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Lesson 8.1 skills practice answers algebra 2

Features. Just to hear the word is enough to send some students running into the hills. But never be 100! Although functional problems are considered some of the more challenging questions about the ACT, it is only because most of you will be much more accustomed to dealing with other mathematical topics (such as factions, exponents or circles) than you do. With regard to AKTom, the problem in the question is categorised by how familiar you are with the question you are probably familiar with, and the only way to combat this challenge is to practice and get used to dealing with issues that are a little less familiar to you. In general, you'll see 3-4 questions about features on any given ACT, so for those who aren't yet comfortable with features (or just want to match it), this guide is for you. This will be your complete guide to ACT features. We will walk you through exactly what features mean, how to use them, manipulate and identify them, and what problems with features you will see in the ACT. What are the features and how do they work? Functions act as a way to describe the relationship between inputs and outputs. They may be in the form of equations, graphs, or tables, but they will always describe this input-output relationship. This can help you think about features such as mounting a line or as a recipe – incoming eggs, veggies and cheese, and the output is an omelette. The most often you will see functions written as $f(x) = \an \equation$. The function equation can be complex as a multivarial expression or as simple as any number. Examples of functions: $f(x) = 14$ $f(x) = 2x + 10$ $f(x) = x^2 - 6x + 9$ Functions can always be graphs and different types of functions will produce different types of graphs. On the standard coordinate graph with axes x and $$y, the graph entry will be x and the output will be y. Each input ($\would be an x$ value) can produce only one output, but one output can have multiple inputs. In other words, multiple inputs can create the same output. One way to remember this is that you can have a lot on one (many entrances to one exit), but NOT one on a large (one entrance to many exits). This means that the graph features can potentially have a lot of $\would-be x$-interception, but only one $\would y$-interception. (Why? Because when the entry $x = $, there can only be one output or y value.) Multi-page $x-intercept function You can always test whether the graph is a function by using this understanding of output inputs using the vertical line test. The function will never hit more than one point on any vertical line. The vertical line test applies to each type of function, no matter how strange it looks. Even the features of the strange look will fit the vertical line test. However, any graph that fails to test a vertical line (with more than one cross with a vertical line), is automatically NO This graph fails to test the vertical line, which means it is not a function. If necessary, you can always observe a genuine function from a non-function by testing a vertical line. Functional terms and definitions Now that we see what features are doing, we are talking about parts of the feature. The functions will be presented to you either by their equations, tables or by a graph (called a function graph). Let us look at the sample function equation and break it down into its components. An example of a function: $f(x) = x^2 + $12 f is the name of the function (Note: the function can be called different names than f. This particular feature is called $f, but you can see features written as $h(x)$, $g(x)$, $r(x)$ali anything else.) (x) is the entrance (Note: in this case, our stake is called $$x, but, as with the name of our function, We can call our entry anything. $f(q)$ or $f(\bananas)$ both functions sa inputom from q i$\bananas$, respectively.) $x^2 + 5$ is an equation that gives us output, but we plug in input values from $$x$ The loaded pair is a clutch of special input sa to its output for a given result. Function. So for the function $f(x) = x - 6$, with entry 2, we can have orders pair: $f(x) = x - 6$ $f(2) = 2 - 6$ $f(2) = -4$ So our ordered pair is $(2, -4)$. (Again, our input value will represent our value x and the result of the equation, when the input value is processed, our value will y.) Command pairs also act as coordinates, so we can use them to graph our graph function. Now that we have all the functional parts and definitions, let's see how they work together. Different types of functions We have seen before this function can have all sorts of different equations for their output, which will change the format of their corresponding graphs. Let's look at each type of equation and its graph. Linear functions Lineana function makes a straight line graph. The equation of linear function can be either a simple number (e.g., $f(x) = 4$) or it may have a variable that does not rise to a power greater than 1 (e.g. $f(x) = 3x + 3$). Why can the variable