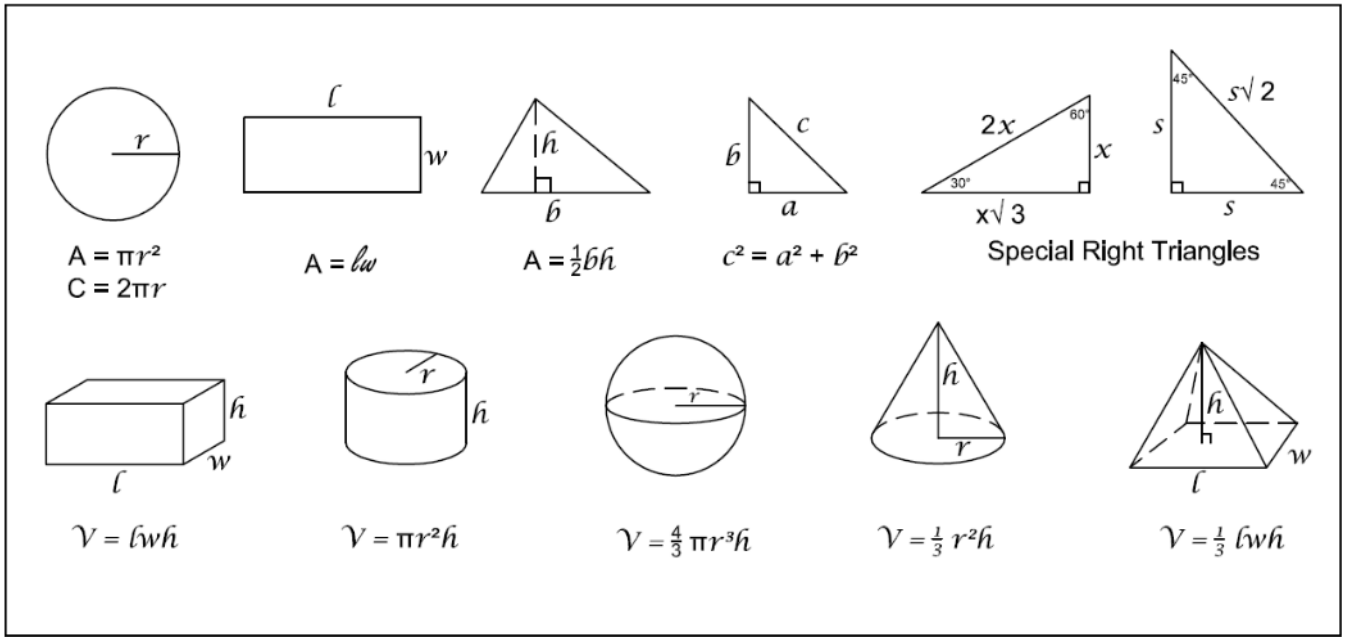
Directions

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet.
For questions 31-38, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

Notes

1. The use of a calculator **is permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

Reference



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.

1. Jason must pay $19.95 per month for his home telephone. With this payment, Jason is able to make unlimited calls to anywhere in the country. However, there is an additional fee of $1.75 for every call to a foreign country. For one month, Jason paid $25.20 in total. How many calls did Jason make to foreign countries that month?

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

2. In Rob's basketball league, the leading scorer averages 25 points per game, and wants to increase his scoring average by .5 points per game every game. Which of the following represents the number of points per game that the lead scorer wants to average after *x* games?

A) $.5 + 20x$
B) $25 + .5x$
C) $20 - .5x$
D) $20 + .5x$

3. If an 80oz. birthday cake is sliced in half and each half is sliced in to fourths, what is the weight, in pounds, of each of the slices? (1 pound = 16 ounces)

A) .25
B) .625
C) 5
D) 10

4. James surveyed a random sample of students in his college to determine whether or not the cafeteria's new lunch menu was approved by the student body. Of the 500 students surveyed, 29% approved the new lunch menu. Based on this information, about how many students in the entire 20,125 person student body would be expected to approve of the new lunch menu?

A) 5000
B) 5800
C) 6200
D) 6500

5. The average speed of an object is equal to the distance that the object travels divided by the time that it takes the object to travel that distance. What distance did the object travel, in feet, if it traveled for 25 seconds at an average speed of 20ft per second?

A) 20
B) 25
C) 200
D) 500

6. Jared and Jessica finished a basket of French fries together. Jared ate 18 more French fries than Jessica. If there were 200 French fries in the basket, how many French fries did Jessica eat?

