SAT Math Strategy #2: Plug In Numbers

Plug In Numbers

Many SAT math problems can be made easier and more concrete by plugging in real numbers for the variables. This strategy is very powerful: it can also be used on the SAT when the answers are not given, i.e., in the student-produced response questions ("grid-in" questions).

When should I apply this strategy? Look for questions that have algebraic answers, or questions that ask for the values of algebraic expressions instead of just the values of variables.

How do I apply this strategy? First, make up easy numbers, such as integers, for the variables in the question. *The numbers must fit the conditions of the question.* Next, if the question asks for the value of an algebraic expression, plug in your numbers and see which answer matches. If the answers are algebraic as well, go through the answers plugging in your numbers until you get a match. In either case, *be careful!* If you get two or more answers that match, you must pick different numbers and try again. However, you can still eliminate answers that didn't match.

Get some practice with the problems below, all of which can be solved using this strategy. If you can solve the problem doing "real" math (I call this the "math teacher solution"), then by all means do so. The test makers expect you to solve the problem that way, and that may be the fastest way to get the answer. But remember that you get a point for the correct answer no matter how you got it.

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1. If $x < y < 0$, which of the following is greatest in value?

(A) $2x + y$
(B) $x + 2y$
(C) $x - 2y$
(D) $y - 2x$
(E) $2y - x$

2. When the positive integer m is divided by 7, the remainder is 4. What is the remainder when $2m$ is divided by 7?

(A) 0
(B) 1
(C) 4
(D) 6
(E) 8

3. If a and b are positive integers such that $a + b = 9$, then what is the value of $\dfrac{b-9}{4a}$?

(A) $-\dfrac{9}{2}$
(B) $-\dfrac{9}{4}$
(C) $-\dfrac{1}{4}$
(D) $\dfrac{1}{4}$
(E) $\dfrac{9}{4}$

4. If $\dfrac{x}{3} = \dfrac{y}{2}$, which of the following is equivalent to $\dfrac{y}{3}$?

(A) $\dfrac{x}{6}$
(B) $\dfrac{2x}{9}$
(C) $\dfrac{x}{3}$
(D) $\dfrac{2x}{3}$
(E) x

5. When each side of a square with side s is lengthened by 2 inches, which of the following represents the increase, in square inches, of the area of the square?

(A) $s^2 + 4$
(B) $(s + 2)^2$
(C) 4
(D) $2s + 4$
(E) $4s + 4$

Answers To SAT Math Strategy #2: Plug In Numbers

1. D (Estimated Difficulty Level: 2)

Strategy Solution: Plug in easy numbers for x and y! Don't forget to use numbers that satisfy the requirement $x < y < 0$. Good choices here would be $x = -2$ and $y = -1$. Next, go through the answers, plugging in the numbers you chose, until you find the largest number. In this case, you'll get -5 for answer A, -4 for B, 0 for C, 3 for D, and 0 for E, so answer D is correct.

Math Teacher Solution: Since x and y are negative, answers A and B are negative. But answer C is the negative of answer E, so either C or E must be positive or zero, making A and B incorrect. Also, whenever $x = 2y$, answers C and E are both zero. Therefore, answer D must be correct since there can only be one correct answer for any x and y. After your math teacher has smugly completed this tricky bit of reasoning, don't forget to remind him or her that you got the same point for the correct answer, only you got it faster.

2. B (Estimated Difficulty Level: 3)

Strategy Solution: Plug in a number for m, making sure that when you divide the number by 7, you get a remainder of 4. A good choice here would be 11, but other possibilities include 4, 18, 25, and so forth since all of them leave 4 when divided by 7. The remainder is 1 when $2 \times 11 = 22$ is divided by 7, so answer B is correct.

Math Teacher Solution: The remainder is 4 when m is divided by 7, so it must be true that $m = 7n + 4$, where n is an integer. Therefore, $2m = 14n + 8$ and $2m/7 = 2n + 8/7 = 2n + 1 + 1/7$. So, when $2m$ is divided by 7, the quotient is $2n + 1$ and the remainder is 1. (Math teachers love to do Euclidean division and use the word "quotient".)

3. C (Estimated Difficulty Level: 3)

Strategy Solution: Plug in easy numbers for a and b that add to 9 such as $a = 4$ and $b = 5$. We get $(b - 9)/4a = -4/16 = -1/4$, so answer C is correct.

Math Teacher Solution: Since $a+b = 9$, $b = 9-a$ so that $b - 9 = -a$. Then, $(b - 9)/4a = (-a)/4a = -1/4$, making answer C the correct one. Fast? Perhaps, but you got the correct answer without algebra!

4. B (Estimated Difficulty Level: 3)

Strategy Solution: Plug in easy numbers for x and y, making sure that $x/3 = y/2$. Good choices would be $x = 3$ and $y = 2$ since both sides of the equation are then equal to 1. We are looking for the answer that is equal to $y/3 = 2/3$. Go through the answers, plugging in 3 for x until you get $2/3$. You'll find that only answer B equals $2/3$, so it must be the correct one.

Math Teacher Solution: Since $x/3 = y/2$, $y = 2x/3$ and $y/3 = 2x/9$, so answer B is correct. The algebraic solution here is probably the fastest way to do the problem, and the way the test makers and your math teacher would want you to do it. But remember that a *machine* is scoring your test, and it will award a point to the correct answer no matter how you got it.

5. E (Estimated Difficulty Level: 4)

Strategy Solution: Plug in an easy number for s. If $s = 3$, the area of the square is 9. When each side is lengthened by 2, the area of the square becomes $5^2 = 25$. The *increase* in the area is then $25 - 9 = 16$. Go through the answers plugging in 3 for s. Only answer E equals 16, so E is the correct answer.

Math Teacher Solution: Let the length of one side of the original square be s. Then, the original square's area is s^2. When the length of the side increases to $s+2$, the area increases to $(s + 2)^2$. The *increase* in area is $(s + 2)^2 - s^2 = s^2 + 4s + 4 - s^2 = 4s + 4$, so answer E is correct. (Math teachers love algebraic solutions like this.)