NOT be raised to a power higher than 1? Because $x^2, it can give you one output (y-value) for two different x. For example, -4^2 and 4^2 equal to 16, which means that the graph cannot be a straight line. (We'll examine this in more detail in the next section on square functions.) The standard equation of the line is: $y = mx + b$$\would m$ is the slope of the line. $\b$ is $\would y$-interception. (For more on the pis and slopes, check out our guide to ACT lines and slopes!) Examples of linear functions: $f(x) = x - 24$ $f(x) = 4$ $f(x) = 2x + 35$ Square function The square function makes a graph of the parabola, which is a graph of the type of the underk of the head that opens up or down. This also means our output variable will always be square. The reason that our variable must be square (not kubed, not taken at power 1, etc.) is because the linear function cannot be square – because two input values can be squarely created the same output (e.g. 5^2 and -5^2 both equal to 25). That gives us our curve. (Note: The parabola cannot open from page to page because it should cross y-os more than once. This, we have already determined, would mean that it would not have a vertical line test and therefore IS NOT a function.) This is not an equation in the square because it fails to test the vertical line. The four-way function is often written as: $f(x) = ax^2 + bx + c$ Value $\a$ tells us how the parabola is formed and the direction in which it opens. Positive $\would give us a parabola that opens upwards. Negative $\would give us a parabola that opens down. A large value of a would give us dry parabola. A small amount of a would give us a broad parabola. The value of $\b$ tells us where vertex parabole is, left or right of origin. Positive $\b$ placed vertex parabole to the left of origin. Negative $\b$ would place vertex parabole to the right of origin. The value of $2.c. gives us $y-interception parabola. (Note: $b = $0, y-interception will also be the location of vertex parabola.) Don't point out if you think there's a lot of information at the moment — a little practice and organization will soon solve questions about the feature, no problems. Typical ACT functional problems will always test you about whether you understand the relationship between inputs and outputs correctly. These questions will generally fall into four types of questions: #1: Functions with equations #2: U nested functions #3: Functions with graphs #4: Table functions there may be some overlap between three categories, but these are the main themes you will be tested for when functions are related to functions. Let's take a look at some real ACT mathematical examples of each species. The function equation problem equation function will give you a function in the form of an equation and then ask you to use one or more inputs to search for output (or output elements). To find a specific way out, we need to include our given entry for $$x. That will give us the end result when we solve the equation. So if we want to $f(5)$ for equation $f(x) = x + $7, we would join 5 for x. $f(x) = x + 7$ $f(5) = 5 + $7 $f(5) = 12$ So when our input ($$x)is 5, our exit ($$y) is 12. Now let's look at a true ACT example of this type: For $h(x)=4x^2-5x$, what is the value $h(-3)$? A. -93B. -9C. 21D. 51E. 159 Although this feature is called h (instead of the usual f), the principles are exactly the same – we need to plug in our input value -3 to find our So let's plug in -3 for $x. $h(x) = 4x^2 - 5x$ $h(-3) = 4(-3)^2 - 5(-3)$ $h(-3) = 4(9) + 15$ $h(-3) = 36 + 15$ $h(-3) = 51$ Our final answer is D, 51. In nested functions Another type of feature problem that you may encounter in the ACT is called the nested function. It's basically an equation within the equation. To solve these kinds of issues, think of them in terms of your order of business. You must always work from the inside, so first look for an exit for your most remote feature. Once you find the output of your internal function, you can use this result as an input function on the outside. Let's look at this in action to make this process more meaningful. According to $f(x)=4x+1$ and $g(x)=x^2-2$, of which the term $f(g(x))$? F. $-x^2+4x+1$G. x^2+4x-1H. $4x^2-7$J. $4x^2-$K. $16x^2+8x-1$ So a hundred is $g(x)$ soothing tops, we need to use its output for the value of our input for $f(g(x)$. In fact, instead of a x in $f(x)$, we got another equation, $g(x)$. However, the principle of solving the function is exactly the same as we did above in the section of our function equation – replace it regardless of the input we have with the variable in the output equation. So, for starters, we have two functions of the equation. $g(x) = x^2 - 2$ $f(x) = 4x + 1$ Now let's change x into our equation $f(x)$ with the full equation $g(x)$. $f(x) = 4x + 1$ $f(g(x)) = 4(x^2 - 2) + 1$ $f(g(x)) = 4x^2 - 8 + 1$ $f(g(x)) = 4x^2 - 7$ Our final answer is H, $f(g(x)) = 4x^2 - 7$ Function Graphs A function graph question will provide you with already graphed function and ask you any number of questions. These questions