

101 Math Questions Test

Following are the 101 most important math questions you should know how to solve. After you take the test, check to see whether your answers are the same as those described, and whether or not you answered the question in the way described. After a solution, there is usually (where appropriate) a rule or generalization of the math concept just used in the solution to the particular problem. Make sure that you understand this generalization or rule, as it will apply to many other questions. Remember that these are the most important basic math questions you need to know how to solve. Make sure that you understand *all of them* before taking any standardized math test such as the SAT.

Do not guess at any answer! Leave answer blank if you don't know how to solve.

A. Fractions

1. $\frac{a}{\frac{b}{c}} =$

(A) $\frac{ab}{c}$

(B) $\frac{ac}{b}$

(C) $\frac{a}{bc}$

(D) abc

(E) None of these.

2. $\frac{1}{\frac{1}{y}} =$

(A) y

(B) y^2

(C) $\frac{1}{y}$

(D) infinity

(E) None of these.

3. $\frac{a}{\frac{b}{c}} =$

(A) $\frac{a}{bc}$

(B) $\frac{ac}{b}$

(C) $\frac{ab}{c}$

(D) abc

(E) None of these.

4. $\frac{1}{\frac{x}{y}} =$

(A) xy

(B) $\frac{x}{y}$

(C) $\frac{y}{x}$

(D) $\left(\frac{x}{y}\right)^2$

(E) None of these.

5. $\frac{\frac{a}{b}}{\frac{b}{a}} =$

(A) $\frac{b^2}{a^2}$

(B) $\frac{a^2}{b^2}$

(C) 1

(D) $\frac{a}{b}$

(E) None of these.

B. Even–Odd Relations

6. ODD INTEGER \times ODD INTEGER =

(A) odd integer only

(B) even integer only

(C) even or odd integer

7. ODD INTEGER + or – ODD INTEGER =

(A) odd integer only

(B) even integer only

(C) even or odd integer

8. EVEN INTEGER \times EVEN INTEGER =

(A) odd integer only

(B) even integer only

(C) even or odd integer

9. EVEN INTEGER + or – EVEN INTEGER =

(A) odd integer only

(B) even integer only

(C) even or odd integer

10. (ODD INTEGER)^{ODD POWER} =

(A) odd integer only

(B) even integer only

(C) even or odd integer

11. (EVEN INTEGER)^{EVEN POWER} =

(A) odd integer only

(B) even integer only

(C) even or odd integer

12. (EVEN INTEGER)^{ODD POWER} =

(A) odd integer only

(B) even integer only

(C) even or odd integer

C. Factors

13. $(x + 3)(x + 2) =$

(A) $x^2 + 5x + 6$

(B) $x^2 + 6x + 5$

(C) $x^2 + x + 6$

(D) $2x + 5$

(E) None of these.

14. $(x + 3)(x - 2) =$

(A) $x^2 - x + 6$

(B) $x^2 + x + 5$

(C) $x^2 + x - 6$

(D) $2x + 1$

(E) None of these.

15. $(x - 3)(y - 2) =$

(A) $xy - 5y + 6$

(B) $xy - 2x - 3y + 6$

(C) $x + y + 6$

(D) $xy - 3y + 2x + 6$

(E) None of these.

16. $(a + b)(b + c) =$

(A) $ab + b^2 + bc$

(B) $a + b^2 + c$

(C) $a^2 + b^2 + ca$

(D) $ab + b^2 + ac + bc$

(E) None of these.

17. $(a + b)(a - b) =$

(A) $a^2 + 2ba - b^2$

(B) $a^2 - 2ba - b^2$

(C) $a^2 - b^2$

(D) 0

(E) None of these.

18. $(a + b)^2 =$
 (A) $a^2 + 2ab + b^2$
 (B) $a^2 + b^2$
 (C) $a^2 + b^2 + ab$
 (D) $2a + 2b$
 (E) None of these.

19. $-(a - b) =$
 (A) $a - b$
 (B) $-a - b$
 (C) $a + b$
 (D) $b - a$
 (E) None of these.

