829925

The SAT®

Practice Test #2

Make time to take the practice test. It is one of the best ways to get ready for the SAT.

After you have taken the practice test, score it right away at **sat.org/scoring**.

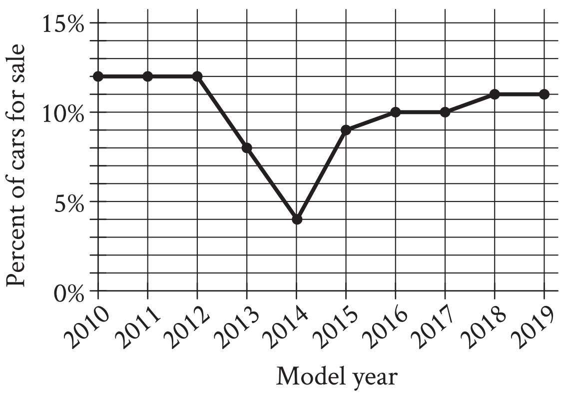
This version of the SAT Practice Test is for students who will be taking the digital SAT in nondigital format.

CollegeBoard SAT®

6TSL03

1

The line graph shows the percent of cars for sale at a used car lot on a given day by model year.



For what model year is the percent of cars for sale the smallest?

A) 2012
B) 2013
C) 2014
D) 2015

2

For a particular machine that produces beads, 29 out of every 100 beads it produces have a defect. A bead produced by the machine will be selected at random. What is the probability of selecting a bead that has a defect?

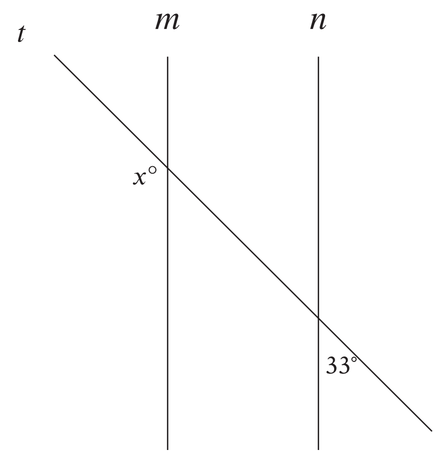
A) $\frac{1}{2{,}900}$

B) $\frac{1}{29}$

C) $\frac{29}{100}$

D) $\frac{29}{10}$

3

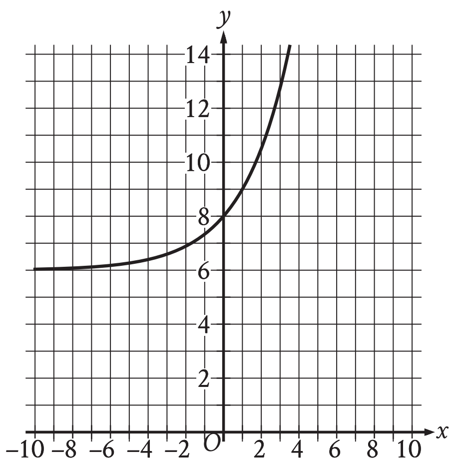


Note: Figure not drawn to scale.

In the figure, line m is parallel to line n, and line t intersects both lines. What is the value of x ?

A) 33
B) 57
C) 123
D) 147

4



What is the y-intercept of the graph shown?

A) $(-8, 0)$
B) $(-6, 0)$
C) $(0, 6)$
D) $(0, 8)$

5

The total cost $f(x)$, in dollars, to lease a car for 36 months from a particular car dealership is given by $f(x) = 36x + 1{,}000$, where x is the monthly payment, in dollars. What is the total cost to lease a car when the monthly payment is \$400?

A) \$13,400
B) \$13,000
C) \$15,400
D) \$37,400

6

Each side of a square has a length of 45. What is the perimeter of this square?

7

$$\frac{55}{x+6} = x$$

What is the positive solution to the given equation?

8

An object travels at a constant speed of 12 centimeters per second. At this speed, what is the time, in seconds, that it would take for the object to travel 108 centimeters?

A) 9
B) 96
C) 120
D) 972

9

Data set X: 5, 9, 9, 13
Data set Y: 5, 9, 9, 13, 27

The lists give the values in data sets X and Y. Which statement correctly compares the mean of data set X and the mean of data set Y?

A) The mean of data set X is greater than the mean of data set Y.
B) The mean of data set X is less than the mean of data set Y.
C) The means of data set X and data set Y are equal.
D) There is not enough information to compare the means.

10

A rocket contained 467,000 kilograms (kg) of propellant before launch. Exactly 21 seconds after launch, 362,105 kg of this propellant remained. On average, approximately how much propellant, in kg, did the rocket burn each second after launch?

A) 4,995
B) 17,243
C) 39,481
D) 104,895

11

If $4x + 2 = 12$, what is the value of $16x + 8$?

A) 40
B) 48
C) 56
D) 60

12

An object is kicked from a platform. The equation $h = -4.9t^2 + 7t + 9$ represents this situation, where h is the height of the object above the ground, in meters, t seconds after it is kicked. Which number represents the height, in meters, from which the object was kicked?

A) 0
B) 4.9
C) 7
D) 9

13

$$f(x) = 4x^2 - 50x + 126$$

The given equation defines the function f. For what value of x does $f(x)$ reach its minimum?

14

A small business owner budgets \$2,200 to purchase candles. The owner must purchase a minimum of 200 candles to maintain the discounted pricing. If the owner pays \$4.90 per candle to purchase small candles and \$11.60 per candle to purchase large candles, what is the maximum number of large candles the owner can purchase to stay within the budget and maintain the discounted pricing?

15

In the linear function f, $f(0) = 8$ and $f(1) = 12$. Which equation defines f ?

A) $f(x) = 12x + 8$

B) $f(x) = 4x$

C) $f(x) = 4x + 12$

D) $f(x) = 4x + 8$

16

The function $f(w) = 6w^2$ gives the area of a rectangle, in square feet (ft^2), if its width is w ft and its length is 6 times its width. Which of the following is the best interpretation of $f(14) = 1{,}176$?

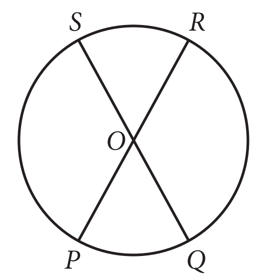
A) If the width of the rectangle is 14 ft, then the area of the rectangle is 1,176 ft^2.

B) If the width of the rectangle is 14 ft, then the length of the rectangle is 1,176 ft.

C) If the width of the rectangle is 1,176 ft, then the length of the rectangle is 14 ft.

D) If the width of the rectangle is 1,176 ft, then the area of the rectangle is 14 ft^2.

17



Note: Figure not drawn to scale.

The circle shown has center O, circumference 144π, and diameters $\overline{PR}$ and $\overline{QS}$. The length of arc PS is twice the length of arc PQ. What is the length of arc QR ?

A) 24π

B) 48π

C) 72π

D) 96π

18

A company that provides whale-watching tours takes groups of 21 people at a time. The company's revenue is 80 dollars per adult and 60 dollars per child. If the company's revenue for one group consisting of adults and children was 1,440 dollars, how many people in the group were children?

A) 3

B) 9

C) 12

D) 18

19

The function h is defined by $h(x) = 4x + 28$. The graph of $y = h(x)$ in the xy-plane has an x-intercept at $(a, 0)$ and a y-intercept at $(0, b)$, where a and b are constants. What is the value of $a + b$?

A) 21
B) 28
C) 32
D) 35

20

One of the factors of $2x^3 + 42x^2 + 208x$ is $x + b$, where b is a positive constant. What is the smallest possible value of b ?

21

$$y = -1.5$$
$$y = x^2 + 8x + a$$

In the given system of equations, a is a positive constant. The system has exactly one distinct real solution. What is the value of a ?

22

$$f(x) = (x + 6)(x + 5)(x - 4)$$

The function f is given. Which table of values represents $y = f(x) - 3$?

