

Question 1 Test 1, Second QR Section (version 1)

List A: 0, 5, 10, 15, 20...

QA: Standard deviation of list A QB: Standard deviation of list B

Statistics: Standard Deviation

Answer: *The two quantities are equal*

1. You do not actually have to find the standard deviation of Quantity A or Quantity B in this question; you simply must understand the concept to compare the two sets of numbers. Standard deviation measures the degree to which values in a set differ from the mean (the set's average). So before we try to calculate the actual standard deviation for these two sets of numbers—which we'll show you how to do below—let's first consider the average of each and the distance of the other numbers in each set from that average. In List A, the average is 10 and you have two numbers that are 5 and 10 greater than the average (15 and 20), and two numbers 5 and 10 below it (5 and 0). Now let's look at List B: the average is 15, and again there are two numbers 5 and 10 greater than the average (20 and 25), and two numbers 5 and 10 lower than the average (10 and 5).

So in both lists the distribution of the numbers above and below the list's average is exactly the same, meaning the standard deviation for each must be the same. Hence, answer choice C is correct.

Note that actually determining the standard deviation was NOT necessary, nor do the numbers themselves matter! That is, standard deviation simply describes proximity to the central point, whatever it may be, and relative standard deviations can generally be determined without knowing the exact deviations themselves. For instance, if List A had a number only 4 above the average as opposed to 5 its deviation would have been slightly less (the set would be closer on the whole to the average), and if List A had a number 6 above the average instead of just 5 its deviation would have been higher.

It is extremely unlikely that you would be asked to find standard deviation on the GRE. But just to be comprehensive, let's examine how to find it on this problem: by determining the square root of the variance, where the variance is the average of the squared differences from the average.

For example, in List A, find the average. PowerScore test takers will know that the average is 10 because the median and average in a set of consecutive numbers is the same. But if you did not know this GRE shortcut, then you can compute the average:

$$\frac{\text{sum}}{\# \text{ of \#s}} = \text{average} \rightarrow \frac{0+5+10+15+20}{5} \rightarrow \frac{50}{5} \rightarrow 10$$

Now look at the differences from the average, and then square those differences:

1st term: 0	Difference from average = 10 - 0 = 10	$10^2 =$	100
2nd term: 5	Difference from average = 10 - 5 = 5	$5^2 =$	25
3rd term: 10	Difference from average = 10 - 10 = 0	$0^2 =$	0
4th term: 15	Difference from average = 10 - 15 = -5	$(-5)^2 =$	25
5th term: 20	Difference from average = 10 - 20 = -10	$(-10)^2 =$	100

To find the variance, find the average of the squared numbers:

$$\frac{\text{sum}}{\# \text{ of \#s}} = \text{average} \rightarrow \frac{100+25+0+25+100}{5} \rightarrow \frac{250}{5} \rightarrow 50 \text{ The standard deviation is the } \sqrt{50}$$

2. You don't really need to know this, however. You can look at List B and determine that the average and squared differences from the average are going to be identical to the differences in List A. The average of List B is 15; we know this because the median and average in a set of consecutive numbers is the same. Now look at the differences from the average, and then square those differences:

1st term: 5	Difference from average = 15 - 5 = 10	$10^2 =$	100
2nd term: 10	Difference from average = 15 - 10 = 5	$5^2 =$	25
3rd term: 15	Difference from average = 15 - 15 = 0	$0^2 =$	0
4th term: 20	Difference from average = 15 - 20 = -5	$(-5)^2 =$	25
5th term: 25	Difference from average = 15 - 25 = -10	$(-10)^2 =$	100

3. Since these differences in List B are the same as in List A, the standard deviation is going to be the same.

Question 2 Test 1, Second QR Section (version 1)

$$(x - 2y)(x + 2y) = 4$$

QA: $x^2 - 4y^2$ QB: 8

*Algebra: Equations**Answer: Quantity B is greater*

1. PowerScore students are going to recognize a classic GRE quadratic form:

$$(x + y)(x - y) = x^2 - y^2$$

$$(x + 2y)(x - 2y) = x^2 - 4y^2 = 4 \quad \text{They can quickly compare 4 to 8 and determine B is greater.}$$

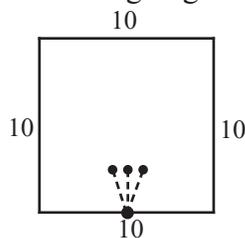
2. If you are not a PowerScore student or if you forget the classic quadratic form, simply perform FOIL (first, outer, inner, last):

$$(x + 2y)(x - 2y) \rightarrow x^2 - 2xy + 2xy - 4y^2 = 4 \rightarrow x^2 - 4y^2 = 4$$

