# Math

**22 QUESTIONS**
**(TIME: 35 MIN)**

**DIRECTIONS**

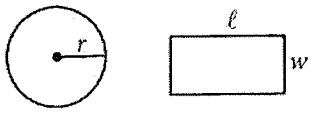
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

**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.

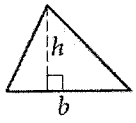
**REFERENCE**



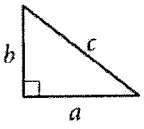

$A = \pi r^2$
$C = 2\pi r$



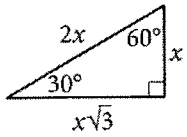

$A = \ell w$

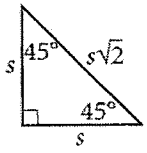



$A = \frac{1}{2}bh$

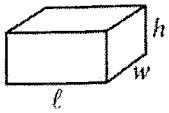



$c^2 = a^2 + b^2$

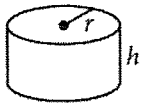



Special Right Triangles

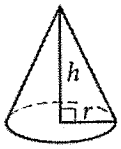



$V = \ell wh$

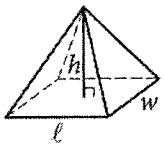



$V = \pi r^2 h$


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




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




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

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

The number of radians of arc in a circle is $2\pi$.

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

$$f(t) = 3000(1 + 0.05)^t$$

Margaux opened a CD account for her saving. This account offers a certain annual interest rate. If $t$ is time in year after she deposit money into her account, what is the best interpretation of $0.05$ in the function above?

A) Her annual contribution in amount of money.
B) The annual interest rate in decimal for her account.
C) The first deposit when she opened her account.
D) The extra one-time bonus from the bank.

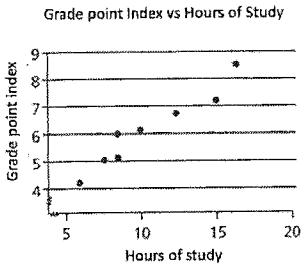
## 2

| x | f(x) |
|---|---|
| 1 | 22 |
| 2 | 25 |
| 3 | 28 |

The table shows some values of x and their corresponding f(x) values. If f(x) is a linear function, which of the following function defines f(x)?

A) $f(x) = -3x + 25$
B) $f(x) = 3x + 19$
C) $f(x) = 3x + 22$
D) $f(x) = -3x + 19$

## 3




The scatterplot above shows the relationship between Grade point index $(0 - 10)$ and Weekly hours of study for a calculus class. Which of the following statements best interprets the graph?

A) It is guaranteed that more hours of study will result in higher grade point index.
B) It is plausible that more hours of study could result in higher grade point index.
C) This scatter plot shows very weak relationship.
D) We can assume that anyone can get at least 5 in grade point index with no hours of study.

## 4

If a triangle has lengths of sides $3\sqrt{3}, 4\sqrt{3}, and\ \sqrt{75}$ units, what is the area of the triangle, in square units?

A) 18
B) 22.5
C) 30
D) $6\sqrt{3}$

5

$$2(4-x)-5=3-3y$$

From the equation shown above, which of the following equations represents correctly between $x$ and $y$?

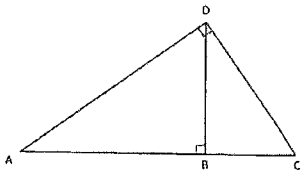
A) $\frac{x-4}{y-1}=1$
B) $\frac{x}{y}=\frac{3}{2}$
C) $\frac{y}{x}=\frac{3}{2}$
D) $y=6x$

6

$$2\sqrt[3]{27x^{36}}\cdot\sqrt[5]{-32x^{10}}$$

The expression above could be simplified as $kx^m$, where $k$ and $m$ are positive numbers. What is the value of $m-k$?

7




Note: Not drawn to scale.

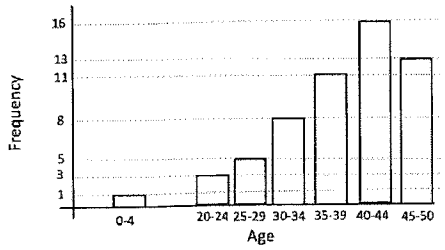
In the right triangle above, $\overline{AD}$=8 and $\cos A = 0.5$. What is the length of $\overline{BD}$?

A) $4\sqrt{3}$
B) $16\sqrt{3}$
C) 6
D) $6\sqrt{3}$

8

The function $f$ in the $xy-plane$ is defined by $f(x)=a\cdot b^x$, where $a$ and $b$ are constants. If the function is translated down 3 units, the y intercept of the function is (0, 5) and passes through (1, 0). What is the value of the product of $a$ and $b$?