A)

x	y
−6	−9
−5	−8
4	1

B)

x	y
−6	−3
−5	−3
4	−3

C)

x	y
−6	−3
−5	−2
4	7

D)

x	y
−6	3
−5	3
4	3

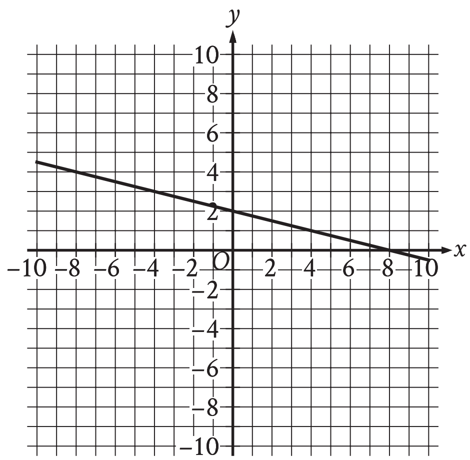
23

For the function q, the value of $q(x)$ decreases by 45% for every increase in the value of x by 1. If $q(0) = 14$, which equation defines q ?

A) $q(x) = 0.55(14)^x$
B) $q(x) = 1.45(14)^x$
C) $q(x) = 14(0.55)^x$
D) $q(x) = 14(1.45)^x$

CONTINUE

24



The graph of $y = f(x) + 14$ is shown. Which equation defines function f?

A) $f(x) = -\frac{1}{4}x - 12$

B) $f(x) = -\frac{1}{4}x + 16$

C) $f(x) = -\frac{1}{4}x + 2$

D) $f(x) = -\frac{1}{4}x - 14$

25

$RS = 20$
$ST = 48$
$TR = 52$

The side lengths of right triangle RST are given. Triangle RST is similar to triangle UVW, where S corresponds to V and T corresponds to W. What is the value of $\tan W$?

A) $\frac{5}{13}$

B) $\frac{5}{12}$

C) $\frac{12}{13}$

D) $\frac{12}{5}$

26

One gallon of paint will cover 220 square feet of a surface. A room has a total wall area of w square feet. Which equation represents the total amount of paint P, in gallons, needed to paint the walls of the room twice?

A) $P = \frac{w}{110}$

B) $P = 440w$

C) $P = \frac{w}{220}$

D) $P = 220w$

27

The number a is 110% greater than the number b. The number b is 90% less than 47. What is the value of a ?

STOP

If you finish before time is called, you may check your work on this module only.
Do not turn to any other module in the test.

1

There are 55 students in Spanish club. A sample of the Spanish club students was selected at random and asked whether they intend to enroll in a new study program. Of those surveyed, 20% responded that they intend to enroll in the study program. Based on this survey, which of the following is the best estimate of the total number of Spanish club students who intend to enroll in the study program?

A) 11

B) 20

C) 44

D) 55

2

Jay walks at a speed of 3 miles per hour and runs at a speed of 5 miles per hour. He walks for w hours and runs for r hours for a combined total of 14 miles. Which equation represents this situation?

A) $3w + 5r = 14$

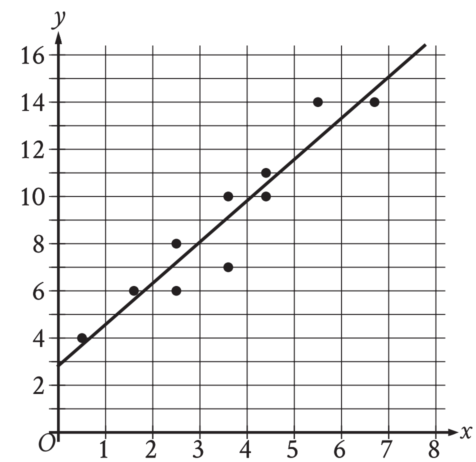
B) $\frac{1}{3}w + \frac{1}{5}r = 14$

C) $\frac{1}{3}w + \frac{1}{5}r = 112$

D) $3w + 5r = 112$

3

The scatterplot shows the relationship between two variables, x and y. A line of best fit is also shown.



Which of the following equations best represents the line of best fit shown?

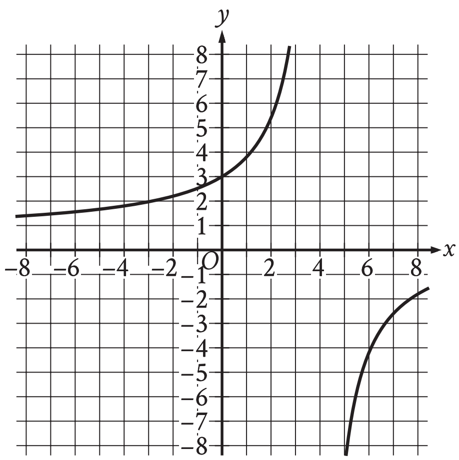
A) $y = 2.8 + 1.7x$

B) $y = 2.8 - 1.7x$

C) $y = -2.8 + 1.7x$

D) $y = -2.8 - 1.7x$

4



The graph of $y = f(x)$ is shown in the xy-plane. What is the value of $f(0)$?

A) -3

B) 0

C) $\frac{3}{5}$

D) 3

5

Which expression is equivalent to $(m^4q^4z^{-1})(mq^5z^3)$, where m, q, and z are positive?

A) $m^4q^{20}z^{-3}$

B) $m^5q^9z^2$

C) $m^6q^8z^{-1}$

D) $m^{20}q^{12}z^{-2}$

6

73, 74, 75, 77, 79, 82, 84, 85, 91

What is the median of the data shown?

7

$$x + 40 = 95$$

What value of x is the solution to the given equation?

8

$$5x = 15$$
$$-4x + y = -2$$

The solution to the given system of equations is (x, y). What is the value of $x + y$?

A) -17

B) -13

C) 13

D) 17

9

$$g(m) = -0.05m + 12.1$$

The given function g models the number of gallons of gasoline that remains from a full gas tank in a car after driving m miles. According to the model, about how many gallons of gasoline are used to drive each mile?

A) 0.05

B) 12.1

C) 20

D) 242.0

10

$$\frac{1}{7b} = \frac{11x}{y}$$

The given equation relates the positive numbers b, x, and y. Which equation correctly expresses x in terms of b and y ?

A) $x = \frac{7by}{11}$

B) $x = y - 77b$

C) $x = \frac{y}{77b}$

D) $x = 77by$

11

$$y = 76$$
$$y = x^2 - 5$$

The graphs of the given equations in the xy-plane intersect at the point (x, y). What is a possible value of x ?

A) $-\frac{76}{5}$

B) -9

C) 5

D) 76

12

$$y > 14$$
$$4x + y < 18$$

The point $(x, 53)$ is a solution to the system of inequalities in the xy-plane. Which of the following could be the value of x ?

A) -9

B) -5

C) 5

D) 9

CONTINUE

13

Out of 300 seeds that were planted, 80% sprouted. How many of these seeds sprouted?

14

The function f is defined by $f(x) = 4x$. For what value of x does $f(x) = 8$?

15

Which expression is equivalent to

$\frac{8x(x-7)-3(x-7)}{2x-14}$, where $x > 7$?

A) $\frac{x-7}{5}$

B) $\frac{8x-3}{2}$

C) $\frac{8x^2-3x-14}{2x-14}$

D) $\frac{8x^2-3x-77}{2x-14}$

16

Line p is defined by $2y + 18x = 9$. Line r is perpendicular to line p in the xy-plane. What is the slope of line r ?

A) -9

B) $-\frac{1}{9}$

C) $\frac{1}{9}$

D) 9

17

$$f(t) = 8{,}000(0.65)^t$$

The given function f models the number of coupons a company sent to their customers at the end of each year, where t represents the number of years since the end of 1998, and $0 \le t \le 5$. If $y = f(t)$ is graphed in the ty-plane, which of the following is the best interpretation of the y-intercept of the graph in this context?

A) The minimum estimated number of coupons the company sent to their customers during the 5 years was 1,428.

B) The minimum estimated number of coupons the company sent to their customers during the 5 years was 8,000.

C) The estimated number of coupons the company sent to their customers at the end of 1998 was 1,428.

D) The estimated number of coupons the company sent to their customers at the end of 1998 was 8,000.

18

Triangle XYZ is similar to triangle RST such that X, Y, and Z correspond to R, S, and T, respectively. The measure of $\angle Z$ is $20°$ and $2XY = RS$. What is the measure of $\angle T$?