3. Compare the quantities: Quantity A: 4 Quantity B: 8

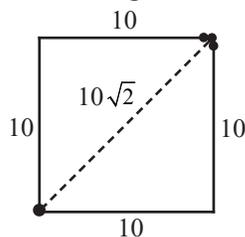
Question 3 Test 1, Second QR Section (version 1)**A power station is located on the boundary....****QA: Sum of the distances QB: 30 miles***Geometry: Quadrilaterals and Triangles**Answer: The relationship cannot be determined*

1. DIAGRAM the question. In the most common scenario, the distance from the power station to the substations is going to be less than 30.



Imagine in this graphic that the substation is on the boundary and the three substations are located close to that boundary. If all three substations were 3 miles from the power station in this diagram, then the sum of the distances is 9 and less than 30.

2. But is this always true? Can you find a location for the stations in which the sum is greater than 30? The greatest distance would be the diagonal of the square, which divides the square into two 45:45:90 triangles, where the ratio of side lengths is $s : s : s\sqrt{2}$:



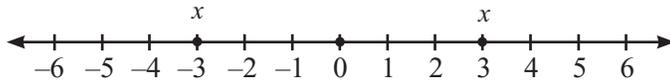
If all three substations are located across the diagonal from the power stations, then it is $10\sqrt{2}$, or 14.14 miles.

$$14.14 + 14.14 + 14.14 = 42.42$$

3. Since we have proven that the sum of the distances can be less than 30 or more than 30, the answer cannot be determined with the information given.

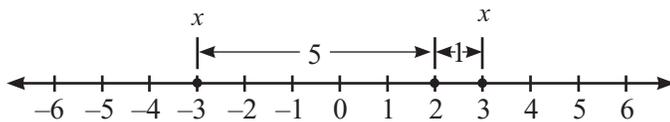
Question 4 Test 1, Second QR Section (version 1)**On the number line, the distance between x ...****QA: Distance between x and 2 QB: 2***Arithmetic: Number Lines**Answer: The relationship cannot be determined*

1. Diagram the question and determine the possible values of x :



The only two points 3 units from 0 are -3 and 3 .

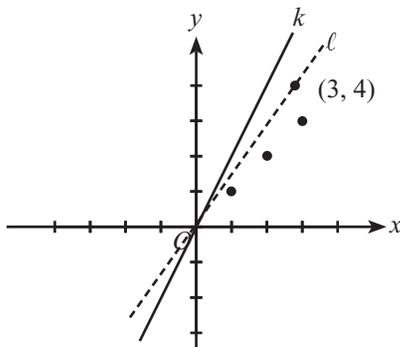
2. Now determine the distance between x and 2:



3. We have shown that the distance between x and 2 could be 5 or 1; thus, it is impossible to say that Quantity A is always greater than Quantity B.

Question 5 Test 1, Second QR Section (version 1)**Graph of line k and point $(3, 4)$** **QA: Slope of k QB: 1***Coordinate Geometry: Slope of a Line**Answer: Quantity A is greater*

1. On the GRE, coordinate geometry figures ARE drawn to scale, so we can determine from the graphic that line k runs through the origin $(0, 0)$. It is impossible to determine the slope of line k , however, because we only have one point on that line $(0, 0)$. Instead, create a line (line ℓ) that runs through the point $(3, 4)$ and the origin $(0, 0)$ to find its slope:



The slope of line ℓ can be found by computing the rise (4) over the run (3):

$$\text{Slope of line } \ell = 4/3$$

As you know, $4/3$ is greater than 1, and since line k has a slope that is even steeper than $4/3$, you know it is also greater than 1.

For comparison's sake, a line with a slope of 1 would run through the 3 points below line ℓ .

Question 6 Test 1, Second QR Section (version 1)**The probability that both events E and F ...****QA: Probability that E will occur QB: 0.58***Probability**Answer: The relationship cannot be determined*

1. A probability of 0.42 is the same as 42% or 42/100. The probability of two events occurring is the product of each individual event occurring:

$$\frac{E}{100} \times \frac{F}{100} = \frac{42}{100}$$

2. Can we make E greater than 58/100? Let's try to make a true math statement when $E = 0.90$:

$$\frac{90}{100} \times \frac{F}{100} = \frac{42}{100} \quad \rightarrow \quad 90F = 42 \quad \rightarrow \quad F = 0.467$$

Sure! If there is a 90% chance of probability that E will occur, there is a 47% chance F will occur.