A) 90
B) 91
C) 92
D) 93

Sneakers Sold the Most in 2014 by Mike's Store

Brand	**Type of Sneaker**			**Total**
	Basketball	Running	Casual	
Brand A	15	10	8	33
Brand B	11	6	3	20
Brand C	4	2	4	10
Brand D	1	2	9	12
Total	31	20	24	75

7. The table above represents the 75 sneakers that Mike's store sold the most in 2014, categorized by brand and type. What fraction of the sneakers are Brand A basketball sneakers?

A) $\frac{2}{15}$
B) $\frac{1}{5}$
C) $\frac{1}{3}$
D) $\frac{3}{20}$

8. Line *m* in the xy-plane contains points from each of Quadrants I, II, and III, but no points from Quadrant IV. Which of the following must be true?

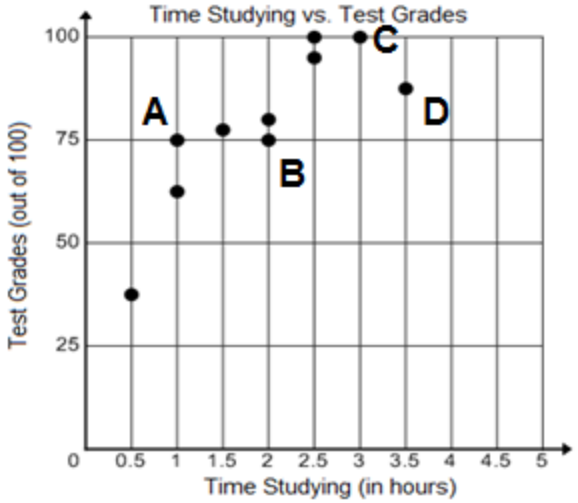
A) The slope of the line *m* is undefined
B) The slope of the line *m* is negative
C) The slope of the line *m* is zero
D) The slope of the line *m* is positive

Estimated Number of Licensed Drivers in NYC in Thousands by 2020						
	Age in Years					
Borough	17 to 24	25 to 44	45 to 64	65 to 74	75 and older	**Total**
Manhattan	279	357	295	158	147	**1,336**
Staten Island	154	174	211	85	90	**714**
Bronx	410	325	451	147	125	**1,458**
Queens	408	347	385	254	82	**1,476**
Brooklyn	214	292	325	251	140	**1,222**
Total	**1,464**	**1,495**	**1,767**	**895**	**584**	**6,206**

9. The table above shows the estimated number of licensed drivers that there will be in New York City by the year 2020 in thousands. Based on the table, if a licensed driver who will be 45 to 74 years old in 2020 is chosen at random, which of the following is closest to the probability that the licensed driver is from Brooklyn?

A) .09
B) .22
C) .25
D) .30

Questions 10 and 11 refer to the following information.



10. A teacher created the scatter plot above to examine the relationship between the time spent studying and test grades of 10 of her students. What is the test grade of the student who studied for the longest time?

A) 77.5
B) 85
C) 87.5
D) 95

11. Of the labeled points, which represents the student for which the ratio of test grade to time studying is greatest?

A) A
B) B
C) C
D) D

12. In the xy-plane, the graph of function *f(x)* has x-intercepts at -4, -5, and 0. Which of the following could define *f(x)*?

A) $f(x) = (x + 4)(x - 5)$
B) $f(x) = (x + 5)(x - 4)(x)$
C) $f(x) = (x - 4)(x - 5)(-x)$
D) $f(x) = (x + 4)(x + 5)(x)$

13. The amount of money that David earns over the course of 5 months is shown in the table.

Time (Months)	Money Earned
1	$10,000
2	$20,000
3	$30,000
4	$40,000
5	$50,000

Which of the following best describes the relationship between time and the money David earns during the 5 months?

A) Increasing linear
B) Decreasing linear
C) Exponential Growth
D) Exponential Decay

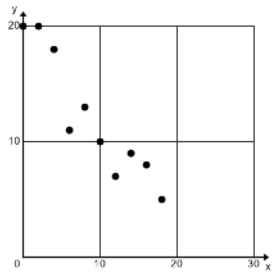
14. $1500x^2 - 450x - 600$

The expression above gives the amount of yearly profit in dollars, that a company makes for selling *x* thousand units. Which of the following expressions shows how much additional profit is made from selling 6 thousand units than selling 4 thousand units?