A) $2°$
B) $10°$
C) $20°$
D) $40°$

19

$$y = 6x + 18$$

One of the equations in a system of two linear equations is given. The system has no solution. Which equation could be the second equation in the system?

A) $-6x + y = 18$
B) $-6x + y = 22$
C) $-12x + y = 36$
D) $-12x + y = 18$

20

What is the area, in square centimeters, of a rectangle with a length of 34 centimeters (cm) and a width of 29 cm?

21

$$y = 4x + 1$$
$$4y = 15x - 8$$

The solution to the given system of equations is (x, y). What is the value of $x - y$?

22

$$5x^2 + 10x + 16 = 0$$

How many distinct real solutions does the given equation have?

A) Exactly one
B) Exactly two
C) Infinitely many
D) Zero

23

A certain park has an area of 11,863,808 square yards. What is the area, in <u>square miles</u>, of this park? $(1 \text{ mile} = 1{,}760 \text{ yards})$

A) 1.96
B) 3.83
C) 3,444.39
D) 6,740.8

24

Which of the following equations represents a circle in the xy-plane that intersects the y-axis at exactly one point?

A) $(x-8)^2 + (y-8)^2 = 16$

B) $(x-8)^2 + (y-4)^2 = 16$

C) $(x-4)^2 + (y-9)^2 = 16$

D) $x^2 + (y-9)^2 = 16$

25

In triangles ABC and DEF, angles B and E each have measure 27° and angles C and F each have measure 41°. Which additional piece of information is sufficient to determine whether triangle ABC is congruent to triangle DEF ?

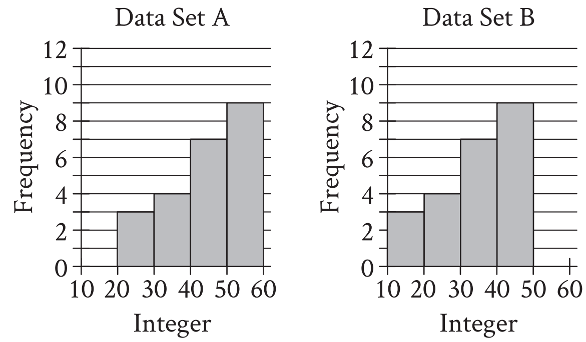
A) The measure of angle A

B) The length of side AB

C) The lengths of sides BC and EF

D) No additional information is necessary.

26



Two data sets of 23 integers each are summarized in the histograms shown. For each of the histograms, the first interval represents the frequency of integers greater than or equal to 10, but less than 20. The second interval represents the frequency of integers greater than or equal to 20, but less than 30, and so on. What is the smallest possible difference between the mean of data set A and the mean of data set B?

A) 0

B) 1

C) 10

D) 23

27

A right triangle has legs with lengths of 24 centimeters and 21 centimeters. If the length of this triangle's hypotenuse, in centimeters, can be written in the form $3\sqrt{d}$, where d is an integer, what is the value of d ?

STOP

If you finish before time is called, you may check your work on this module only.

Do not turn to any other module in the test.

Math

Module 1
(27 questions)

QUESTION 1

Choice C is correct. For the given line graph, the percent of cars for sale at a used car lot on a given day is represented on the vertical axis. The percent of cars for sale is the smallest when the height of the line graph is the lowest. The lowest height of the line graph occurs for cars with a model year of 2014.

Choice A is incorrect and may result from conceptual errors. *Choice B* is incorrect and may result from conceptual errors. *Choice D* is incorrect and may result from conceptual errors.

QUESTION 2

Choice C is correct. It's given that 29 out of every 100 beads that the machine produces have a defect. It follows that if the machine produces k beads, then the number of beads that have a defect is $\frac{29}{100}k$, for some constant k. If a bead produced by the machine will be selected at random, the probability of selecting a bead that has a defect is given by the number of beads with a defect, $\frac{29}{100}k$, divided by the number of beads produced by the machine, k. Therefore, the probability of selecting a bead that has a defect is $\frac{\frac{29}{100}k}{k}$, or $\frac{29}{100}$.

Choice A is incorrect and may result from conceptual or computational errors. *Choice B* is incorrect and may result from conceptual or computational errors. *Choice D* is incorrect and may result from conceptual or computational errors.

QUESTION 3

Choice D is correct. It's given that line m is parallel to line n, and line t intersects both lines. It follows that line t is a transversal. When two lines are parallel and intersected by a transversal, exterior angles on the same side of the transversal are supplementary. Thus, $x+33=180$. Subtracting 33 from both sides of this equation yields $x=147$. Therefore, the value of x is 147.

Choice A is incorrect and may result from conceptual or calculation errors.
Choice B is incorrect and may result from conceptual or calculation errors.
Choice C is incorrect and may result from conceptual or calculation errors.

QUESTION 4

Choice D is correct. The *y*-intercept of a graph in the *xy*-plane is the point at which the graph crosses the *y*-axis. The graph shown crosses the *y*-axis at the point $(0, 8)$. Therefore, the *y*-intercept of the graph shown is $(0, 8)$.

Choice A is incorrect and may result from conceptual or calculation errors.
Choice B is incorrect and may result from conceptual or calculation errors.
Choice C is incorrect and may result from conceptual or calculation errors.

QUESTION 5

Choice C is correct. It's given that $f(x)$ is the total cost, in dollars, to lease a car from this dealership with a monthly payment of x dollars. Therefore, the total cost, in dollars, to lease the car when the monthly payment is $\$400$ is represented by the value of $f(x)$ when $x=400$. Substituting 400 for x in the equation $f(x)=36x+1{,}000$ yields $f(400)=36(400)+1{,}000$, or $f(400)=15{,}400$. Thus, when the monthly payment is $\$400$, the total cost to lease a car is $\$15{,}400$.

Choice A is incorrect and may result from conceptual or calculation errors.
Choice B is incorrect and may result from conceptual or calculation errors.
Choice D is incorrect and may result from conceptual or calculation errors.

QUESTION 6

The correct answer is 180. The perimeter of a polygon is equal to the sum of the lengths of the sides of the polygon. It's given that each side of the square has a length of 45. Since a square is a polygon with 4 sides, the perimeter of this square is $45+45+45+45$, or 180.

QUESTION 7

The correct answer is 5. Multiplying both sides of the given equation by $x+6$ results in $55=x(x+6)$. Applying the distributive property of multiplication to the right-hand side of this equation results in $55=x^2+6x$. Subtracting 55 from both sides of this equation results in $0=x^2+6x-55$. The right-hand side of this equation can be rewritten by factoring. The two values that multiply to -55 and add to 6 are 11 and -5. It follows that the equation $0=x^2+6x-55$ can be rewritten as $0=(x+11)(x-5)$. Setting each factor equal to 0 yields two equations: $x+11=0$ and $x-5=0$. Subtracting 11 from both sides of the equation $x+11=0$ results in $x=-11$. Adding 5 to both sides of the equation $x-5=0$ results in $x=5$. Therefore, the positive solution to the given equation is 5.

QUESTION 8

Choice A is correct. If the object travels 108 centimeters at a speed of 12 centimeters per second, the time of travel can be determined by dividing the total distance by the speed. This results in $\frac{108 \text{ centimeters}}{12 \text{ centimeters/second}}$, which is 9 seconds.

Choice B is incorrect and may result from conceptual or calculation errors.
Choice C is incorrect and may result from conceptual or calculation errors.
Choice D is incorrect and may result from conceptual or calculation errors.

QUESTION 9

Choice B is correct. 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. It follows that the mean of data set X is $\frac{5+9+9+13}{4}$, or 9, and the mean of data set Y is $\frac{5+9+9+13+27}{5}$, or 12.6. Since 9 is less than 12.6, the mean of data set X is less than the mean of data set Y.

Alternate approach: Data set Y consists of the 4 values in data set X and one additional value, 27. Since the additional value, 27, is larger than any value in data set X, the mean of data set X is less than the mean of data set Y.

Choice A is incorrect and may result from conceptual or calculation errors.
Choice C is incorrect and may result from conceptual or calculation errors.
Choice D is incorrect and may result from conceptual or calculation errors.

