

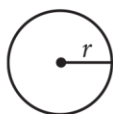
# SAT MATH DIAGNOSTIC EXAM

This diagnostic test was designed to give you a rough idea of what you would score in SAT math on the current version of the SAT. You can use this score as a starting point to decide the difficulty level of problems you should focus on during your preparation.

Please take this diagnostic just as you would take the SAT. Notice that for the first part of the test a calculator is not allowed. For the second part of the test you may use a calculator. Please time yourself accurately and stop working as soon as your time is up. Continuing to answer questions after time is up will decrease the accuracy of your score.

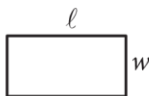
## REFERENCE

For your convenience, here are the formulas that you will be given on the SAT. Feel free to look back at these formulas as you are taking the diagnostic exam.

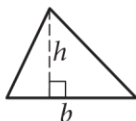


$$A = \pi r^2$$

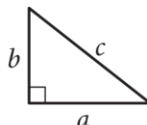
$$C = 2\pi r$$



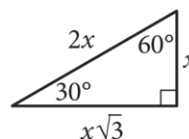
$$A = \ell w$$



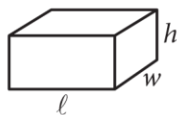
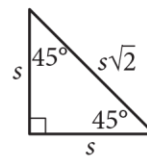
$$A = \frac{1}{2}bh$$



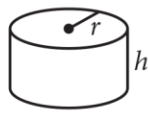
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = \ell wh$$



$$V = \pi r^2 h$$



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



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



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

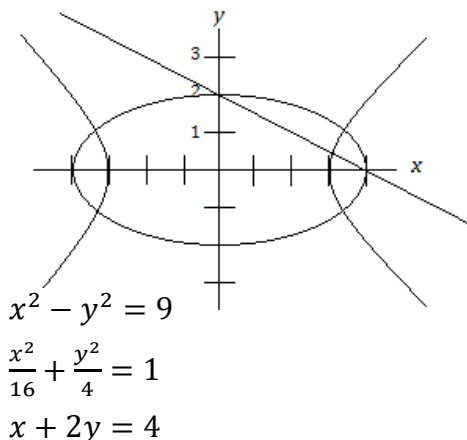
The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is  $2\pi$ .

The sum of the measures in degrees of the angles of a triangle is 180.

## Math Test – No Calculator

9 Minutes, 7 Questions



1. A system of three equations in two unknowns and their graphs in the  $xy$ -plane are shown above. How many solutions does the system have?

A) None  
 B) Two  
 C) Four  
 D) Six

2. If  $\frac{3}{x^2+2} = \frac{12}{z}$ , where  $z \neq 0$ , what is  $z$  in terms of  $x$ ?

A)  $4x^2 + \frac{2}{3}$   
 B)  $4x^2 + 8$   
 C)  $4x^2 + 24$   
 D)  $\sqrt{\frac{3}{2}x - 2}$

3. If  $-7$  and  $5$  are both zeros of the polynomial  $q(x)$ , then a factor of  $q(x)$  is

A)  $x^2 - 35$   
 B)  $x^2 + 35$   
 C)  $x^2 + 2x + 35$   
 D)  $x^2 + 2x - 35$

$$\begin{aligned}3x - 7y &= 12 \\ kx + 21y &= -35\end{aligned}$$

4. For which of the following values of  $k$  will the system of equations above have no solution?

- A) 9
- B) 3
- C) -3
- D) -9

5. It is given that  $\cos x = k$ , where  $x$  is the radian measure of an angle and  $\pi < x < \frac{3\pi}{2}$ . If  $\cos z = -k$ , which of the following could not be the value of  $z$ ?

- A)  $x - \pi$
- B)  $\pi - x$
- C)  $2\pi - x$
- D)  $3\pi - x$

6. If  $\frac{1}{5}x + \frac{1}{7}y = 3$ , what is the value of  $7x + 5y$ ?

$$g(x) = x^4 - kx^3 + 13x^2 - 12x + 4$$

7. The function  $g$  is defined above, and  $k$  is a constant. In the  $xy$ -plane, the graph of  $g$  intersects the  $y$ -axis at  $(0,4)$  and intersects the  $x$ -axis at  $(1,0)$  and  $(2,0)$ . What is the value of  $k$ ?

