
Since $\frac{9}{5} = 1.8$, statement II is true. On the other hand, statement III is not true, since a temperature increase of $\frac{9}{5}$ degrees Fahrenheit, not $\frac{5}{9}$ degree Fahrenheit, is equal to a temperature increase of 1 degree Celsius. Choices A, B, and C are incorrect because each of these choices omits a true statement or includes a false statement.

QUESTION 16

The correct answer is either 1 or 2. The given equation can be rewritten as $x^5 - 5x^3 + 4x = 0$. Since the polynomial expression on the left has no constant term, it has x as a factor: $x(x^4 - 5x^2 + 4) = 0$. The expression in parentheses is a quadratic equation in x^2 that can be factored, giving $x(x^2 - 1)(x^2 - 4) = 0$. This further factors as $x(x - 1)(x + 1)(x - 2)(x + 2) = 0$. The solutions for x are $x = 0$, $x = 1$, $x = -1$, $x = 2$, and $x = -2$. Since it is given that $x > 0$, the possible values of x are $x = 1$ and $x = 2$. Either 1 or 2 may be gridded as the correct answer.

QUESTION 17

The correct answer is 2. First, clear the fractions from the given equation by multiplying each side of the equation by 36 (the least common multiple of 4, 9, and 12). The equation becomes $28x - 16x = 9 + 15$. Combining like terms on each side of the equation yields $12x = 24$. Finally, dividing both sides of the equation by 12 yields $x = 2$.

Alternatively, since $\frac{7}{9}x - \frac{4}{9}x = \frac{3}{9}x = \frac{1}{3}x$ and $\frac{1}{4} + \frac{5}{12} = \frac{3}{12} + \frac{5}{12} = \frac{8}{12} = \frac{2}{3}$, the given equation simplifies to $\frac{1}{3}x = \frac{2}{3}$. Multiplying each side of $\frac{1}{3}x = \frac{2}{3}$ by 3 yields $x = 2$.

QUESTION 18

The correct answer is 105. Since $180 - z = 2y$ and $y = 75$, it follows that $180 - z = 150$, and so $z = 30$. Thus, each of the base angles of the isosceles triangle on the right has measure $\frac{180^\circ - 30^\circ}{2} = 75^\circ$. Therefore, the measure of the angle marked x° is $180^\circ - 75^\circ = 105^\circ$, and so the value of x is 105.

QUESTION 19

The correct answer is 370. A system of equations can be used where h represents the number of calories in a hamburger and f represents the number of calories in an order of fries. The equation $2h + 3f = 1700$ represents the fact that 2 hamburgers and 3 orders of fries contain a total of 1700 calories, and the equation $h = f + 50$ represents the fact

that one hamburger contains 50 more calories than an order of fries. Substituting $f + 50$ for h in $2h + 3f = 1700$ gives $2(f + 50) + 3f = 1700$. This equation can be solved as follows:

$$2f + 100 + 3f = 1700$$

$$5f + 100 = 1700$$

$$5f = 1600$$

$$f = 320$$

The number of calories in an order of fries is 320, so the number of calories in a hamburger is 50 more than 320, or 370.

QUESTION 20

The correct answer is $\frac{3}{5}$ or .6. Triangle ABC is a right triangle with its right angle at B . Thus, \overline{AC} is the hypotenuse of right triangle ABC , and \overline{AB} and \overline{BC} are the legs of right triangle ABC . By the Pythagorean theorem, $AB = \sqrt{20^2 - 16^2} = \sqrt{400 - 256} = \sqrt{144} = 12$. Since triangle DEF is similar to triangle ABC , with vertex F corresponding to vertex C , the measure of angle F equals the measure of angle C . Thus, $\sin F = \sin C$. From the side lengths of triangle ABC , $\sin C = \frac{\text{opposite side}}{\text{hypotenuse}} = \frac{AB}{AC} = \frac{12}{20} = \frac{3}{5}$. Therefore, $\sin F = \frac{3}{5}$. Either $\frac{3}{5}$ or its decimal equivalent, .6, may be gridded as the correct answer.

Section 4: Math Test – Calculator

QUESTION 1

Choice C is correct. Marilyn's distance from her campsite remained the same during the time she ate lunch. This is represented by a horizontal segment in the graph. The only horizontal segment in the graph starts at a time of about 1:10 P.M. and ends at about 1:40 P.M. Therefore, Marilyn finished her lunch and continued her hike at about 1:40 P.M.

Choices A, B, and D are incorrect and may be the result of a misinterpretation of the graph. For example, choice B is the time Marilyn started her lunch, and choice D is the time Marilyn was at the maximum distance from her campsite.

QUESTION 2

Choice B is correct. Of the 25 people who entered the contest, there are 8 females under age 40 and 2 males age 40 or older. Because there is no overlap in the categories, the probability that the contest winner will be either a female under age 40 or a male age 40 or older is

$$\frac{8}{25} + \frac{2}{25} = \frac{10}{25}.$$

Choice A is incorrect and may be the result of dividing 8 by 2, instead of adding 8 to 2, to find the probability. Choice C is incorrect; it is the probability that the contest winner will be either a female under

QUESTION 30

Choice A is correct. Subtracting the sides of $3y + c = 5y - 7$ from the corresponding sides of $3x + b = 5x - 7$ gives $(3x - 3y) + (b - c) = (5x - 5y) + (-7 - (-7))$. Since $b = c - \frac{1}{2}$, or $b - c = -\frac{1}{2}$, it follows that $(3x - 3y) + \left(-\frac{1}{2}\right) = (5x - 5y)$. Solving this equation for x in terms of y gives $x = y - \frac{1}{4}$. Therefore, x is y minus $\frac{1}{4}$.