QUESTION 10

Choice A is correct. It's given that the rocket contained $467{,}000$ kilograms (kg) of propellant before launch and had $362{,}105$ kg remaining exactly 21 seconds after launch. Finding the difference between the amount, in kg, of propellant before launch and the remaining amount, in kg, of propellant after launch gives the amount, in kg, of propellant burned during the 21 seconds: $467{,}000 - 362{,}105 = 104{,}895$. Dividing the amount of propellant burned by the number of seconds yields $\frac{104{,}895}{21} = 4{,}995$. Thus, an average of $4{,}995$ kg of propellant burned each second after launch.

Choice B is incorrect and may result from conceptual or calculation errors.
Choice C is incorrect and may result from conceptual or calculation errors.
Choice D is incorrect and may result from finding the amount of propellant burned, rather than the amount of propellant burned each second.

QUESTION 11

Choice B is correct. Multiplying both sides of the given equation by 4 yields $(4)(4x+2)=(4)(12)$, or $16x+8=48$. Therefore, the value of $16x+8$ is 48.

Choice A is incorrect and may result from conceptual or calculation errors.
Choice C is incorrect and may result from conceptual or calculation errors.
Choice D is incorrect and may result from conceptual or calculation errors.

QUESTION 12

Choice D is correct. It's given that the equation $h=-4.9t^2+7t+9$ represents this situation, where h is the height, in meters, of the object t seconds after it is kicked. It follows that the height, in meters, from which the object was kicked is the value of h when $t=0$. Substituting 0 for t in the equation $h=-4.9t^2+7t+9$ yields $h=-4.9(0)^2+7(0)+9$, or $h=9$. Therefore, the object was kicked from a height of 9 meters.

Choice A is incorrect and may result from conceptual or calculation errors.
Choice B is incorrect and may result from conceptual or calculation errors.
Choice C is incorrect and may result from conceptual or calculation errors.

QUESTION 13

The correct answer is $\frac{25}{4}$. The given equation can be rewritten in the form $f(x)=a(x-h)^2+k$, where a, h, and k are constants. When $a>0$, h is the value of x for which $f(x)$ reaches its minimum. The given equation can be rewritten as $f(x)=4\left(x^2-\frac{50}{4}x\right)+126$, which is equivalent to $f(x)=4\left(x^2-\frac{50}{4}x+\left(\frac{50}{8}\right)^2-\left(\frac{50}{8}\right)^2\right)+126$. This equation can be rewritten as $f(x)=4\left(\left(x-\frac{50}{8}\right)^2-\left(\frac{50}{8}\right)^2\right)+126$, or $f(x)=4\left(x-\frac{50}{8}\right)^2-4\left(\frac{50}{8}\right)^2+126$, which is equivalent to $f(x)=4\left(x-\frac{25}{4}\right)^2-\frac{121}{4}$. Therefore, $h=\frac{25}{4}$, so the value of x for which $f(x)$ reaches its minimum is $\frac{25}{4}$. Note that 25/4 and 6.25 are examples of ways to enter a correct answer.

QUESTION 14

The correct answer is 182. Let s represent the number of small candles the owner can purchase, and let ℓ represent the number of large candles the owner can purchase. It's given that the owner pays $\$4.90$ per candle to purchase small candles and $\$11.60$ per candle to purchase large candles. Therefore, the owner pays $4.90s$ dollars for s small candles and 11.60ℓ dollars for ℓ large candles, which means the owner pays a total of $4.90s+11.60\ell$ dollars to purchase candles. It's given that the owner budgets $\$2,200$ to purchase candles. Therefore, $4.90s+11.60\ell\leq 2,200$. It's also given that the owner must purchase a minimum of 200 candles. Therefore, $s+\ell\geq 200$. The inequalities $4.90s+11.60\ell\leq 2,200$ and $s+\ell\geq 200$ can be combined into one compound inequality by rewriting the second inequality so that its left-hand side is equivalent to the left-hand side of the first inequality. Subtracting ℓ from both sides of the inequality $s+\ell\geq 200$ yields $s\geq 200-\ell$. Multiplying both sides of this inequality by 4.90 yields $4.90s\geq 4.90(200-\ell)$, or $4.90s\geq 980-4.90\ell$. Adding 11.60ℓ to both sides of this inequality yields $4.90s+11.60\ell\geq 980-4.90\ell+11.60\ell$, or $4.90s+11.60\ell\geq 980+6.70\ell$. This inequality can be combined with the inequality $4.90s+11.60\ell\leq 2,200$, which yields the compound inequality

$980+6.70\ell \le 4.90s+11.60\ell \le 2{,}200$. It follows that $980+6.70\ell \le 2{,}200$. Subtracting 980 from both sides of this inequality yields $6.70\ell \le 2{,}200$. Dividing both sides of this inequality by 6.70 yields approximately $\ell \le 182.09$. Since the number of large candles the owner purchases must be a whole number, the maximum number of large candles the owner can purchase is the largest whole number less than 182.09, which is 182.

QUESTION 15

Choice D is correct. Since f is a linear function, it can be defined by an equation of the form $f(x)=ax+b$, where a and b are constants. It's given that $f(0)=8$. Substituting 0 for x and 8 for $f(x)$ in the equation $f(x)=ax+b$ yields $8=a(0)+b$, or $8=b$. Substituting 8 for b in the equation $f(x)=ax+b$ yields $f(x)=ax+8$. It's given that $f(1)=12$. Substituting 1 for x and 12 for $f(x)$ in the equation $f(x)=ax+8$ yields $12=a(1)+8$, or $12=a+8$. Subtracting 8 from both sides of this equation yields $a=4$. Substituting 4 for a in the equation $f(x)=ax+8$ yields $f(x)=4x+8$. Therefore, an equation that defines f is $f(x)=4x+8$.

Choice A is incorrect and may result from conceptual or calculation errors.
Choice B is incorrect and may result from conceptual or calculation errors.
Choice C is incorrect and may result from conceptual or calculation errors.

QUESTION 16

Choice A is correct. The function f gives the area of the rectangle, in ft^2, if its width is w ft. Since the value of $f(14)$ is the value of $f(w)$ if $w=14$, it follows that $f(14)=1{,}176$ means that $f(w)$ is $1{,}176$ if $w=14$. In the given context, this means that if the width of the rectangle is 14 ft, then the area of the rectangle is $1{,}176\ \text{ft}^2$.

Choice B is incorrect and may result from conceptual errors. *Choice C* is incorrect and may result from conceptual errors. *Choice D* is incorrect and may result from interpreting $f(w)$ as the width, in ft, of the rectangle if its area is $w\ \text{ft}^2$, rather than as the area, in ft^2, of the rectangle if its width is w ft.

QUESTION 17

Choice B is correct. Since $\overline{PR}$ and $\overline{QS}$ are diameters of the circle shown, $\overline{OS}$, $\overline{OR}$, $\overline{OP}$, and $\overline{OQ}$ are radii of the circle and are therefore congruent. Since $\angle SOP$ and $\angle ROQ$ are vertical angles, they are congruent. Therefore, arc PS and arc QR are formed by congruent radii and have the same angle measure, so they are congruent arcs. Similarly, $\angle SOR$ and $\angle POQ$ are vertical angles, so they are congruent. Therefore, arc SR and arc PQ are formed by congruent radii and have the same angle measure, so they are congruent arcs. Let x represent the length of arc SR. Since arc SR and arc PQ are congruent arcs, the length of arc PQ can also be represented by x. It's given that the length of arc PS is twice the length of arc PQ. Therefore, the length of arc PS can be represented by the expression $2x$. Since arc PS and arc QR are congruent arcs, the length of arc QR can also be represented by $2x$. This gives the expression $x+x+2x+2x$.

Since it's given that the circumference is 144π, the expression $x+x+2x+2x$ is equal to 144π. Thus $x+x+2x+2x=144\pi$, or $6x=144\pi$. Dividing both sides of this equation by 6 yields $x=24\pi$. Therefore, the length of arc QR is $2(24\pi)$, or 48π.

Choice A is incorrect. This is the length of arc PQ, not arc QR. *Choice C* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect and may result from conceptual or calculation errors.

