Math

22 QUESTIONS
(TIME: 35 MIN)

DIRECTIONS

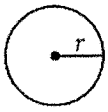
The questions in this section address a number of important math skills.
Use of a calculator is permitted for all questions.

NOTES

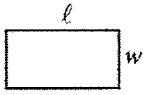
Unless otherwise indicated:

- 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.

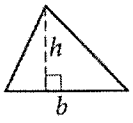
REFERENCE



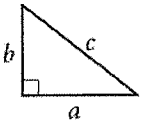
$A = \pi r^2$
$C = 2\pi r$



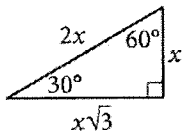
$A = \ell w$

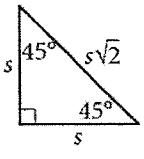


$A = \frac{1}{2}bh$

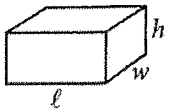


$c^2 = a^2 + b^2$

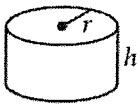




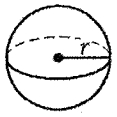
Special Right Triangles



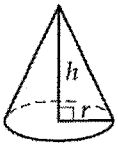
$V = \ell wh$



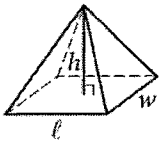
$V = \pi r^2 h$



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



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



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

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 rowing team entered a 500-meter race. The team rowed at an average speed of 32 strokes per minutes. If the team took 350 seconds to complete the 500-meter race, how many strokes did it take the team during the race to the nearest whole number?

2

The measure of an angle is $\frac{2}{3}\pi$ radians. If it is converted into degrees, it has a measure of m degrees. What is the value of m?

3

The value of function f will increase by 30% for every value of x increase by 1 in the function. Which of the following could be the function f?

A) $f(x) = 2(0.3)^x$
B) $f(x) = 23(1.3)^{x+2}$
C) $f(x) = 0.13(1.3)^{-x}$
D) $f(x) = 25(1.3)^{2x}$

4

$$f(x) = (x-5)(x+2)^2$$

The function f is defined above. If $f(x-2) = 0$, what could be the value of x?

A) 0
B) 1
C) 2
D) 5

5

Participants in the international model airplane competition need to build a light-weight (less than 30 pounds) airplane model and a heavy-weight (more than or equal to 30 pounds) airplane model for the competition. A heavy-weight airplane model uses 2 small wheels and 4 large wheels, and a light-weight airplane model uses 1 small wheel and 2 large wheels for their landing gears, respectively. There are 40 large wheels and 30 small wheels available in the competition, and each participant must build one heavy-weight airplane model and one light-weight airplane model. What is the maximum number of participants that could attend the competition?

6

Nutritional information for 1 ounce servings of seeds

	Total fat (grams)	Protein (grams)	Calories
Barley	0.65	3.54	100
Brown rice	0.26	0.73	31

The table above shows nutritional information for 1-ounce of barley and brown rice. How many more grams of total fat are in one pound of barley than are in one pound of brown rice?
(1 pound = 16 ounces)

A) 2.81
B) 33.72
C) 0.39
D) 6.24

7

Jimmy bought a $90 daily pass for unlimited rides in magic mountain theme park. The average price for a ride in the theme park is $6.50. If he took 8 different rides in the morning, at least how many rides does he need to take in the afternoon in order to save money in the cost?

A) 4
B) 5
C) 6
D) 7

8

$$x^6 - y^6 = 16$$
$$x^3 - y^3 = 8$$

In the two equations above, what is the value of $x^3 + y^3$?

9

Sarah surveyed 80 people who visited in a local library and asked if they are in favor of the proposal to use $150,000 of local taxes for upgrading desks and chairs for the libraries in the city. She found that 60 of those surveyed were in favor of the proposal. Which of the following statements is the most reasonable conclusion?

A) This sampling method was flawed and could be biased because of the survey place.
B) No prediction should be made because the sample size is too small.
C) 75% of the votes will be in favor of the proposal when the actual votes were taken.
D) The result of this survey is valid, unbiased, and must forecast the actual votes fairly.

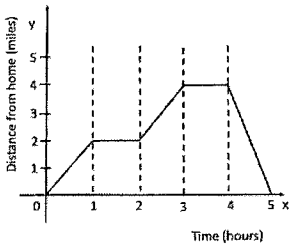
10

Distribution of tossing two coins

		Quarter	
		Heads	Tails
Nickel	Heads	12	9
	Tails	10	11

The two-way table shows the distribution of the results of tossing two coins. For what percent of the tosses were the Quarters landed on tails to the nearest tenth?

11



Charles walked from home to his friend's house. He stopped by a restaurant on the way to have a lunch for an hour and walked again to reach his friend's house and stayed there with his friend for an hour and finally he ran straight back to his home on the same road. The graph above show distance from his home by hours. How many times faster in speed, in miles per hour, was he running back home than walking to his friend's house?

A) 1.5
B) 2.0
C) 2.5
D) 4.0

12

The graphs of the following quadratic equations each have x-intercepts of -3 and 7 in the XY-plane. Which equation has its vertex farthest from the x-axis?

