Math

22 QUESTIONS
(TIME: 35 MIN)

DIRECTIONS

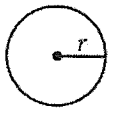
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

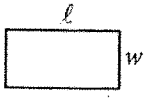
Unless otherwise indicated:

- 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.

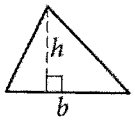
REFERENCE



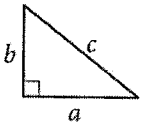
$A = \pi r^2$
$C = 2\pi r$



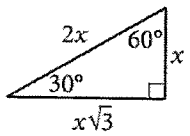
$A = \ell w$

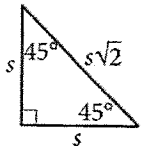


$A = \frac{1}{2}bh$

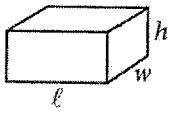


$c^2 = a^2 + b^2$

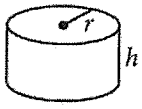




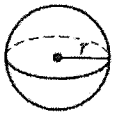
Special Right Triangles



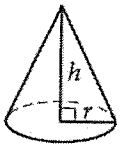
$V = \ell wh$



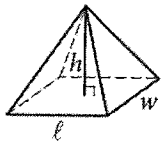
$V = \pi r^2 h$



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



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



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

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.

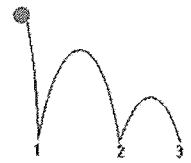
For multiple-choice questions, solve each problem, choose the correct answer from the choices provided, and then circle your answer in this book. Circle only one answer for each question. If you change your mind, completely erase the circle. You will not get credit for questions with more than one answer 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

Ball Free-fall diagram



A tennis ball bounces on the ground as shown. The ball is released from the initial height, h_0 and reaches out approximately two third the previous height after each bounce. Which of the following equations best represents the height of the ball after n bounce, where n is the number of bounce after it is released?

A) $h(n) = h_0\left(\frac{1}{3}\right)^n$
B) $h(n) = h_0\left(\frac{2}{3}\right)^n$
C) $h(n) = h_0 - \frac{h_0}{3^n}$
D) $h(n) = h_0\left(1 - \left(\frac{2}{3}\right)^n\right)$

2

The chance of an accident on the freeway 23 on a dry day is 0.10%. but the chance of an accident will go up to 0.50% on a rainy day. If there is a 30% chance of the weather being rainy today, what is the probability that there will be an accident on the freeway 23 today?

A) 0.22
B) 0.0022
C) 0.38
D) 0.0038

3

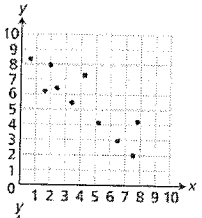
$$4r^2q^4 + r^3 - 4(q^2 + rq^2)^2$$

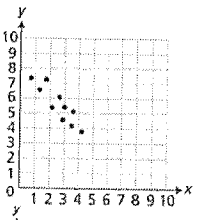
Which of the followings is equivalent to the expression above?

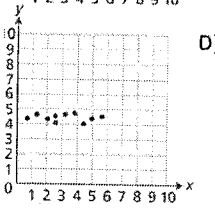
A) $r^3 - 4q^4 + 8rq^4$
B) $r^3 - 4q^4 - 8r^2q^4$
C) $r^3 - 4q^4 - 8rq^4$
D) $r^3 - 4q^4 - 4rq^4$

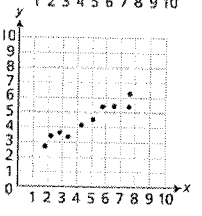
4

Which of the following scatter plots could be described the line of best fit $y = kx$, where k is a constant?

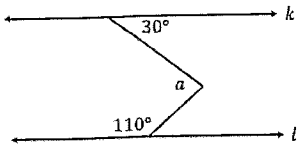
A)


B)


C)


D)


5



In the diagram above, lines k *and* l are parallel. What is the measure of angle a *in degrees*?

A) $80°$
B) $90°$
C) $100°$
D) $110°$

6

$$-x^2 + 5x + 3 = 0$$

In the quadratic equation above, what is the solution to the equation?

A) $\frac{-5\pm\sqrt{37}}{2}$
B) $\frac{5\pm\sqrt{37}}{-2}$
C) $\frac{5\pm\sqrt{37}}{2}$
D) $\frac{\sqrt{37}\pm5}{2}$

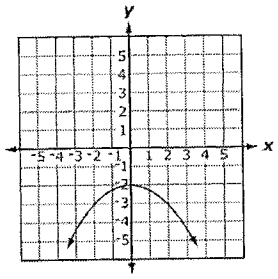
7

$$|x - 2| = 8$$
$$-|y + 3| = -4$$

In the system of absolute equations above, what is the least possible value of $x + y$?

A) -5
B) -7
C) -13
D) -17

8



Which of the following equations represents the graph above?

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

CONTINUE

9

Which of the following equations is correct for a circle with center $(2, 0)$ and diameter 6?

A) $(x+2)^2 + y^2 = 9$
B) $(x-2)^2 + y^2 = 36$
C) $(x+2)^2 + y^2 = 36$
D) $(x-2)^2 + y^2 = 9$

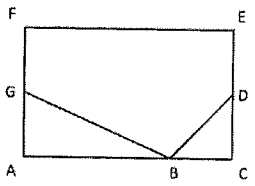
10

$$f(x) = -(2)^x + 1$$

What are the x intercept and y intercept, respectively, for the exponential function above?

