Math

22 QUESTIONS
(TIME: 35 MIN)

DIRECTIONS

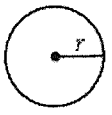
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

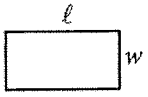
Unless otherwise indicated:

- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

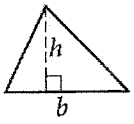
REFERENCE



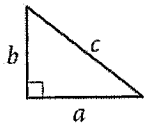
$A = \pi r^2$
$C = 2\pi r$



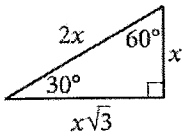
$A = \ell w$

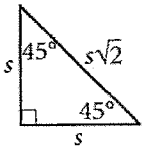


$A = \frac{1}{2}bh$

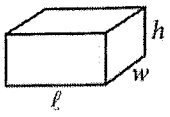


$c^2 = a^2 + b^2$

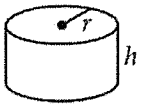




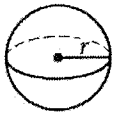
Special Right Triangles



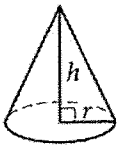
$V = \ell wh$



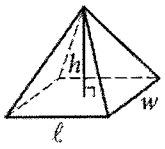
$V = \pi r^2 h$



$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π.

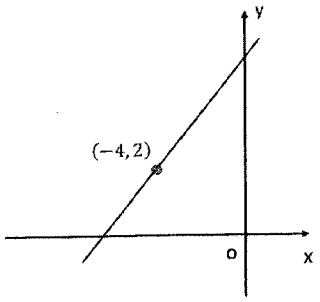
The sum of the measures in degrees of the angles of a triangle is 180.

For multiple-choice questions, solve each problem, choose the correct answer from the choices provided, and then circle your answer in this book. Circle only one answer for each question. If you change your mind, completely erase the circle. You will not get credit for questions with more than one answer circled, or for questions with no answers circled.

For student-produced response questions, solve each problem and write your answer next to or under the question in the test book as described below.

- Once you've written your answer, circle it clearly. You will not receive credit for anything written outside the circle, or for any questions with more than one circled answer.
- If you find **more than one correct answer**, write and circle only one answer.
- Your answer can be up to 5 characters for a **positive** answer and up to 6 characters (including the negative sign) for a **negative** answer, but no more.
- If your answer is a **fraction** that is too long (over 5 characters for positive, 6 characters for negative), write the decimal equivalent.
- If your answer is a **decimal** that is too long (over 5 characters for positive, 6 characters for negative), truncate it or round at the fourth digit.
- If your answer is a **mixed number** (such as $3\frac{1}{2}$), write it as an improper fraction (7/2) or its decimal equivalent (3.5).
- Don't include **symbols** such as a percent sign, comma, or dollar sign in your circled answer.

1



The line as shown in the figure goes through the point (-4, 2) in the XY-plane. What is the area of triangle formed by the line in the XY-plane if the line has a slope of 2?

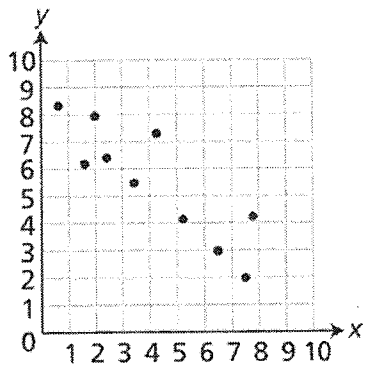
A) 25
B) 50
C) 56
D) 60

2

In the shipment department of a computer manufacturing company, the quality control staffs found that there were four defective units out of 200 machines. If two computers are selected at random and tested for being defective, what is the probability that at least one is defective?

A) $\frac{3}{9950}$ B) $\frac{98}{4975}$ C) $\frac{79}{1990}$ D) $\frac{1}{50}$

3



Which of the following best represents the relationship between x and y variables in the scatterplot above?

A) Speed of a car (x) vs. distance traveled (y).
B) Distance traveled (x) vs. gas remaining in the tank (y).
C) Temperature outside (x) vs. Cost for air conditioning (y) in a hot weather.
D) Number of days to attend gym (x) vs. Number of total hours of exercising (y).

4

In the XY-plane, what is the equation of the circle if two points, $A(-1,3) and\ B(1,-3)$, are the end points of a diameter of the circle?

A) $(x-1)^2+(y-3)^2=10$
B) $(x+1)^2+(y-3)^2=10$
C) $x^2+y^2=10$
D) $x^2+y^2=40$

5

$$f(x) = 1.34(1.01)^x$$

The function above represent to estimate the number of Electric Vehicles in a certain state, in millions, for $x \geq 0$, where x is the number of years after 2020. Which of the following best interpret the number 1.34 in this context?

