Math

22 QUESTIONS
(TIME: 35 MIN)

DIRECTIONS

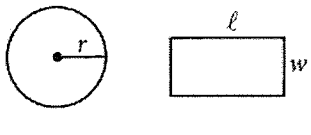
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

Unless otherwise indicated:

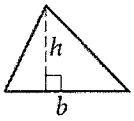
- All variables and expressions represent real numbers.
- Figures provided are drawn to scale.
- All figures lie in a plane.
- The domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE

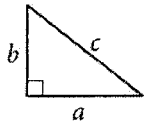


$A = \pi r^2$
$C = 2\pi r$

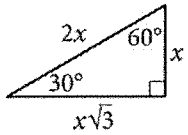
$A = \ell w$

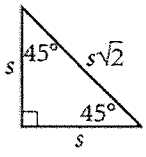


$A = \frac{1}{2}bh$

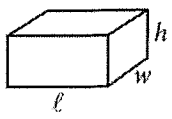


$c^2 = a^2 + b^2$

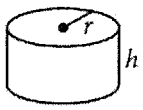




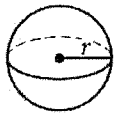
Special Right Triangles



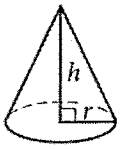
$V = \ell wh$



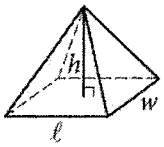
$V = \pi r^2 h$



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



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



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

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

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

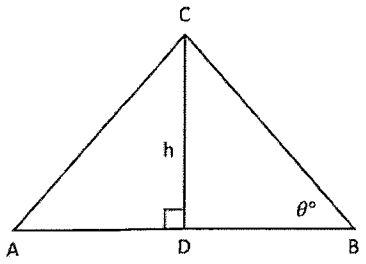
The sum of the measures in degrees of the angles of a triangle is 180.

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 isosceles triangle ABC is shown above. Which of the following expressions represents the length of AB?

A) $\frac{h}{tan\theta}$
B) $\frac{2h}{tan\theta}$
C) $\frac{2h}{sin\theta}$
D) $\frac{2h}{cos\theta}$

2

$$y > -x + 4$$
$$-2x > 4$$

In the system of inequalities above, which of the following consists of the y-coordinates of all points that satisfies the system?

A) $y > 6$
B) $y < 6$
C) $y > 3.5$
D) $y < 3.5$

3

A concrete water storage tank (reservoir) in a mountain has a crack on the wall. It was filled up to the max capacity,200 gallons, of the tank before it had the crack on the wall but it started to leak water at a constant rate. After 30 minutes, it retained only 40% of its capacity. Which of the following describes correctly the amount of water remaining in the tank m minutes after it started to leak?

A) $200 - 4m$
B) $200 - 2.67m$
C) $200(1 - .4)^m$
D) $200(1 - .4)^{m/30}$

4

There 110 members in a certain club. $\frac{5}{11}$ of the members are males and the ratio of the number of members who have kids to the number of members who don't is 3:2. If $\frac{3}{5}$ of the male members don't have kids, how many female members have kids?

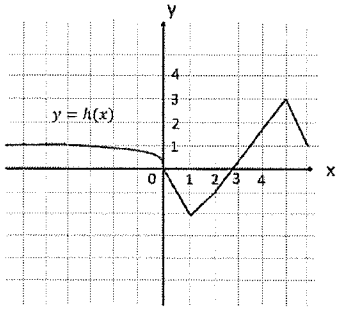
5

Age	Frequency
17	2
18	1
19	6
20	5
21	2
25	1

The table above shows the distribution of ages of students who enrolled for a certain college class. Which of the following gives the correct order for the median, mean, and mode of the data?

A) mean = mode = median
B) mode = median < mean
C) mean < mode = median
D) median < mode < mean

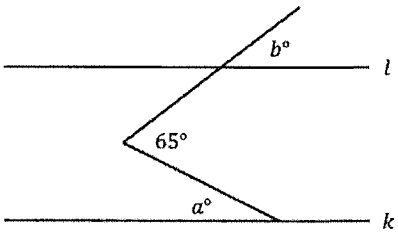
6



x	F(x)
-2	2
-1	1
0	6
1	5
2	2
3	1

The complete graph of the function $y = h(x)$ and a table of some values for the function $y = f(x)$ are shown above. If the minimum value of $h(x)$ is a, what is the value of $f(-a)$?

7



In the figures shown above, Lines l and k are parallel. What is the value of $m\angle a + m\angle b$?

A) 40
B) 45
C) 55
D) 65

8

$$(x-1)^2 + (1-y)^2 = 25$$
$$2x^2 - 4x + 2y^2 - 4y = a$$

In two circle equations above, if two equations are equivalent, what is the value of a?

A) 21
B) 25
C) 46
D) 50

9

$$f(x) = 3 \cdot 1.1^{x-1}$$

The exponential function above was formulated for the exponential growth model on the demand of a certain brand tires. If x represents the number of years after the brand was launched and $f(x)$ represents the amount of demand of the tires in millions, what does 1.1 mean in this situation?

A) The demand of the brand tires is increasing 110% every year.
B) The demand of the brand tires is increasing 10% every year.
C) The demand of the brand tires in increasing 1.1 million tires every year.
D) The demand of the brand tires is increasing 1.1% every year.