A) $y = \frac{1}{2}(x+3)(x-7)$
B) $y = -\frac{1}{5}(x+3)(x-7)$
C) $y = 6(x+3)(x-7)$
D) $y = -12(x+3)(x-7)$

13

With greater depth of the atmosphere, more air is pressing down from above. Therefore, air pressure is greatest at sea level and falls with increasing altitude. Michael hiked the Mt. Everest in winter and the air pressure dropped at a constant rate of 0.768 kPa per every 100 meters vertical distance. The height of Mt. Everest is about 8.85 kilometers from the sea level. Which of the following is closest to the total drop in air pressure, in psi (pounds per square inch), over the course of the entire hike from the sea level to the top of the mountain? (1 kPa = 0.145 psi)

A) 0.99
B) 468.7
C) 68.0
D) 9.86

14

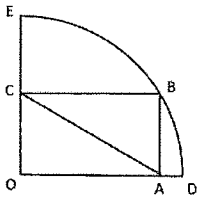
If $\frac{3x}{y} = 7$, what is the value of $\left(\frac{4xy}{3}\right) \cdot (2y)^{-2}$?

15

Which of the following describes exponential relationship between two variables listed?

A) Airplane's speed v, in feet per minute, will decrease at a constant rate of 1,500 feet per minute every minute m.
B) The depth h of water in a water container decreases by 10 inches each minute m as the water is going out at a constant rate.
C) The air pressure p decreases by 7.68 Pa when the height h increases every meter.
D) The sales of a product s, in dollars, in a company is expected to grow 20% every year t for the next decade.

16



Rectangle OABC is inscribed into the quarter circle O as shown above. The length of OA is $5\sqrt{3}$ and the measure of $\angle OAC$ is 30°. What is the area of the quarter circle O?

A) 100π
B) 50π
C) 25π
D) 20π

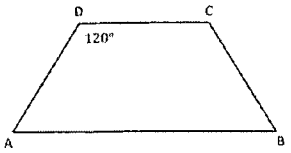
17

Science classes enrollment at Valencia High School

	Male	Female	Total
Physics	65		100
Chemistry			
Total	110		200

The table above shows the distribution of science classes (Physics and Chemistry) at Valencia high school partially. After completing the table, what percent of female students are taking Chemistry class to the nearest whole number?

18



An isosceles trapezoid ABCD is formed by cutting the regular hexagon into half as shown above and the perimeter of trapezoid ABCD is 10, what is the area of the trapezoid?

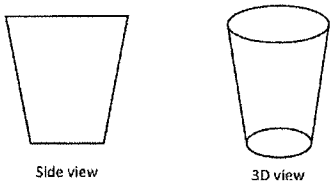
A) $3\sqrt{3}$
B) $5\sqrt{3}$
C) $6\sqrt{3}$
D) 6

19

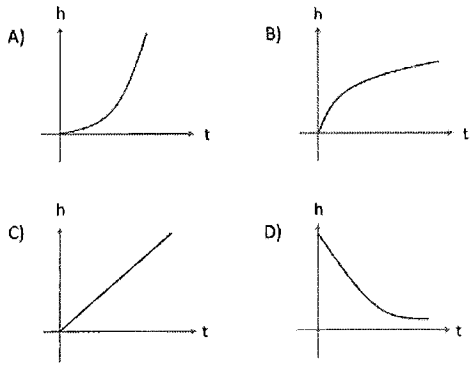
Which of the following transformation should be made for the graph of $f(x) = (x-2)^2$ to become the graph of $g(x) = -(x-2)^2 + 3$?

A) Translate 3 units left.
B) Reflect over x-axis and translate 3 units right.
C) Reflect over y-axis and translate 3 units up.
D) Reflect over x-axis and translate 3 units up.

20



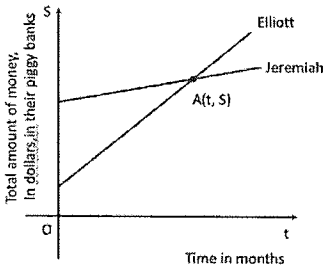
Two different views for a water cup are shown above. Assuming that water is being poured at a constant rate, which of the following best represents the height of water h in the water cup as time t elapses in the x-axis?



CONTINUE

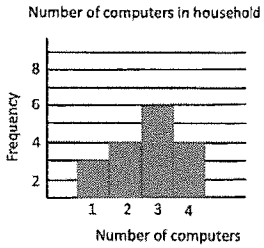
21

Jeremiah has $120 in his piggy bank and deposits $30 every month of his allowance from parents. Elliott has $40 in his piggy bank and deposits $50 every month from his part-time job. The linear graphs for this situation are shown below.

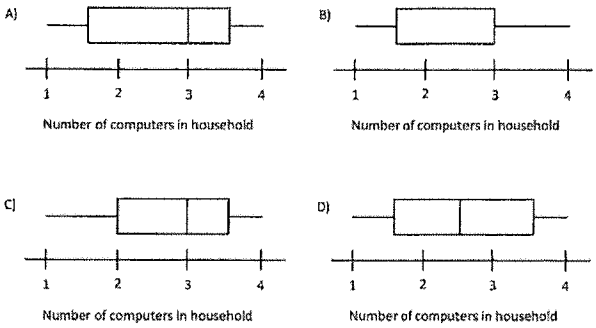


If two lines are graphed in the tS-plane. What is the value of S, in dollars, when they have the same amount of money in their piggy banks?

22



A teacher surveyed her class for the number of computers in the household. The results are shown in the bar graph above. Which of the following box plots best represents her survey result?



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.