Choices B and C are incorrect because placing a colon before or after “such as” would create an error in sentence structure: a colon must be preceded by an independent clause. Choice D is incorrect because no comma is necessary here.

QUESTION 43

Choice A is the best answer because the transitional phrase “for example” appropriately indicates that the Help Me Investigate project discussed in the sentence is an example of the use of social media mentioned in the previous sentence.

Choices B, C, and D are incorrect because neither “therefore,” “however,” nor “in any case” indicates the true relationship between this and the previous sentence. The Help Me Investigate project discussed in the current sentence is an example of the use of social media mentioned in the previous sentence.

QUESTION 44

Choice C is the best answer because the full subject of the independent clause, “the advent of the digital age,” directly follows the dependent clause that introduces it.

Choices A, B, and D are incorrect because the subjects of their independent clauses do not directly follow the introductory dependent clause. “Far from marking the end of investigative journalism” refers to the “advent of the digital age,” not to “cooperation among journalists” (choice A) or “the number of potential investigators” (choice B). In choice D, an interrupting phrase (“by facilitating cooperation among journalists and ordinary citizens”) separates the subject from the dependent clause that modifies it.

Section 3: Math Test - No Calculator

QUESTION 1

Choice D is correct. From the graph, the *y*-intercept of line ℓ is (0, 1). The line also passes through the point (1, 2). Therefore the slope of the line is $\frac{2-1}{1-0}=\frac{1}{1}=1$, and in slope-intercept form, the equation for line ℓ is $y = x + 1$.

Choice A is incorrect. It is the equation of the vertical line that passes through the point (1, 0). Choice B is incorrect. It is the equation of the horizontal line that passes through the point (0, 1). Choice C is incorrect. The line defined by this equation has *y*-intercept (0, 0), whereas line ℓ has *y*-intercept (0, 1).

QUESTION 2

Choice A is correct. A circle has 360 degrees of arc. In the circle shown, *O* is the center of the circle and angle *AOC* is a central angle of the circle. From the figure, the two diameters that meet to form angle *AOC* are perpendicular, so the measure of angle *AOC* is 90°. This central angle intercepts minor arc *AC*, meaning minor arc *AC* has 90° of arc. Since the circumference (length) of the entire circle is 36, the length of minor arc *AC* is $\frac{90}{360} \times 36 = 9$.

Choices B, C, and D are incorrect. The perpendicular diameters divide the circumference of the circle into four equal arcs; therefore, minor arc *AC* is $\frac{1}{4}$ of the circumference. However, the lengths in choices B and C are, respectively, $\frac{1}{3}$ and $\frac{1}{2}$ the circumference of the circle, and the length in choice D is the length of the entire circumference. None of these lengths is $\frac{1}{4}$ the circumference.

QUESTION 3

Choice B is correct. Dividing both sides of the quadratic equation $4x^2 - 8x - 12 = 0$ by 4 yields $x^2 - 2x - 3 = 0$. The equation $x^2 - 2x - 3 = 0$ can be factored as $(x + 1)(x - 3) = 0$. This equation is true when $x + 1 = 0$ or $x - 3 = 0$. Solving for x gives the solutions to the original quadratic equation: $x = -1$ and $x = 3$.

Choices A and C are incorrect because −3 is not a solution of $4x^2 - 8x - 12 = 0$: $4(-3)^2 - 8(-3) - 12 = 36 + 24 - 12 \neq 0$. Choice D is incorrect because 1 is not a solution of $4x^2 - 8x - 12 = 0$: $4(1)^2 - 8(1) - 12 = 4 - 8 - 12 \neq 0$.

QUESTION 4

Choice C is correct. If f is a function of x, then the graph of f in the xy-plane consists of all points $(x, f(x))$. An x-intercept is where the graph intersects the x-axis; since all points on the x-axis have y-coordinate 0, the graph of f will cross the x-axis at values of x such that $f(x) = 0$. Therefore, the graph of a function f will have no x-intercepts if and only if f has no real zeros. Likewise, the graph of a quadratic function with no real zeros will have no x-intercepts.