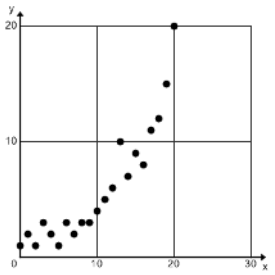
A) $1500(6-4)^2 - 450(6-4) - 600$
B) $1500\left(\frac{6}{4}\right)^2 - 450\left(\frac{6}{4}\right) - 600$
C) $1500(6)^2 - 450(6)^2 - 600 - 1500(4)^2 + 450(4)^2 + 600$
D) $\frac{1500(6)^2 - 450(6)^2 - 600}{1500(4)^2 - 450(4)^2 - 600}$

15. Which of the following scatterplots shows a relationship that is appropriately modeled with the equation $y = ax + b$, where a is negative and b is positive?

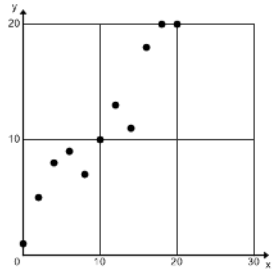
A)



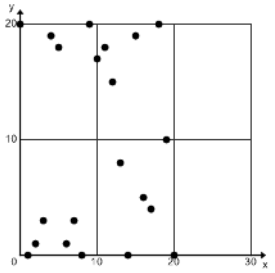
C)



B)



D)



Questions 16 and 17 refer to the following information.

Dennis is organizing a birthday party for his son. He must decide where to buy the balloons and rent a cotton candy machine and bouncy house. The table below shows the cost of balloons and the hourly rental costs of the cotton candy machine and bouncy house for three different stores.

Store	Cost of Balloons, B($)	Rental Cost of Cotton Candy Machine, C($/hr)	Rental Cost of Bouncy House, H($/hr)
1	20	20	35
2	20	15	40
3	25	22	32

The total cost, y, for buying the balloons and renting the cotton candy machine and the bouncy house in terms of number of hours, x, is given by $y = B + (C + H)x$.

16. For what number of hours, x, will the total cost, y, from Store 2 be less or equal to the cost, y, from Store 3?

A) $x \geq 5$
B) $x \leq 5$
C) $x \leq 6$
D) $x \geq 6$

17. If the relationship between the total cost, y, at Store 1 and the number of hours, x, for which the cotton candy machine and the bouncy house are rented is graphed in the xy-plane, what does the y-intercept of the line represent?

A) The total cost of the party
B) The total cost of balloons
C) The total hourly cost of the project
D) The hourly rental costs of the bouncy house

18. In the waiting room at a doctor's office, there is a water dispenser that holds one gallon of water. Every person who uses the dispenser uses the cone shaped cups provided at the office. Each cup has an internal diameter of 1.5 inches. If the height of each is 3 inches, what is the largest number of full cups that can be poured from one gallon of water? (Note: There are 231 cubic inches in one gallon)

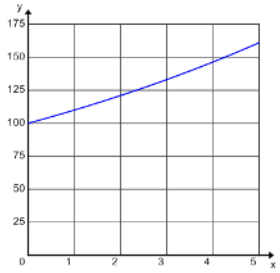
A) 120
B) 121
C) 130
D) 131

19. If $5x - 5 \leq 15$, what is the greatest possible value of $5x + 5$?

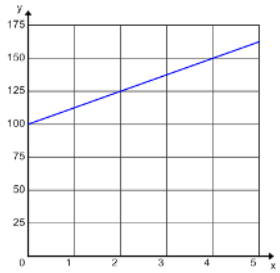
A) 15
B) 20
C) 25
D) 30

20. The population of an endangered species is determined once every year for 5 years. If the population has increased steadily by 10% each year, which of the following graphs could model the population of the species as a function of time?

