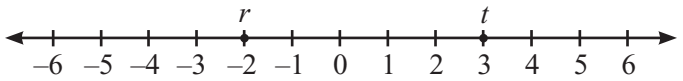
Question 1 Test 2, Second QR Section (version 2)
The number 0 is between the two nonzero....
QA: The product of *r* and *t* QB: 0
Arithmetic: Number Lines Answer: *Quantity B is greater*

1. If 0 is between r and t, one of the numbers will always be negative and the other will always be positive. When multiplying numbers, a negative times a positive is always negative, so the product will always be less than 0. Thus, quantity B is greater.

2. If you have a hard time understanding this, DIAGRAM the question and SUPPLY numbers for r and t. For example, if r = –2 and t = 3, then:



$-2 \times 3 = -6$

Question 2 Test 2, Second QR Section (version 2)
***X* is the set of all integers less than....**
QA: The least integer in set *X* that is also in set *Y* QB: 11
Arithmetic: Number Properties Answer: *The two quantities are equal*

1. There are four numbers that are common to both sets: 11, 12, 13, 14

   Set *X*: {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14}
   Set *Y*: {11, 12, 13, 14, 15, 16, 17, ...}

2. The least integer in set *X* that is also in set *Y* is 11. Therefore, the two quantities are equal.

Question 3 Test 2, Second QR Section (version 2)
4 percent of *s* is equal to....
QA: *s* QB: *t*
Arithmetic: Percent Answer: *Quantity B is greater*

1. TRANSLATE:

   4 percent of *s* is equal to 3 percent of *t*
   $0.04 \times s = 0.03 \times t$
   $0.04s = 0.03t$
   $s = 0.75t$

   Supply a number for *t*. For example, say $t = 5$:

   $s = 0.75t$
   $s = 0.75(5)$
   $s = 3.75$ Since *t* is greater, Quantity B is greater.

Question 4 Test 2, Second QR Section (version 2)
T is a list of 100 different numbers that are greater than....
QA: $x - y$ QB: 20
Arithmetic: Percent Answer: *The relationship cannot be determined*

1. SUPPLY numbers for x and y, using numbers at the extreme ends of the range.

   For example, say that $x = 2$. That means that over 60 percent of the numbers are less than 2. How can that be possible? It works if you consider there are an infinite number of numbers between 0 and 2 when you use decimals. So the 60 percent would look like (0.1, 0.12, 0.1579, 0.2, 0.29, etc).

   Now say that $y = 1$. That would mean 40% of the numbers are between 0 and 1, and another 20% are between 1 and 2 to satisfy both $y = 1$ and $x = 2$.

   So $x - y = 2 - 1 = 1$. In this case, Quantity B is greater.

   But what if x were at the other extreme of the range, such as $x = 48$? If we keep $y = 1$, that would mean that 40% of the numbers were between 0 and 1 and the next 20% were between 1 and 48 (and the remaining 40% were between 48 and 50).

   Now $x - y = 48 - 1 = 47$. In this case, Quantity A is greater. Thus, the relationship cannot be determined.

Question 5 Test 2, Second QR Section (version 2)
x* > *y
QA: $|x + y|$ QB: $|x - y|$
Algebra: Absolute Value Answer: *The relationship cannot be determined*

1. SUPPLY numbers for x and y:

   $x = 3, y = 1$
   $|x + y| \rightarrow |3 + 1| \rightarrow |4| \rightarrow 4$
   $|x - y| \rightarrow |3 - 1| \rightarrow |2| \rightarrow 2$ In this case, Quantity A is greater.

   The presence of absolute value symbols should make us want to SUPPLY negative numbers because of the special properties of absolue value. What if y is a negative number?

   $x = 3, y = -1$
   $|x + y| \rightarrow |3 + -1| \rightarrow |2| \rightarrow 2$
   $|x - y| \rightarrow |3 - -1| \rightarrow |4| \rightarrow 4$ In this case, Quantity B is greater.

   Thus, the relationship cannot be determined.

Question 6 Test 2, Second QR Section (version 2)
The frequency of distributions shown above....
QA: The standard deviation of distribution *A* **QB: The standard deviation of distribution *B***
Data Analysis: Standard Deviation Answer: *Quantity B is greater*

1. This is a classic GRE case of a standard deviation question where actually trying to calculate values is a time-sucking trap. Instead, you can solve this one simply by analyzing the data.

