WEEK3.8

Math

22 QUESTIONS
(TIME: 35 MIN)

DIRECTIONS

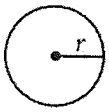
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

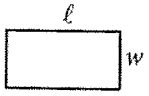
Unless otherwise indicated:

- 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.

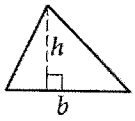
REFERENCE



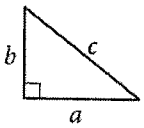
$A = \pi r^2$
$C = 2\pi r$



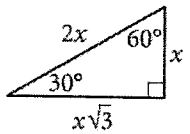
$A = \ell w$

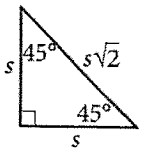


$A = \frac{1}{2}bh$

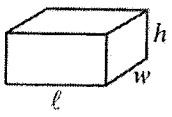


$c^2 = a^2 + b^2$

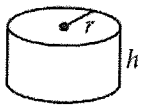




Special Right Triangles

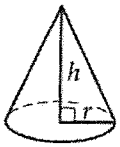


$V = \ell wh$

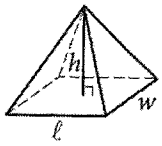


$V = \pi r^2 h$

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



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



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

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.

CONTINUE

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

$$-2(1-x)-3=ax+1$$

If the equation above has no solutions, for a constant a, what is the value of a?

2

For an exponential function f, where k is a constant. If the value of $f(-2)$ is k, which of the following forms of the function f shows the value of k as **the coefficient**?

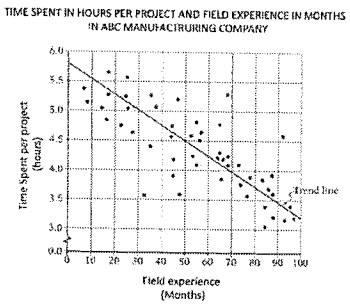
A) $f(x)=202(2.1)^{x-2}$
B) $f(x)=12.5(2.1)^{x}$
C) $f(x)=-302(2.1)^{-x}$
D) $f(x)=4(2.1)^{x+2}$

3

If Sally earns k dollars for t hour in her job, which of the following expression represents the amount of money, in dollars, Sally makes for $\boldsymbol{4t+1}$ hours of work if she earns only hourly pay?

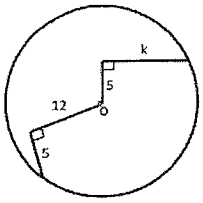
A) $4k$
B) $4k+1$
C) $4k+t/k$
D) $4k+k/t$

4



In the scatterplot above, the data represent the time spent, in hours, per project for 50 workers in ABC Company. What fraction of workers could finish one project less than the expected time, in hours, if the workers had at least 80 hours of field experience?

5



Note: Not drawn to scale.
O is the center of the circle

In the circle O above, what is the value of k?

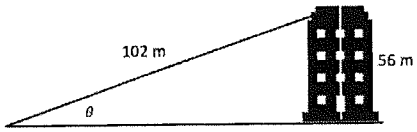
6

$$3x = 4y = 2z = 20$$

In the equation above, what is the value of $15xy^2z$?

A) 8,000
B) 15,000
C) 20,000
D) 25,000

7



The guywire length stretched from the ground to the top of the building is 102 m and the height of the building is 56m. which of the following expressions represents the angle of elevation of the guywire from the ground to the top of the building?

A) $\sin^{-1}\left(\frac{56}{102}\right)$
B) $\cos^{-1}\left(\frac{56}{102}\right)$
C) $\tan\left(\frac{56}{102}\right)$
D) $\sin\left(\frac{56}{102}\right)$

8

$$2x^2 - (m+1)x + 2m = 0$$

In the equation above, m is a constant. If the sum of two roots is 4, then what is the product of the roots?

A) 4
B) 5
C) 7
D) 8

$$y < \frac{2}{3}x + 2$$

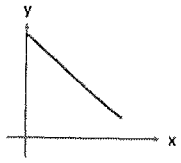
$$y > \frac{2}{3}x - 1$$

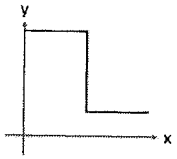
In the inequalities shown above, if $(0, a)$ is a solution of the system of inequalities, assuming a is positive integer, what is the value of a?

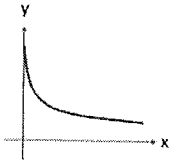
A) 1
B) 2
C) 3
D) 4

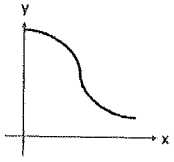
10

A person is injected with a certain drug. The amount of drug left in the person's body decreases in half every hour at a constant rate. Which of the following graphs best represents the amount of drug left after a certain time?