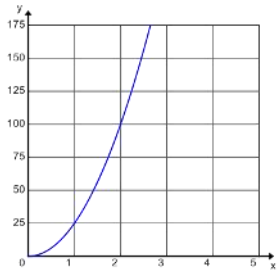
A)



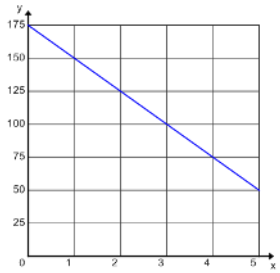
B)



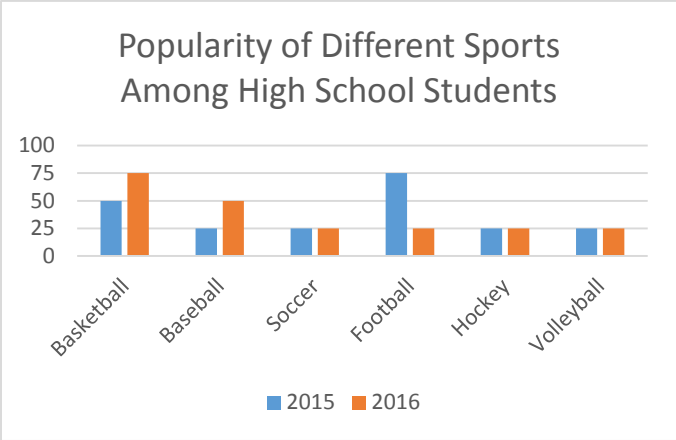
C)



D)



Question 21 and 22 refer to the following information.



In 2015, a survey was taken among 225 NY high school students in which each participant was asked what their favorite sport was. In 2016, another survey was taken among 225 NY high school students in which each participant was asked the same question. The bar graph above shows the results of both surveys.

21. In a scatter plot of this data, where popularity in the year 2015 is plotted along the x-axis and popularity in the year 2016 is plotted along the y-axis for each of the given sports, how many data points would lie on the line $y = x$?

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

22. Of the following which best approximates the percent decrease in popularity of football among NY high school students from 2015 to 2016?

A) 25%
B) 50%
C) 67%
D) 75%

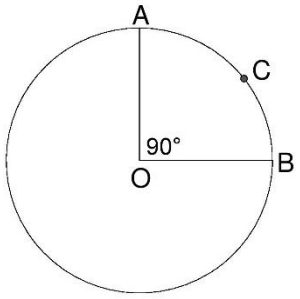
23. The tables below give the distribution of test scores for Ms. Brandon's 1st period class and Ms. Brandon's 2nd period class.

1st period	
Test Scores	Frequency
$90 \leq x$	3
$80 \leq x \leq 89$	5
$70 \leq x \leq 79$	15
$60 \leq x \leq 69$	4
$x \leq 59$	3

2nd period	
Test Scores	Frequency
$90 \leq x$	6
$80 \leq x \leq 89$	5
$70 \leq x \leq 79$	7
$60 \leq x \leq 69$	6
$x \leq 59$	6

Which of the following is true about the data shown for these two classes?

A) The standard deviation of test scores for Ms. Brandon's 1st period class is larger than her 2nd period class.
B) The standard deviation of test scores for Ms. Brandon's 2nd period class is larger than her 1st period class.
C) The standard deviation of test scores is the same for both classes
D) The standard deviation of test scores for these classes cannot be compared with the data provided



24.
In the circle above, segments $\overline{AO}$ and $\overline{BO}$ are radii that form an angle of 90^o. If the length of arc $\overset{\frown}{ACB}$ is 2π, what is the length of the diameter of the circle?

A) 2
B) 4
C) 6
D) 8

25. $f(x) = 3x^3 + 15x^2 + 18x$
$g(x) = x^2 + 5x + 6$

The polynomials $f(x)$ and $g(x)$ are defined above. Which of the following polynomials is divisible by $3x + 4$?

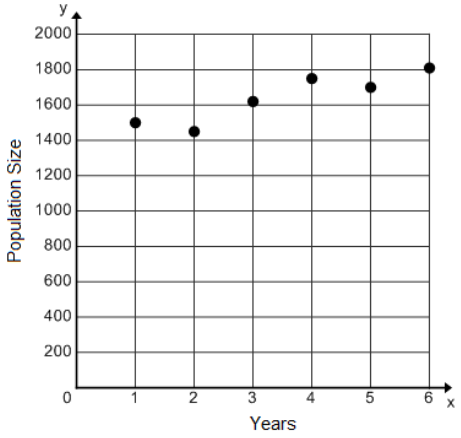
A) $a(x) = f(x) + g(x)$
B) $b(x) = 4f(x) + g(x)$
C) $c(x) = f(x) + 4g(x)$
D) $d(x) = 4f(x) + 3g(x)$

26. Let x and y be numbers such that $y < x < -y$. Which of the following must be true?

I. $x > 0$
II. $x + y < 0$
III. $y < 0$

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

27. A scientist recorded the population size of a particular species of birds over the course of 6 years. The scatter plot below shows the scientist's results.



