

SAT Math Diagnostic test

Time Duration: 35 Mins

Math

22 Questions

Directions

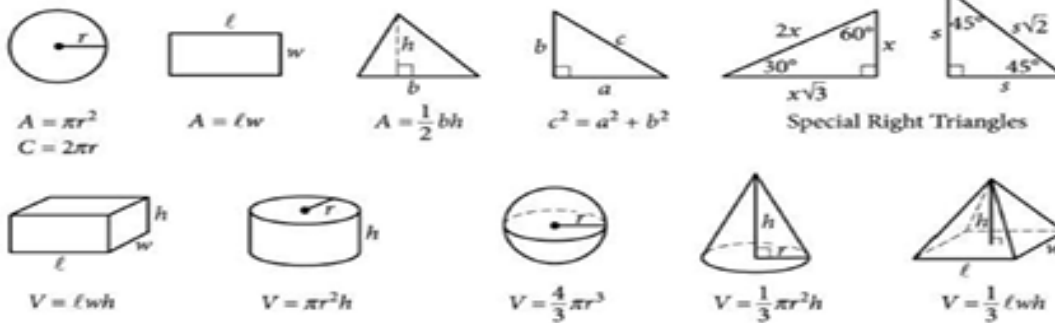
The questions in this section address a number of important math skills. Use of a calculator is permitted for all questions.

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



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. Choose only one answer for each question. You will not get credit for questions with more than one answer, or for questions with no answer.

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 ($\frac{7}{2}$) or its decimal equivalent (3.5).
- Don't include **symbols** such as a percent sign, comma, or dollar sign in your circled answer.

- Angela wants to buy tickets for a symphony concert that is sold out. She finds some from a ticket reseller, who will charge her a service fee. The equation $y = 121x + 23$ represents the total amount, y , that Angela will have to pay to buy x tickets. What does 121 mean?
 - The price of a single ticket
 - The amount of the service fee being charged
 - The total amount Angela will pay if she buys just one ticket
 - The total amount Angela will pay for any number of tickets she chooses to buy
- A race car starts out around a track at a relatively low speed of 140 miles per hour. The race car increases speed by 7 miles per hour each lap after that. What is the speed of the race car on the fourth lap?
- A theme park features two attractions that include moving cars. The Speedway lasts 15 minutes and costs \$26. City Motors lasts 12 minutes and costs \$19. In one day, the theme park sold a total of 600 tickets for these two attractions for a total amount of \$12,800. Which of the following systems of equations could be used to find the number of tickets sold for the speedway?
 - $15S + 12C = 12,800$
 $S + C = 600$
 - $S + C = 12,800$
 $26S + 19C = 600$
 - $26S + 19C = 12,800$
 $S + C = 600$
 - $19S + 26C = 12,800$
 $S + C = 600$
- $y \geq 2x + 2$
 $-x < 5 - y$
Which of the ordered pairs is a solution to both these inequalities?
 - (2, 6)
 - (6, 2)
 - (6, 9)
 - (9, 6)
- If $|x - y| = d$ and $x > y$, which of the following cannot be the value of $y - x$?
 - d
 - $-d$
 - $|y - x|$
 - I
 - II
 - I and II
 - I and III

6. How many solutions are there to the system of equations shown below?

$$y = 2x^2 - 8x + 6$$

$$y = 4x + 12$$

- A. There are no solutions
- B. There is exactly one solution
- C. There are exactly two solutions
- D. There are exactly three solutions

7. In the equation below, what is the possible value of x ?

$$\frac{x - 4}{x} = \frac{2}{x - 4}$$

x	$f(x)$
-4	12
3	2
6	0
10	-1

8. The function $f(x)$ is defined by a polynomial. Some values of x and $f(x)$ are shown in the table above. Which of the following must be a factor of $f(x)$?

- A. $x + 4$
- B. $x - 3$
- C. $x - 6$
- D. $x + 1$

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

- A. $f(x) = x^2 - 15$
- B. $f(x) = x^2 - 2x - 15$
- C. $f(x) = (x - 1)^2 - 14$
- D. $f(x) = (x + 1)^2 - 16$

10. $y = (x - r)(x - s)$

The equation above represents the graph of a parabola in the xy -plane, where r and s are constants, and $r \neq s$. Which of the following represents the x -coordinate of the vertex of the parabola?

- A. $\frac{r - s}{2}$
- B. $\frac{r + s}{2}$
- C. $r - s$
- D. $r + s$

11. Which of the following expression is equivalent to $\frac{(x^2 - x - 4)}{(x-2)}$?

A. $x - 4 - \frac{20}{x - 2}$

B. $x + 1 - \frac{4}{x - 2}$

C. $x + 1 - \frac{8}{x - 2}$

D. $x + 1 - \frac{2}{x - 2}$

12. $x^2 - 10x + y^2 - 6y = 30$

In the xy -plane, the graph of the given equation is a circle. What is the area of this circle?