A)


B)


C)


D)


11

Jeremiah builds catapult for his physics project. The restriction of the catapult must measure 20 cm in height, with 1.5 cm margin of error. Which absolute inequalities show the possible height of the catapult he can build?

A) $|20 - x| < 1.5$
B) $|x - 1.5| < 20$
C) $|x - 20| > 1.5$
D) $|x - 1.5| < 20$

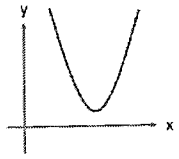
12

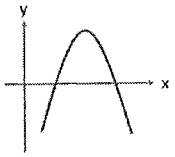
An author wants to publish his book. A book publisher informs that the thickness of pages is 0.2 millimeters and both front cover and back cover need to have 3 millimeters thick respectively. Which of the following functions shows the total thickness of the book in millimeter which has x pages?

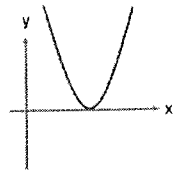
E) $f(x) = 3 + 0.2x$
F) $f(x) = 6 + 0.2x$
G) $f(x) = 3 + 0.4x$
H) $f(x) = 6 + 0.4x$

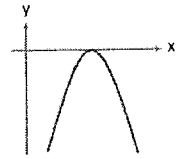
13

The function f is defined by $f(x) = -(x-1)^2 + 1$. Which of the following graphs below could be the graph of $y = f(x) - 1$?

A) 

B) 

C) 

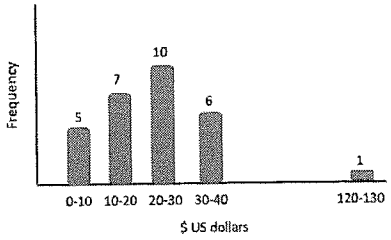
D) 

14

A carpenter needs to make 4 wooden dog houses. The length of wood stick required for each dog house is 2.9 ft. if the wood stick is purchased as a single length in feet and sells for $2 per foot. what is the total cost of the wood stick needs to be purchased for the 4 dog houses?

A) $24.00
B) $23.20
C) $23.00
D) $22.90

15

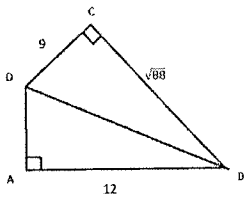


The graph above shows the frequency distribution of 29 students weekly allowance

If the student who gets the largest weekly allowance in the data (outlier) is removed from the research, which value could be **affected the most**?

A) Median
B) Range
C) Interquartile Range
D) Mode

16



In the figure above, what is the area of triangle ABD?

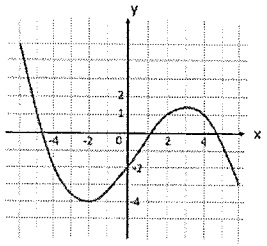
E) 28
F) 29
G) 30
H) 31

17

Adrian's monthly earning is t dollars. If he spends $\frac{2}{5}t$ dollars for taxes and expenses and saves the rest every month. If this continues at the same rate, how many **years** will it take him to save $\$3600$?

A) $\frac{6000}{t}$
B) $\frac{1000}{t}$
C) $\frac{500}{t}$
D) $\frac{3600}{t}$

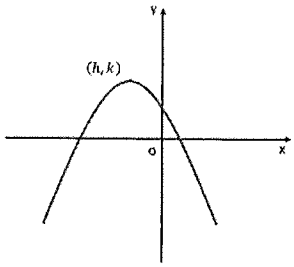
18



The figure above shows the complete graph of the function f in the xy-plane. How many values of x exist if $f(x) = f(f(-2))$?

A) 0
B) 1
C) 2
D) 3

19



The graph of $y = a(x + 3)(x - 1)$ is shown in the XY-plane above, where a is a constant. If the graph passes through $(0,2)$ and the coordinates of the vertex is (h, k), what is the value of k?

20

During a one-year study, the price of a certain car 10 percent was decreased in the first half year and then increased 10 percent in the second half year. From the beginning of the year to the end of the year, the price of car was

A) did not change
B) decreased by 1%
C) increased by 1%
D) decreased by 10%

21

$$x^2 + 6x + y^2 - 2y = -1$$

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

E) π
F) 3π
G) 6π
H) 9π

22

$$2x - y = 1$$
$$y = x^2 - 9$$

The graphs of the system of equations intersects at the points (x, y) in the $XY - plane$. What is the product of two y values?

A) -8
B) 8
C) -35
D) 35

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.