will generally require you to specify specific graph elements, or you will find the equation of the function from the graph. As long as you understand that x is your input and your equation is your output y, then these kinds of questions won't be as complicated as they seem. This question relies on knowing how the formula works for the 40th equation. If you remember from before, the square equation requires square power and will form a parabola. We are told that the x-coordinate value will be square, so we know for a fact that this graph will indeed form a parabola and will be a four-way equation. This means that we can remove the selection of F and G answers, because they are straight lines, not parabola. We're told that the y1 is less than x-coordinate square. We know that our standard equation is a four-core formula: $ax^2 + bx + c$ c gives us our $$y-interception, and in this equation we are told it will be -1. This means that we can remove the answer to choice H, y-interception is not at -1. Finally, we were told that the points on our graph were the only place where the $y-coordinate is less than $x-coordinates. This means that our graph must open Which means that we can remove the selection of K answers. Here you will get a table of values for both input and output, and then ask you to locate the function equation or function graph. (Note: instead of x as our entry, this problem uses us t. If you're very accustomed to using $f(x)$, this may seem disorienting, so you can always rewrite the problem using $$x$ on the $$t. site. In this case, we will continue to t so that we can organize the problem on the page.) Let's $y the intercept first. $y-interception is the point at which $x = $0, so we can see that we have already obtained this with the first set of numbers in the table. When $t = $0, d (otherwise thought as $f(t)$) equals 14.) Our y-interception is therefore 14, which means that the equation of our line will look like: $y = mx + 14$ We can automatically rule out selections of answers B, D and E, because their y-interceptions are not at 14. Let's use a strategy to plug in answers to make our lives simpler. In this way, we do not actually need to find the equation ourselves – we can simply test which answers choices match the inputs and outputs that we got in the table. The choice of answers is between A and C, so let's try A with another ordered pair. Our potential equation is: $d = t +14$ (or, in other words: $f(t) = t + 14$) And our order pair is: $(1, 20)$ So let's put them together. $f(t) = t + 14$ $f(1) = 1 + 14$ $f(1) = 15$ This is wrong, as this would mean that our exit is 15 when our input is 1, and yet the ordering pair says that our exit will be 20 when our entrance is 1. Answer A selection is not correct. After the elimination process, let's try to answer the selection C. Our potential equation is: $d = 6t + 14$ (or, in other words: $f(t) = 6t + 14$) And our ordered pair is again: $(1, 20)$ So let's put them together. $f(t) = 6t + 14$ $f(1) = 6(1) + 14$ $f(1) = 6 + 14$ $f(1) = 20$ This corresponds to the entrance and output we got in our order pair. Answer selection C is correct. (Note: In general, it is good to test more than one order pair, as two equates can occasionally get the same order pair. In this case, we stopped here because there were no other decisions to respond that could be matched). Our final answer is C, $d = 6t + $14. Now that we've seen our definitions, let's talk about the function of the strategy. How to solve the problem of the feature Now that you have seen all the different types of problems with the features in the action, let's look at some tips and strategies for solving feature problems. For clarity, we've divided these strategies into several sections — tips for all feature problems and tips for feature problems by type. So let's look at every strategy. For all functional #1: pay attention to all your All down Although it may seem obvious in the heat of the moment it can be far too easy to confuse your negatives and positive or wrong place, which part of your function (or graph or table) is your input and which is your output. Brackets are key. ACT creators know how easy it is to get parts of the functional equations confused and mixed (especially when your input is also an equation), so be careful about all the moving pieces and don't try to do functional problems in your head. #2: Use PIA and PIN as required as we see in our functional table problem above, it can save a lot of effort and energy to use the connection strategy in the answers. With the technique of plugging into your own numbers, you can test the points on function graphs, work with any variable equation of functions, or work by nesting functions with variables. For example, let's look at our previous pin nesting problem. (Remember , the maximum number of variables involving a problem, you can use a PIN). Regarding $f(x)=4x+1$ and $g(x)=x^2$, which of the following for $f(g(x))$? F. $-x^2 +4x+1$G. x^2+4x-1H. $4x^2-7$J. $4x^2-1$K. $16x^2+8x-1$ If we get some work-hard