Method Test Prep

Redesigned SAT
Mathematics Study Guide Sample

This free study guide provides several strategies for mastering questions on the Mathematics sections of the Revised SAT. The full version of the study guide is available to all Method Test Prep subscription users through the Method Test Prep Resource Center.

Key Strategy #2: *Interpreting Tables*

*Use whenever…*you are dealing with a two-way table, which features row and column totals.

	Household Location		
Type of Generator	Suburban	Rural	Total
Natural Gas	35	11	46
Gasoline	16	64	80
Total	51	75	126

Ex. 3: A random survey of 51 suburban households and 75 rural households asked homeowners which type of generator they owned. The responses of those who owned generators are summarized in the table above.

Of the respondents who owned a generator, which of the following is closest to the percent of suburban homeowners who owned a natural gas generator?

A) 76%
B) 69%
C) 47%
D) 28%

The key here is to determine which column total is the most relevant. This involves paying careful attention to the language of the problem, particularly the words following "percent" or "fraction". When you see "percent of" or "fraction of", the category following the phrase will be the relevant total.

Need to find: **"Percent of"** suburban homeowners who owned a natural gas generator.

Therefore, the relevant total is the total number of suburban homeowners, or 51.

$$\frac{35}{51} \times 100 = 68.7\% \approx 69\%$$

Therefore, Choice B is correct.

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Key Strategy #4: *Get Comfortable with Systems of Equations*

*Use whenever…*you see the term "system of equations" or are presented with two or more equations that have multiple common unknowns.

When you've got two equations "stacked", you can add or subtract them just like you would numbers. To solve for one of the variables, you must eliminate the other.

$$4m + 7n = 16$$
$$2m - 3n = 5$$

Ex. 4: If (m, n) is the solution to the system of equations above, what is the value of n ?

Step 1: Decide which variable to get rid of. This is the one that you're *not* trying to solve for. Make the coefficient in front of the variables you want to eliminate the same in both equations by multiplying by whatever is necessary. We multiply the bottom equation by 2 because we want to solve for n by eliminating m.

$$4m + 7n = 16 \text{ ----> } 4m + 7n = 16$$
$$2\,[2m - 3n = 5] \text{ ----> } 4m - 6n = 10$$

Step 2: Subtract the equations, noting that the negative subtraction sign will distribute to any negatives in the bottom equation, turning them positive.

$$\begin{array}{r} 4m + 7n = 16 \\ \underline{-\ (4m - 6n = 10)} \\ 13n = 6 \end{array}$$

$$n = \frac{6}{13}$$

When you have multiple variables and one is equal to an expression in terms of the other, you can use substitution.

Ex. 5:

$$x = 2c + y$$
$$y = x - 4$$

The system of equations above is true for all values (x, y), and c is a constant. What is the value of c ?

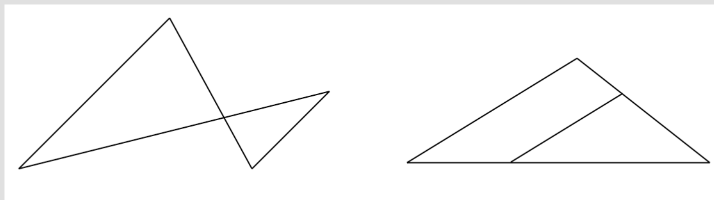
Note that the equations share variables, and that the second relates y in terms of x. We can substitute the quantity $x - 4$ for y in the first equation.

$$x = 2c + y \text{ ----> } x = 2c + x - 4$$

$$2c - 4 = 0 \text{ ----> } 2c = 4 \text{ ----> } c = 2$$

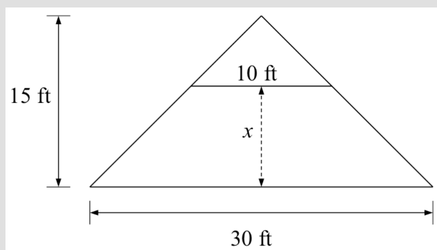
Key Strategy #10: *Recognize Similar Triangles*

*Use whenever…*you see two triangles that are oriented in one of the following ways.



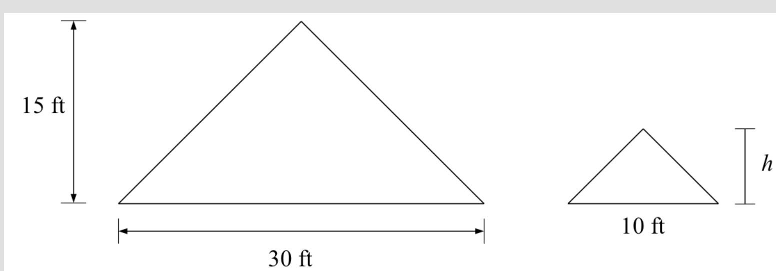
Triangles with parallel bases sharing a vertical angle (left) and the "triangle-in-a-triangle" with parallel sides are two common similar triangle setups.

Similar triangles have three equal angles and proportional sides. When you see similar triangles and need to solve for an unknown side length, set up a proportion, placing the measures of corresponding sides over one another. Sometimes, it helps to draw the triangles separately.



Ex. 14: The figure above shows an isosceles triangular roof with a 30-foot base and 15-foot height. A 10-foot crossbeam is to be installed a distance x feet from the base of the roof for support. What is the value of x ?

> We can't solve directly for *x*, because it is not itself a side of any triangle. We can separate the triangles though, and set up a proportion to solve for the height of the small triangle (shown below as *h*). Then, we'll subtract this from the total height to solve for *x*, which is the leftover height above the base of the roof.



$$\frac{15}{h} = \frac{30}{10} \text{ ----> } 30h = 150 \text{ ----> } h = 5$$

Since h = 5 and the roof is 15 feet high, the distance x = 10 feet.

Key Strategy #11: *Understand Linear and Exponential Functions*

*Use whenever…*you are asked what kind of model or function would best describe or fit a data set.

Linear functions have a constant rate of change (slope): their *y*-value increases or decreases by the same amount for equivalent changes in *x*-values. The *y*-value of the function whose points are shown below decreases by 3 for every 1-unit increase in *x* (slope = –3).

$$y = -3x + 11$$

x	1	2	3	4	5
y	8	5	2	–1	–4

Exponential functions increase or decrease by a constant *percent or fraction* of the previous value. The *y*-value of the function whose points are shown below decreases by 80% of its previous value for each 1-unit increase in *x*.

$$y = 1000(0.2)^x$$

x	1	2	3	4	5
y	200	40	8	1.6	0.32

Note that to make an exponential equation of the form $y = a(b)^x$ increase by *p* percent, add the decimal equivalent of *p* to 1 and make that quantity *b*. To make it decrease by *p* percent, subtract the decimal equivalent of *p* from 1 and make that quantity *b*. It's clear that in the exponential equation above, the function's value decreases by 80%, because *b* = 0.2, which is the same as 1 – 0.8.

Key Strategy #12: *Understand Function Notation for Graph Shifts*

*Use whenever…*you are asked how the graph of a function will change when given a manipulation of *f* (*x*).

Given the original function *f* (*x*)…

f (*x* + *k*) shifts the graph *k* units left; *f* (*x* – *k*) shifts the graph *k* units right

f (*x*) + *k* shifts the graph *k* units up; *f* (*x*) – *k* shifts the graph *k* units down

k (*f* (*x*)) stretches the graph: if *k* > 1, the graph narrows; if 0 < *k* < 1, the graph widens