Question 1   Test 2, Second QR Section (version 1)
The length of each side of equilateral triangle *T* is.....
QA: Ratio of one side of *T* to another side of *T*   QB: Ratio of one side of *X* to another side of *X*
Geometry: Triangles   Answer: *The two quantities are equal*

1. An equilateral triangle has equal side lengths, so the ratio is always going to be 1:1.

2. To illustrate, SUPPLY numbers for side length of *T* and *X*:

Side length of $T = 3$ $3 : 3$ $\rightarrow$ $\dfrac{3}{3}$ $\rightarrow$ $\dfrac{1}{1}$ $\rightarrow$ $1 : 1$

Side length of $X = 101$ $101 : 101$ $\rightarrow$ $\dfrac{101}{101}$ $\rightarrow$ $\dfrac{1}{1}$ $\rightarrow$ $1 : 1$

Question 2   Test 2, Second QR Section (version 1)
The function *f* is defined for all numbers *x*....
QA: *f*(0)   QB: 5
Algebra II: Functions   Answer: *The two quantities are equal*

1. Find $f(0)$:

$$f(x) = |\,x + 3\,| + |\,x - 2\,|$$
$$f(0) = |\,0 + 3\,| + |\,0 - 2\,|$$
$$f(0) = |\,3\,| + |\,{-2}\,|$$
$$f(0) = 3 + 2$$
$$f(0) = 5$$

2. The value of Quantity A is equal to Quantity B.

Question 3   Test 2, Second QR Section (version 1)
List *A*: 20, 56, 27....
List *B* (not shown)....
QA: The range of the numbers in list *B*   QB: 15
Arithmetic: Number Properties   Answer: *Quantity B is greater*

1. The lowest number in list B will be derived from the lowest number in list A, which is 16. The greatest number in list B will be derived from the highest number is list A, which is 56. Find these two numbers in list B:

$$16 \div 4 + 5 = 4 + 5 = 9$$
$$56 \div 4 + 5 = 14 + 5 = 19$$

2. The range of list B is 10 ($19 - 9 = 10$). Quantity B is greater.

Question 4   Test 2, Second QR Section (version 1)

x > y

QA: $\dfrac{1}{3}x$ **QB:** $\dfrac{1}{2}y$

Arithmetic: Fractions   Answer: *The relationship cannot be determined*

1. SUPPLY numbers for *x* and *y*:

$x = 6, y = 4$

$\dfrac{1}{3}(6) = 2$ $\dfrac{1}{2}(4) = 2$ In this case the quantities are equal.

$x = 30, y = 4$

$\dfrac{1}{3}(30) = 2$ $\dfrac{1}{2}(4) = 2$ In this case, Quantity A is greater.

2. Because we were able to prove two different results, the relationship cannot be determined.

Question 5   Test 2, Second QR Section (version 1)
In the set of integers between 1 and 19, P is....
QA: Number of integers common to all three sets P, Q, and R   QB: 3

Arithmetic: Number Properties   Answer: *The two quantities are equal*

1. Find the numbers in each set:

Set P (multiples of 2): {2, 4, 6, 8, 10, 12, 14, 16, 18}
Set Q (multiples of 3): {3, 6, 9, 12, 15, 18}
Set R (multiples of 6): {6, 12, 18}

2. The number of integers common to all three sets is three (6, 12, 18). The two quantities are equal.

Question 6   Test 2, Second QR Section (version 1)
In the circle, line segments *AD*, *BE*....
QA: The area of *BOC*   QB: The area of *AOF*
Geometry: Circles   Answer: *Quantity B is greater*

1. The sector with the greatest central angle will have the greatest area.

2. Angle *BOC* is a vertical angle with angle *EOF*, so *BOC* also equals 42°.

3. Angle *AOB* + angle *AOF* + angle *EOF* = 180° (because BE is a line).

$$\angle AOB + \angle AOF + \angle EOF = 180°$$
$$95° + \angle AOF + 42° = 180°$$

$$95° + \angle AOF + 42° = 180°$$
$$137° + \angle AOF = 180°$$
$$\angle AOF = 43°$$

4. Because angle *AOF* is greater than angle *BOC*, sector *AOF* is greater.

Question 7   Test 2, Second QR Section (version 1)
In a certain graduating class, 80 percent of the students....
QA: The percent who were accepted and who will go to college   QB: 70%
Arithmetic: Percents   Answer: *Quantity A is greater*

1. SUPPLY a number for the number of students in the graduating class. Remember, when
    SUPPLYING for a percentage question, it's helpful to use 100.