functions (let me get a navlake), u function $x $g(x)$. So we won't have to work with variables and we can use real numbers instead. So let's say the $$x feature is $g(x)$ $3. (Why 3? Why not!) $g(x) = x^2 - 2$ $g(3) = (3)^2 -$$g(3) = 9 - 2$ $g(3) = 7$ Now, we connect this number as the value for our function $g(x)$to our $f(g(x))$. $f(x) = 4x + 1$ $f(g(3)) = 4(7) + 1$ $f(g(3)) = 28 + 1$ $f(g(3)) = 29$ Finally, let's test our choice of answers to see which one corresponds to our found answer 29. Let's start with answer selection H. $4x^2 - $7 Now we replace our value x with the value of x, which we chose originally -3. $4(x)^2 - $7$4(3)^2 - $7$4(9) - $7- 7 $29. We found an answer that corresponds to our reply on 29 March 2009. (Note: If you use this method on the test, make sure you've tried other answer choices so you don't have duplicate correct answers. We can go through our options of answers and see that none of them equal 29 after we replace our x with 3.) Our final answer is H, $4x^2 -$7 #3: Practice, Practice, Practice Finally, the only way to be truly comfortable with any mathematical topic is to practice as many different types of questions on this topic as you can. If features are a weak area for you, then look for more questions to practice. For function graphs and #1 tables: Start by searching for an interception $\y$In general, the easiest way to start with features is to find an interception y. From there, you can often eliminate several different response decisions that do not match our graph or our (as we have done in some of the above cases). $y-interception is almost always the easiest to find a piece, so it's always a good place to start. #2: Test your equation against multiple order pairs It's always a good idea to find two or more points (order pairs) of your features and test them against a potential function equation. Sometimes one order pair works for your graph, but a second doesn't. You must match the equation with a graph (or equation with a table) that works for each coordinate point/order pair, not just one or two. For functional equations and U nesting equations #1: Always work within the nastiness functions can look like beasts and difficult, but they take a piece of them. Create an equation in the center, and then slowly build outwards so that you don't mix any variables or equations. #2: Remember the ACT foil it is perfectly normal to make a square equation. That's because many students get these kinds of questions wrong and share their exhibits instead of squatting the entire term. If you don't properly FOIL, then you'll get these questions wrong. Whenever possible, try not to allow you to lose points due to these types of carefree errors. Are you ready to test your knowledge of the feature? Test your skills Now let our knowledge functions to test, using real act mathematical problems. 1. The $f(x)$ is defined as $f(x)=-8x^2$. What'$f(-$3)$? F. -72G. 72H. 192J. -576K. 576 2rd 1st 10th Follow the $f(x)=√x$ and $g(x)=7x+b$. In the standard coordinate plane (x,y) $y=f(g(x))$$ passes through $($4.6)$. What's the b? A. 8B. $-$8 C. $-$25$D. $-$26, $4-7√6$ 4. 5. The P function is defined as follows: for $x>0$, $(P(x)=x^5+x^4-36x-36$for $x<$, $P(x)=-x^5+x^4+36x-36$ What is the value $P(-1)$? A. -70B. -36C. 0D. 36E. 70 Answers: F, C, A, F, A Explanation of answers: 1. Here we have a simple equation of function. So let's replace our daed input (-3) x value to find our way out. Note that the reason this problem is difficult is because of the many negative characters and the layout of the square. But as long as we're careful and make sure we keep track of all our pieces, we can solve the problem just fine (without being stranded by the bait!). $f(x) = -8x^2$ $f(-3) = -8(-3)^2$ $f(-3) = -8(9)$ $f(-3) = -72$ Our final answer is F, -72. 2. This question is a functional table, so let's remember our tips and tricks of the function table. Before we begin, this problem may be somewhat confusing, as the labels in the chart are different from the label we normally use. To visualize our data, we $x as a certain distance that the cart is in any second, t. That means our entrance is $$t (seconds) and our exit x (distance). Now that we can see it, let's search the problem. Let's $y the intercept first. Fortunately for We got a coordinate pair with $t = $0, $x = $10. Since $$t serves as our entry value (our $$x-coordinate) and $$x$ serves as our output (our y-coordinate), we can see that our $$y-interception point at which $t = $0. This means that $y intercept $10. If we know that this linead function and the graph line is $y = mx + b$, we can rule out the selection of answers B, D and E. None of them give y-interception as 10, so none can be the correct answer. Now let's use our PIA strategy to find the line equation using our existing coordinate points. So let's test the $(2, 18)$ item and see which of our remaining equations (choice of A answers or choice of C answers) gives us these coordinates. First, let's test the choice of answers A. $x = t + 10$ $x = 2 + 10$ $x = 12$ Answer selection