FILL-INS: A TEST DRIVE

To get a feel for this format, let's work through two examples. As you will see, fill-in questions are just regular Digital SAT Math questions.

1 Mark for Review

If $a + 2 = 6$ and $b + 3 = 21$, what is the value of $\frac{b}{a}$?

Here's How to Crack It

The question asks for the value of $\frac{b}{a}$. You need to solve the first equation for a and the second equation for b. Start with the first equation, and solve for a. By subtracting 2 from both sides of the equation, you should see that $a = 4$.

Now move to the second equation, and solve for b. By subtracting 3 from both sides of the second equation, you should see that $b = 18$.

The question asked you to find the value of $\frac{b}{a}$. That's easy. The value of b is 18, and the value of a is 4. Therefore, the value of $\frac{b}{a}$ is $\frac{18}{4}$.

That's an odd-looking fraction. How in the world do you fill it in? Ask yourself this question: "Does $\frac{18}{4}$ fit?" Yes! Fill in $\frac{18}{4}$.

18/4

Your math teacher wouldn't like it, but the scoring computer will. You shouldn't waste time reducing $\frac{18}{4}$ to a prettier fraction or converting it to a decimal. Spend that time on another question instead. The fewer steps you take, the less likely you will be to make a careless mistake.

2 Mark for Review

The radius of circle O is 212 times the radius of circle P. If the area of circle O is t times the area of circle P, what is the value of t?

Here's How to Crack It

The question asks for the relationship between the areas of two geometric figures. It doesn't matter that this is a fill-in instead of a multiple-choice question: you still start with the Geometry Basic Approach. Draw two circles on your scratch paper. Next, label the figure. Mark the center of one circle as O and the center of the other as P, and draw in the radius of each circle. The question doesn't give you any numbers for the radius or area of circle P, so plug in. Make the radius 2 and label that on the figure. Finally, write down formulas. The area of a circle is given by $A = \pi r^2$. Plug in $r = 2$ to get $A = \pi(2)^2$, or $A = 4\pi$ for circle P.

The question states that *the radius of circle O is 212 times the radius of circle P*, so multiply 2 by 212 to get $r = (2)(212) = 424$. Label the radius of circle O as 424. Plug $r = 424$ into the area formula to get $A = \pi(424)^2$, or $A = 179{,}776\pi$. To solve for t, divide the area of circle O by the area of circle P to get $t = \frac{179{,}776\pi}{4\pi}$, or $t = 44{,}944$. This is a big number! However, it's still only 5 characters long, so it will fit in the fill-in box. The fill-in box doesn't accept commas, so don't worry about that. The correct answer is 44944.

44944

MORE POOD

The fill-in questions are mixed in with the multiple-choice questions, and both math modules have an approximate order of difficulty. More important than the question order is your Personal Order of Difficulty (POOD), a strategy that encourages you to focus on the questions you know how to answer first. Don't spend too much time on a question you are unsure about, no matter which format it is.

Keep in mind, of course, that many of the math techniques that you've learned are still very effective on fill-in questions. The Geometry Basic Approach and Plugging In both worked well on the previous question. If you're able to plug in or take an educated guess, go ahead and fill in that answer. As always, there's no penalty for getting it wrong.

Here's another fill-in question that you can answer by using a technique you've learned before.

3 Mark for Review

Town A has 2,200 residents. The mean age of the residents of Town A is 34. Town B has 3,680 residents with a mean age of 40. What is the mean age of the residents of Town A and Town B combined?

Here's How to Crack It

The question asks for a mean, or average. Work the question in bite-sized pieces and start with Town A. For averages, use the formula $T = AN$, in which T is the *Total*, A is the *Average*, and N is the *Number of things*. The question states that *Town A has 2,200 residents*, so that is the *Number of things*. The question also states that the *mean age of the residents of Town A is 34*, so that is the *Average*. Plug these numbers into the average formula to get $T = (34)(2{,}200)$, or $T = 74{,}800$. Do the same thing for Town B: the *Number of things* is 3,680 residents, and the *Average* is the mean age of 40, so the formula becomes $T = (40)(3{,}680)$, or $T = 147{,}200$.

Next, add the two totals to get 74,800 + 147,200 = 222,000. This is the *Total* for the two towns combined. The *Number of things* for the two towns combined is 2,200 + 3,680 = 5,880 residents. Use the average formula one more time to get $222{,}000 = (A)(5{,}880)$. Divide both sides of the equation by 5,880 to get $37.7551020408 = A$.

There clearly isn't room to enter this answer in the fill-in box, so either cut it off or round when you run out of room. You can enter 37.75 or 37.76 and get the question right. Don't round too much, though: if you enter 37.8, you'll get the question wrong. Enter the full five characters to get credit for a positive answer. The correct answer is 37.75 or 37.76.

37.75	or	37.76

Careless Mistakes

On fill-in questions, you obviously can't use POE to get rid of bad answer choices, and Plugging In the Answers won't work either. In order to earn points on fill-in questions, you're going to have to find the answer yourself, as well as be extremely careful when you enter your answers in the fill-in box. If you need to, double-check your work to make sure you have solved correctly. If you suspect that the question is a difficult one and you get an answer too easily, you may have made a careless mistake or fallen into a trap.