10

Population of Valencia, CA in thousands

Year	Population
1990	124
2000	156

The table above shows the population of a county for the years 1990 and 2000. If the relationship between year and population is a linear, which of the following functions correctly represents the population model t years after 1990?

A) $124 + 32(t - 1990)$
B) $124 + 32t$
C) $124 + 3.2(t - 1990)$
D) $124 + 3.2t$

11

Which of the following is a value of x for which the expression $\frac{2x-2}{x^2-x-2}$ is undefined?

A) -2
B) 2
C) 1
D) 3

12

$$k = \frac{4}{7}m + 10$$

The equation above shows the relationship between k and m. If the value of m increased by 3, how much does the value of k increase by?

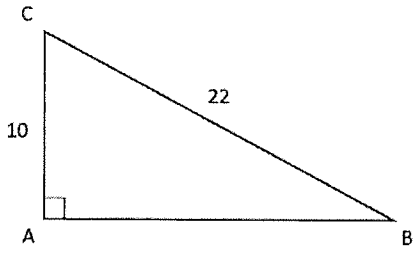
A) $\frac{4}{7}$ B) $\frac{110}{7}$ C) $\frac{12}{7}$ D) $\frac{98}{7}$

13

In order to find the average hours of studying a day for children, Sam visited a local library and surveyed 30 children randomly. For 20 children surveyed, the average hour of studying a day was 4. Which of the following statements best describes this survey?

A) The average number of hours of studying a day for children is not valid in this survey because the sample size is way too small.
B) The average number of hours of studying a day for children in the community is 4.
C) The sampling method was flawed and it may produce a biased result of the survey.
D) The sampling method was fair and unbiased because the survey was at random.

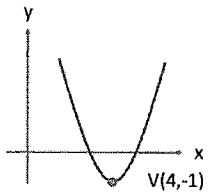
14

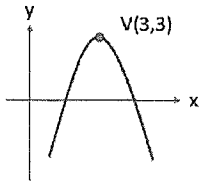


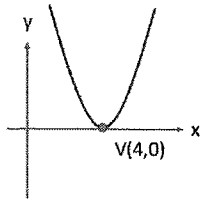
In triangle ABC above, point D is located on the segment BC. What is the value of $\sin(\angle CAD) - \cos(\angle BAD)$?

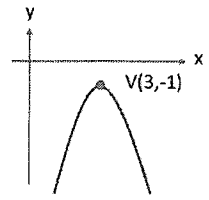
15

The zeros of the quadratic function, f, are 1 and 5, If the range of the function is less than or equal to 3, which of the following graphs could represent the graph of $y = f(x)$?

A)


B)


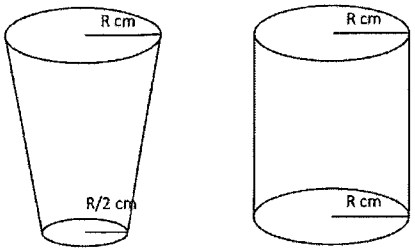
C)


D)


16

In a triangle XYZ, the measure of $\angle X$ is a right angle. If $cos\angle Y = \frac{1}{5}$, then what is the value of $sin\angle Z$?

17



Two different cups A and B, with same heights are shown above. If water is being poured at the same constant rate into both cups at the same time, which of the following statements must be true?

I. The height of both cups will go up at the same rate.
II. The rate of change in the height of cup A is non-linear but the rate of change in the height of cup B is linear.
III. The rate of change in the height of cup B is non-linear but the rate of change in the height of cup A is linear.

A) I only
B) II only
C) I and II only
D) I and III only

18

$$f(x) = -300x^2 + 40{,}000x$$

The profit $f(x)$, in dollars that a company makes from the sales of a certain product is given above, where x is the unit price of the product, in dollars. The graph of f forms a parabola open downward. The graph has two zeros at 0 and m. Then what does m could represent in the context?

A) The unit price, in dollars, which will result in the maximum profit.
B) The unit price, in dollars, which will result in $\$0$ profit.
C) The profit, in dollars, when the company can make the most.
D) The profit, in dollars, when the unit price of the product is $\$0$.

19

$$y = \frac{(x+2)(x-1)}{(x+3)}$$

In the rational equation above, which of the following is (are) an x-intercept of the graph?

I. (-2, 0)
II. (-3, 0)
III. (1, 0)

A) I only
B) II only
C) I and III only
D) I, II, and III

20

$\sqrt[3]{a^x}$, where $a, x > 0$

In the expression above, x is a constant. If the expression is equivalent to a^3, what is the value of x?

21

$$6x^2 - 5x - 12 = 0$$

In the quadratic equation above, if a and b are two solutions of the equation. What is the value of $\frac{1}{b} + \frac{1}{a}$?

A) $-\frac{5}{6}$ B) $-\frac{5}{12}$ C) $-\frac{2}{5}$ D) $-\frac{12}{5}$

22

3 *Pennies*
2 *Nickels*
4 *Dimes*
3 *Quarters*

Suppose you reach into a jar which contains the fair coins as above. What is the probability that you grab a dime and then, without replacement, another dime?

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.