    Number of graduates = 100
    Number accepted to college = 80 (80% of 100   OR 0.80 × 100 = 80)
    Number of accepted NOT going to college = 8 (10% of 80 OR 0.10 × 80 = 8)
    Number of accepted going to college = 72   (80 – 8 = 72)

4. The percentage of graduates going to college is 72 out of 100, or 72%. Quantity A is greater.

Question 8   Test 2, Second QR Section (version 1)
If $4x + 3 > ...$?
Algebra: Inequalities   Answer: -3

1. An Algebra question with numbers as answer choices and the phrase "which of the following could be a value of x" is a perfect candidate for BACKPLUGGING.

2. Quickly plug in the answer choices. Start with the median value answer choice, -8:

   If $x = -8$
   $4x + 3 > -13$
   $4(-8) + 3 > -13$ $\rightarrow$ $-32 + 3 > -13$ $\rightarrow$ $-29 > -13$ ✗

   When -8 is multiplied by 4, it creates -32, which is too large of a number (and too little of a value) to make the left side of the equation greater than the right side. This means we need to try answer choices with smaller numbers (but greater values), like -5 and -3:

   If $x = -5$
   $4x + 3 > -13$
   $4(-5) + 3 > -13$ $\rightarrow$ $-20 + 3 > -13$ $\rightarrow$ $-17 > -13$ ✗

   If $x = -3$
   $4x + 3 > -13$
   $4(-3) + 3 > -13$ $\rightarrow$ $-12 + 3 > -13$ $\rightarrow$ $-9 > -13$ ✓

Question 9   Test 2, Second QR Section (version 1)
List S: $-25, -10, 0,....$
The numbers in which of the following lists...?
Statistics: Averages   Answers: *(A) $-10, -5, 0, 5, 10$, (B) $-20, -10, 0, 10, 20$, (D) $-25, -5, 0, 5, 25$*

1. While you can certainly compute the average of List S and the averages of all of the answer choices, it's much more efficient to understand how the average works in a list with negative values that "cancel out" the positive values when added together. Look at list S:

   $-25, -10, 0, 10, 25$

   When plugged into the average formula, the average is found to be 0 because the sum of the numbers in the list will always be 0:

   $$\frac{\text{sum}}{\text{\# of \#s}} = \text{average} \quad \rightarrow \quad \frac{-25 + -10 + 0 + 10 + 25}{5} \quad \rightarrow \quad \frac{\cancel{-25} + \cancel{-10} + 0 + \cancel{10} + \cancel{25}}{5} \quad \rightarrow \quad \frac{0}{5} = 0$$

2. Answer choices (A), (B), and (D) have similar patterns, so the average of these three answer choices is also 0. The sum of choice (C) will be -10, so the average is -2.

Question 10   Test 2, Second QR Section (version 1)
***ABCD* and *EFGH* are rectangles....**
Geometry: Quadrilaterals   Answer: $6x^2 - xy$

1. Find the area of *ABCD* and *EFGH*:

   Area = $\ell \times w$
   Area of *ABCD* = $3x \times 2x$ → $6x^2$
   Area of *EFGH* = $x \times y$ → xy

2. The area of the shaded region is the area of *ABCD* minus the area of *EFGH*:

   Area of *ABCD* = $6x^2$
   Area of *EFGH* = xy

   Area of the shaded region = $6x^2 - xy$

Question 11   Test 2, Second QR Section (version 1)
DISTRIBUTION OF BLOOD TYPES TABLE
The distribution of blood types within a certain....
Statistics: Probability   Answer: *0.04*

