MANIPULATING AN EQUATION

To solve an equation, you need to isolate the variable. Get the variables on one side of the equal sign and the numbers on the other side.

If you do something on one side of the *equal sign*, you must also do it on the other side.

2. If $10 - 3y = 4$, then $y =$

(A) $-\frac{14}{3}$

(B) -2

(C) -1

(D) 2

(E) $\frac{14}{3}$

3. If $\frac{3}{m} = \frac{5}{12}$, what is the value of m?

(A) $\frac{1}{4}$

(B) $\frac{3}{5}$

(C) $\frac{5}{4}$

(D) $\frac{12}{5}$

(E) $\frac{36}{5}$

For many questions, you won't actually have to solve for the variable. Pay attention to what the question asks you to find.

3. If $3(5p - 6q) = 12$, then $5p - 6q =$

(A) 36
(B) 30
(C) 15
(D) 12
(E) 4

Always check to see what you're solving for.

9. If $x^2 - 7 = 28$, what is the value of $x^2 + 7$?

(A) 14
(B) 21
(C) 35
(D) 42
(E) 196

TRANSLATING INTO ALGEBRA

If the question doesn't give you an equation, you may have to make your own. Translate the words in the question into an equation.

"Carolina makes $200 more than twice the amount Alexis makes" means:

$C = 200 + 2A$

	Column A	Column B
	Four less than the product of s and t is 10	
6.	Five more than the product of s and t	19

4. Which of the following represents the statement "The sum of one-half of m and the square of n is equal to the square of the difference of m and n" ?

(A) $\frac{m}{2}n^2 = (m-n)^2$
(B) $\frac{m}{2}n^2 = (m+n)^2$
(C) $\frac{m}{2}+n^2 = (m-n)^2$
(D) $\frac{m}{2}+n^2 = \sqrt{m-n}$
(E) $\frac{m}{2}+\sqrt{n} = (m-n)^2$

INEQUALITIES (>, <, ≥, ≤)

Inequalities can be manipulated just like equations. The important thing to remember is:

When you *multiply* or *divide* by a *negative* number, *flip the sign.* Until then, treat inequalities like normal equations.

13. If $-9m - 12 > 11 - 3m$, what is m?

(A) $m < -\frac{23}{6}$

(B) $m < -\frac{1}{6}$

(C) $m > -\frac{23}{12}$

(D) $m > -\frac{1}{6}$

(E) $m > -\frac{23}{6}$

$a + 5 < 9$

	Column A	Column B
11.	$a + 3$	7

EXPONENTS

Exponents just mean multiplication. Instead of writing $5 \times 5 \times 5 \times 5$, we write 5^4.

When in doubt, expand it out.

You can multiply and divide exponents with the same base.

Try these examples:

1) $2^2 \times 2^3 =$ 2) $\frac{x^6}{x^2} =$ 3) $(x^2)^3 =$

10. If $\left(x^a\right)^6 = x^{18}$ and $\frac{x^b}{x^2} = x^8$, then $b - a =$

(A) –7
(B) –2
(C) 4
(D) 7
(E) 13

SPECIAL RULES
$1^{4,265} =$
$924^0 =$
$0^5 =$

20. If $y^6 < y^3$, which of the following could be the value of y?

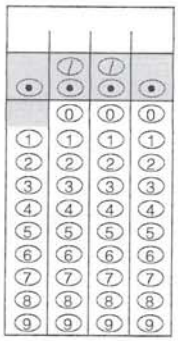
(A) $-\frac{1}{3}$
(B) $\frac{1}{3}$
(C) 0
(D) 1
(E) 6

If you square a positive fraction less than 1, it *gets smaller.*

A negative number raised to an even power *becomes positive.*

A negative number raised to an odd power *stays negative.*

22. If $64^{12} = 4^x$, then $x =$



The *exponent* applies to all parts in parentheses, so:

$(2x)^3 = (2)^3 \bullet (x)^3 = 8x^3$

9. $\dfrac{(3x^3y^2)^3}{9x^6y^9} =$

(A) $\dfrac{1}{3x^3y^7}$

(B) $\dfrac{1}{y^4}$

(C) $\dfrac{x^3}{y^3}$

(D) $\dfrac{3x^3}{y^3}$

(E) $\dfrac{9y^3}{x^3}$

	Column A	Column B
9.	$(b^8)^6(b^8)(b^6)$	$(b^{31})^2$

ROOTS

If $x^2 = 9$, then $x = +3$ or -3. However, the square root of a number is defined, for the SAT, as its **positive root only**. Thus,

$$\sqrt{9} = +3.$$

You can add and subtract square roots when the numbers under the square root sign ("$\sqrt{\ }$") are the same.

For example:

$$3\sqrt{2} + 4\sqrt{2} = 7\sqrt{2}$$
$$\text{and } 8\sqrt{5} - 2\sqrt{5} = 6\sqrt{5}.$$

Square roots can be multiplied or divided. Just put everything under the $\sqrt{\ }$.

$$\sqrt{3} \times \sqrt{12} = \sqrt{3 \times 12} = \sqrt{36} = 6 \qquad \frac{\sqrt{48}}{\sqrt{3}} = \sqrt{\frac{48}{3}} = \sqrt{16} = 4$$

If you take the square root of a fraction less than 1, it gets bigger.

Try these:

7. $\dfrac{\left(3\sqrt{3}\right) \times \left(2\sqrt{8}\right)}{\left(\sqrt{12}\right)} =$

(A) $\frac{1}{6}$

(B) $3\sqrt{2}$

(C) 6

(D) $6\sqrt{2}$

(E) 12

21. If $\dfrac{\sqrt{5}}{m} = \dfrac{m}{\sqrt{20}}$, which of the following could be a value of m?

(A) $\sqrt{10}$

(B) 5

(C) $2\sqrt{10}$

(D) 10

(E) 100

12. If z is a positive integer, which of the following is equal to $2\sqrt{16z^2}$?

(A) $\sqrt{32z^2}$

(B) $12z$

(C) $8z^2$

(D) $8z$

(E) $4z$

	Column A	$a > 0$	Column B
11.	$\sqrt{\frac{a+1}{a+1}}$		$\sqrt{\frac{a}{a}} + \sqrt{\frac{1}{1}}$