Choice A is incorrect. The graph of a linear function in the xy-plane whose rate of change is not zero is a line with a nonzero slope. The x-axis is a horizontal line and thus has slope 0, so the graph of the linear function whose rate of change is not zero is a line that is not parallel to the x-axis. Thus, the graph must intersect the x-axis at some point, and this point is an x-intercept of the graph. Choices B and D are incorrect because the graph of any function with a real zero must have an x-intercept.

QUESTION 5

Choice D is correct. If $x = 9$ in the equation $\sqrt{k+2} - x = 0$, this equation becomes $\sqrt{k+2} - 9 = 0$, which can be rewritten as $\sqrt{k+2} = 9$. Squaring each side of $\sqrt{k+2} = 9$ gives $k + 2 = 81$, or $k = 79$. Substituting $k = 79$ into the equation $\sqrt{k+2} - 9 = 0$ confirms this is the correct value for k.

Choices A, B, and C are incorrect because substituting any of these values for k in the equation $\sqrt{k+2} - 9 = 0$ gives a false statement. For example, if $k = 7$, the equation becomes $\sqrt{7+2} - 9 = \sqrt{9} - 9 = 3 - 9 = 0$, which is false.

QUESTION 6

Choice A is correct. The sum of $(a^2 - 1)$ and $(a + 1)$ can be rewritten as $(a^2 - 1) + (a + 1)$, or $a^2 - 1 + a + 1$, which is equal to $a^2 + a + 0$. Therefore, the sum of the two expressions is equal to $a^2 + a$.

Choices B and D are incorrect. Since neither of the two expressions has a term with a^3, the sum of the two expressions cannot have the term a^3 when simplified. Choice C is incorrect. This choice may result from mistakenly adding the terms a^2 and a to get $2a^2$.

QUESTION 7

Choice C is correct. If Jackie works x hours as a tutor, which pays \$12 per hour, she earns $12x$ dollars. If Jackie works y hours as a lifeguard, which pays \$9.50 per hour, she earns $9.5y$ dollars. Thus the total, in dollars, Jackie earns in a week that she works x hours as a tutor and y hours as a lifeguard is $12x + 9.5y$. Therefore, the condition that Jackie wants to earn at least \$220 is represented by the inequality $12x + 9.5y \geq 220$. The condition that Jackie can work no more than 20 hours per week is represented by the inequality $x + y \leq 20$. These two inequalities form the system shown in choice C.

Choice A is incorrect. This system represents the conditions that Jackie earns no more than \$220 and works at least 20 hours. Choice B is incorrect. The first inequality in this system represents the condition that Jackie earns no more than \$220. Choice D is incorrect. The second inequality in this system represents the condition that Jackie works at least 20 hours.

QUESTION 8

Choice A is correct. The constant term 331.4 in $S(T) = 0.6T + 331.4$ is the value of S when $T = 0$. The value $T = 0$ corresponds to a temperature of 0°C. Since $S(T)$ represents the speed of sound, 331.4 is the speed of sound, in meters per second, when the temperature is 0°C.

Choice B is incorrect. When $T = 0.6$°C, $S(T) = 0.6(0.6) + 331.4 = 331.76$, not 331.4, meters per second. Choice C is incorrect. Based on the given formula, the speed of sound increases by 0.6 meters per second for every increase of temperature by 1°C, as shown by the equation $0.6(T + 1) + 331.4 = (0.6T + 331.4) + 0.6$. Choice D is incorrect. An increase in the speed of sound, in meters per second, that corresponds to an increase of 0.6°C is $0.6(0.6) = 0.36$.