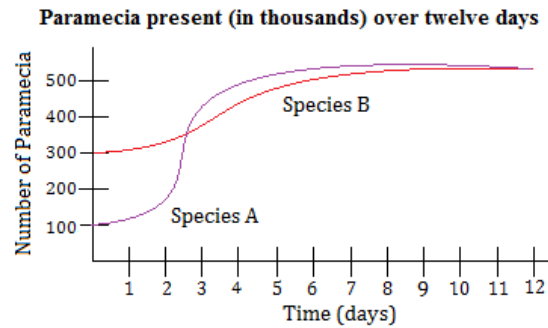
## Math Test – Calculator

19 Minutes, 13 Questions

1. A high school has a \$1000 budget to buy calculators. Each scientific calculator will cost the school \$12.97 and each graphing calculator will cost the school \$73.89. Which of the following inequalities represents the possible number of scientific calculators  $S$  and graphing calculators  $G$  that the school can purchase while staying within their specified budget?
- A)  $12.97S + 73.89G > 1000$   
B)  $12.97S + 73.89G \leq 1000$   
C)  $\frac{12.97}{S} + \frac{73.89}{G} > 1000$   
D)  $\frac{12.97}{S} + \frac{73.89}{G} \leq 1000$
2. A biologist was interested in the number of times a field cricket chirps each minute on a sunny day. He randomly selected 100 field crickets from a garden, and found that the mean number of chirps per minute was 112, and the margin of error for this estimate was 6 chirps. The biologist would like to repeat the procedure and attempt to reduce the margin of error. Which of the following samples would most likely result in a smaller margin of error for the estimated mean number of times a field cricket chirps each minute on a sunny day?
- A) 50 randomly selected crickets from the same garden.  
B) 50 randomly selected field crickets from the same garden.  
C) 200 randomly selected crickets from the same garden.  
D) 200 randomly selected field crickets from the same garden.

3. The expression  $x^2 - x - 12$  can be written as the product of two binomial factors with integer coefficients. One of the binomials is  $(x + 3)$ . Which of the following is the other binomial?

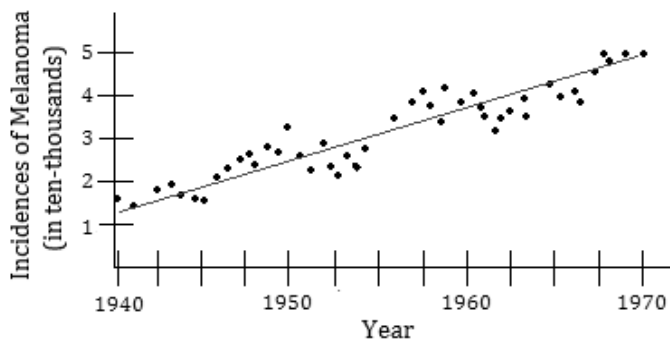
- A)  $x^2 - 4$   
 B)  $x^2 + 4$   
 C)  $x - 4$   
 D)  $x + 4$



4. A small puddle is monitored by scientists for the number of *paramecia* present. The scientists are interested in two distinct species, let's call them "species A" and "species B." At time  $t = 0$ , the scientists measure and estimate the amount of species A and species B present in the puddle. They then proceed to measure and record the number of each species of *paramecium* present every hour for 12 days. The data for each species were then fit by a smooth curve, as shown in the graph above. Which of the following is a correct statement about the data above?
- A) At time  $t = 0$ , the number of species B present is 150% greater than the number of species A present.
- B) At time  $t = 0$ , the number of species A present is 75% less than the number of species B present.
- C) For the first 3 days, the average growth rate of species B is higher than the average growth rate of species A.
- D) The growth rate of both species A and species B decreases for the last 8 days.

5. If  $y = k^{-\frac{2}{3}}$ , where  $k > y > 0$ , which of the following equations gives  $k$  in terms of  $y$ ?

- A)  $k = -\sqrt[3]{y^2}$   
 B)  $k = -\sqrt{y^3}$   
 C)  $k = \frac{1}{\sqrt[3]{y^2}}$   
 D)  $k = \frac{1}{\sqrt{y^3}}$



6. The scatterplot above shows the numbers of incidences of melanoma, in ten-thousands, from 1940 to 1970. Based on the line of best fit to the data, as shown in the figure, which of the following values is closest to the average yearly increase in the number of incidences of melanoma?