20. $a(b + c) =$
 (A) $ab + ac$
 (B) $ab + c$
 (C) abc
 (D) $ab + bc$
 (E) None of these.

21. $-a(b - c) =$
 (A) $ab - ac$
 (B) $-ab - ac$
 (C) $ac - ab$
 (D) $ab + ac$
 (E) None of these.

D. Exponents

22. $10^5 =$
 (A) 1000
 (B) 10,000
 (C) 100,000
 (D) 1,000,000
 (E) None of these.
23. $107076.5 = 1.070765 \times$
 (A) 10^4
 (B) 10^5
 (C) 10^6
 (D) 10^7
 (E) None of these.

24. $a^2 \times a^5 =$
 (A) a^{10}
 (B) a^7
 (C) a^3
 (D) $(2a)^{10}$
 (E) None of these.

25. $(ab)^7 =$
 (A) ab^7
 (B) a^7b
 (C) a^7b^7
 (D) $a^{14}b^{14}$
 (E) None of these.

26. $\left(\frac{a}{c}\right)^8$
 (A) $\frac{a^8}{c^8}$
 (B) $\frac{a^8}{c}$
 (C) $\frac{a}{c^8}$
 (D) $\frac{a^7}{c}$
 (E) None of these.

27. $a^4 \times b^4 =$
 (A) $(ab)^4$
 (B) $(ab)^8$
 (C) $(ab)^{16}$
 (D) $(ab)^{12}$
 (E) None of these.

28. $a^{-3} \times b^5 =$
 (A) $\frac{b^5}{a^3}$
 (B) $(ab)^2$
 (C) $(ab)^{-15}$
 (D) $\frac{a^3}{b^5}$
 (E) None of these.

29. $(a^3)^5 =$
 (A) a^8
 (B) a^2
 (C) a^{15}
 (D) a^{243}
 (E) None of these.
30. $2a^{-3} =$
 (A) $\frac{2}{a^3}$
 (B) $2a^3$
 (C) $2\sqrt[3]{a}$
 (D) a^{-6}
 (E) None of these.
31. $2a^m \times \frac{1}{3}a^{-n} =$
 (A) $\frac{2}{3}a^{m+n}$
 (B) $\frac{2a^m}{3a^n}$
 (C) $\frac{2}{3}a^{-mn}$
 (D) $-\frac{2}{3}a^{mn}$
 (E) None of these.
32. $3^2 + 3^{-2} + 4^1 + 6^0 =$
 (A) $8\frac{1}{9}$
 (B) $12\frac{1}{9}$
 (C) $13\frac{1}{9}$
 (D) $14\frac{1}{9}$
 (E) None of these.

E. Percentages

33. 15% of 200 =
 (A) 3
 (B) 30
 (C) 300
 (D) 3,000
 (E) None of these.
34. What is 3% of 5?
 (A) $\frac{5}{3}\%$
 (B) 15
 (C) $\frac{3}{20}$
 (D) $\frac{3}{5}$
 (E) None of these.
35. What percent of 3 is 6?
 (A) 50
 (B) 20
 (C) 200
 (D) $\frac{1}{2}$
 (E) None of these.

F. Equations

36. If $y^2 = 16$, $y =$
 (A) +4 only
 (B) -4 only
 (C) + or -4
 (D) + or -8
 (E) None of these.
37. If $x - y = 10$, $y =$
 (A) $x - 10$
 (B) $10 + x$
 (C) $10 - x$
 (D) 10
 (E) None of these.

38. What is the value of x if $x + 4y = 7$ and $x - 4y = 8$?

- (A) 15
- (B) $\frac{15}{2}$
- (C) 7
- (D) $\frac{7}{2}$
- (E) None of these.

39. What is the value of x and y if $x - 2y = 2$ and $2x + y = 4$?

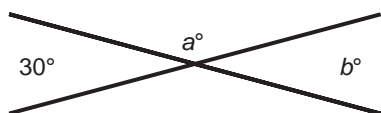
- (A) $x = 2, y = 0$
- (B) $x = 0, y = -2$
- (C) $x = -1, y = 2$
- (D) $x = 0, y = 2$
- (E) None of these.