1. Since the population is 100% of the people, the sum of the four blood types must equal 100%:

   O + A + B + AB = 100%
   45% + 40% + 11% + x% = 100%
   x% = 4%

2. There is a 4% chance that a person selected at random has AB blood. Four percent can be represented all of the following ways:

   4% $\dfrac{4}{100}$ 0.04

Question 12   Test 2, Second QR Section (version 1)
If $(a - b)c = 0$, which of the following...?
Algebra: Equations and Number Properties   Answer: $a \neq b$ and $c \neq 0$

1. In order for $(a - b)c = 0$, then either $(a - b)$ must equal 0 or c must equal 0:

     If $(a - b) = 0$ and $c = 2$, then $(0)2 = 0$ $\rightarrow$ $0 = 0$ ✓
     If $(a - b) = 0$ and $c = -3$, then $(0)-3 = 0$ $\rightarrow$ $0 = 0$ ✓
     If $(a - b) = 0$ and $c = 100$, then $(0)100 = 0$ $\rightarrow$ $0 = 0$ ✓

     If $c = 0$, $a = 2$, and $b = 1$, then $(2 - 1)0 = 0$ $\rightarrow$ $(1)0 = 0$ $\rightarrow$ $0 = 0$ ✓
     If $c = 0$, $a = 5$, and $b = -3$, then $(5 - -3)0 = 0$ $\rightarrow$ $(8)0 = 0$ $\rightarrow$ $0 = 0$ ✓
     If $c = 0$, $a = 4$, and $b = 100$, then $(4 - 100)0 = 0$ $\rightarrow$ $(-96)0 = 0$ $\rightarrow$ $0 = 0$ ✓

2. Therefore, if $a \neq b$ (thus $a - b$ will not equal 0) AND $c \neq 0$, then the question can never be true.

Question 13   Test 2, Second QR Section (version 1)
Working at their respective constant rates...
Arithmetic: Proportions/Rates   Answer: *12*

1. Create a proportion to determine the number of copies machine I makes in 6 minutes:

     Copies: 240   ?
     $$\frac{240}{8} = \frac{?}{6}$$ $\rightarrow$ $(240)(6) = (8)(?)$ $\rightarrow$ $1440 = (8)(?)$ $\rightarrow$ $180 = ?$
     Minutes: 8   6

2. Now find the number of copies made by machine II in 4 minutes:

     Copies: 240   ?
     $$\frac{240}{5} = \frac{?}{4}$$ $\rightarrow$ $(240)(4) = (5)(?)$ $\rightarrow$ $960 = (5)(?)$ $\rightarrow$ $192 = ?$
     Minutes: 5   4

3. How many more copies were made by machine II?

     $192 - 180 = 12$

Question 14   Test 2, Second QR Section (version 1)
DISTRIBUTION OF FINANCIAL ASSETS GRAPH
In 1998, if 2/5 of the amount of household financial assets...?

Data Analysis: Percentages   Answer: *5%*

1. If you are confused by this question, it's likely because you are scouring the graphic for information about checking accounts—and there is none.

    The amount of financial assets in checking accounts in 1998 is just shy of 12%, which you can gather by reading the bar graph. If 2/5 of that 12% is checking accounts, what is the resulting percentage?

    $$\frac{2}{5} \text{ of } 12\% \quad \rightarrow \quad \frac{2}{5} \times 0.12 \quad \rightarrow \quad \frac{0.24}{5} \quad \rightarrow \quad 0.048 \quad \rightarrow \quad 4.8\%$$

2. Since the question asks for an approximate percentage, 5% is the best answer.

Question 15   Test 2, Second QR Section (version 1)
DISTRIBUTION OF FINANCIAL ASSETS GRAPH
In 1998 the amount of household financial assets in mutual funds....

Data Analysis: Fractions   Answer: $\frac{2}{5}x$ *million dollars*

1. PowerScore test takers should be able to solve this question by ANALYZING the answer choices. The amount of financial assets in mutual funds in 1998 is just shy of 13%, while the amount in bonds in 1998 is 5%. Thus, if 13% represents x million dollars, then 5% is less than one half of x million dollars. Only the first answer choice, $\frac{2}{5}x$ (which can also be written as $0.40x$) is less than one half. The other four are fractions greater than one half.