QUESTION 9

Choice A is correct. Substituting x^2 for y in the second equation gives $2(x^2) + 6 = 2(x + 3)$. This equation can be solved as follows:

$2x^2 + 6 = 2x + 6$ (Apply the distributive property.)

$2x^2 + 6 - 2x - 6 = 0$ (Subtract $2x$ and 6 from both sides of the equation.)

$2x^2 - 2x = 0$ (Combine like terms.)

$2x(x - 1) = 0$ (Factor both terms on the left side of the equation by $2x$.)

Thus, $x = 0$ and $x = 1$ are the solutions to the system. Since $x > 0$, only $x = 1$ needs to be considered. The value of y when $x = 1$ is $y = x^2 = 1^2 = 1$. Therefore, the value of xy is $(1)(1) = 1$.

Choices B, C, and D are incorrect and likely result from a computational or conceptual error when solving this system of equations.

QUESTION 10

Choice B is correct. Substituting $a^2 + b^2$ for z and ab for y into the expression $4z + 8y$ gives $4(a^2 + b^2) + 8ab$. Multiplying $a^2 + b^2$ by 4 gives $4a^2 + 4b^2 + 8ab$, or equivalently $4(a^2 + 2ab + b^2)$. Since $(a^2 + 2ab + b^2) = (a + b)^2$, it follows that $4z + 8y$ is equivalent to $(2a + 2b)^2$.

Choices A, C, and D are incorrect and likely result from errors made when substituting or factoring.

QUESTION 11

Choice C is correct. The volume of right circular cylinder A is given by the expression $\pi r^2 h$, where r is the radius of its circular base and h is its height. The volume of a cylinder with twice the radius and half the height of cylinder A is given by $\pi(2r)^2(\frac{1}{2})h$, which is equivalent to $4\pi r^2(\frac{1}{2})h = 2\pi r^2 h$. Therefore, the volume is twice the volume of cylinder A, or $2 \times 22 = 44$.

Choice A is incorrect and likely results from not multiplying the radius of cylinder A by 2. Choice B is incorrect and likely results from not squaring the 2 in $2r$ when applying the volume formula. Choice D is incorrect and likely results from a conceptual error.

QUESTION 12

Choice D is correct. Since 9 can be rewritten as 3^2, $9^{\frac{3}{4}}$ is equivalent to $3^{2^{(\frac{3}{4})}}$. Applying the properties of exponents, this can be written as $3^{\frac{3}{2}}$, which can further be rewritten as $3^{\frac{2}{2}}(3^{\frac{1}{2}})$, an expression that is equivalent to $3\sqrt{3}$.

Choices A is incorrect; it is equivalent to $9^{\frac{1}{3}}$. Choice B is incorrect; it is equivalent to $9^{\frac{1}{4}}$. Choice C is incorrect; it is equivalent to $3^{\frac{1}{2}}$.

QUESTION 13

Choice B is correct. When n is increased by 1, t increases by the coefficient of n, which is 1.

Choices A, C, and D are incorrect and likely result from a conceptual error when interpreting the equation.

QUESTION 14

Choice C is correct. The graph of $y = -f(x)$ is the graph of the equation $y = -(2^x + 1)$, or $y = -2^x - 1$. This should be the graph of a decreasing exponential function. The y-intercept of the graph can be found by substituting the value $x = 0$ into the equation, as follows: $y = -2^0 - 1 = -1 - 1 = -2$. Therefore, the graph should pass through the point $(0, -2)$. Choice C is the only function that passes through this point.

Choices A and B are incorrect because the graphed functions are increasing instead of decreasing. Choice D is incorrect because the function passes through the point $(0, -1)$ instead of $(0, -2)$.

QUESTION 15

Choice D is correct. Since gasoline costs \$4 per gallon, and since Alan's car travels an average of 25 miles per gallon, the expression $\frac{4}{25}$ gives the cost, in dollars per mile, to drive the car. Multiplying $\frac{4}{25}$ by *m* gives the cost for Alan to drive *m* miles in his car. Alan wants to reduce his weekly spending by \$5, so setting $\frac{4}{25}m$ equal to 5 gives the number of miles, *m*, by which he must reduce his driving.