**9**




In the bar graph above, which of the following statements must be true?

I. The mean age of the data is located more left than the median of the data.
II. If the smallest age is removed, the mean value will change more than the median value of the data will change.
III. The range of data is 50.

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

**10**

$$y < x + 2$$

$$y > -2x - 1$$

If the point $(1, k)$ is a solution to the inequality system above in the $xy - plane$. How many integers of $k$ satisfies the system?

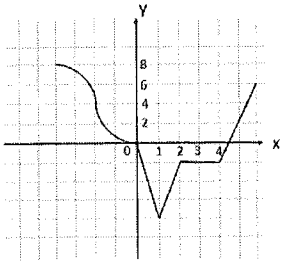
I) 2
J) 4
K) 5
L) 7

**11**

Adrian studies SAT practice test book for his upcoming test. He finishes one page for 15 minutes in Math and two pages for 10 minutes in English, respectively. He wants to know how long, in minutes, it will take in total to complete the practice book. If the book consists of k pages for Math and w pages for English, which expression best represents the situation?

A) $15k + 10w$
B) $10w + 15k$
C) $15k + 5w$
D) $15k + 20w$

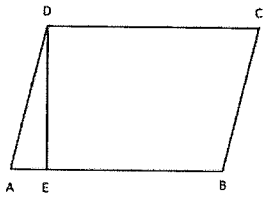
**12**




The graph of $y = f(x)$ is shown above in the xy-plane. What is the value of $f(-f(2))$?

A) -2
B) -4
C) 4
D) 1

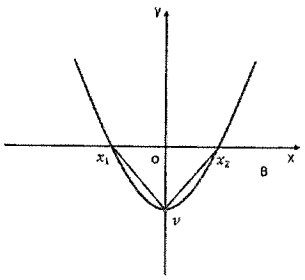
13




In the parallelogram ABCD above, $\overline{AD} = 6$ *and* $\overline{DE} \perp \overline{AB}$. Which of the following expressions represents the height, $\overline{DE}$, of the parallelogram?

A) $6cos\angle A$
B) $6tan\angle A$
C) $6sin\angle A$
D) $\frac{sin\angle A}{6}$

15




The graph of $f(x) = 2x^2 - 8$ is shown above in the XY-plane. What is the area of $\Delta x_1 x_2 v$?

14

$$x^2 + y^2 = 26$$
$$2xy = 23$$

In the system of non-linear equations above, if $x$ *and* $y$ *are positive numbers*, what is the sum of $x$ *and* $y$?

16

Each worker is in either department A or department B in XYZ company. If the number of workers in department A is three time the number of workers in department B and the average salary of workers in department A is $\$50{,}000$ and the average salary for workers in department B is $\$54{,}000$, what is the average of salary of the entire workers in the company?

A) $\$51{,}000$
B) $\$51{,}500$
C) $\$52{,}000$
D) $\$52{,}500$

17

Annual percent change in sales for five stores 2006-2008

| Store | Percent Change from 2006 to 2007 | Percent Change from 2007 to 2008 |
|---|---|---|
| P | 10 | −10 |
| Q | −20 | 9 |
| R | 5 | 12 |
| S | −7 | −15 |
| T | 17 | −8 |

The table above shows Annual percent change in sales for 5 stores for 2006-2008. Which of the statements must be true?

I. The net percent change for store P from 2006 to 2007 is 0.
II. Total sales amount in dollars in store R for 2006-2008 is larger than total sales amount in store S.

A) I only
B) II only
C) I and II
D) None

18

If $y = 4x$ and $z = -2y$, what is $\frac{x+2y+3z}{5}$ in terms of $x$?

A) $3x$
B) $-3x$
C) $\frac{3}{5}x$
D) $\frac{9}{5}x$

19

$$2x^2 - 4x + 2y^2 + 8y = -2$$

In the circle equation above, what is the value of the radius of the circle?

20

| Thomas Williams | Fran Rodriguez |
|---|---|
| 456 | 395 |

The table above shows the result of a survey which was conducted at random for a total of 851 voters for a certain election. If 4,255 people vote for the actual election, by how many votes would Thomas Williams be expected to win the election?

21

$f(x)$ *equals* 82 *percent of* $x$

For $x > 0$, the function is defined as above. Which of the following best describes the function?

A) Linearly decreasing
B) Exponentially decreasing
C) Linearly increasing
D) Exponentially increasing

22

Which of the following rational expressions are equivalent to $\frac{1}{x+1} - \frac{x}{x-2} + \frac{x^2+2}{x^2-x-2}$?

A) 0
B) $\frac{2x}{x^2-x-2}$
C) $\frac{-4}{x^2-x-2}$
D) $\frac{x^2-x-1}{x^2+x-3}$

**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.