Try the example below with this in mind.

4 Mark for Review

A teacher is grading two assignments that each had to be a specific length: research papers and short stories. Each research paper has 5 more pages than each short story. How many pages are in a research paper if 7 research papers and 5 short stories have a total of 275 pages?

Here's How to Crack It

The question asks for the number of pages in a research paper given other information about two assignments. Use another skill from earlier in this book and translate English to math in bite-sized pieces. The question states that *each research paper has 5 more pages than each short story.* Let r represent the number of pages in a research paper. The word *has* translates to =. The phrase *5 more than* translates to 5 +. Finally, let s represent the number of pages in a short story. The sentence, therefore, translates to $r = 5 + s$. Do the same thing with the information that *7 research papers and 5 short stories have a total of 275 pages.* Use r and s again for the number of pages in a research

paper and a short story, respectively. Translate *and* as + and *have a total of* as =, and the sentence translates to $7r + 5s = 275$. You now have two equations with the same two variables:

$$r = 5 + s$$

$$7r + 5s = 275$$

Substitute $5 + s$ for r in the second equation to get

$$7(5 + s) + 5s = 275$$

Distribute the 7.

$$35 + 7s + 5s = 275$$

Combine like terms on the left side, then subtract 35 from both sides.

$$12s = 240$$

Isolate s.

$$s = 20$$

It's tempting to fill in 20 and call it a day, but always read the final question! The question asks for the number of pages in a research paper, not in a short story. Plug 20 for s into the first equation to solve for r.

$$r = 5 + 20 = 25$$

Thus, $r = 25$, so fill in that value. The correct answer is 25.

25

WEEK0.2

MULTIPLE CORRECT ANSWERS

As you've already seen, some fill-in questions will have more than one possible correct answer. It won't matter which correct answer you enter as long as it really is correct. This happens frequently when the answer is a fraction or a decimal. It can also happen when there is more than one solution to an equation.

Let's look at one of those.

5 Mark for Review

What is one possible solution to the equation $|a + 3| = 7$?

Here's How to Crack It

The question asks for a possible solution to an equation with an absolute value. With an absolute value, the value inside the absolute value bars can be either positive or negative. Set $a + 3$ equal to both 7 and –7, and solve both equations. When $a + 3 = 7$, subtract 3 from both sides of the equation to get $a = 4$. When $a + 3 = -7$, subtract 3 from both sides of the equation to get $a = -10$. Enter either 4 or –10 and you'll get the question right.

In this case, that was more work than you needed to do. The question asked for *one possible solution*, so you could have stopped after finding one value. However, questions about absolute value might ask for a specific solution—either the positive solution or the negative solution—so always read the final question (RTFQ) to make sure you don't enter a value that isn't correct.

4 **or** –10

Fill-In Drill

Answers and explanations can be found starting on page 591.

1 Mark for Review

If $a^b = 4$, and $3b = 2$, what is the value of a?

2 Mark for Review

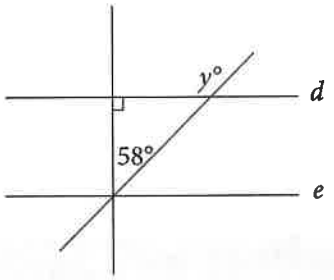
If $4x + 2y = 24$ and $\frac{7y}{2x} = 7$, what is the value of x?

3 Mark for Review

$$n = 12(2)^{\frac{t}{3}}$$

The number of mice in a certain colony is shown by the formula above, such that n is the number of mice and t is the time, in months, since the start of the colony. If 2 years have passed since the start of the colony, how many mice does the colony contain now?

4 Mark for Review



In the figure above, if d is parallel to e, what is the value of y?

5 Mark for Review

The function g is defined by $g(x) = -(x - 3)(x + 11)$. For what value of x is the value of $g(x)$ at its maximum?

WEEK0.2

6 Mark for Review

If line m is defined by the equation $-3x = -2y - 12$ and line n is parallel to line m, what is the slope of line n?

7 Mark for Review

If Alexandra pays \$56.65 for a table, and this amount includes a tax of 3% on the price of the table, what is the amount, in dollars, that she pays in tax?

8 Mark for Review

In triangle ABC, where angle A is a right angle, $\sin(C)$ is $\frac{13}{85}$. What is the value of $\tan(B)$?

9 Mark for Review

The kinetic energy (KE) of a ball in motion is given by the equation $KE = \frac{1}{2}mv^2$, where m is the mass of the ball in kilograms (kg) and v is the velocity in meters per second $\left(\frac{\text{m}}{\text{s}}\right)$. A ball with a mass of 5 kg and a kinetic energy of 18.225 kg$\left(\frac{\text{m}^2}{\text{s}^2}\right)$ is to be rolled along the ground. What is the velocity of the ball in meters per second, assuming there is no friction?