QUESTION 18

Choice C is correct. Let x represent the number of children in a whale-watching tour group. Let y represent the number of adults in this group. Because it's given that 21 people are in a group and the group consists of adults and children, it must be true that $x+y=21$. Since the company's revenue is 60 dollars per child, the total revenue from x children in this group was $60x$ dollars. Since the company's revenue is 80 dollars per adult, the total revenue from y adults in this group was $80y$ dollars. Because it's given that the total revenue for this group was $1{,}440$ dollars, it must be true that $60x+80y=1{,}440$. The equations $x+y=21$ and $60x+80y=1{,}440$ form a linear system of equations that can be solved to find the value of x, which represents the number of children in the group, using the elimination method. Multiplying both sides of the equation $x+y=21$ by 80 yields $80x+80y=1{,}680$. Subtracting $60x+80y=1{,}440$ from $80x+80y=1{,}680$ yields $(80x+80y)-(60x+80y)=1{,}680-1{,}440$, which is equivalent to $80x-60x+80y-80y=240$, or $20x=240$. Dividing both sides of this equation by 20 yields $x=12$. Therefore, 12 people in the group were children.

Choice A is incorrect and may result from conceptual or calculation errors. *Choice B* is incorrect. This is the number of adults in the group, not the number of children in the group. *Choice D* is incorrect and may result from conceptual or calculation errors.

QUESTION 19

Choice A is correct. The x-intercept of a graph in the xy-plane is the point on the graph where $y=0$. It's given that function h is defined by $h(x)=4x+28$. Therefore, the equation representing the graph of $y=h(x)$ is $y=4x+28$. Substituting 0 for y in the equation $y=4x+28$ yields $0=4x+28$. Subtracting 28 from both sides of this equation yields $-28=4x$. Dividing both sides of this equation by 4 yields $-7=x$. Therefore, the x-intercept of the graph of $y=h(x)$ in the xy-plane is $(-7, 0)$. It's given that the x-intercept of the graph of $y=h(x)$ is $(a, 0)$. Therefore, $a=-7$. The y-intercept of a graph in the xy-plane is the point on the graph where $x=0$. Substituting 0 for x in the equation $y=4x+28$ yields $y=4(0)+28$, or $y=28$. Therefore, the y-intercept of the graph of $y=h(x)$ in the xy-plane is $(0, 28)$. It's given that the y-intercept of the graph of $y=h(x)$ is $(0, b)$. Therefore, $b=28$. If $a=-7$ and $b=28$, then the value of $a+b$ is $-7+28$, or 21.

Choice B is incorrect. This is the value of b, not $a+b$. *Choice C* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect. This is the value of $-a+b$, not $a+b$.

QUESTION 20

The correct answer is 8. Since each term of the given expression, $2x^3+42x^2+208x$, has a factor of $2x$, the expression can be rewritten as $2x\left(x^2\right)+2x\left(21x\right)+2x\left(104\right)$, or $2x\left(x^2+21x+104\right)$. Since the values 8 and 13 have a sum of 21 and a product of 104, the expression $x^2+21x+104$ can be factored as $\left(x+8\right)\left(x+13\right)$. Therefore, the given expression can be factored as $2x\left(x+8\right)\left(x+13\right)$. It follows that the factors of the given expression are 2, x, $x+8$, and $x+13$. Of these factors, only $x+8$ and $x+13$ are of the form $x+b$, where b is a positive constant. Therefore, the possible values of b are 8 and 13. Thus, the smallest possible value of b is 8.

QUESTION 21

The correct answer is $\frac{29}{2}$. According to the first equation in the given system, the value of y is -1.5. Substituting -1.5 for y in the second equation in the given system yields $-1.5=x^2+8x+a$. Adding 1.5 to both sides of this equation yields $0=x^2+8x+a+1.5$. If the given system has exactly one distinct real solution, it follows that $0=x^2+8x+a+1.5$ has exactly one distinct real solution. A quadratic equation in the form $0=px^2+qx+r$, where p, q, and r are constants, has exactly one distinct real solution if and only if the discriminant, q^2-4pr, is equal to 0. The equation $0=x^2+8x+a+1.5$ is in this form, where $p=1$, $q=8$, and $r=a+1.5$. Therefore, the discriminant of the equation $0=x^2+8x+a+1.5$ is $\left(8\right)^2-4\left(1\right)\left(a+1.5\right)$, or $58-4a$. Setting the discriminant equal to 0 to solve for a yields $58-4a=0$. Adding $4a$ to both sides of this equation yields $58=4a$. Dividing both sides of this equation by 4 yields $\frac{58}{4}=a$, or $\frac{29}{2}=a$. Therefore, if the given system of equations has exactly one distinct real solution, the value of a is $\frac{29}{2}$. Note that 29/2 and 14.5 are examples of ways to enter a correct answer.

QUESTION 22

Choice B is correct. It's given that $f\left(x\right)=\left(x+6\right)\left(x+5\right)\left(x-4\right)$ and $y=f\left(x\right)-3$. Substituting $\left(x+6\right)\left(x+5\right)\left(x-4\right)$ for $f\left(x\right)$ in the equation $y=f\left(x\right)-3$ yields $y=\left(x+6\right)\left(x+5\right)\left(x-4\right)-3$. Substituting -6 for x in this equation yields $y=\left(-6+6\right)\left(-6+5\right)\left(-6-4\right)-3$, or $y=-3$. Substituting -5 for x in the equation $y=\left(x+6\right)\left(x+5\right)\left(x-4\right)-3$ yields $y=\left(-5+6\right)\left(-5+5\right)\left(-5-4\right)-3$, or $y=-3$. Substituting 4 for x in the equation $y=\left(x+6\right)\left(x+5\right)\left(x-4\right)-3$ yields $y=\left(4+6\right)\left(4+5\right)\left(4-4\right)-3$, or $y=-3$. Therefore, when $x=-6$ then $y=-3$, when $x=-5$ then $y=-3$, and when $x=4$ then $y=-3$. Thus, the table of values in choice B represents $y=f\left(x\right)-3$.

Choice A is incorrect. This table represents $y=x-3$ rather than $y=f(x)-3$.
Choice C is incorrect. This table represents $y=x+3$ rather than $y=f(x)-3$.
Choice D is incorrect. This table represents $y=f(x)+3$ rather than $y=f(x)-3$.

QUESTION 23

Choice C is correct. Since the value of $q(x)$ decreases by a fixed percentage, 45%, for every increase in the value of x by 1, the function q is a decreasing exponential function. A decreasing exponential function can be written in the form $q(x)=a\left(1-\frac{p}{100}\right)^x$, where a is the value of $q(0)$ and the value of $q(x)$ decreases by $p\%$ for every increase in the value of x by 1. If $q(0)=14$, then $a=14$. Since the value of $q(x)$ decreases by 45% for every increase in the value of x by 1, $p=45$. Substituting 14 for a and 45 for p in the equation $q(x)=a\left(1-\frac{p}{100}\right)^x$ yields $q(x)=14\left(1-\frac{45}{100}\right)^x$, which is equivalent to $q(x)=14(1-0.45)^x$, or $q(x)=14(0.55)^x$.

Choice A is incorrect and may result from conceptual or calculation errors.
Choice B is incorrect and may result from conceptual or calculation errors.
Choice D is incorrect. For this function, the value of $q(x)$ increases, rather than decreases, by 45% for every increase in the value of x by 1.

QUESTION 24

Choice A is correct. An equation for the graph shown can be written in slope-intercept form $y=mx+b$, where m is the slope of the graph and its *y*-intercept is $(0, b)$. Since the *y*-intercept of the graph shown is $(0, 2)$, the value of b is 2. Since the graph also passes through the point $(4, 1)$, the slope can be calculated as $\frac{1-2}{4-0}$, or $-\frac{1}{4}$. Therefore, the value of m is $-\frac{1}{4}$. Substituting $-\frac{1}{4}$ for m and 2 for b in the equation $y=mx+b$ yields $y=-\frac{1}{4}x+2$. It's given that an equation for the graph shown is $y=f(x)+14$. Substituting $f(x)+14$ for y in the equation $y=-\frac{1}{4}x+2$ yields $f(x)+14=-\frac{1}{4}x+2$. Subtracting 14 from both sides of this equation yields $f(x)=-\frac{1}{4}x-12$.