2. If you need to solve this question, set up a proportion:

    $$\text{Millions:} \quad \frac{x}{13} = \frac{?}{5} \quad \rightarrow \quad (5)(x) = (13)(?) \quad \rightarrow \quad \frac{5}{13}x = ?$$
    $$\text{Percent:}$$

    If you do not realizes that $\frac{2}{5}x$ is the closest fraction to $\frac{5}{13}x$, you can convert them to decimals:

    $$\frac{2}{5}x = 0.40x \quad \text{and} \quad \frac{5}{13}x = 0.38x$$

Question 16   Test 2, Second QR Section (version 1)
DISTRIBUTION OF FINANCIAL ASSETS GRAPH
Of the amount of households financial assets in the six major asset categories...?

Data Analysis: Fractions   Answer: $\dfrac{1}{4}$

1. First, find the approximate percentage total of the six major asset totals (ignoring the "all others" category, as the graphic explains this category is not one of the six major asset categories). You will need to approximate each total:

Bank accounts	19%
Bonds	13%
Cert. of deposits	10%
Mutual funds	5%
Retirement Accts	22%
Stocks	<u>15%</u>
Total:	84%

2. Now TRANSLATE:

   Assets in bank accounts is what fraction of the total six major assets?
   19 is what fraction of 84
   $19 = ? \times 84$
   $\dfrac{19}{84} = ?$

   If we round the numerator up and the denominator down, we get the approximation $\dfrac{20}{80}$ or $\dfrac{1}{4}$.

   You can also convert $\dfrac{19}{84}$ to a decimal (0.226) to find that $\dfrac{1}{4}$ (0.25) is the best approximation.

Question 17   Test 2, Second QR Section (version 1)
If $7x = 5y + 66$ and...?
Algebra: Equations   Answer: *3*

1. Plug $-3x$ in for y in the equation:

   $7x = 5y + 66$
   $7x = 5(-3x) + 66$
   $7x = -15x + 66$
   $22x = 66$
   $x = 3$

Question 18   Test 2, Second QR Section (version 1)
Joan bought a calculator at a discounted price that was 30 percent less....
Arithmetic: Percents   Answer: *$150*

1. TRANSLATE in order to create an equation and then solve:

    The original price (P) minus 30% of the original price (P) equals the discounted price
    P – 30% of P = $105
    P – 0.30(P) = $105
    0.70(P) = $105
    P = $150

Question 19   Test 2, Second QR Section (version 1)
If | x + 3 | = 12 and x is...?
Algebra: Absolute Value   Answer: *–15*

1. To solve absolute value questions, create an equation for each sign:

    $x + 3 = 12$ or $x + 3 = -12$
    $x = 9$ $x = -15$

    The only value of x that is a multiple of 5 is –15.

Question 20   Test 2, Second QR Section (version 1)
Water started leaking from tank yesterday at 12:00 noon....
Arithmetic: Rates   Answers: *1280, 6480, 10240, 12800*

1. Since the rate of the leak is given in ounces per seconds, figure out how many seconds are in the 8
    hours between 12:00 noon and 8:00 pm:

    $$8 \text{ hours} \times \frac{60 \text{ minutes}}{1 \text{ hour}} \times \frac{60 \text{ seconds}}{1 \text{ minute}} = 28,800 \text{ seconds}$$

2. Now set up a proportion to solve find the number of ounces leaked in 8 hours (or 28,800 seconds)

    Ounces: 0.5   ?
    $$\frac{\quad}{\quad} = \frac{\quad}{\quad} \quad \rightarrow \quad (0.5)(28,800) = (1)(?) \quad \rightarrow \quad 14,400 = ?$$
    Seconds: 1   28,800

    So in 8 hours, the tank could lose 14,400 ounces, the answer must be all choices less than 14,400.
    Only the last choice, 15,360, is impossible because it would take longer than 8 hours to leak this
    many ounces.