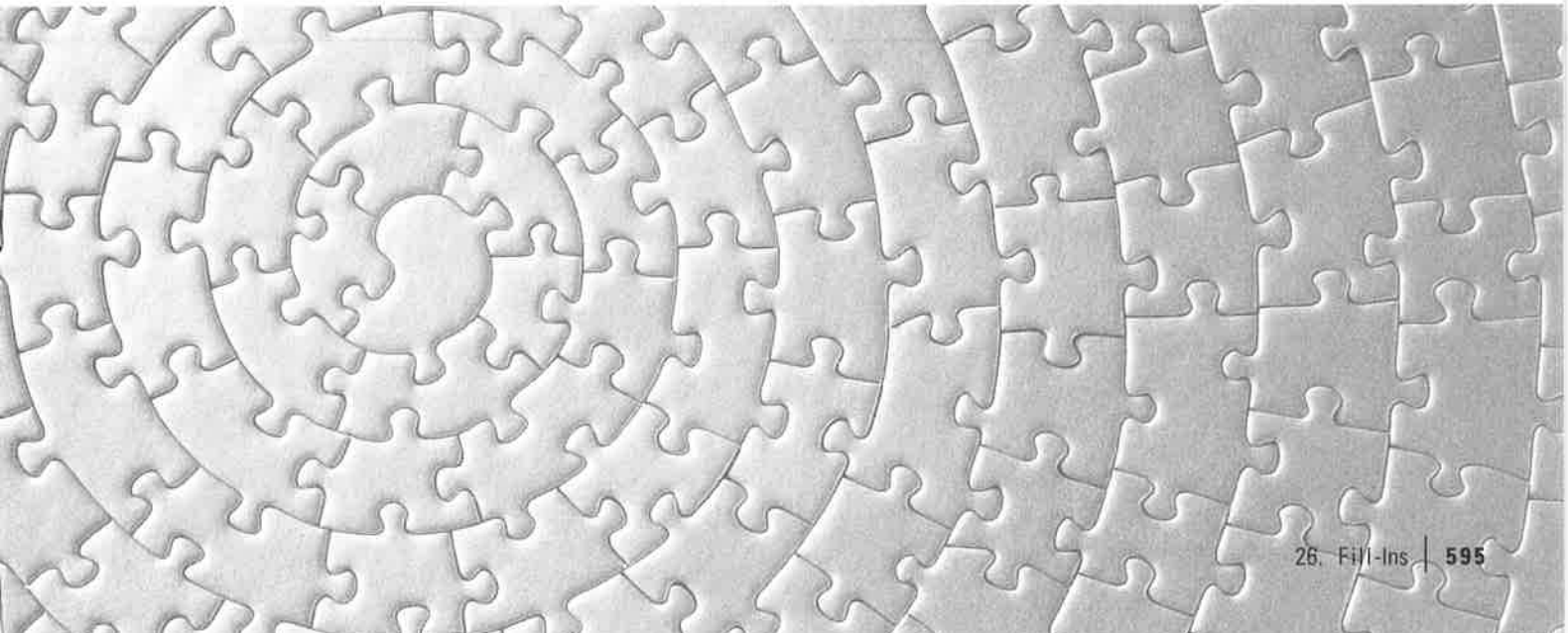
10 Mark for Review

$$x(mx + 42) + 18 = 0$$

If the equation above has exactly two real solutions and m is an integer constant, what is the greatest possible value of m?

Summary

- Both of the Math modules on the Digital SAT contain several questions without answer choices. The test-writers call these questions "student-produced responses." We call them fill-ins because you have to fill in your own answer.
- Despite their format, fill-ins are really just like other Math questions on the Digital SAT, and many of the same techniques that you have learned still apply.
- The fill-in questions and multiple-choice questions are mixed together in a loose order of difficulty. Use your knowledge of your own strengths and weaknesses to decide which ones to tackle first and which ones, if any, to skip.
- The fill-in format increases the likelihood of careless errors. Know the instructions and check your work carefully.
- Just like the rest of the Digital SAT, there is no guessing penalty for fill-ins, so you should always fill in an answer, even if it's a guess.
- Enter only one answer even if the question has multiple possible answers. It doesn't matter which answer you enter, as long as it's one of the possible answers.
- Enter up to 5 characters when the answer is positive. Enter up to 6 characters, including the negative sign, when the answer is negative.
- The characters that can be entered are the digits 0–9, the negative sign, the forward slash (/) for fractions, and the decimal point. Special characters such as % or π cannot be entered.
- If the answer to a fill-in question contains a fraction or decimal, you can enter the answer in either form. Use whichever form is easier and less likely to cause mistakes.
- If your answer is a fraction that doesn't fit in the space, either reduce the fraction or convert it to a decimal.



- If a fraction fits in the space, you don't have to reduce the fraction before entering it.
- Do not enter mixed numbers. Convert mixed numbers to fractions or decimals before entering your answer.
- If your answer is a long or repeating decimal, fill up all of the space. Either keep entering digits until the space is full or round the last digit that will fit.