Choice B is incorrect and may result from conceptual or calculation errors.
Choice C is incorrect and may result from conceptual or calculation errors.
Choice D is incorrect and may result from conceptual or calculation errors.

QUESTION 25

Choice B is correct. It's given that right triangle RST is similar to triangle UVW, where S corresponds to V and T corresponds to W. It's given that the side lengths of the right triangle RST are $RS=20$, $ST=48$, and $TR=52$. Corresponding angles in similar triangles are equal. It follows that the measure of angle T is equal to the measure of angle W. The hypotenuse of a right triangle is the longest side. It follows that the hypotenuse of triangle RST is side TR. The hypotenuse of a right triangle is the side opposite the right angle. Therefore, angle S is a right angle. The adjacent side of an acute angle in a right triangle is the side closest to the angle that is not the hypotenuse. It follows that the adjacent side of angle T is side ST. The opposite side of an acute angle in a right triangle is the side across from the acute angle. It follows that the opposite side of angle T is side RS. The tangent of an acute angle in a right triangle is the ratio of the length of the opposite side to the length of the adjacent side. Therefore, $\tan T = \frac{RS}{ST}$. Substituting 20 for RS and 48 for ST in this equation yields $\tan T = \frac{20}{48}$, or $\tan T = \frac{5}{12}$. The tangents of two acute angles with equal measures are equal. Since the measure of angle T is equal to the measure of angle W, it follows that $\tan T = \tan W$. Substituting $\frac{5}{12}$ for $\tan T$ in this equation yields $\frac{5}{12} = \tan W$. Therefore, the value of $\tan W$ is $\frac{5}{12}$.

Choice A is incorrect. This is the value of $\sin W$. *Choice C* is incorrect. This is the value of $\cos W$. *Choice D* is incorrect. This is the value of $\frac{1}{\tan W}$.

QUESTION 26

Choice A is correct. It's given that w represents the total wall area, in square feet. Since the walls of the room will be painted twice, the amount of paint, in gallons, needs to cover $2w$ square feet. It's also given that one gallon of paint will cover 220 square feet. Dividing the total area, in square feet, of the surface to be painted by the number of square feet covered by one gallon of paint gives the number of gallons of paint that will be needed. Dividing $2w$ by 220 yields $\frac{2w}{220}$, or $\frac{w}{110}$. Therefore, the equation that represents the total amount of paint P, in gallons, needed to paint the walls of the room twice is $P = \frac{w}{110}$.

Choice B is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect and may result from finding the amount of paint needed to paint the walls once rather than twice. *Choice D* is incorrect and may result from conceptual or calculation errors.

QUESTION 27

The correct answer is 9.87. It's given that the number a is 110% greater than the number b. It follows that $a = \left(1 + \frac{110}{100}\right)b$, or $a = 2.1b$. It's also given that the number b is 90% less than 47. It follows that $b = \left(1 - \frac{90}{100}\right)(47)$, or $b = 0.1(47)$, which yields $b = 4.7$. Substituting 4.7 for b in the equation $a = 2.1b$ yields $a = 2.1(4.7)$, which is equivalent to $a = 9.87$. Therefore, the value of a is 9.87.

Math

Module 2
(27 questions)

QUESTION 1

Choice A is correct. It's given that 20% of the students surveyed responded that they intend to enroll in the study program. Therefore, the proportion of students in Spanish club who intend to enroll in the study program, based on the survey, is 0.20. Since there are 55 total students in Spanish club, the best estimate for the total number of these students who intend to enroll in the study program is $55(0.20)$, or 11.

Choice B is incorrect. This is the best estimate for the percentage, rather than the total number, of students in Spanish club who intend to enroll in the study program. *Choice C* is incorrect. This is the best estimate for the total number of Spanish club students who do not intend to enroll in the study program. *Choice D* is incorrect. This is the total number of students in Spanish club.

QUESTION 2

Choice A is correct. Since Jay walks at a speed of 3 miles per hour for w hours, Jay walks a total of $3w$ miles. Since Jay runs at a speed of 5 miles per hour for r hours, Jay runs a total of $5r$ miles. Therefore, the total number of miles Jay travels can be represented by $3w+5r$. Since the combined total number of miles is 14, the equation $3w+5r=14$ represents this situation.

Choice B is incorrect and may result from conceptual errors. *Choice C* is incorrect and may result from conceptual errors. *Choice D* is incorrect and may result from conceptual errors.

QUESTION 3

Choice A is correct. The line of best fit shown intersects the *y*-axis at a positive *y*-value and has a positive slope. The graph of an equation of the form $y=a+bx$, where a and b are constants, intersects the *y*-axis at a *y*-value of a and has a slope of b. Of the given choices, only choice A represents a line that intersects the y-axis at a positive y-value, 2.8, and has a positive slope, 1.7.

Choice B is incorrect. This equation represents a line that has a negative slope, not a positive slope. *Choice C* is incorrect. This equation represents a line that intersects the y-axis at a negative y-value, not a positive y-value. *Choice D* is incorrect. This equation represents a line that intersects the y-axis at a negative y-value, not a positive y-value, and has a negative slope, not a positive slope.

QUESTION 4

Choice D is correct. Because the graph of $y = f(x)$ is shown, the value of $f(0)$ is the value of y on the graph that corresponds with $x = 0$. When $x = 0$, the corresponding value of y is 3. Therefore, the value of $f(0)$ is 3.

Choice A is incorrect and may result from conceptual errors. *Choice B* is incorrect and may result from conceptual errors. *Choice C* is incorrect and may result from conceptual errors.

QUESTION 5

Choice B is correct. Applying the commutative property of multiplication, the expression $(m^4q^4z^{-1})(mq^5z^3)$ can be rewritten as $(m^4m)(q^4q^5)(z^{-1}z^3)$. For positive values of x, $(x^a)(x^b) = x^{a+b}$. Therefore, the expression $(m^4m)(q^4q^5)(z^{-1}z^3)$ can be rewritten as $(m^{4+1})(q^{4+5})(z^{-1+3})$, or $m^5q^9z^2$.

Choice A is incorrect and may result from multiplying, not adding, the exponents. *Choice C* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect and may result from conceptual or calculation errors.

QUESTION 6

The correct answer is 79. The median of a data set with an odd number of values is the middle value of the set when the values are ordered from least to greatest. Because the given data set consists of nine values that are ordered from least to greatest, the median is the fifth value in the data set. Therefore, the median of the data shown is 79.

QUESTION 7

The correct answer is 55. Subtracting 40 from both sides of the given equation yields $x = 55$. Therefore, the value of x is 55.

QUESTION 8

Choice C is correct. Adding the second equation of the given system to the first equation yields $5x + (-4x + y) = 15 + (-2)$, which is equivalent to $x + y = 13$. So the value of $x + y$ is 13.

Choice A is incorrect and may result from conceptual or calculation errors. *Choice B* is incorrect. This is the value of $-(x+y)$. *Choice D* is incorrect and may result from conceptual or calculation errors.

QUESTION 9

Choice A is correct. It's given that the function g models the number of gallons that remain from a full gas tank in a car after driving m miles. In the given function $g(m)=-0.05m+12.1$, the coefficient of m is -0.05. This means that for every increase in the value of m by 1, the value of $g(m)$ decreases by 0.05. It follows that for each mile driven, there is a decrease of 0.05 gallons of gasoline. Therefore, 0.05 gallons of gasoline are used to drive each mile.

Choice B is incorrect and represents the number of gallons of gasoline in a full gas tank. *Choice C* is incorrect and may result from conceptual errors. *Choice D* is incorrect and may result from conceptual errors.

QUESTION 10

Choice C is correct. Multiplying each side of the given equation by y yields the equivalent equation $\frac{y}{7b}=11x$. Dividing each side of this equation by 11 yields $\frac{y}{77b}=x$, or $x=\frac{y}{77b}$.

Choice A is incorrect. This equation is not equivalent to the given equation. *Choice B* is incorrect. This equation is not equivalent to the given equation. *Choice D* is incorrect. This equation is not equivalent to the given equation.