Choices B, C, and D are incorrect and may be the result of making a computational error when solving the equations for x in terms of y .

QUESTION 31

The correct answer is either 4 or 5. Because each student ticket costs \$2 and each adult ticket costs \$3, the total amount, in dollars, that Chris spends on x student tickets and 1 adult ticket is $2(x) + 3(1)$. Because Chris spends at least \$11 but no more than \$14 on the tickets, one can write the compound inequality $2x + 3 \geq 11$ and $2x + 3 \leq 14$. Subtracting 3 from each side of both inequalities and then dividing each side of both inequalities by 2 yields $x \geq 4$ and $x \leq 5.5$. Thus, the value of x must be an integer that is both greater than or equal to 4 and less than or equal to 5.5. Therefore, $x = 4$ or $x = 5$. Either 4 or 5 may be gridded as the correct answer.

QUESTION 32

The correct answer is 58.6. The mean of a data set is determined by calculating the sum of the values and dividing by the number of values in the data set. The sum of the ages, in years, in the data set is 703, and the number of values in the data set is 12. Thus, the mean of the ages, in years, of the first 12 United States presidents at the beginning of their terms is $\frac{703}{12}$. The question asks for an answer rounded to the nearest tenth, so the decimal equivalent, rounded to the nearest tenth, is the correct answer. This rounded decimal equivalent is 58.6.

QUESTION 33

The correct answer is 9. To rewrite the difference $(-3x^2 + 5x - 2) - 2(x^2 - 2x - 1)$ in the form $ax^2 + bx + c$, the expression can be simplified by using the distributive property and combining like terms as follows:

$$\begin{aligned} & -3x^2 + 5x - 2 - (2x^2 - 4x - 2) \\ & -3x^2 - 2x^2 + (5x - (-4x)) + (-2 - (-2)) \\ & -5x^2 + 9x + 0 \end{aligned}$$

The coefficient of x is the value of b , which is 9.

Alternatively, since b is the coefficient of x in the difference $-3x^2 + 5x - 2 - 2(x^2 - 2x - 1)$, one need only compute the x -term in the difference. The x -term is $5x - 2(-2x) = 5x + 4x = 9x$, so the value of b is 9.

QUESTION 34

The correct answer is $\frac{5}{8}$ or .625. A complete rotation around a point is 360° or 2π radians. Since the central angle AOB has measure $\frac{5\pi}{4}$ radians, it represents $\frac{\frac{5\pi}{4}}{2\pi} = \frac{5}{8}$ of a complete rotation around point O . Therefore, the sector formed by central angle AOB has area equal to $\frac{5}{8}$ the area of the entire circle. Either the fraction $5/8$ or its decimal equivalent, .625, may be gridded as the correct answer.

QUESTION 35

The correct answer is 50. The mean of a data set is the sum of the values in the data set divided by the number of values in the data set. The mean of 75 is obtained by finding the sum of the first 10 ratings and dividing by 10. Thus, the sum of the first 10 ratings was 750. In order for the mean of the first 20 ratings to be at least 85, the sum of the first 20 ratings must be at least $(85)(20) = 1700$. Therefore, the sum of the next 10 ratings must be at least $1700 - 750 = 950$. The maximum rating is 100, so the maximum possible value of the sum of the 12th through 20th ratings is $9 \times 100 = 900$. Therefore, for the store to be able to have an average of at least 85 for the first 20 ratings, the least possible value for the 11th rating is $950 - 900 = 50$.

QUESTION 36

The correct answer is 750. The inequalities $y \leq -15x + 3000$ and $y \leq 5x$ can be graphed in the xy -plane. They are represented by the lower half-planes with the boundary lines $y = -15x + 3000$ and $y = 5x$, respectively. The solution set of the system of inequalities will be the intersection of these half-planes, including the boundary lines, and the solution (a, b) with the greatest possible value of b will be the point of intersection of the boundary lines. The intersection of boundary lines of these inequalities can be found by substituting $5x$ for y in the equation for the first line: $5x = -15x + 3000$, which has solution $x = 150$. Thus, the x -coordinate of the point of intersection is 150. Therefore, the y -coordinate of the point of intersection of the boundary lines is $5(150) = -15(150) + 3000 = 750$. This is the maximum possible value of b for a point (a, b) that is in the solution set of the system of inequalities.

QUESTION 37

The correct answer is 7. The average number of shoppers, N , in the checkout line at any time is $N = rt$, where r is the number of shoppers entering the checkout line per minute and T is the average number of minutes each shopper spends in the checkout line. Since 84 shoppers per hour make a purchase, 84 shoppers per hour enter the checkout line. This needs to be converted to the number of

shoppers per minute. Since there are 60 minutes in one hour, the rate is $\frac{84 \text{ shoppers}}{60 \text{ minutes}} = 1.4$ shoppers per minute. Using the given formula with $r = 1.4$ and $t = 5$ yields $N = rt = (1.4)(5) = 7$. Therefore, the average number of shoppers, N , in the checkout line at any time during business hours is 7.

QUESTION 38

The correct answer is 60. The estimated average number of shoppers in the original store at any time is 45. In the new store, the manager estimates that an average of 90 shoppers per hour enter the store, which is equivalent to 1.5 shoppers per minute. The manager also estimates that each shopper stays in the store for an average of 12 minutes. Thus, by Little's law, there are, on average, $N = rt = (1.5)(12) = 18$ shoppers in the new store at any time. This is $\frac{45 - 18}{45} \times 100 = 60$ percent less than the average number of shoppers in the original store at any time.