40. If $\frac{x}{5} = \frac{7}{12}, x =$

- (A) $\frac{35}{12}$
- (B) $\frac{12}{35}$
- (C) $\frac{7}{60}$
- (D) $\frac{60}{7}$
- (E) None of these.

**G. Angles
(Vertical, Supplementary)**

Questions 41–42 refer to the diagram below:



41. $a =$

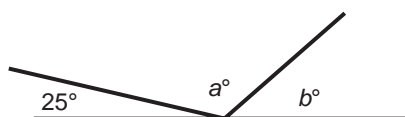
- (A) 30
- (B) 150
- (C) 45

- (D) 90
- (E) None of these.

42. $b =$

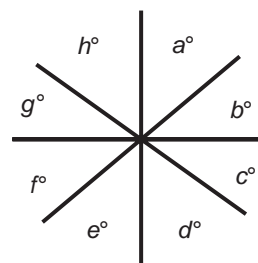
- (A) 30
- (B) 150
- (C) 45
- (D) 90
- (E) None of these.

Question 43 refers to the diagram below:



43. $a + b =$

- (A) 155
- (B) 165
- (C) 180
- (D) 145
- (E) None of these.

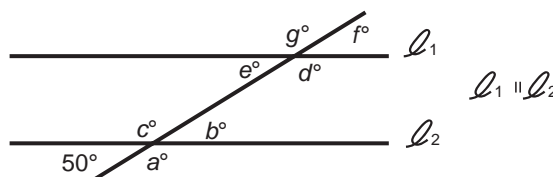


44. What is the value of $a + b + c + d + e + f + g + h$ in the diagram above?

- (A) 180
- (B) 240
- (C) 360
- (D) 540
- (E) None of these.

H. Angles (Parallel Lines)

Questions 45–51 refer to the diagram below:



41. $a =$

- (A) 30
- (B) 150
- (C) 45

45. $a =$
 (A) 50
 (B) 130
 (C) 100
 (D) 40
 (E) None of these.

46. $b =$
 (A) 50
 (B) 130
 (C) 100
 (D) 40
 (E) None of these.

47. $c =$
 (A) 50
 (B) 130
 (C) 100
 (D) 40
 (E) None of these.

48. $d =$
 (A) 50
 (B) 130
 (C) 100
 (D) 40
 (E) None of these.

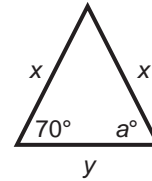
49. $e =$
 (A) 50
 (B) 130
 (C) 100
 (D) 40
 (E) None of these.

50. $f =$
 (A) 50
 (B) 130
 (C) 100
 (D) 40
 (E) None of these.

51. $g =$
 (A) 50
 (B) 130
 (C) 100
 (D) 40
 (E) None of these.

I. Triangles

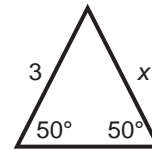
52.



(Note: Figure is not drawn to scale.)

- $a =$
 (A) 70
 (B) 40
 (C) $\frac{xy}{70}$
 (D) Cannot be determined.
 (E) None of these.

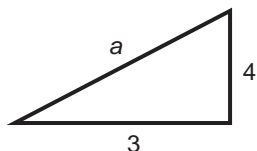
53.



(Note: Figure is not drawn to scale.)

- $x =$
 (A) 3
 (B) $\frac{50}{3}$
 (C) $3\sqrt{2}$
 (D) Cannot be determined.
 (E) None of these.

54.

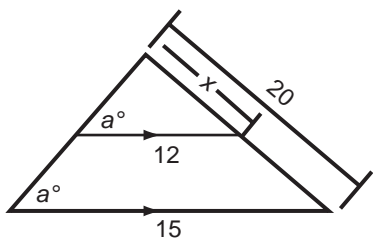


(Note: Figure is not drawn to scale.)

Which is a possible value for a ?

- (A) 1
- (B) 6
- (C) 10
- (D) 7
- (E) None of these.

55.

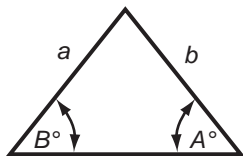


(Note: Figure is not drawn to scale.)