A is incorrect. When $t = $2, x should be equal to $18. So let's test the answer to choice C instead of see if it's in turn with our entry and output $(2, $18)$. $x = 4t + $10 $x = 4(2) + $10 $x = 8+10$ $x = 18$ Success! We found the right equation. Our final answer is C, $x = 4t + 10$ 3. This is a problem with bite functions that requires us to understand that coordinate points can act as inputs and outputs. So if we solve the nesting equation as you would normally (don't forget to work inside the nausea), you'd see: $g(x) = 7x + b$ $f(x) = √x$ $f(g(x)) = √ $f I don't think it'√ $y s $f the right place $y to be, henderson said. Let's get rid of the root by using both sides (for more on the root and square , see our guide to advanced citegers). This gives us: $y^2 = 7x + b$ We know that the function goes through the coordinate point $(4, 6)$, which means that we can replace the x and y values with our x and $$y$ into the function equation. So: $y^2 = 7x + b$$(6)^2 = 7(4) + b$$36 = 28 + b$$8 = b$ Our final answer is A, $b = $8. 4. In this graph question, we are asked to find out how the graphs work. Even without knowing their equations, we can understand – only through a diagram – a lot of information about our two functions. In this case, we can see that the functions are ed together at exactly two points. This means that they are the same at exactly two x. So the answer to choice F is correct. However, before choosing the choice of F answers, let us also take the time to eliminate the alternatives to the answers. We know that the choice of G answers is wrong, as we have already found that the graphs are graphs at two points, so they have two values of x for which they are the same, not 1. The choice of H and J responses is thus incorrect, as there are points of x-coordinates at which the graph is $f(x)$ higher (greater) than $g(x)$ and $x-coordinate points where $f(x)$ is smaller. No function is larger (or smaller) at all points x than the other function. And The choice of the K answer is also incorrect, as these are two different functions – square and lineal – not an inverse function. Inverse functions would produce the same type of graph, just inverted. We know that our initial choice of answers is correct and we have successfully eliminated the others. Our final answer is F. 5. This is a function that has two different equations, depending on our input value. Therefore, we must first determine which equation we use to find a way to our particular input. We got that our stake ($$x) -1. We also know that we need to use a different equation function for x, which is less than 0. This means that we need to use another functional equation, $p(x) = -x^5 + x^4 + 36x - 36$ So now we just plug in our input value -1 (be very careful about all our negative characters). $p(x) = -x^5 + x^4 + 36x - 36$ $p(-1) = -(-1)^5 + (-1)^4 + 36(-1) - $36 $p(-1) = -(--1) = -(--1) 1) + (1) - 36 -$$p(-1) = 1 +1 - 36 - $$p(-1) = 2 -$72 $p(-1) = -70$ Our final answer is A, -70. Congratulations! You've mastered ACT functions! Take Aways Although there are many different ways you can present with problem features, the fundamental principles are always the same. Regardless of the equation or graph, the functions always look for inputs and outputs, and the relationship between the two. As long as you remember the function definitions (and the corresponding graph formats) and keep your head clean, you'll see that the features aren't as difficult as they might have occurred. What's next? You've taken over (and bypassed) one of the toughest math topics in the ACT (go!), but there are still many topics to be covered up. Next, take the gander on all the mathematical topics on the test and then bulk on any topic with which you feel rusty. You need to brush how to finish the square? Root and exponent rules? What about your triangular rules and problems? All of our ACT maths guides are complete with strategies and practice problems for any topic you need. Do you feel overwhelmed? Make sure you pass a practice test and see how the result will cond will be so that you can set realistic milestones and goals. Are you running out of time in the ACT Maths Department? See how best to beat the clock and increase your score. Are you aiming for a great grade? Our guide to getting a perfect 36 at the ACT Maths Department (written by the perfect-scorer!) will help you get to where you need to be. Want to improve the ACT score by 4 points? Check out our best-in-class online ACT prep program. We assure you that if you do not improve the ACT rating by 4 points or more, we will pay you back. Our program is completely online, and adapts what you study to your strengths and weaknesses. If you liked this math lesson, you'll love our program. Along with more detailed lessons, you will get thousands of problems with the practice organized by individual skills so that you learn the most efficiently. So will we. Step by step follow the program so that you will never be confused about what you need to study further. Check out our 5-day free trial: test: