

STATISTICS READINESS TEST STUDY GUIDE

The statistics readiness test covers 6 areas of arithmetic that will be used to evaluate the prospective student's readiness for the math involved in the statistics module. The problems of each type are mixed with problems of the other types throughout the test.

Type #1: Decimals

Accurately add, subtract, multiply and divide decimals and be able to accurately round off decimal to a given number of places.

Sample problems

1. $34.62 - 2.7 =$ (a) 31.92 (b) 33.35 (c) 7.62 (d) 37.32
2. Which is larger than 63.12 (a) 63.1 (b) 63.115 (c) 63.2
(d) 62.995
3. $0.23 \times 100 =$ (a) 0.2300 (b) 23 (c) 2.300 (d) 0.0023
4. Multiply 23.83 and 9.73. Round off to 3 decimal places. (a) 231.870
(b) 231.866 (c) 231.865 (d) 231.900
5. $0.11 \overline{)1.21} =$ (a) 11 (b) 1.1 (c) 0.11 (d) 110

Explanation of sample problems

1. The correct answer is (a). When two decimals are added or subtracted, only the same place values can be added or subtracted. This can be assured in column form by being sure the decimals are in line. Thus the problem becomes:

$$\begin{array}{r} 34.62 \\ - \underline{2.7} \\ \hline 31.92 \end{array}$$

2. The correct answer is (c). One way to see the solution to this problem is to write each decimal with the same number of decimal places. The five numbers are thus written 63.120, 63.100, 63.115, 63.200 and 62.995. Putting the numbers in order from smallest to largest we have 62.995, 63.100, 63.115, 63.120, 63.200. The only number larger than 63.12(63.120) is 63.200 or 63.2.
3. The correct answer is (b). When a number is multiplied by 100, the result is the same as if the decimal is moved two places to the right. When any number is multiplied by a number which is followed by any number of zeroes, the result is the same as moving the decimal that number of places to the right.
4. The correct answer is (b). $23.83 \times 9.73 = 231.8659$. The rule is to look at the next decimal place to the right, the fourth in this case. If it is 5 or more, you add 1 to the place you are rounding to and drop the numbers to the right of that place. If the number is less than 5, you simply drop the numbers to the right of the place to which you are rounding. In this case the fourth decimal place is a 9. The number thus rounds off to 231.866 correct to three decimal places.
5. The correct answer is (a). $0.11 \overline{)1.21}^{11}$

Type #2: Squares and square roots

Accurately work problems which involve finding squares and taking square roots.

Sample problems

1. $2 + \sqrt{16} =$ (a) 6 (b) 10 (c) -2 (d) 18
2. $5^2 =$ (a) 25 (b) 10 (c) 52 (d) 125
3. $\sqrt{[(8-2)^2 + 8^2]} =$ (a) 14 (b) 6 (c) 10 (d) 50

Explanation of sample problems

1. The correct answer is (a). $2 + \sqrt{16} = 2 + 4 = 6$. The square root of a number is that positive number which when squared gives you the number of which you are taking the square root. Thus $\sqrt{16} = 4$ since $4^2 = 16$.
2. The correct answer is (a). 5^2 means $5 \times 5 = 25$. Another example: 3^4 means $3 \times 3 \times 3 \times 3 = 81$.
3. The correct answer is (c). $\sqrt{[(8-2)^2 + 8^2]} = \sqrt{6^2 + 8^2} = \sqrt{36 + 64} = \sqrt{100} = 10$. Whatever is included under the square root sign is grouped together, just like it would be if it had parentheses around it. You therefore add the squares together before you take the square root.

Type #3: Order of operations

General Rule: Order of operations within parentheses, or if there are no parentheses, can be learned by remembering this mnemonic sentence.
“Please Excuse My Dear Aunt Sally.”

P – Parentheses Always do what is in the parentheses first. If parentheses are included inside parentheses, deal with the innermost parentheses first and work outwards until all operations within parentheses have been completed. For example $3 - (4 \times (5+2)) = 3 - (4 \times 7) = 3 - 28 = -25$

E – Exponents Raise any powers or take roots before all other operations. Examples: $3 + 2^3 = 3 + 8 = 11$ and $18 \times \sqrt{9} = 18 \times 3 = 54$.

M – Multiply

D – Divide

Multiply or divide in order moving from left to right. If a division comes before multiplication, do it first and vice versa. Examples: $2 \times 3 \div 6 = 6 \div 6 = 1$ and $8 \div 4 \times 3 = 2 \times 3 = 6$.

A – Add

S – Subtract

Add or subtract in order moving from left to right. If an addition comes before a subtraction do it first and vice versa.

Sample problems

1. $10 + 2^3 \div 2 =$ (a) 9 (b) 13 (c) 8 (d) 14

2. $4 + 3 \times 2 =$ (a) 10 (b) 14 (c) 11 (d) 12

3. $4 \times 2 + 4 - 27 \div \sqrt{9} =$ (a) -5 (b) 3 (c) -3 (d) 5

Explanation of sample problems

1. The correct answer is (d). There are no parentheses in this problem so we go to the second rule: do exponents. Thus $10 + 2^3 \div 2 = 10 + 8 \div 2$. The next rule says do the division next. Thus $10 + 8 \div 2 = 10 + 4 = 14$.
2. The correct answer is (a). Here there are no parentheses or exponents. The next rule says we multiply first. Thus $4 + 3 \times 2 = 4 + 6 = 10$.
3. The correct answer is (b). By the order of operation rules we would do our powers (or roots) first, thus $4 \times 2 + 4 - 27 \div \sqrt{9} = 4 \times 2 + 4 - 27 \div 3$. We next do multiplication and division in order from left to right. Therefore, $4 \times 2 + 4 - 27 \div 3 = 8 + 4 - 27 \div 3 = 8 + 4 - 9$ and then by the last rule, $8 + 4 - 9 = 12 - 9 = 3$.

Type #4: Percent problems

Be able to find the percent of a number and be able to change a percent to a decimal and a decimal to a percent.

Sample problems

- 15% of 238 is (a) 23.8 (b) 35.7 (c) 3570 (d) 223
- Which of the following is equivalent to 6%? (a) 0.60 (b) 60
(c) 0.06 (d) 600

Explanation of sample problems

- The correct answer is (b). Whenever you see “of” in a word problem, it always means multiply. 15% of 238 is then $0.15 \times 238 = 35.7$.
(15% = 0.15)
- The correct answer is (c). To change a percent to a decimal, remove the % sign and move the decimal two places left. If there are not enough places, add zeroes.

Type #5: Signed numbers

Be able to add, subtract, multiply, and divide signed numbers, and find absolute values (the sign for absolute value is |).

Sample problems

- $\frac{-16}{8} =$ (a) -2 (b) -8 (c) 2 (d) 8
- $\frac{(-2)(50)}{-10} =$ (a) 10 (b) -10 (c) -4.8 (d) -110
- $4 - 15 =$ (a) -11 (b) 19 (c) -19 (d) 11
- $|3 - 5| =$ (a) -2 (b) 2 (c) 8 (d) -8

Explanation of sample problems

1. The correct answer is (a). Whenever numbers with opposite signs are divided (or multiplied) the result is negative.
2. The correct answer is (a). $\frac{(-2)(50)}{-10}$ is another way of writing $[(-2) \times 50] \div (-10)$. We thus do the numerator first (the top part). When we multiply (or divide) two numbers with opposite signs, the result is negative. Thus $(-2) \times 50 = -100$. The problem now $\frac{(-2)(50)}{-10} = \frac{-100}{-10}$. Whenever two numbers with the same sign are multiplied (or divided), the result is positive. Thus $\frac{-100}{-10} = +10$. If a number is positive, it is usually written without the sign or 10 in this case.
3. The correct answer is (a). When two signed numbers which have opposite signs are added, the sum is determined by subtracting the smaller absolute value from the larger absolute value and prefixing the sign of the number which gave the larger absolute value. The absolute value of a number can be found by just dropping any sign in front of the number. Thus the absolute value of 2 (or +2) is 2 ($|2| = 2$). $|-15| = 15$, $|+56| = 56$. To subtract signed numbers, we add the opposite of the number being subtracted. Thus in this problem, $4 - 15$ becomes $4 + (-15)$. Using the process explained above, we find $|4| = 4$ and $|-15| = 15$. $15 - 4 = 11$. 15 is the larger absolute value and it came from finding the absolute value of a negative number. Our answer is thus -11. Other examples: $5 - (-10) = 5 + 10 = 15$, $(-3) - (-7) = +[(-3) + (7)] = +(7 - 3) = +4$ which we usually write 4.
4. The correct answer is (b). $|3 - 5|$ means find the absolute value of (3 - 5). Anything inside the absolute value signs is treated as one number. Thus $|3 - 5| = |-2| = 2$.

Type #6: Applications

Be able to apply the above skills in working problems you might encounter in everyday life.

Sample problems

1. A two pound roast costs \$7. What would 3 pounds of the same kind of roast cost? (a) \$10.50 (b) \$21 (c) \$10 (d) \$3.50
2. A store is running a sale advertised as everything 30% off. What would the sale price of an item be if it's normally priced at \$25? (a) \$22 (b) \$32.50 (c) \$17.50 (d) \$7.50

Explanation of sample problems

1. The correct answer is (a). If two pounds cost \$7, then one pound would be \$3.50. Thus 3 pounds would be $3 \times \$3.50 = \10.50 .
Another way to do this problem would be to set up a proportion:
$$\frac{2}{\$7} = \frac{3}{x}$$
 Cross multiplying we get $2x = \$21$ or $x = \$10.50$.
2. The correct answer is (c). 30% of $\$25 = 0.30 \times \$25 = \$7.50$.
 $\$25 - \$7.50 = \$17.50$