Math

22 QUESTIONS
(TIME: 35 MIN)

DIRECTIONS

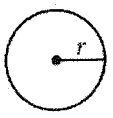
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

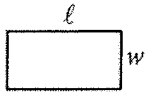
Unless otherwise indicated:

- 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.

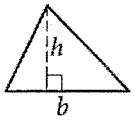
REFERENCE



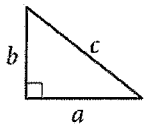
$A = \pi r^2$
$C = 2\pi r$



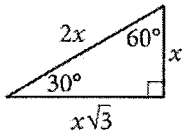
$A = \ell w$

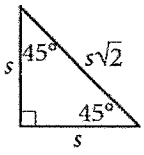


$A = \frac{1}{2}bh$

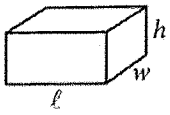


$c^2 = a^2 + b^2$

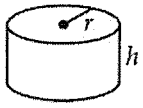




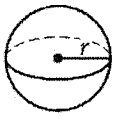
Special Right Triangles



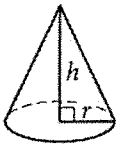
$V = \ell wh$



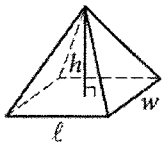
$V = \pi r^2 h$



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



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



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

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

A survey was conducted by ABC engineering company for future marketing plan on two brands. The survey indicated that 70% of respondents favor Brand A over Brand B with a 2% margin of error. In this situation, which of the following statements best describes margin of error?

A) The actual percentage that prefers Brand A likely falls within the range of 68-72%.
B) The actual percentage that prefers Brand A likely falls within the range of 70-72%.
C) The actual percentage that prefers Brand A likely falls within the range of 68-70%.
D) The actual percentage that prefers Brand B could be $\pm 2\%$.

2

$$a_n = a_1 + (n-1)d$$

The nth-term of arithmetic sequence is shown above. Which of the following equations correctly solved for d?

A) $d = \frac{n-1}{a_n - a_1}$
B) $d = \frac{a_1 - a_n}{1-n}$
C) $d = \frac{a_n}{a_1} - (n-1)$
D) $d = \frac{a_n}{n-1} + a_1$

3

$$\frac{-3}{x^2} = \frac{1}{2x} - \frac{1}{2}$$

In a rational equation shown above, where $x \neq 0$, what is the value of the sum of all solutions of the equation?

A) -1
B) 0
C) 1
D) 2

4

ICE CREAM PREFERENCE FOR VALENCIA SCHOOL

Items	Like	Neutral	Dislike	Total
Pistachio	23	120	57	200
Strawberry	186	12	2	200
Vanilla	120	57	23	200
Total	329	189	82	600

The table shows the distribution of a survey for three different flavors of ice cream. Each of 200 participants was asked for their thought for each flavor and the results are shown above. If one of these participants is selected at random, what is the probability of choosing "Like" and the person is asked about vanilla flavor?

A) $\frac{120}{600}$ B) $\frac{120}{329}$ C) $\frac{120}{200}$ D) $\frac{300}{600}$

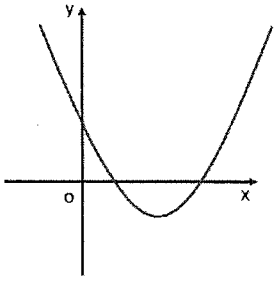
5

$$r = 2^{\frac{1}{x}} - 1$$

The annual interest rate in decimal, r, is given above, which is for your money to be double in x years. If it takes 12 years for your deposit to be double, what is the annual interest rate in percent approximately?

A) 0.06%
B) 6%
C) 0.27%
D) 27%

6



The graph of a quadratic function, f, is shown above in the XY-plane. If the function $f(x) = x^2 + bx + 2$ is solved for zeros using a quadratic formula. The zeros are as follows.

$$x = \frac{-b \pm \sqrt{b^2 - 8}}{2}$$

What could be the value of b in the equation above?