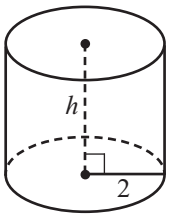
   Standard deviation is higher when there are more elements far from the average. In both graphs, there is symmetry in each set of consecutive terms. For example, in Distribution A, the frequency of 10 and 50 is the same, and the frequency of 20 and 40 is the same. This is also true in Distribution B: the frequency in 10 and 50 is equal as is the frequency in 20 and 40. This means the average is immediately right in the middle—both distributions have an average of 30. So if you imagine these two data sets as bell curves, then in A you have the largest group in the middle at the average of 30 (standard type bell curve), while in B you have the opposite: the large groups are at the extremes of 10 and 50 and not at the average of 30 (an inverse bell curve of sorts, almost like a parabola), meaning the deviation from the standard (the central tendency we call "average") is going to be much higher in B.

   Simply put: when a data set clusters towards the middle (towards the average) standard deviation is less than when a data set has more outliers, with clusters at the ends (away from the average). So the standard deviation in B must be greater than the standard deviation in A.

Question 7 Test 2, Second QR Section (version 2)
A right circular cylinder with radius 2 inches....
QA: The height of the cylinder **QB: 2 inches**
Geometry: Geometric Solids Answer: *Quantity B is greater*

1. RECORD what you know:

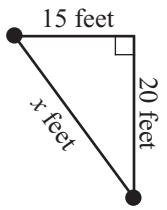
   Volume = 15
   Radius = 2
   Volume = $\pi r^2 h$
   $15 = \pi 2^2 h \quad \rightarrow \quad 15 = 3.14(4)h \quad \rightarrow \quad 15 = 12.56h \quad \rightarrow \quad 1.19 = h$



   Quantity B (2) is greater than Quantity A (1.19).

Question 8 Test 2, Second QR Section (version 2)
A bush will be dug up and then planted again....
Geometry: Right Triangles Answer: *25*

1. DIAGRAM the question:



PowerScore students will immediately recognize the Pythagorean Triple 15:20:25 (a multiple of the 3:4:5 triangle). But if you do not know the Pythagorean Triples, you can perform the Pythagorean Theorem:

$a^2 + b^2 = c^2$
$15^2 + 20^2 = c^2$
$225 + 400 = c^2$
$625 = c^2$
$25 = c$

Question 9 Test 2, Second QR Section (version 2)
If $3x + 5{,}000 = 6x$...?

Algebra: Equations Answer: $-\frac{5000}{3}$

1. Isolate x to solve:

$3x + 5000 = 6x + 10000$
$3x = 6x + 5000$
$-3x = 5000$
$x = -\frac{5000}{3}$

Question 10 Test 2, Second QR Section (version 2)
Steve's property tax is $140 less than Patricia's property tax....
Arithmetic: Percentages Answer: *6.7%*

1. First, find Patricia's property tax:

Steve's property tax + $140 = Patricia's property tax
$1960 + $140 = $2100

2. Now translate:

Steve's property tax is what percent less than Patricia's property tax
$140 is what percent of $2100
$140 = \frac{?}{100} \times 2100$

$14000 = 2100(?)$
$6.6\overline{66} = ?$

Question 11 Test 2, Second QR Section (version 2)
Chris entered a number in his calculator and erroneously multiplied....
Arithmetic: Number Properties Answers: Multiply the incorrect product by 0.001 and Divide the incorrect product by 1,000

1. Consider Chris's error:

   What he meant to enter: $x \times 2.073$
   What he actually entered: $x \times 2{,}073$

   He multiplied the number (x) by a number that was 1000 times greater than he intended, so he either needs to divide the new product by 1000 or multiply it by $\frac{1}{1000}$ or 0.001.

2. If this concept seems too abstract, you can always SUPPLY a number for x:

   x = 100
   What he meant to enter: $100 \times 2.073 = 207.3$
   What he actually entered: $100 \times 2{,}073 = 207{,}300$

   Which answer choices will turn 207,300 into 207.3?