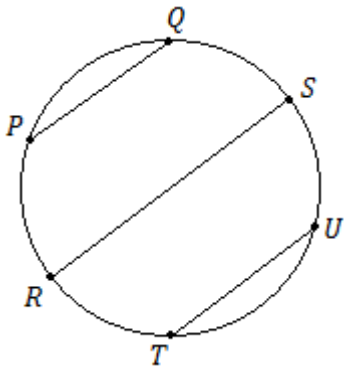
- A) 1300  
 B) 330  
 C) 0.33  
 D) 0.13

$$2x + y = 7 - 2y$$

$$5y - x = 5 - 4x$$

7. If  $(x, y)$  is a solution to the above system of equations, what is the value of  $\frac{y+1}{x}$ ?

- A) -11  
 B)  $-\frac{1}{2}$   
 C) 2  
 D) 20



8. In the circle above with diameter  $d$ , chords  $\overline{PQ}$  and  $\overline{TU}$  are parallel to diameter  $\overline{RS}$ . If  $\overline{PQ}$  and  $\overline{TU}$  are each  $\frac{3}{4}$  of the length of  $\overline{RS}$ , what is the distance between chords  $\overline{PQ}$  and  $\overline{TU}$  in terms of  $d$ ?
- A)  $\frac{d\sqrt{7}}{8}$   
 B)  $\frac{d\sqrt{7}}{4}$   
 C)  $\frac{\pi d}{4}$   
 D)  $\frac{3\pi d}{4}$

9. 2500 single men and 2500 single women were asked about whether they owned any dogs or cats. The table below displays a summary of the results.

	Dogs Only	Cats Only	Both	Neither	Total
Men	920	270	50	1260	2500
Women	750	430	340	980	2500
Total	1670	700	390	2240	5000

Of the people who said they had neither dogs nor cats, 200 were selected at random, and they were asked if they had any pets at all. 43 people said they did have pets, and the remaining 157 said that they did not. Based on both the initial data given in the table, together with the new data stated in this paragraph, which of the following is most likely to be accurate?

- A) Approximately 482 of the original people surveyed would say that they have no pets.  
 B) Approximately 1758 of the original people surveyed would say that they have no pets.  
 C) Approximately 1963 of the original people surveyed would say that they have no pets.  
 D) Approximately 3925 of the original people surveyed would say that they have no pets.

10. If the expression  $\frac{9x^2}{3x+5}$  is written in the equivalent form  $\frac{25}{3x+5} + k$ , what is  $k$  in terms of  $x$  ?

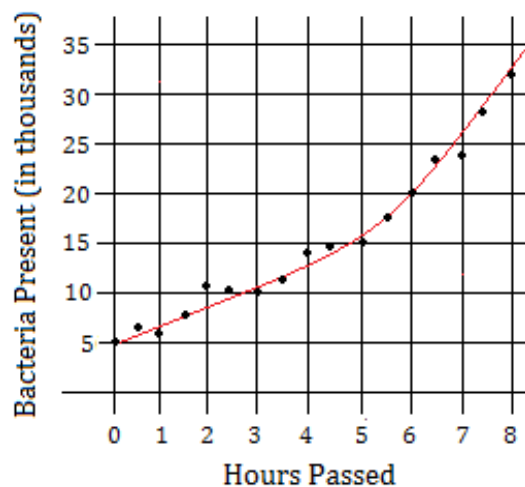
- A)  $9x^2$   
 B)  $9x^2 + 5$   
 C)  $3x - 5$   
 D)  $3x + 5$

$$\frac{7 - (4 - q)}{8} = \frac{3(5 - q)}{12}$$

11. In the equation above, what is the value of  $q$  ?

12. What is the sum of the two solutions of the equation  $x^2 - 7x + 3 = 0$  ?

13. A biologist places a colony consisting of 5000 bacteria into a petri dish. After the initial placement of the bacteria at time  $t = 0$ , the biologist measures and estimates the number of bacteria present every half hour. This data was then fitted by an exponential curve of the form  $y = c \cdot 2^{kt}$  where  $c$  and  $k$  are constants,  $t$  is measured in hours, and  $y$  is measured in thousands of bacteria. The scatterplot together with the exponential curve are shown below.



According to the scatterplot, the biologist's measurements indicate that the number of bacteria present quadrupled in 6 hours, and the exponential curve passes through the corresponding data point at time  $t = 6$ . The exponential function also agrees with the initial number of bacteria. Compute  $ck$ .



# ANSWER KEY

## Part 1

1. A
2. B
3. D
4. D
5. C
6. 105
7. 6

## Part 2

1. B
2. D
3. C
4. D
5. D
6. A
7. B

8. B
9. B
10. C
11.  $\frac{7}{3}$  or 2.33
12. 7
13.  $\frac{5}{3}$ , 1.66, or 1.67

## SCORING

Add 1 point for each question you got correct. This sum is your **Raw Score**. Then use the conversion chart below to get your **Scaled Score**.

SAT Mathematics Conversion Table			
Raw Score	Scaled Score	Raw Score	Scaled Score
20	800		
19	750	9	490
18	700	8	470
17	670	7	440
16	650	6	420
15	620	5	400
14	600	4	370
13	580	3	340
12	560	2	300
11	530	1	260
10	520	0	200