

## Directions

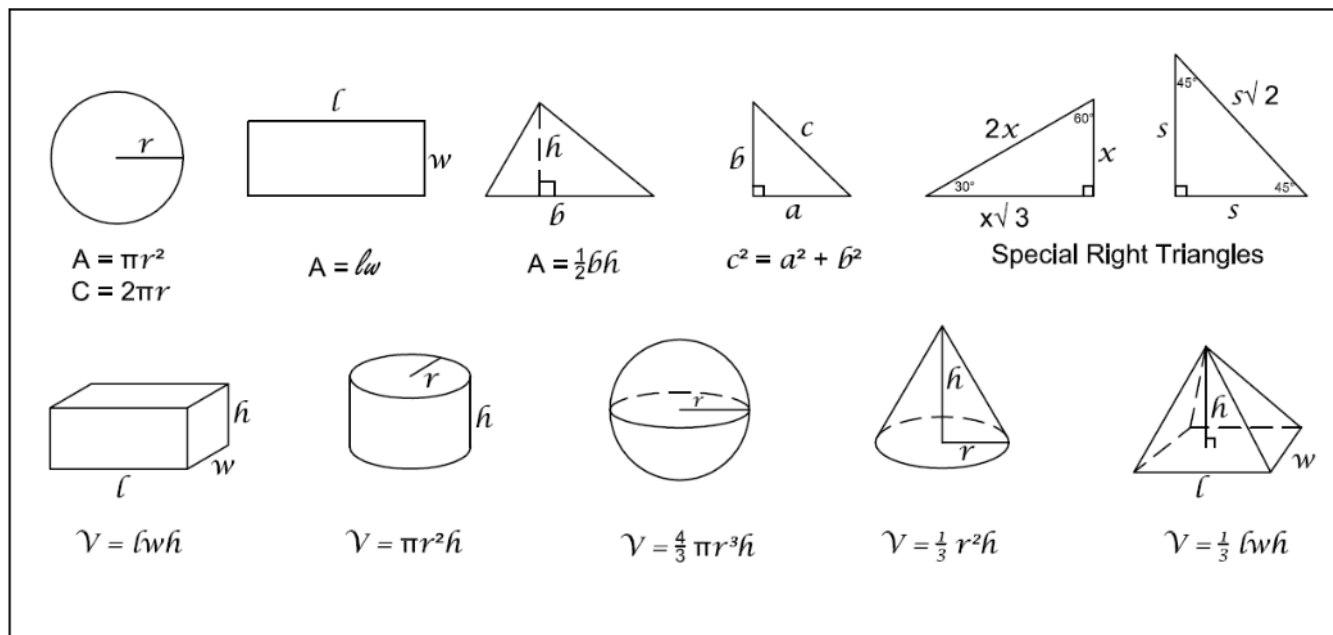
For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet.

For questions 16-20, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 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 not 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  $2\pi$ .

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

**SAT Test 1-3**

Math Test- No Calculator | 25 Minutes, 20 Questions



1. A store that makes customized suits will make  $x$  suits with the same size using a particular type of material. The store's fee can be calculated by the expression  $xTn + z$ , where  $x$  is the number of suits,  $T$  is a constant with units of dollars per square inch of material,  $n$  is the amount of material used in square inches, and  $z$  is an additional fee for shipping. If the customer asks the store to use a more expensive material, which of the factors in the expression would change?

- A)  $x$
- B)  $T$
- C)  $n$
- D)  $z$

2. If  $4x = 24$ , what is the value of  $5x + 1$ ?

- A) 6
- B) 26
- C) 31
- D) 35

3. Which of the following is equal to  $a^{\frac{4}{5}}$ , for all values of  $a$ ?

- A)  $\sqrt[5]{a}$
- B)  $\sqrt[5]{a^4}$
- C)  $\sqrt[4]{a^5}$
- D)  $\sqrt{a^4}$

4. The number of girls in the sixth grade is  $\frac{2}{3}$  the number of boys in the sixth grade. If there are 20 girls in the sixth grade and  $x$  boys in the sixth grade, which of the following is true?

- A)  $20x = \frac{2}{3}$
- B)  $\frac{2}{3}x = 20$
- C)  $\frac{3x}{2} = 20$
- D)  $\frac{2}{3} + x = 20$

5. If  $\frac{10}{x} = \frac{30}{x+10}$ , what is the value of  $\frac{x}{10}$ ?

- A)  $\frac{1}{2}$
- B) 2
- C) 10
- D) 20

6.  $5x - 2y = 20$

$$6x - 3y = 15$$

If  $(x,y)$  is a solution to the system of equations above, what is the value of  $x-y$ ?

- A) -10
- B) -5
- C) 5
- D) 10

7.

$x$	$f(x)$
0	-12
3	-15
5	-7
6	0

The function  $f$  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)  $x + 12$
- B)  $x - 12$
- C)  $x + 6$
- D)  $x - 6$

8. The line  $7 + y = kx + 15$ , where  $k$  is a constant, is graphed in the  $xy$ -plane. If the line contains the point  $(a,b)$ , where  $a \neq 0$  and  $b \neq 0$ , what is the slope of the line in terms of  $a$  and  $b$ ?