3. Can we make E less than 58/100?

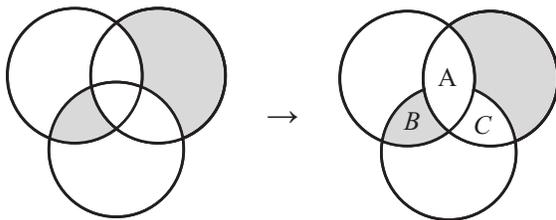
$$\frac{50}{100} \times \frac{F}{100} = \frac{42}{100} \quad \rightarrow \quad 50F = 42 \quad \rightarrow \quad F = 0.84$$

If there is a 50% chance of probability that E will occur, there is a 84% chance that F will occur.

4. Since we can make E both greater than and less than 0.42, it is impossible to determine the relationship on this question.

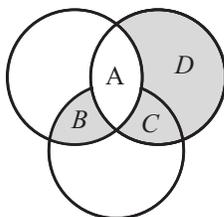
Question 7 Test 1, Second QR Section (version 1)**The area of each of the three circular regions....****QA: Sum of the shaded region area QB: 30***Geometry: Circle and Perception**Answer: Quantity B is greater*

1. We have removed an arc of the bottom circle in order to envision sections A, B, and C:



Section A is an area of intersection of two circular regions, so we know $A = 15$.

Notice that Sections B and C are identical. So imagine the following:



If the area of an entire circle is 40 and A is 15, then:

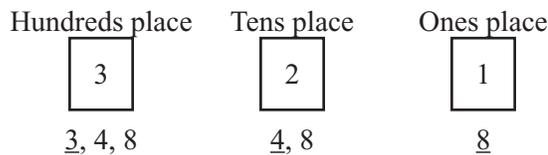
$$C + D = 40 - 15 = 25 \text{ and } B + D = C + D$$

3. Compare the quantities: 25 is less than 30.

Question 8 Test 1, Second QR Section (version 1)**How many three-digit positive integers...?***Arithmetic and Counting Problems*

Answer: 6

1. There are two ways to solve this question. The first is the most efficient and involves understanding this is a simple combination. There are three choices for the hundreds place (3, 4, or 8); if we put 3 in the hundreds place, then there are two choices (4 or 8) for the tens place. Say we put a 4 in the tens place; there is only one choice (8) for the ones place.



This is the same as 3 factorial (3!):

$$3! = 3 \times 2 \times 1 = 6$$

2. The other way to solve it is to write out the possible three-digit positive integers and count them:

$$348, 384, 438, 483, 834, 843 \rightarrow 6 \text{ three-digit positive integers}$$

While this method is efficient when the question only has three digits, it can get quite complicated with more digits or four-digit positive integers.

Question 9 Test 1, Second QR Section (version 1)**A teacher took a container filled with....***Algebra: Exponents/Expression*

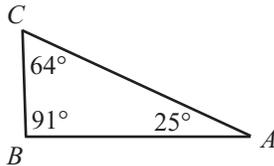
Answer: 12.50%

1. Use the formula for percent change:

$$\text{Percent change} = \text{decrease} \div \text{original number} \times 100 \rightarrow 2 \text{ L} \div 16 \text{ L} \times 100 = 12.5\%$$

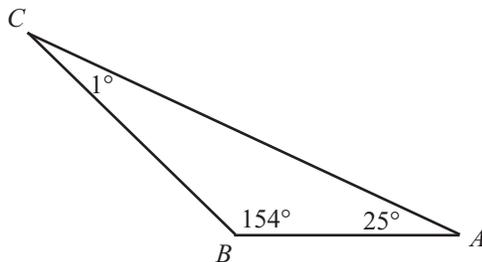
Question 10 Test 1, Second QR Section (version 1)**In the triangle ABC , the measure of angle A is 25°***Geometry: Triangles*Answers: 12° , 15° , 45° , 50°

1. Diagram the question and SUPPLY a number for angle B . Since $B > 90^\circ$, B can be anything greater than 90° (like 90.0009°), but start with the lowest possible integer, $B = 91^\circ$ to make calculations easier:



$$\begin{aligned} A + B + C &= 180^\circ \\ 25^\circ + 91^\circ + C &= 180^\circ \\ C &= 64^\circ \end{aligned}$$

2. Now imagine if B were at the other extreme—as large as possible. :



$$\begin{aligned} A + B + C &= 180^\circ \\ 25^\circ + B + C &= 180^\circ \\ B + C &= 155^\circ \end{aligned}$$

$$\text{If } B = 154^\circ, \text{ then } C = 1^\circ$$

Remember, these figures are not drawn to scale. A 1° angle would be very, very small.