A. 8π

B. 15π

C. 46π

D. 64π

13. One of the two linear equations in a system is $-6x + 7y = -6$. The system has no solution. Which equation could be the second equation in this system?

A. $6x - 7y = 0$

B. $-\frac{21x}{4} + \frac{49y}{8} = \frac{-21}{4}$

C. $-\frac{21x}{4} - 14y = 0$

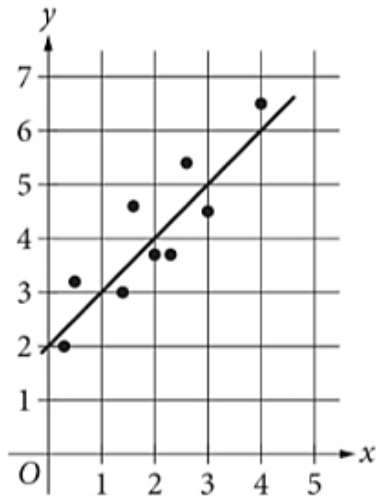
D. $6x - 7y = 6$

14. A circle has been divided into three nonoverlapping regions: I, II, and III. The area of region I is 4π square centimeters (cm^2), the area of region II is $12\pi \text{ cm}^2$, and the area of region III is $16\pi \text{ cm}^2$. If a point in the circle is selected at random, what is the probability of selecting a point that does not lie in region II? (Express your answer as a decimal or fraction, not as a percent).

15. $M(t) = 10\left(\frac{1}{2}\right)^{t/5730}$

The given function M models the mass of the radioactive isotope carbon – 14 in a sample, in picograms, t years after the initial measurement. How much time, in years, does it take for the mass of carbon – 14 in the sample to decrease to 5 picograms?

16. In the give scatterplot, a line of best fit for the data is show.



Which of the following is an equation for the line of best fit?

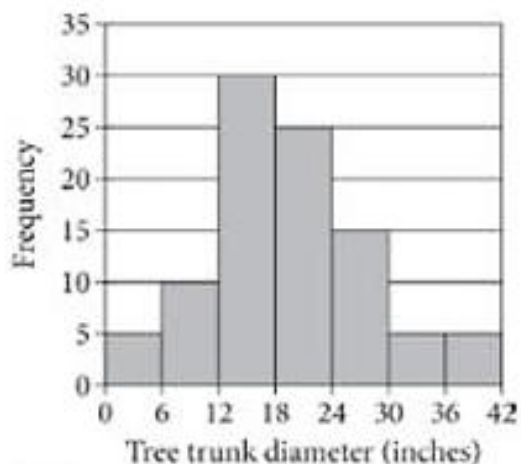
- A. $y = x$
- B. $y = 2x$
- C. $y = 1 + x$
- D. $y = 2 + x$

17. A data set consists of 100 values. The least value is 30, and the greatest two values are 80 and 125. If the value 125 is removed from the original data set to create a new data set with 99 values, which statement must be true?

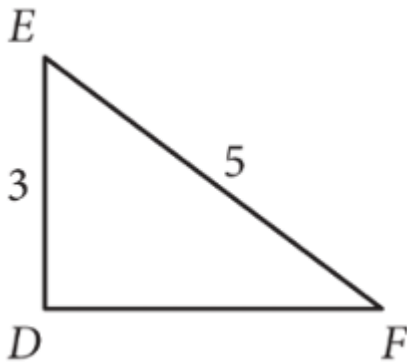
- A. **The means of the two data sets will be the same**
- B. **The mean of the new data set will be less than the mean of the original data set**
- C. **The medians of the two data sets will be the same**
- D. **The median of the new data set will be less than the median of the original data set**

Questions 18 and 19 refer to the following information

A forest department measures tree trunk diameter, in inches, at a constant height from the ground for each tree growing in a certain area. The data for 95 of these trees are summarized in the histogram. The first bar represents tree with a trunk diameter less than 6 inches. The second bar represents trees with a trunk diameter of at least 6 inches but less than 12 inches, and so on.



18. Approximately what percentage of these trees have a trunk diameter less than 6 inches?
- A. 2.6%
 - B. 5.3%
 - C. 10.5%
 - D. 15.8%
19. Which of the following is a possible value for the median trunk diameter, in inches, of these trees?
- A. 10
 - B. 15
 - C. 20
 - D. 25



20. Which of the following additional pieces of information provides enough information to prove whether triangle DEF is a right triangle?
- I. The measure of angle D
 - II. The length of segment DF
- A. I only
 - B. II only
 - C. Either I or II
 - D. Neither I nor II
21. The perimeter of a square inscribed in a circle is 30 inches. The radius of the circle is $x\sqrt{2}$ inches. What is the value of x ?
22. In 1980, the world population was 4.44 billion people. A model created at the time predicted that this population would grow at a rate of 0.076 billion people each year after 1980. In 2015, the world population was 7.35 billion people. What is the positive difference, in billions of people, between the actual world population in 2015 and the model's predicted world population in 2015?