In the triangle above, $x =$

- (A) 12
- (B) 16
- (C) 15
- (D) 10
- (E) None of these.

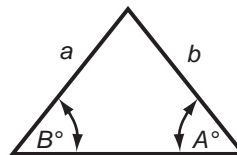
56.



In the triangle above, if $B > A$, then

- (A) $b = a$
- (B) $b > a$
- (C) $b < a$
- (D) A relation between b and a cannot be determined.
- (E) None of these.

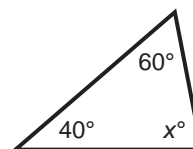
57.



In the triangle above, if $b < a$, then

- (A) $B > A$
- (B) $B = A$
- (C) $B < A$
- (D) A relation between B and A cannot be determined.
- (E) None of these.

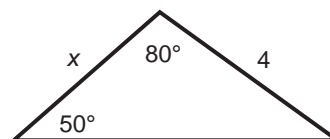
58.



In the triangle above, $x =$

- (A) 100
- (B) 80
- (C) 90
- (D) 45
- (E) None of these.

59.

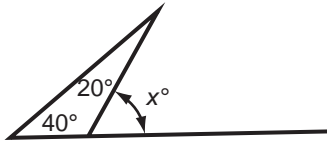


(Note: Figure is not drawn to scale.)

In the triangle above, $x =$

- (A) $4\sqrt{2}$
- (B) 8
- (C) 4
- (D) a number between 1 and 4
- (E) None of these.

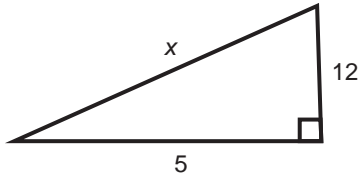
60.



In the diagram above, $x =$

- (A) 40
- (B) 20
- (C) 60
- (D) 80
- (E) None of these.

61.

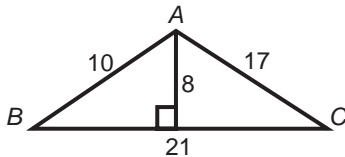


(Note: Figure is not drawn to scale.)

In the right triangle above as shown, $x =$

- (A) 17
- (B) 13
- (C) 15
- (D) $12\sqrt{2}$
- (E) None of these.

Questions 62–63 refer to the diagram below:



(Note: Figure is not drawn to scale.)

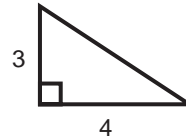
62. The perimeter of the triangle ABC is

- (A) 16
- (B) 48
- (C) 168
- (D) 84
- (E) None of these.

63. The area of triangle ABC is

- (A) 170
- (B) 85
- (C) 168
- (D) 84
- (E) None of these.

Questions 64–65 refer to the diagram below:



64. The area of the triangle is

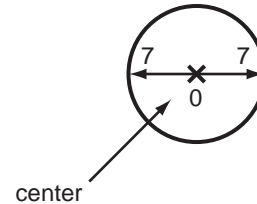
- (A) 6
- (B) 7
- (C) 12
- (D) any number between 5 and 7
- (E) None of these.

65. The perimeter of the triangle is

- (A) 7
- (B) 12
- (C) 15
- (D) any number between 7 and 12
- (E) None of these.

J. Circles

Questions 66–67 refer to the diagram below:

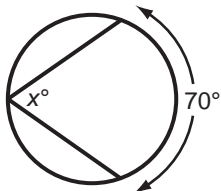


66. The area of the circle is

- (A) 49
- (B) 49π
- (C) 14π
- (D) 196π
- (E) None of these.

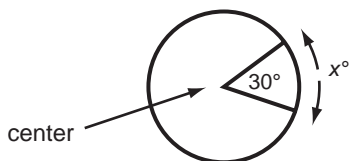
67. The circumference of the circle is
 (A) 14π
 (B) 7π
 (C) 49π
 (D) 14
 (E) None of these.

68.