3. Angle C can be anything less than 65 degrees, so the first four answers are possible values of C .

Question 11 Test 1, Second QR Section (version 1)**In the sunshine, an upright pole 12 feet tall....***Arithmetic: Proportions*

Answer: 15

1. Create a cross-multiplying diagram and fill it in with values from the question:

	Tree 1:	Tree 2:	
Real height:	12 ft.	? ft.	
	=	=	
Shadow height:	8 ft.	10 ft.	

2. Now cross multiply:

	Tree 1:	Tree 2:	
Real height:	12 ft.	? ft.	
	↙ ↘	↘ ↙	
Shadow height:	8 ft.	10 ft.	

$$\rightarrow (8)(?) = (12)(10) \rightarrow (8)(?) = 120 \rightarrow ? = 15$$

Question 12 Test 1, Second QR Section (version 1)
If a is the smallest prime number greater than 21...?

Arithmetic: Prime Numbers

Answer: 299

1. A prime number is any number that has no factors other than 1 and itself. It is wise to memorize the first 10 prime numbers before the GRE:

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

2. If a is the smallest prime number greater than 21, it must be 23.
 3. If b is the largest prime number less than 16, it must be 13.
 4. Find ab :

$$23 \times 13 = 299$$

Question 13 Test 1, Second QR Section (version 1)
For the 3 numbers in a list, the average (arithmetic mean)...

Statistics: Average and Median

Answer: 13

1. If the median of the three numbers is 8, we know that 8 is the second term. The first and third term can be x and $(x + 10)$:

$$x, 8, (x + 10)$$

2. We know the average = 8, so use the average formula to find x :

$$\frac{\text{sum}}{\# \text{ of \#s}} = \text{average} \quad \rightarrow \quad \frac{x + 8 + (x + 10)}{3} = 8 \quad \rightarrow \quad x + 8 + (x + 10) = 24 \quad \rightarrow$$

$$2x + 18 = 24 \quad \rightarrow \quad 2x = 6 \quad \rightarrow \quad x = 3$$

3. Be careful! The most common wrong answer is 3! The question asks for the greatest number ($x + 10$), not the least number (x). The correct answer is 13:

$$x + 10 \quad \rightarrow \quad 3 + 10 \quad \rightarrow \quad 13$$

Question 14 Test 1, Second QR Section (version 1)**STUDENT ENROLLMENT TABLES****The ratio of the number of male freshmen to...***Data Analysis/Ratios*

Answer: 3 to 1

1. Read the first table carefully to find the number of male freshman (MF) and female sophomores (SF):

$$\text{MF} : \text{SF} \rightarrow 303 : 109$$

2. The question asks for an approximation, so round both numbers down to the nearest hundred:

$$\text{MF} : \text{SF} \rightarrow 300 : 100$$

3. Remember, ratios can be expressed as fractions. When you reduce $300 : 100$, you end up with $3 : 1$.

$$300 : 100 \rightarrow \frac{300}{100} \rightarrow \frac{3}{1} \rightarrow 3 : 1 \text{ or } 3 \text{ to } 1$$

Question 15 Test 1, Second QR Section (version 1)**STUDENT ENROLLMENT TABLES****How many of the enrolled students are not majoring...?***Data Analysis: Percents*

Answer: 182

1. What percent of the students are not majoring in Humanities (33%), Social sciences (30%), or Physical sciences (24%)?

$$33\% + 30\% + 24\% + ? = 100\%$$

$$87\% + ? = 100\%$$

$$? = 13\%$$

2. If the total enrollment is 1400 students, then 13% of 1400 is how many students?

TRANSLATE:

13% of 1400 is how many students?

$$0.13 \times 1400 = ?$$

$$182 = ?$$

Question 16 Test 1, Second QR Section (version 1)**STUDENT ENROLLMENT TABLES****Sophomores constitute approximately...?***Data Analysis: Percents*