A) $(0, 0)$ on both
B) $(1, 0), (0, -1)$
C) $(-1, 0), (1, 0)$
D) $(1, 0), (0, 0)$

11



In the rectangle shown above, D and G are the midpoints of $\overline{CE}$ and $\overline{AF}$, respectively and the length of $\overline{BC}$ is the same as the length of $\overline{DC}$. If the length of $\overline{BG}$ is twice the length of $\overline{AG}$, what is the measure of $\angle DBG$, in degrees?

12

$$80, 39, 210, 152, 244, 239, 232, 112$$

The internet store manager kept on track of the number of items sold over an eight-week period. The results are shown above. What is the positive difference between mean and median of these lists?

A) 11.5
B) 17.5
C) 46.5
D) 48.5

13

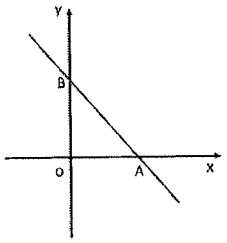
If $2xy = 3$, what is the value of $\left(\frac{y}{3x}\right) \cdot (2x)^2$?

14

If a function f, is defined as $y = f(x)$. Which of the following statements is correctly described the transformation for $y = -f(x + 1)$?

A) Translate the graph horizontally 1 unit to the right and then reflect it over the x axis.
B) Reflect the graph over the x axis and then translate it horizontally 1 unit to the left.
C) Translate the graph horizontally 1 unit to the right and then reflect it over the x axis.
D) Reflect the graph over the y axis and then translate it vertically 1 unit up.

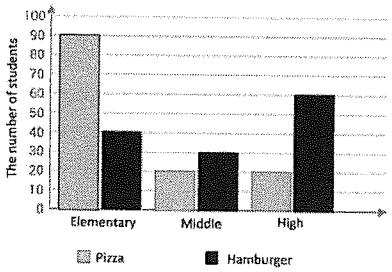
15



If a line passes through two points $A(n, 0)$ and $B(0, m)$ on the axes in the XY-plane as shown above. Which one is correct expression for $cos\angle OAB$ in terms of m and n?

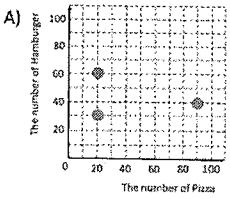
A) $\frac{n}{\sqrt{m^2+n^2}}$
B) $\frac{m}{\sqrt{m^2+n^2}}$
C) $\frac{m}{n}$
D) $\frac{\sqrt{m^2+n^2}}{m}$

16

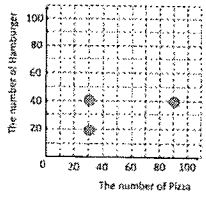


The bar graph above shows the distribution of lunch choices for 130 orders of pizza and 130 orders of hamburger in ABC school district. Which of the scatter plots correctly represents the bar graph?

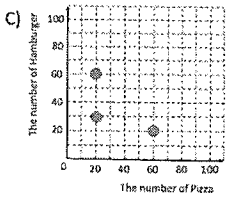
A)



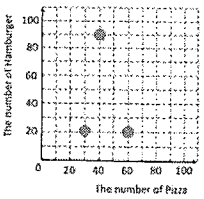
B)



C)



D)

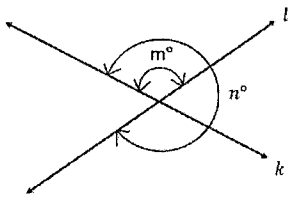


17

Julie bought a new phone with promotion. She paid a promotion discount price that was 30% less than the list price ($1,200). She also paid a sales tax equal to 9% of the list price. What is the total amount of cost in dollars for her purchase?

A) $915.60
B) $948.00
C) $764.40
D) $756.00

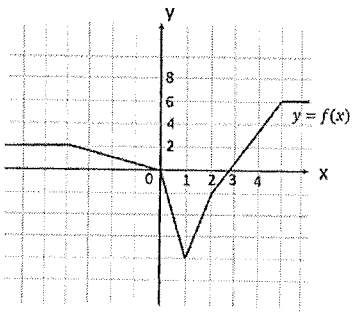
18



Note: Not drawn to scale.

In the figure above, lines l and k intersect at one point and form angles. If $n = 3m$, what is the measure of angle m, in degrees?

19



The graph of f in the XY-plane is shown above. What is the value of $-f(2) + 2 \cdot f(-5)$?

E) 3
F) 4
G) 5
H) 6

20

If $sin(2a - 15)° = cos(a + 30)°$, what is the value of a?

A) 25
B) 35
C) 45
D) 55

21

$$C(x) = \frac{450x}{270 - x}$$

The cost C, in thousands of dollars, to pave $x\%$ of the entire dirt road in a certain rural area with brand-new asphalt is modeled by the function above. Approximately what percent of the entire dirt road could be paved with 120 thousand dollars budget?

A) 50
B) 57
C) 62
D) 67

22

$$f(k) = 2.88(0.94)^k$$

The function above represents the number of ICU (Internal Combustion Units), in billions, in a certain country, where k is the number of years since 2020. Which of the following best represents the number 0.94 in this context?

A) The estimated percent decrease of ICU in the entire country in 2020.
B) The number shows that the number of ICU in the country is decreasing 6% from the number of ICU in the previous year.
C) The number shows that the number of ICU in the country is increasing 94% annually for the number of ICU in the previous year.
D) The estimated number of ICU in billions in k years after 2020.

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.