Choices A, B, and C are incorrect. Choices A and B transpose the numerator and the denominator in the fraction. The fraction $\frac{25}{4}$ would result in the unit miles per dollar, but the question requires a unit of dollars per mile. Choices A and C set the expression equal to 95 instead of 5, a mistake that may result from a misconception that Alan wants to reduce his driving by 5 miles each week; instead, the question says he wants to reduce his weekly expenditure by \$5.

QUESTION 16

The correct answer is 4. The equation $60h + 10 \leq 280$, where *h* is the number of hours the boat has been rented, can be written to represent the situation. Subtracting 10 from both sides and then dividing by 60 yields $h \leq 4.5$. Since the boat can be rented only for whole numbers of hours, the maximum number of hours for which Maria can rent the boat is 4.

QUESTION 17

The correct answer is $\frac{6}{5}$, or 1.2. To solve the equation $2(p + 1) + 8(p - 1) = 5p$, first distribute the terms outside the parentheses to the terms inside the parentheses: $2p + 2 + 8p - 8 = 5p$. Next, combine like terms on the left side of the equal sign: $10p - 6 = 5p$. Subtracting $10p$ from both sides yields $-6 = -5p$. Finally, dividing both sides by -5 gives $p = \frac{6}{5} = 1.2$. Either 6/5 or 1.2 can be gridded as the correct answer.

QUESTION 18

The correct answer is $\frac{21}{4}$, or 5.25. Use substitution to create a one-variable equation that can be solved for *x*. The second equation gives that $y = 2x$. Substituting $2x$ for *y* in the first equation gives $\frac{1}{2}(2x + 2x) = \frac{21}{2}$. Dividing both sides of this equation by $\frac{1}{2}$ yields $(2x + 2x) = 21$. Combining like terms results in $4x = 21$. Finally, dividing both sides by 4 gives $x = \frac{21}{4} = 5.25$. Either 21/4 or 5.25 can be gridded as the correct answer.

QUESTION 19

The correct answer is 2. The given expression can be rewritten as $\frac{2x+6}{(x+2)^2} - \frac{2x+4}{(x+2)^2}$, which is equivalent to $\frac{2x+6-2x-4}{(x+2)^2}$, or $\frac{2}{(x+2)^2}$. This is in the form $\frac{a}{(x+2)^2}$; therefore, $a = 2$.

QUESTION 20

The correct answer is 97. The intersecting lines form a triangle, and the angle with measure of $x°$ is an exterior angle of this triangle. The measure of an exterior angle of a triangle is equal to the sum of the measures of the two nonadjacent interior angles of the triangle. One of these angles has measure of 23° and the other, which is supplementary to the angle with measure 106°, has measure of 180° − 106° = 74°. Therefore, the value of x is 23 + 74 = 97.

Section 4: Math Test - Calculator

QUESTION 1

Choice D is correct. The change in the number of 3-D movies released between any two consecutive years can be found by first estimating the number of 3-D movies released for each of the two years and then finding the positive difference between these two estimates. Between 2003 and 2004, this change is approximately 2 − 2 = 0 movies; between 2008 and 2009, this change is approximately 20 − 8 = 12 movies; between 2009 and 2010, this change is approximately 26 − 20 = 6 movies; and between 2010 and 2011, this change is approximately 46 − 26 = 20 movies. Therefore, of the pairs of consecutive years in the choices, the greatest increase in the number of 3-D movies released occurred during the time period between 2010 and 2011.

Choices A, B, and C are incorrect. Between 2010 and 2011, approximately 20 more 3-D movies were released. The change in the number of 3-D movies released between any of the other pairs of consecutive years is significantly smaller than 20.

QUESTION 2