Choice A: Multiply by 0.001	$207{,}300 \times 0.001 = 207.3$ ✓
Choice B: Divide by 0.001	$207{,}300 \div 0.001 = 207{,}300{,}000$ ×
Choice C: Multiply by 1,000	$207{,}300 \times 1{,}000 = 207{,}300{,}000$ ×
Choice D: Divide by 1,000	$207{,}300 \div 1{,}000 = 207.3$ ✓

Question 12 Test 2, Second QR Section (version 2)
A base of a triangle has length *b*, the altitude corresponding to the...
Geometry: Triangles Answer: h^2

1. Plug the information from the problem into the formula for the area of a triangle:

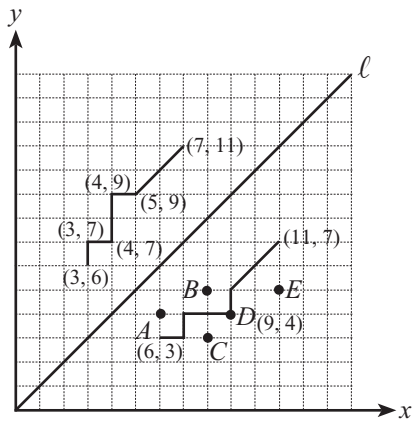
   base = b or $2h$
   height (altitude) = h

   Formula for the Area of a triangle = $\frac{1}{2}$(base)(height)

   Area = $\frac{1}{2}(2h)(h) \quad \rightarrow \quad (h)(h) \quad \rightarrow \quad h^2$

Question 13 Test 2, Second QR Section (version 2)
In the *xy*-plane above, if the graph above line ℓ is reflected across line ℓ...?
Coordinate Geometry: Reflections Answer: *D*

1. The line of reflection acts as a mirror. Some students may be able to DIAGRAM the reflected graph without pinpointing the coordinates, while others will need to rely on the knowledge that the *x*- and *y*-coordinates are reversed over the line $y = x$.



If the original graph starts at point (3, 6), then the reflected graph will start at the reverse coordinates: (6, 3). You can reverse all of the coordinates in the original graph to plot the reflected graph (we have only reversed 3—the first, last, and point *D*—because the graph is too crowded to illustrate it well). As you can see, the reflected graph passes through point *D*.

Question 14 Test 2, Second QR Section (version 2)
SOURCES OF SOLID WASTE GRAPHS
In 1988, for how many of the eight categories shown...?
Data Analysis: Circle graphs and percentages Answer: *One*

1. Since the question is about 1988, use the circle graph on the left. The total weight of solid waste in 1998 is 160 million tons. TRANSLATE:

$$\underline{\text{8 million tons}}\ \underline{\text{is}}\ \underline{\text{what percent}}\ \underline{\text{of}}\ \underline{\text{160 million tons}}$$
$$\downarrow \qquad \downarrow \qquad \downarrow \qquad \downarrow \qquad \downarrow$$
$$8 \qquad = \qquad \frac{?}{100} \qquad \times \qquad 160$$

$$8 = \frac{?}{100} \times 160$$

$$800 = ? \times 160$$
$$5\% = ?$$

If 8 millions tons is 5% of the total 160 million tons, the only category with 5% or less is Miscellaneous at 1.7%. So there is one category with 8 million tons or less.

Question 15 Test 2, Second QR Section (version 2)
SOURCES OF SOLID WASTE GRAPHS
For 1988, how many of the 8 categories of solid waste...?
Data Analysis: Circle graphs, percentages, and averages Answer: *Two*

1. First, find the average weight for all 8 categories:

$$\frac{\text{sum}}{\text{\# of \#s}} = \text{average} \quad \rightarrow \quad \frac{160 \text{ million tons}}{8 \text{ categories}} = 20$$

2. Now TRANSLATE:

20 million tons is what percent of 160 million tons

$$20 = \frac{?}{100} \times 160$$

$$2000 = ? \times 160$$
$$12.5\% = ?$$

How many categories are greater than 12.5%? Two: Yard Waste (17.9%) and Paper and Paperboard (41.0%).

Question 16 Test 2, Second QR Section (version 2)
SOURCES OF SOLID WASTE GRAPHS
In 1988, if 10 percent of the glass waste and...?
Data Analysis: Circle graphs and percentages Answer: *20%*

1. Some students may be able to solve this one without any calculations, other than 50% of 41% (the percent of paper and paperboard waste). The percent of glass waste is so insignificant as to not affect the calculations. So test takers may be able to select 20% quickly and move on.