The line of best fit has an equation $y = 69.43x + 1395.3$. Which of the following best explains how 1395.3 in the equation relates to the scatter plot?

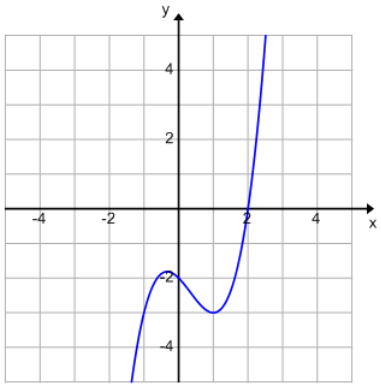
A) The approximate population size at the beginning of the first year.
B) The approximate population size 10 years prior to the conclusion of the 6-year period.
C) The number of birds that which the species is considered endangered.
D) The exact number of birds that were present when the scientist began recording the population size of the species.

28. $f(x) = (x + 5)(x - 3)$
Which of the following is an equivalent form of the function *f* above in which the minimum value of *f* appears as a constant or coefficient?

A) $f(x) = x^2 - 15$
B) $f(x) = x^2 + 2x - 15$
C) $f(x) = (x - 1)^2 - 12$
D) $f(x) = (x + 1)^2 - 16$

29. If *a* is the average (arithmetic mean) of $4x^2$, $7x$, and 15, and *b* is the average of $2x^2$, $5x$, and 3, what is the average of *a* and *b* in terms of *x*?

A) $x^2 + x + 3$
B) $2x^2 + 4x + 3$
C) $x^2 + 2x + 3$
D) $3x^2 + 2x + 6$



30. The function $f(x) = x^3 - x^2 - x - 2$ is graphed on the *xy*-plane above. If *t* is a constant such that the equation $f(x) = t$ has two solutions, which of the following could be the value of *t*?

A) 0
B) -1
C) -3
D) -4

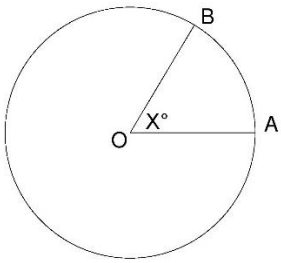
31. A car travels at a constant speed from Point A to Point C without stopping. From Point A to Point B, a car has traveled 20 miles. From Point B to Point C, the car travels at 40 miles per hour. If it takes the car 2 hours to travel from Point B to Point C, how many miles did the car travel from Point A to Point C?

32. Four roommates divide the monthly cost of renting an apartment equally. The equation $C = \frac{x+3500}{4}$ represents the amount that one roommate must pay for one month. In the equation, *x* represents the amount in dollars the roommates pay for groceries in one month. According to the model, for every increase of $1 in the amount spent on groceries, by how many dollars will the amount that one roommate must pay increase for one month?

33. One pound is approximately equal to 453.592 grams. It is also equivalent to 16 ounces. Based on these relationships, 55 ounces, is equivalent to how many kilograms, to the nearest whole number? (1000 g = 1 kg).

34. At a concert, there are 1,200 men and 1,500 women. If 600 more men attend the concert, how many more women must attend the concert so that 4/7 of the total number of attendees are women?

35. $a_c = \frac{v^2}{r}$
The centripetal acceleration, a_c, of an object moving in a circular motion with velocity *v* can be found using the formula above, where *r* is the radius of the circular path that which the object travels. For physics class, Jennifer must determine, using the formula, the centripetal acceleration of Object A moving with velocity *v* along a path with radius *r*. She must also determine the centripetal acceleration of Object B moving with velocity *v* along a path with radius 2*r*. What is the ratio of the centripetal acceleration of Object A to the centripetal acceleration of Object B?



36. In the figure above, the circle has center O and has radius 20. If the value of x is between 19 and 30,and the length of arc $\widehat{AB}$ is $k\pi$. What is one possible integer value of k?

Questions 37 and 38 refer to the following information.

The rent for Audrey's apartment is $1500 per month. She anticipates that the rent will increase by 8% each year for the next four years. Audrey uses the equation $R = 1500(x)^t$ to model the price, R, of the rent after t years.

37. What value should Audrey use for x?

38. To the nearest dollar, what does Audrey believe the rent will be at the end of the four years? (Note Disregard the $ when gridding your answer.)