- A)  $\frac{8+b}{a}$
- B)  $\frac{b-a}{8}$
- C)  $\frac{8}{b-8}$
- D)  $\frac{a-8}{b}$

9.  $mx - 5y = 3$

$$10x - 2y = 8$$

In the system of equations above  $m$  is a constant and  $x$  and  $y$  are variables. For what value of  $m$  will the system of equations have no solution?

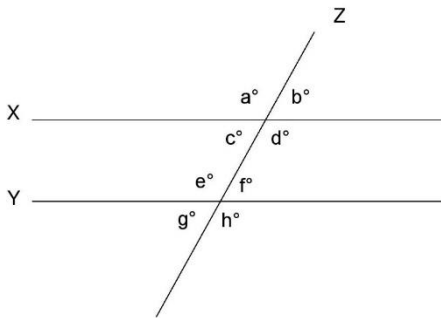
- A)  $\frac{1}{2}$
- B) 10
- C) 25
- D) 30

10. In the  $xy$ -plane, the parabola with equation  $y = (x - 15)^2$  intersects the line with equation  $y = 16$  at two points,  $A$  and  $B$ . What is the length of  $\overline{AB}$ ?

- A) 4
- B) 6
- C) 8
- D) 10

**SAT Test 1-3**

Math Test- No Calculator | 25 Minutes, 20 Questions



11. In the figure above, lines  $X$  and  $Y$  are parallel and line  $Z$  intersects both lines  $X$  and  $Y$ . Which of the following must be true?

- I.  $a^\circ + g^\circ = d^\circ + f^\circ$
- II.  $d^\circ + a^\circ = f^\circ + g^\circ$
- III.  $a^\circ + b^\circ = e^\circ + g^\circ$

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

12.  $y = a(x - 4)(x + 8)$

In the quadratic equation above,  $a$  is a non-zero constant.

The graph of the equation in the  $xy$ -plane is a parabola with vertex  $(t, u)$ . Which of the following is equal to  $u$ ?

- A)  $-39a$
- B)  $-36a$
- C)  $-30a$
- D)  $-27a$

13. The equation  $\frac{30x^2 - 3x + 15}{ax - 3} = 5x + 2 + \frac{21}{ax - 3}$  is true for all values of  $x$ , such that  $x \neq \frac{3}{a}$ , where  $a$  is a constant.

What is the value of  $a$ ?

- A)  $-12$
- B)  $-6$
- C)  $6$
- D)  $12$

14. What are the solutions to  $5x^2 + 20 - 10 = 0$ ?

- A)  $x = -2 \pm \sqrt{6}$
- B)  $x = -2 \pm \frac{\sqrt{60}}{10}$
- C)  $x = 10 \pm \sqrt{6}$
- D)  $x = -10 \pm \sqrt{6}$

15.  $^\circ\text{F} = \frac{9}{5}^\circ\text{C} + 32$

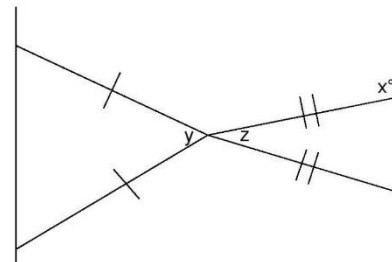
The equation above shows how to convert degrees Celsius to degrees Fahrenheit. Based on the equation, which of the following must be true?

- A) A temperature increase of  $1^\circ\text{C}$  is equal to a temperature increase of  $\frac{9}{5}^\circ\text{F}$
- B) A temperature increase of  $1^\circ\text{F}$  is equal to a temperature increase of  $1.8^\circ\text{C}$
- C) A temperature increase of  $\frac{9}{5}^\circ\text{C}$  is equal to a temperature increase of  $1^\circ\text{F}$
- D) A temperature increase of  $2^\circ\text{F}$  is equal to a temperature increase of  $1.3^\circ\text{F}$

16.  $x^3(x^2 - 10) = -9x$

If  $x > 0$ , what is one possible solution to the equation above?

17. If  $\frac{5}{14}x - \frac{3}{14}x = \frac{1}{7} + \frac{6}{21}$ , what is the value of  $x$ ?



\*Not drawn to scale

18. Two isosceles triangles are shown above. If  $280 + 2y - z = 6y + 10$  &  $y = 55$ , what is the value of  $x$ ?

## SAT Test 1-3

Math Test- No Calculator | 25 Minutes, 20 Questions



19. In a store, each dress costs \$25 more than each shirt. If a woman buys 3 dresses and 7 shirts and her total is 1305, what is the cost of one dress?

20. In triangle  $ABC$ , the measure of  $\angle B = 90^\circ$ ,  $\overline{BC} = 20$  and  $\overline{AC} = 25$ . Triangle  $DEF$  is similar to triangle  $ABC$  where vertices  $D$ ,  $E$ , and  $F$  correspond to vertices  $A$ ,  $B$ , and  $C$  respectively, and each side of triangle  $DEF$  is  $\frac{1}{4}$  the length of the corresponding side of triangle  $ABC$ . What is the value of  $\sin F$ ?