 - 7x + 3$ is divided by $2x - 1$?

(1) $5x^2 + x + 3$

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

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

(4) $5x^2 + x - 3$

10 Judith puts \$5000 into an investment account with interest compounded continuously. Which approximate annual rate is needed for the account to grow to \$9110 after 30 years?

(1) 2%

(3) 0.02%

(2) 2.2%

(4) 0.022%

11 If $n = \sqrt{a^5}$ and $m = a$, where $a > 0$, an expression for $\frac{n}{m}$ could be

(1) $a^{\frac{5}{2}}$

(3) $\sqrt[3]{a^2}$

(2) a^4

(4) $\sqrt{a^3}$

12 The solutions to $x + 3 - \frac{4}{x-1} = 5$ are

(1) $\frac{3}{2} \pm \frac{\sqrt{17}}{2}$

(3) $\frac{3}{2} \pm \frac{\sqrt{33}}{2}$

(2) $\frac{3}{2} \pm \frac{\sqrt{17}}{2}i$

(4) $\frac{3}{2} \pm \frac{\sqrt{33}}{2}i$

**Use this space for
computations.**