A) 0
B) -2
C) 2
D) -3

7

$$x^2 + 31 = 7y$$
$$x = y - 3$$

In the system of equations above, which of the followings could be the solution to the system?

A) $(2, 5)$
B) $(5, -8)$
C) $(-2, 1)$
D) $(-5, -2)$

8

The amount spent on lunch for college students was recorded for a sample of 250 college students. The mean expenditure was computed to \$15 and the median expenditure was computed to \$17. Which of the following interpretation of median is correct?

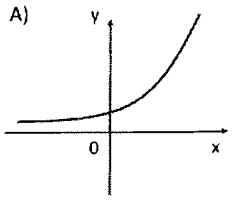
A) 50% of the students sampled had lunch costs equal to \$17.
B) 50% of the students sampled had lunch costs that were less than or equal to \$17.
C) 50% of the students sampled had lunch costs that were less than or equal to \$15.
D) The most occurring lunch cost in the sample was \$17.

9

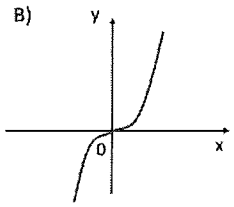
x	f(x)
-1	a
0	b
1	c

For the function f, the table shows some values of x and their corresponding f(x) values, where $a, b, and\ c$ are **positive** constants. If $a < b < c$, which of the following could be the graph of $y = f(x)$ in the XY-plane?

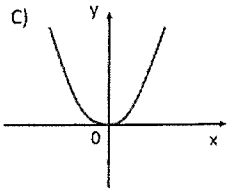
A)



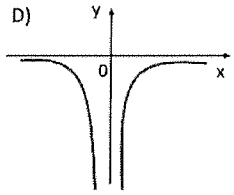
B)



C)



D)



10

Adrian's group plans a survey for their project in economics class. Which of the following best characterizes a simple random sample?

A) All participants in the sample could provide information voluntarily.
B) Some participants in the sample are allowed to communicate with each other.
C) Everyone in the population has an equal possibility of being chosen.
D) Some participants in the sample could participate more than once in the survey.

11

A rectangular solid has a volume of $2x^3 - 2x^2 - 4x$ and a height of $2x$. Which of the following expressions represents the area of the base of the solid?

A) $(x + 2)(x - 1)$
B) $(x - 2)(x + 1)$
C) $x(x - 1)$
D) $x(x + 1)$

12

$$3 + x - \frac{1}{x - 2}$$

If $x \neq 2$, which expression represents the equivalent to the expression above?

A) $\frac{x^2-x+7}{x-2}$
B) $\frac{x^2-x-7}{x-2}$
C) $\frac{x^2+x-5}{x-2}$
D) $\frac{x^2+x-7}{x-2}$

13

$$\frac{x^{-\frac{2}{3}}(x^3)^3}{x^5}$$

Which of the following expressions is equivalent to the expression above, where $x > 0$?

E) x^3
F) $x^3\sqrt[3]{x}$
G) $\sqrt[3]{x^{11}}$
H) $x^3\sqrt{x^3}$

14

A salesperson's compensation consists of basic monthly pay ($500) plus m% of the selling price of cars as commission. If the salesperson sold 12 cars which are $25,000 each. Which expression correctly represents the amount of monthly paycheck in this situation?

A) $500 + \frac{m}{100} \cdot 12 \cdot 25{,}000$
B) $500 + m \cdot 12 \cdot 25{,}000$
C) $\frac{m}{100} \cdot 500 \cdot (12 \cdot 25{,}000)$
D) $500 + \frac{m \cdot 25{,}000}{12}$

15

$$h(t) = -16t^2 + 32t + 25$$

The function, h, modeled the height of an object from the ground, in feet, t seconds after it was launched from the building. Based on the function given above, how long did the object stay 32ft above from the ground after it was launched?