Answer: 23%

1. Find the total number of sophomores: 215 (males) + 109 (females) = 324

2. TRANSLATE:

sophomores are what percent of the total enrollment

$$\begin{array}{ccccccc}
 \downarrow & \downarrow & \searrow & \downarrow & \downarrow & & \\
 324 & = & \frac{?}{100} & \times & 1400 & & \\
 \\
 324 = \frac{?}{100} \times 1400 & \rightarrow & 324 = \frac{(1400)(?)}{100} & \rightarrow & 324 = (14)(?) & \rightarrow & 23.14 = ?
 \end{array}$$

Question 17 Test 1, Second QR Section (version 1)**A third-grade teacher has n boxes....***Algebra: Creating Expressions*Answer: $\frac{12n-t}{p}$

1. RECORD what you know:

 $12n$ = total pencils p = number of pencils per student t = leftover pencils $?$ = total number of students in the class

2. Some students may be able to conceptualize this problem to determine the expression that represents the number of students in the class. Others, however, may need concrete numbers to understand the problem. If so, SUPPLY numbers to satisfy the terms:

24 total pencils $12n$ = total pencils ($n = 2$)2 pencils per student p = number of pencils per student4 leftover pencils t = leftover pencils10 total students $?$ = total number of students in the class

How would the first three numbers give us a total of 10 students?

10 students (2 pencils each) + 4 leftover pencil = 24 total pencils

$$? \quad (p) \quad + \quad t \quad = \quad 12n$$

$$(?)p + t = 12n$$

$$(?)p = 12n - t$$

$$? = \frac{12n-t}{p}$$

Question 18 Test 1, Second QR Section (version 1)**If $(x + 2)(x - 3) = 0$...?***Algebra: Equations/Exponents*Answer: $\frac{1}{9}$

1. The value of x must be -2 or 3 , because these are the roots of the quadratic binomials $(x + 2)(x - 3) = 0$. Since the problem says that $x > 1/2$, then $x = 3$.

2. Now find x^{-2} :

$$x^{-n} = \frac{1}{x^n} \quad \rightarrow \quad 3^{-2} = \frac{1}{3^2} \quad \rightarrow \quad \frac{1}{9}$$

Question 19 Test 1, Second QR Section (version 1)**If j and k are integers...?***Arithmetic: Number Properties*Answer: $jk + j$

1. SUPPLY numbers for j and k . Choose a couple sets of numbers for each variable, so that j and k themselves are both even and odd:

$j - k$ is even

$$j = 4, k = 2 \quad 4 - 2 = 2 \text{ (even)}$$

$$j = 5, k = 3 \quad 3 - 1 = 2 \text{ (even)}$$

2. Now plug them into the answer choices, with the intention of eliminating an answer choice if we can produce an odd number:

(A) k If $j = 5, k = 3 \rightarrow k$ is odd ✗

(B) jk If $j = 5, k = 3$, then $jk = (5)(3) = 15 \rightarrow jk$ is odd ✗

(C) $j + 2k$ If $j = 5, k = 3$, then $j + 2k = 5 + 2(3) = 5 + 6 = 11 \rightarrow j + 2k$ is odd ✗

(D) $jk + j$ If $j = 5, k = 3$, then $jk + j = (5)(3) + 5 = 15 + 5 = 20 \rightarrow jk + j$ is even ✓

 If $j = 4, k = 2$, then $jk + j = (4)(2) + 4 = 8 + 4 = 12 \rightarrow jk + j$ is even ✓

(E) $jk - 2j$ If $j = 5, k = 3$, then $jk - 2j = (5)(3) - (2)(5) = 15 - 10 = 5 \rightarrow jk - 2j$ is odd ✗

Question 20 Test 1, Second QR Section (version 1)**A fruit stand sells two varieties of apples....***Arithmetic*

Answers: \$6.00, \$6.25, \$6.75

1. Write an equation for this word problem, where A = apples, and B = oranges:

$$3A + 2B = \text{total price}$$

2. Now compute the two possible values of 3A and the two possible values of 2B:

$$A = 1.00 \text{ or } 1.25$$

$$3A = 3.00 \text{ or } 3.75$$

$$B = 1.25 \text{ or } 1.50$$

$$2B = 2.50 \text{ or } 3.00$$

3. Now plug all of the possible values into the equation:

$$3A + 2B = \text{total price}$$

$$3.00 + 2.50 = 5.50 \quad (\text{Not listed in the answer choices})$$

$$3.00 + 3.00 = 6.00$$

$$3.75 + 2.50 = 6.25$$

$$3.75 + 3.00 = 6.75$$