2. If you are not able to complete this mental math, use the first circle graph to find the percent of glass waste (8.2%) and paper and paperboard waste (41%). Then TRANSLATE:

10 percent of glass waste
10% of 8.2% → 0.10 × 0.082 → 0.0082 or 0.82%

50 percent of paper and paperboard waste
50% of 41% → 0.50 × 0.41 → 0.205 or 20.5%

What percent of the solid waste was recycled?

0.82% + 20.5% = 21.32% The closest approximation is 20%

Question 17 Test 2, Second QR Section (version 2)
Each month, a certain manufacturing company's total expenses....
Algebra: Equations Answer: *$30,000*

1. TRANSLATE and plug in the information from the problem:

   Total expenses are equal to a fixed monthly expense (F) plus a variable expense (V)

   First month: 570,000 = F + 20,000V
   Second month: 705,000 = F + 25,000V

   If we isolate F in both equations, we can set them equal:

   570,000 = F + 20,000V → 570,000 – 20,000V = F
   705,000 = F + 25,000V → 705,000 – 25,000V = F

   570,000 – 20,000V = 705,000 – 25,000V
   570,000 + 5,000V = 705,000
   5,000V = 135,000
   V = 27

   Now find F using either of the original equations:

   570,000 = F + 20,000V
   570,000 = F + 20,000(27)
   570,000 = F + 540,000
   30,000 = F

Question 18 Test 2, Second QR Section (version 2)
Which of the following lines are perpendicular to...?
Coordinate Geometry: Lines Answers: $x + y = 0$ and $x + y = 1$

1. Lines are perpendicular if their slopes are negative reciprocals. Start by finding the slope of line $y = x$:

   $y = mx + b$ where m = slope

   $y = x \rightarrow y = (1)x$ so the slope is 1

   Which answer choices have a slope of –1 or $–x$?

   x = 0 ✗
   y = –1 ✗
   $x + y = 0 \rightarrow y = –x$ ✓
   $x + y = 1 \rightarrow y = –x + 1$ ✓
   $x – y = 2 \rightarrow –y = –x + 2 \rightarrow y = x – 2$ ✗

Question 19 Test 2, Second QR Section (version 2)
The hundreds digit of the five-digit number 73_95 is missing....

Statistics: Probability and Number Properties Answer: $\frac{2}{5}$

1. To determine whether a large number is divisible by 3, add the digits of the number together. If the sum is divisible by 3, the original number is divisible by 3. For example, we know the number 129 is divisible by 3 because 1 + 2 + 9 = 12, which is divisible by 3.

2. Add the existing digits of the five-digit number:

   73_95 → 7 + 3 + 9 + 5 = 24

   Since 24 is divisible by 3, then 73,095 is also divisible by 3:

   73095 → 7 + 3 + 0 + 9 + 5 = 24 24 is divisible by 3

   There are 9 more options: 73,195, 73,295, 73,395, etc. However, only the multiples of 3 will produce a sum that is multiple of 3:

   73395 → 7 + 3 + 3 + 9 + 5 = 27 27 is divisible by 3
   73695 → 7 + 3 + 6 + 9 + 5 = 30 30 is divisible by 3
   73995 → 7 + 3 + 9 + 9 + 5 = 33 33 is divisible by 3

   So there are 10 possibilities, 4 of which produce a multiple of 3.

3. Now find the probability:

$$\text{Probability} = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}} \rightarrow \frac{4}{10} \rightarrow \frac{2}{5}$$

Question 20 Test 2, Second QR Section (version 2)
How many ordered pairs of positive integers (*x, y*)...?
Algebra: Inequalities Answer: *Four*

1. Because the left side of the equation needs to be less than 10, use small numbers to find the ordered pairs that work:

	$2x + 3y < 10$					
(1, 1):	$2(1) + 3(1) < 10$	→	$2 + 3 < 10$	→	$5 < 10$	✓
(1, 2);	$2(1) + 3(2) < 10$	→	$2 + 6 < 10$	→	$8 < 10$	✓
(1, 3);	$2(1) + 3(3) < 10$	→	$2 + 9 < 10$	→	$11 > 10$	×
(2, 1);	$2(2) + 3(1) < 10$	→	$4 + 3 < 10$	→	$7 < 10$	✓
(3, 1);	$2(3) + 3(1) < 10$	→	$6 + 3 < 10$	→	$9 < 10$	✓
(4, 1);	$2(4) + 3(1) < 10$	→	$8 + 3 < 10$	→	$11 > 10$	×

   There are four pairs of positive integers that work.