QUESTION 11

Choice B is correct. Since the point (x, y) is an intersection point of the graphs of the given equations in the *xy*-plane, the pair (x, y) should satisfy both equations, and thus is a solution of the given system. According to the first equation, $y=76$. Substituting 76 in place of y in the second equation yields $x^2-5=76$. Adding 5 to both sides of this equation yields $x^2=81$. Taking the square root of both sides of this equation yields two solutions: $x=9$ and $x=-9$. Of these two solutions, only -9 is given as a choice.

Choice A is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect and may result from conceptual or calculation errors. *Choice D* is incorrect. This is the value of coordinate y, rather than x, of the intersection point (x, y).

QUESTION 12

Choice A is correct. It's given that the point $(x, 53)$ is a solution to the given system of inequalities in the *xy*-plane. This means that the coordinates of the point, when substituted for the variables x and y, make both of the inequalities in the system true. Substituting 53 for y in the inequality $y>14$ yields $53>14$, which is true. Substituting 53 for y in the inequality $4x+y<18$ yields $4x+53<18$. Subtracting 53 from both sides of this inequality yields $4x<-35$.

Dividing both sides of this inequality by 4 yields $x < -8.75$. Therefore, x must be a value less than -8.75. Of the given choices, only -9 is less than -8.75.

Choice B is incorrect. Substituting -5 for x and 53 for y in the inequality $4x + y < 18$ yields $4(-5) + 53 < 18$, or $33 < 18$, which is not true. *Choice C* is incorrect. Substituting 5 for x and 53 for y in the inequality $4x + y < 18$ yields $4(5) + 53 < 18$, or $73 < 18$, which is not true. *Choice D* is incorrect. Substituting 9 for x and 53 for y in the inequality $4x + y < 18$ yields $4(9) + 53 < 18$, or $89 < 18$, which is not true.

QUESTION 13

The correct answer is 240. It's given that 80% of the 300 seeds sprouted. Therefore, the number of seeds that sprouted can be calculated by multiplying the number of seeds that were planted by $\frac{80}{100}$, which gives $300\left(\frac{80}{100}\right)$, or 240.

QUESTION 14

The correct answer is 2. Substituting 8 for $f(x)$ in the given equation yields $8 = 4x$. Dividing the left- and right-hand sides of this equation by 4 yields $x = 2$. Therefore, the value of x is 2 when $f(x) = 8$.

QUESTION 15

Choice B is correct. The given expression has a common factor of 2 in the denominator, so the expression can be rewritten as $\frac{8x(x-7)-3(x-7)}{2(x-7)}$. The three terms in this expression have a common factor of $(x-7)$. Since it's given that $x > 7$, x can't be equal to 7, which means $(x-7)$ can't be equal to 0. Therefore, each term in the expression, $\frac{8x(x-7)-3(x-7)}{2(x-7)}$, can be divided by $(x-7)$, which gives $\frac{8x-3}{2}$.

Choice A is incorrect and may result from conceptual or calculation errors.
Choice C is incorrect and may result from conceptual or calculation errors.
Choice D is incorrect and may result from conceptual or calculation errors.

QUESTION 16

Choice C is correct. It's given that line r is perpendicular to line p in the *xy*-plane. This means that the slope of line r is the negative reciprocal of the slope of line p. If the equation for line p is rewritten in slope-intercept form $y = mx + b$, where m and b are constants, then m is the slope of the line and $(0, b)$ is its *y*-intercept. Subtracting $18x$ from both sides of the equation $2y + 18x = 9$ yields $2y = -18x + 9$. Dividing both sides of this equation by 2 yields $y = -9x + \frac{9}{2}$. It follows that the slope of line p is -9. The negative reciprocal of a number is -1 divided by the number. Therefore, the negative reciprocal of -9 is $\frac{-1}{-9}$, or $\frac{1}{9}$. Thus, the slope of line r is $\frac{1}{9}$.

Choice A is incorrect. This is the slope of line p, not line r. *Choice B* is incorrect. This is the reciprocal, not the negative reciprocal, of the slope of line p. *Choice D* is incorrect. This is the negative, not the negative reciprocal, of the slope of line p.

QUESTION 17

Choice D is correct. The *y*-intercept of a graph in the *ty*-plane is the point where $t = 0$. For the given function f, the *y*-intercept of the graph of $y = f(t)$ in the *ty*-plane can be found by substituting 0 for t in the equation $y = 8{,}000(0.65)^t$, which gives $y = 8{,}000(0.65)^0$. This is equivalent to $y = 8{,}000(1)$, or $y = 8{,}000$. Therefore, the *y*-intercept of the graph of $y = f(t)$ is $(0, 8{,}000)$. It's given that the function f models the number of coupons a company sent to their customers at the end of each year. Therefore, $f(t)$ represents the estimated number of coupons the company sent to their customers at the end of each year. It's also given that t represents the number of years since the end of 1998. Therefore, $t = 0$ represents 0 years since the end of 1998, or the end of 1998. Thus, the best interpretation of the *y*-intercept of the graph of $y = f(t)$ is that the estimated number of coupons the company sent to their customers at the end of 1998 was $8{,}000$.

Choice A is incorrect and may result from conceptual or calculation errors. *Choice B* is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect and may result from conceptual or calculation errors.

QUESTION 18

Choice C is correct. It's given that triangle XYZ is similar to triangle RST, such that X, Y, and Z correspond to R, S, and T, respectively. Since corresponding angles of similar triangles are congruent, it follows that the measure of $\angle Z$ is congruent to the measure of $\angle T$. It's given that the measure of $\angle Z$ is $20°$. Therefore, the measure of $\angle T$ is $20°$.

Choice A is incorrect and may result from a conceptual error. *Choice B* is incorrect. This is half the measure of $\angle Z$. *Choice D* is incorrect. This is twice the measure of $\angle Z$.

QUESTION 19

Choice B is correct. A system of two linear equations in two variables, x and y, has no solution if the lines represented by the equations in the *xy*-plane are parallel and distinct. Lines represented by equations in standard form, $Ax + By = C$ and $Dx + Ey = F$, are parallel if the coefficients for x and y in one equation are proportional to the corresponding coefficients in the other equation, meaning $\frac{D}{A} = \frac{E}{B}$; and the lines are distinct if the constants are not proportional, meaning $\frac{F}{C}$ is not equal to $\frac{D}{A}$ or $\frac{E}{B}$. The given equation, $y = 6x + 18$, can be written in standard form by subtracting $6x$ from both sides of the equation to yield $-6x + y = 18$. Therefore, the given equation can be written in the form $Ax + By = C$, where $A = -6$, $B = 1$, and $C = 18$. The equation in choice B,

$-6x+y=22$, is written in the form $Dx+Ey=F$, where $D=-6$, $E=1$, and $F=22$. Therefore, $\frac{D}{A}=\frac{-6}{-6}$, which can be rewritten as $\frac{D}{A}=1$; $\frac{E}{B}=\frac{1}{1}$, which can be rewritten as $\frac{E}{B}=1$; and $\frac{F}{C}=\frac{22}{18}$, which can be rewritten as $\frac{F}{C}=\frac{11}{9}$. Since $\frac{D}{A}=1$, $\frac{E}{B}=1$, and $\frac{F}{C}$ is not equal to 1, it follows that the given equation and the equation $-6x+y=22$ are parallel and distinct. Therefore, a system of two linear equations consisting of the given equation and the equation $-6x+y=22$ has no solution. Thus, the equation in choice B could be the second equation in the system.

Choice A is incorrect. The equation $-6x+y=18$ and the given equation represent the same line in the *xy*-plane. Therefore, a system of these linear equations would have infinitely many solutions, rather than no solution. *Choice C* is incorrect. The equation $-12x+y=36$ and the given equation represent lines in the *xy*-plane that are distinct and not parallel. Therefore, a system of these linear equations would have exactly one solution, rather than no solution. *Choice D* is incorrect. The equation $-12x+y=18$ and the given equation represent lines in the *xy*-plane that are distinct and not parallel. Therefore, a system of these linear equations would have exactly one solution, rather than no solution.