A) The estimated number of EV, in millions, in 2020.
B) The estimated percent increase each year from 2020.
C) The estimated number of EV, in millions, x years after 2020.
D) The estimated number of EV, in millions, per year after 2020.

6

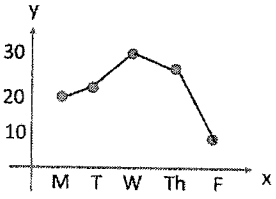
$$y = -2x^2$$
$$y = x - 3$$

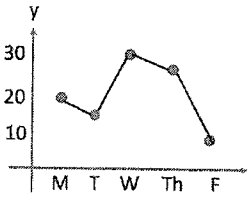
In the system of equations above, if the graphs intersect at a point (x, y) in the fourth quadrant, What is the y-coordinate of the point of intersection?

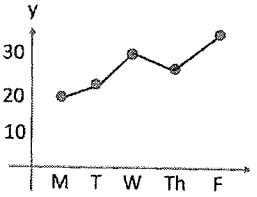
A) -4.5
B) -1.5
C) -2
D) -3

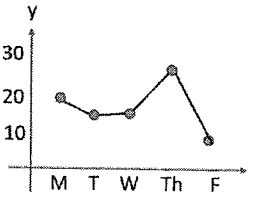
7

A car manufacturing factory in a certain company had 20,000 vehicles in stock at the end of Monday. The company delivered 8,000 vehicles to the customers and manufactured 12,000 vehicles on Tuesday. There were no deliveries on Wednesday but manufactured 6,000 vehicles. On Thursday, the company delivered 15,000 vehicles and manufactured 13,000 vehicles. On Friday, the company delivered 20,000 vehicles and no vehicles are manufactured. Which of the following best represents the number of vehicles the company had in stock on each day?

A)


B)


C)


D)


8

The sum of three numbers is 720. The sum of two numbers is 50% more than the third number, z. what is the value of z?

9

A study of a random sample of 2,000 of a certain brand phone battery estimated that the mean working time was 5.6 hours with all default functions on. The study also found out that there was a margin of error 0.2 hours. Which of the following best concludes based on the study?

A) This brand phone battery has a mean working time of between 5.4 and 5.8 hours.
B) This brand phone battery has a mean working time at least 5.4 hours.
C) This brand phone battery has a mean working time at most 5.8 hours.
D) Any battery in this brand has a mean working time of between 5.4 and 5.8 hours.

10

x	f(x)
-8	-11
-4	-5
0	1
2	4

The table above shows some values of x and their corresponding values of $f(x)$. What is the x-intercept of the graph of $y = f(x)$?

E) $\left(-\frac{3}{2}, 0\right)$
F) $\left(-\frac{2}{3}, 0\right)$
G) $\left(\frac{3}{2}, 0\right)$
H) $\left(\frac{2}{3}, 0\right)$

11

Peter jogs on a trail in the neighborhood every morning. One morning, He found out that he still needed to jog 2 miles to complete after he jogged P percent of the entire tail. What is the correct expression of the length of the entire trail in terms of P?

A) $\frac{100}{200-P}$
B) $\frac{200}{100-P}$
C) $\frac{200}{P-100}$
D) $\frac{P-100}{200}$

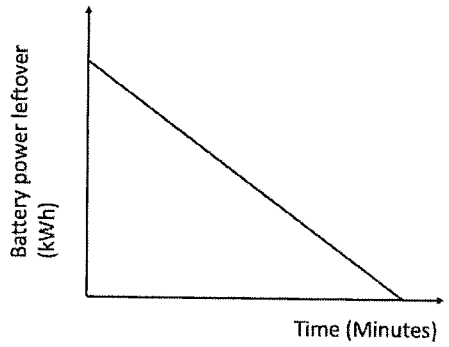
12

$$x - y < 3$$
$$-2x + y < 0$$

In the system of inequalities above, which of the following ordered pairs (x, y) satisfies the system?

E) $(-3,\ 3)$
F) $(-2, 0)$
G) $(1, 3)$
H) $(1, 0)$

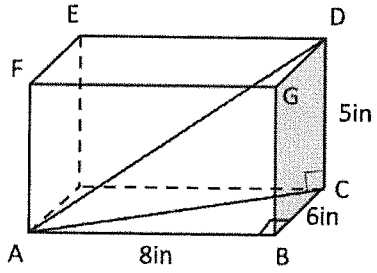
13



The graph represents the battery power leftover (kWh) for a certain brand after using t minutes. The tester charged a battery fully in the beginning and started to use it to the testing motor. Which of the following best interpret the x-intercept of the graph above?