A) 0.25 sec
B) 1.25 sec
C) 1.50 sec
D) 1.75 sec

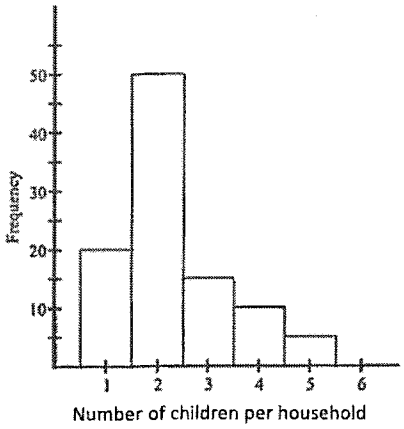
16

$$y > x$$
$$y < x + 2$$

Which ordered pair (x, y) could be a solution to the given system of inequalities above in the XY-plane?

A) $(0, 2)$
B) $(1, 2)$
C) $(1, 3)$
D) $(-1, 2)$

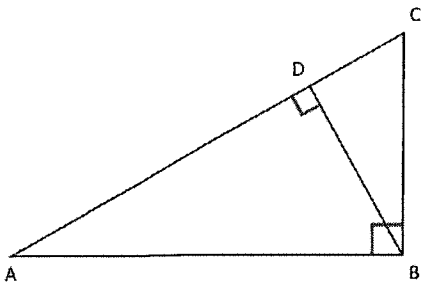
17



The histogram above represents the number of children per household for a sample of a certain high school. What is the median number of children of the data shown above?

E) 1
F) 2
G) 3
H) 4

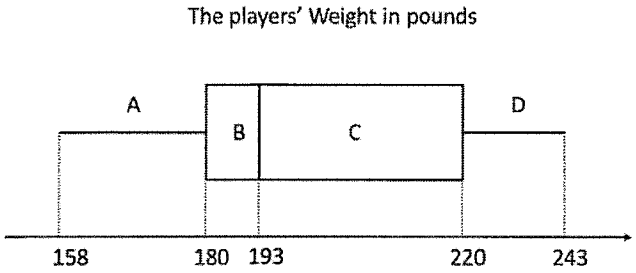
18



In the figure above, if $CD = 2$ *and* $CB = 4$, what is the value of $cos\angle A$?

A) $\frac{\sqrt{3}}{2}$ B) $\frac{2\sqrt{3}}{3}$ C) $\frac{\sqrt{3}}{3}$ D) $\frac{1}{2}$

19



A college football team has 24 players in total. The distribution of the players' weight is shown in the box plot above. Approximately, what is the number of players weighing greater than or equal to 193 pounds?

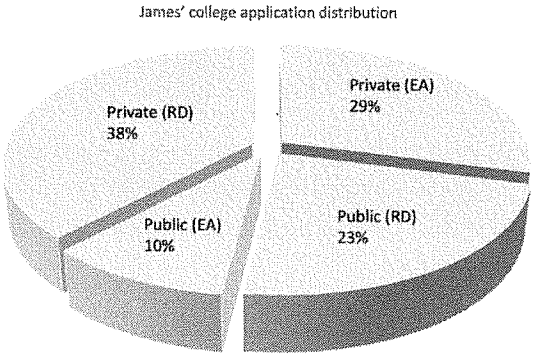
A) 12
B) 13
C) 14
D) 15

20

Elliott received \$100 for his monthly allowance in 2020. His monthly allowance was raised to \$144 after two years in 2022. What was the annual percent increase if the increasing rate was constant yearly for the last two years?

E) 0.20%
F) 2%
G) 20%
H) 25%

21



The pie chart above shows the distribution of James's college application. If he applied for both private or public colleges through Early Action (EA) or Regular Decision (RD) process. The percentage of each category is shown above. If there are 28 colleges he applied in total, what is the fraction of the number of public colleges to the number of private colleges?

A) $\frac{67}{33}$ B) $\frac{23}{38}$ C) $\frac{33}{67}$ D) $\frac{29}{33}$

22

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

In the circle equation above, what is the area of the circle?

A) 12π
B) 6π
C) 4π
D) 3π

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.