QUESTION 20

The correct answer is 986. The area, A, of a rectangle is given by $A=\ell w$, where ℓ is the length of the rectangle and w is its width. It's given that the length of the rectangle is 34 centimeters (cm) and the width is 29 cm. Substituting 34 for ℓ and 29 for w in the equation $A=\ell w$ yields $A=(34)(29)$, or $A=986$. Therefore, the area, in square centimeters, of this rectangle is 986.

QUESTION 21

The correct answer is 35. The first equation in the given system of equations defines y as $4x+1$. Substituting $4x+1$ for y in the second equation in the given system of equations yields $4(4x+1)=15x-8$. Applying the distributive property on the left-hand side of this equation yields $16x+4=15x-8$. Subtracting $15x$ from each side of this equation yields $x+4=-8$. Subtracting 4 from each side of this equation yields $x=-12$. Substituting -12 for x in the first equation of the given system of equations yields $y=4(-12)+1$, or $y=-47$. Substituting -12 for x and -47 for y into the expression $x-y$ yields $-12-(-47)$, or 35.

QUESTION 22

Choice D is correct. The number of solutions of a quadratic equation of the form $ax^2+bx+c=0$, where a, b, and c are constants, can be determined by the value of the discriminant, b^2-4ac. If the value of the discriminant is positive, then the quadratic equation has exactly two distinct real solutions. If the value of the discriminant is equal to zero, then the quadratic equation has exactly one real solution. If the value of the discriminant is negative, then the quadratic equation has zero real solutions. In the given equation, $5x^2+10x+16=0$, $a=5$, $b=10$, and $c=16$. Substituting these values for a, b, and c in b^2-4ac yields $(10)^2-4(5)(16)$, or -220. Since the value of its discriminant is negative, the given equation has zero real solutions. Therefore, the number of distinct real solutions the given equation has is zero.

Choice A is incorrect and may result from conceptual or calculation errors. *Choice B* is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect and may result from conceptual or calculation errors.

QUESTION 23

Choice B is correct. Since 1 mile is equal to $1{,}760$ yards, 1 square mile is equal to $1{,}760^2$, or $3{,}097{,}600$, square yards. It's given that the park has an area of $11{,}863{,}808$ square yards. Therefore, the park has an area of $(11{,}863{,}808 \text{ square yards})\left(\frac{1 \text{ square mile}}{3{,}097{,}600 \text{ square yards}}\right)$, or $\frac{11{,}863{,}808}{3{,}097{,}600}$ square miles. Thus, the area, in square miles, of the park is 3.83.

Choice A is incorrect and may result from conceptual or calculation errors. *Choice C* is incorrect. This is the square root of the area of the park in square yards, not the area of the park in square miles. *Choice D* is incorrect and may result from converting $11{,}863{,}808$ yards to miles, rather than converting $11{,}863{,}808$ square yards to square miles.

QUESTION 24

Choice C is correct. The graph of the equation $(x-h)^2+(y-k)^2=r^2$ in the *xy*-plane is a circle with center (h,k) and a radius of length r. The radius of a circle is the distance from the center of the circle to any point on the circle. If a circle in the *xy*-plane intersects the *y*-axis at exactly one point, then the perpendicular distance from the center of the circle to this point on the *y*-axis must be equal to the length of the circle's radius. It follows that the *x*-coordinate of the circle's center must be equivalent to the length of the circle's radius. In other words, if the graph of $(x-h)^2+(y-k)^2=r^2$ is a circle that intersects the *y*-axis at exactly one point, then $r=|h|$ must be true. The equation in choice C is $(x-4)^2+(y-9)^2=16$, or $(x-4)^2+(y-9)^2=4^2$. This equation is in the form $(x-h)^2+(y-k)^2=r^2$, where $h=4$, $k=9$, and $r=4$, and represents a circle in the *xy*-plane with center $(4,9)$ and radius of length 4. Substituting 4 for r and 4 for h in the equation $r=|h|$ yields $4=|4|$, or $4=4$, which is true. Therefore, the equation in choice C represents a circle in the *xy*-plane that intersects the *y*-axis at exactly one point.

Choice A is incorrect. This is the equation of a circle that does not intersect the *y*-axis at any point. *Choice B* is incorrect. This is an equation of a circle that intersects the *x*-axis, not the *y*-axis, at exactly one point. *Choice D* is incorrect. This is the equation of a circle with the center located on the *y*-axis and thus intersects the *y*-axis at exactly two points, not exactly one point.

QUESTION 25

Choice C is correct. Since angles B and E each have the same measure and angles C and F each have the same measure, triangles ABC and DEF are similar, where side BC corresponds to side EF. To determine whether two similar triangles are congruent, it is sufficient to determine whether one pair of corresponding sides are congruent. Therefore, to determine whether triangles ABC and DEF are congruent, it is sufficient to determine whether sides BC and EF have equal length. Thus, knowing the lengths of BC and EF is sufficient to determine whether triangle ABC is congruent to triangle DEF.

Choice A is incorrect and may result from conceptual errors. *Choice B* is incorrect and may result from conceptual errors. *Choice D* is incorrect. The given information is sufficient to determine that triangles ABC and DEF are similar, but not whether they are congruent.

QUESTION 26

Choice B is correct. The histograms shown have the same shape, but data set A contains values between 20 and 60 and data set B contains values between 10 and 50. Thus, the mean of data set A is greater than the mean of data set B. Therefore, the smallest possible difference between the mean of data set A and the mean of data set B is the difference between the smallest possible mean of data set A and the greatest possible mean of data set B. In data set A, since there are 3 integers in the interval greater than or equal to 20 but less than 30, 4 integers greater than or equal to 30 but less than 40, 7 integers greater than or equal to 40 but less than 50, and 9 integers greater than or equal to 50 but less than 60, the smallest possible mean for data set A is $\frac{(3 \cdot 20)+(4 \cdot 30)+(7 \cdot 40)+(9 \cdot 50)}{23}$. In data set B, since there are 3 integers greater than or equal to 10 but less than 20, 4 integers greater than or equal to 20 but less than 30, 7 integers greater than or equal to 30 but less than 40, and 9 integers greater than or equal to 40 but less than 50, the largest possible mean for data set B is $\frac{(3 \cdot 19)+(4 \cdot 29)+(7 \cdot 39)+(9 \cdot 49)}{23}$. Therefore, the smallest possible difference between the mean of data set A and the mean of data set B is $\frac{(3 \cdot 20)+(4 \cdot 30)+(7 \cdot 40)+(9 \cdot 50)}{23} - \frac{(3 \cdot 19)+(4 \cdot 29)+(7 \cdot 39)+(9 \cdot 49)}{23}$, which is equivalent to $\frac{(3 \cdot 20)-(3 \cdot 19)+(4 \cdot 30)-(4 \cdot 29)+(7 \cdot 40)-(7 \cdot 39)+(9 \cdot 50)-(9 \cdot 49)}{23}$. This expression can be rewritten as $\frac{3(20-19)+4(30-29)+7(40-39)+9(50-49)}{23}$, or $\frac{23}{23}$, which is equal to 1. Therefore, the smallest possible difference between the mean of data set A and the mean of data set B is 1.

Choice A is incorrect. This is the smallest possible difference between the ranges, not the means, of the data sets. *Choice C* is incorrect. This is the difference between the greatest possible mean, not the smallest possible mean, of data set A and the greatest possible mean of data set B. *Choice D* is incorrect. This is the smallest possible difference between the sum of the values in data set A and the sum of the values in data set B, not the smallest possible difference between the means.

QUESTION 27

The correct answer is 113. It's given that the legs of a right triangle have lengths 24 centimeters and 21 centimeters. In a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the two legs. It follows that if h represents the length, in centimeters, of the hypotenuse of the right triangle, $h^2 = 24^2 + 21^2$. This equation is equivalent to $h^2 = 1{,}017$. Taking the square root of each side of this equation yields $h = \sqrt{1{,}017}$. This equation can be rewritten as $h = \sqrt{9 \cdot 113}$, or $h = \sqrt{9} \cdot \sqrt{113}$. This equation is equivalent to $h = 3\sqrt{113}$. It's given that the length of the triangle's hypotenuse, in centimeters, can be written in the form $3\sqrt{d}$. It follows that the value of d is 113.