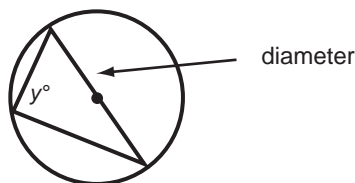
- In the diagram above, $x =$
 (A) 70
 (B) 35
 (C) 90
 (D) a number that cannot be determined
 (E) None of these.

69.



- In the diagram above, $x =$
 (A) 30
 (B) 60
 (C) 90
 (D) a number that cannot be determined
 (E) None of these.

70.

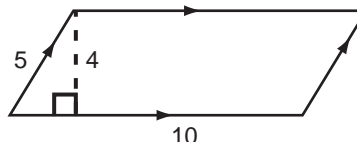


- In the diagram above, $y =$
 (A) 145
 (B) 60
 (C) 90

- (D) a number that cannot be determined
 (E) None of these.

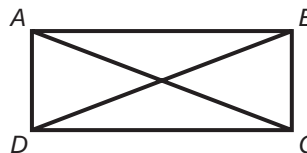
K. Other Figures

Questions 71–72 refer to the diagram below:



71. The area of the figure is
 (A) 15
 (B) 20
 (C) 40
 (D) 50
 (E) None of these.
72. The perimeter of the figure is
 (A) 15
 (B) 30
 (C) 40
 (D) 50
 (E) None of these.

Questions 73–75 refer to the figure below:

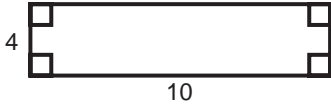


$ABCD$ is a rectangle

73. What is BC if $AD = 6$?
 (A) 4
 (B) 6
 (C) 8
 (D) 10
 (E) 12
74. What is DC if $AB = 8$?
 (A) 4
 (B) 6
 (C) 8
 (D) 10
 (E) 12

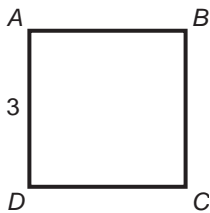
75. What is DB if $AC = 10$?
- (A) 4
 - (B) 6
 - (C) 8
 - (D) 10
 - (E) 12

Questions 76–77 refer to the diagram below:



76. The area of the figure is
- (A) 14
 - (B) 40
 - (C) 80
 - (D) 28
 - (E) None of these.
77. The perimeter of the figure is
- (A) 14
 - (B) 28
 - (C) 36
 - (D) 40
 - (E) None of these.

Questions 78–79 refer to the figure below:

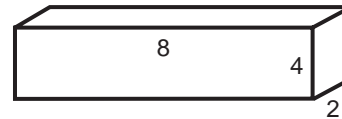


$ABCD$ is a square; $AC = 3$

78. What is the area of the square?
- (A) 9
 - (B) 12
 - (C) 16
 - (D) 20
 - (E) None of these.

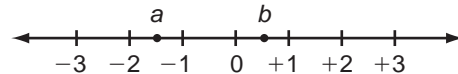
79. What is the perimeter of the square?
- (A) 9
 - (B) 12
 - (C) 16
 - (D) 20
 - (E) None of these.

80. The volume of the rectangular solid below is
- (A) 48
 - (B) 64
 - (C) 128
 - (D) 72
 - (E) None of these.



L. Number Lines

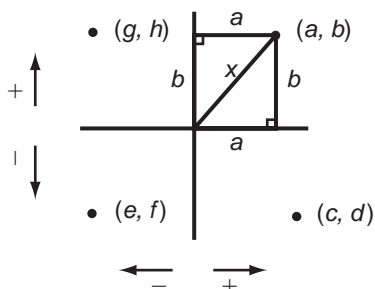
Questions 81–82 refer to the diagram below:



81. Which defines the range in values of b best?
- (A) $1 > b > -2$
 - (B) $2 > b > 0$
 - (C) $1 > b > 0$
 - (D) $3 > b > -3$
 - (E) $b > 0$
82. Which defines the range in values of a best?
- (A) $a > -2$
 - (B) $-1 > a > -2$
 - (C) $0 > a > -2$
 - (D) $-1 > a$
 - (E) $0 > a > -3$

M. Coordinates

Questions 83–85 refer to the diagram below:



83. How many of the variables a, b, c, d, e, f, g, h are positive?

- (A) 1
- (B) 2
- (C) 3
- (D) 4
- (E) 5

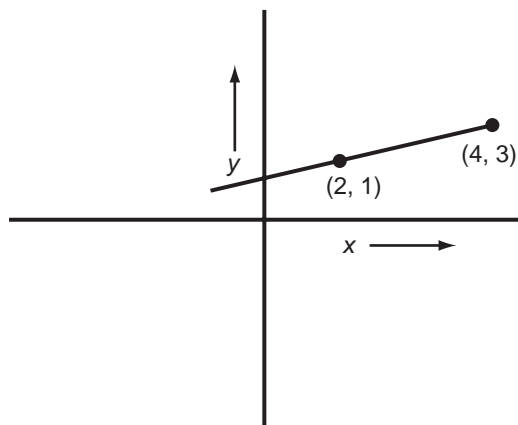
84. How many of the variables a, b, c, d, e, f, g, h are negative?

- (A) 1
- (B) 2
- (C) 3
- (D) 4
- (E) 5

85. If $a = 3, b = 4$, what is x ?

- (A) 3
- (B) 4
- (C) 5
- (D) 6
- (E) None of these.

86.



What is the slope of the line above?

- (A) -1
- (B) 0
- (C) $+1$
- (D) $+2$
- (E) $+3$

N. Inequalities

Note: Any variable can be positive or negative or 0.

87. If $x > y$, then $4x > 4y$

- (A) always
- (B) sometimes
- (C) never

88. If $x + y > z$, then $y > z - x$

- (A) always
- (B) sometimes
- (C) never

89. If $-4 < -x$, then $+4 > +x$

- (A) always
- (B) sometimes
- (C) never

90. If $m > n$, where q is any number, then $qm > qn$

- (A) always
- (B) sometimes
- (C) never

91. If $x > y$ and $p > q$, then $x + p > y + q$

- (A) always
- (B) sometimes
- (C) never

92. If $x > y$ and $p > q$, then $xp > qy$

- (A) always
- (B) sometimes
- (C) never

O. Averages

93. What is the average of 30, 40, and 80?

- (A) 150
 (B) 75
 (C) 50
 (D) 45
 (E) None of these.

94. What is the average speed in mph of a car traveling 40 miles for 4 hours?

- (A) 160
 (B) 10
 (C) 120
 (D) 30
 (E) None of these.

P. Shortcuts

95. Which is greater? (Don't calculate a common denominator!)

$$\frac{7}{16} \text{ or } \frac{3}{7}$$

- (A) $\frac{7}{16}$
 (B) $\frac{3}{7}$
 (C) They are equal.
 (D) A relationship cannot be determined.

96. Add: $\frac{7}{12} + \frac{3}{5}$:

- (A) $1\frac{11}{60}$
 (B) $1\frac{13}{60}$
 (C) $1\frac{15}{60}$
 (D) $\frac{10}{17}$
 (E) None of these.

97. Subtract: $\frac{7}{12} - \frac{3}{5}$:

- (A) $-\frac{1}{60}$
 (B) $-\frac{3}{60}$
 (C) $-1\frac{11}{60}$
 (D) $\frac{4}{7}$
 (E) None of these.

98. $\frac{4}{250} =$

- (A) .016
 (B) .04
 (C) .004
 (D) .025
 (E) None of these.

(Note: Do not divide 250 into 4 in the above question!)

99. What is c if

$$200 = \frac{a+b+c}{2} \text{ and } 80 = \frac{a+b}{3} ?$$

- (A) 160
 (B) 140
 (C) 120
 (D) 100
 (E) None of these.

100. What is the value of $95 \times 75 - 95 \times 74$?

(Don't multiply 95×75 or 95×74 !)

(A) 65

(B) 75

(C) 85

(D) 95

(E) None of these.

101. Find the value of

$$\frac{140 \times 15}{5 \times 7} \quad \text{(Don't multiply } 140 \times 15\text{!)}$$

(A) 20

(B) 40

(C) 60

(D) 90

(E) None of these.