E) The capacity of battery power when its fully charged.
F) The hourly rate of battery usage.
G) The time in minutes when the battery used completely.
H) The time in minutes when the battery fully charged.

14



In the rectangular solid above, what is the length of the diagonal $\overline{AD}$,in inches, to the nearest tenth?

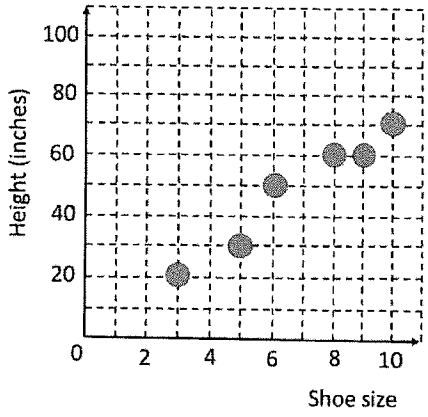
15

$$f(x) = 150 \cdot \left(1 + \frac{b}{100}\right)^x$$

The function shown above is used to compute the total balance of CD account, where x is the number of years after the initial deposit. which of the following describes the function f, correctly if b is the interest rate in percent?

A) The function increases linearly.
B) The function increases exponentially.
C) The function decreases linearly.
D) The function decreases exponentially.

16



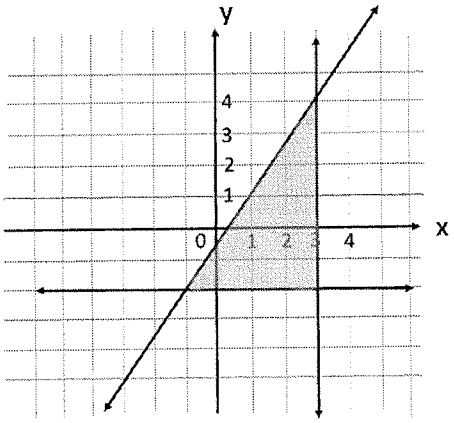
The scatter plot shows the relationship between shoe sizes (x) and height (y). Which of the following statements best describes the scatter plot above?

A) The scatter plot shows a negative correlation between x, y variables.
B) The scatter plot shows a positive correlation between x, y variables.
C) The scatter plot shows no correlation between x, y variables.
D) The scatter plot shows very weak relationship between x, y variables.

17

Jeremiah deposited $2,000 to his savings account at 20% annual interest rate, which increases 20% of its value the previous year. The balance in the savings account, in dollars, 3 years after he deposited can be represented by the expression $2{,}000b$, where b is a constant. What is the value of b in the nearest hundredth?

18



The solution to which system of inequalities is represented by the shaded region in the graphs above?

A) $\begin{cases} x \leq 3 \\ y \geq -2 \\ y \leq -\frac{3}{2}x - \frac{1}{2} \end{cases}$

B) $\begin{cases} x \geq 3 \\ y \geq -2 \\ y \leq \frac{3}{2}x - \frac{1}{2} \end{cases}$

C) $\begin{cases} x \leq 3 \\ y \geq -2 \\ y \leq \frac{3}{2}x - \frac{1}{2} \end{cases}$

D) $\begin{cases} x \leq -3 \\ y \geq 2 \\ y \leq \frac{3}{2}x - \frac{1}{2} \end{cases}$

19

$$N(x) = -2x^2 + 120x - 275$$

The function above is formulated based on the study of tools market. If the number of tools, N, a manufacturer can sell is based on the unit price, x, What is the price of the tool in order to sell the maximum number of tools?

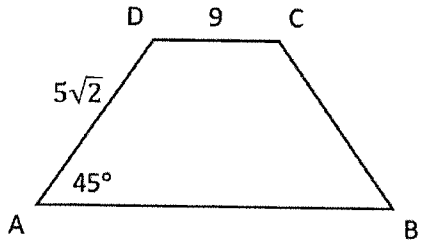
20

$$g(x) = \sqrt{\frac{2x}{3}} + k$$

$$h(x) = \frac{3g(x)}{2}$$

In the system of equations above, where k is a constant, if $h(6) = 6$, then what is the value of k?

21



In the figure shown above, Isosceles trapezoid ABCD has base angle A has $45°$ and the length of side AD equals to $5\sqrt{2}$ and the length of top CD equals to 9. What is the area of trapezoid?

E) 60
F) 70
G) $50\sqrt{2}$
H) $70\sqrt{2}$

22

There are 20 students in a class and students can take either Biology or History or both or none. If 12 students take Biology, 15 students take History, and 2 students take neither Biology nor History, what is the probability that a randomly selected student takes both subjects?

A) $\frac{9}{20}$
B) $\frac{1}{2}$
C) $\frac{11}{20}$
D) $\frac{3}{5}$

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.