Name:

APPLICATION: Prices and Discounts

Level 1

Charlotte has been saving up to buy a home gym so she can work out at home without having to pay for a gym membership or worry about travel when the weather is bad (she lives in Minnesota where it snows frequently). One day, she sees an ad for a 15% off sale at a fitness equipment store and decides it's a great time to buy the home gym! She notices the fine print says that to get the 15% off the home gym, she has to pay $139.95 up front for a 6-month subscription to a workout channel, which holds no value to her.

1. **Using function notation, write an expression for the final before-tax cost, f(x), of the purchase based on the initial price, x, of the home gym equipment with this deal.**

2. **She was considering purchasing the AwesomeFlex3000 for $889. Using your function from question 1, what would Charlotte be Charlotte's before-tax cost with the deal? Is it worth it for her to pay for the subscription to get 15% off? Explain your answer.**

3. **What is the domain and range of f(x) if the AwesomeFlex is the cheapest option at the store?**

4. **The store offers a similar deal if you purchase the $139.95 workouts but with a 20% off discount instead of 15% for purchases over $1000. The home gym she'd really like, the Shredmaster5000, costs $1199 before-tax. Write a new function, g(x) for this second deal and calculate the before-tax cost of the Shredmaster5000.**

5. **If Charlotte lives in Minnesota where sales tax is 6.875% applied at the end of a purchase, what is the domain and range for g(x), including tax, if the ShredMaster is the cheapest system that qualifies for the second deal?**

Level 2

Davis is trying to decide between two part time jobs on Saturdays. He could make $16.25 per hour working at the city's ice arena, but getting to work and back would cost him $7.50 round trip for travel. His other option is to work as a dog walker in his neighborhood for $12.50 per hour but he can ride his bike or walk there for free. He estimates he could work up to 7 hours at the arena but up to 10 hours walking dogs. He always works at least 1 hour if he goes to the arena.

1. **Write two different functions that represent Davis's gross wages, where h is the number of hours Davis works per week, a(h) is his gross wages at the ice arena minus travel expenses, and d(h) is his gross wages from walking dogs.**

1. **State the domain and range for each function.**

2. **If Davis works 1 hour, what would be his gross pay at each job? What if he worked 6 hours?**

3. **Davis wants to know what his net pay, also called take-home pay, is going to be. Assume that 10.5% of just his paycheck, not his travel expenses, is withheld for taxes at the arena. Because dog walking is a self-employed activity, Davis estimates he needs to set aside 18% of his income for taxes. Modify your functions from question 1 to model net pay including these tax withholdings.**

4. **State the domain and range for each of these new functions.**

Level 3

Part I: Rebates and Discounts

José is trying to purchase a used car that he has been saving up for. When he gets to the dealership, the car salesperson tells him that there are two deals they have going on that he can choose between. One is a $350 rebate taken off the price of the vehicle, or 3.5% off the listed price.

1. **Write two different expressions that represent the total cost of the vehicle with the rebate r(x) or with the percent discount p(x) as a function of the price of the vehicle, x.**

2. **The salesperson asks if he knows which he wants to choose before he's even found a car. Why might José have trouble answering this question? What information would help him answer?**

3. **He searches the lot and finally finds a nice, modest Toyota Corolla listed at $7800. Which deal should José choose, and what will be his total cost?**

Part II: Composition of Functions

First, watch this EdPuzzle video to learn how composition of functions works.

José took a personal finance class in school where he learned how to negotiate, and he manages to talk the salesperson into giving him BOTH deals. When using both discounts, the company calculates them according to the rule: r(p(x))

4. **Does this mean that the company applies the percent discount first or the coupon code first?**

5. **Use the rule to calculate how much José will pay for his Toyota Corolla.**

6. **How much would José pay for the Dodge Charger he also saw on the lot with a sticker price of $11,400?**

7. **How much more or less would José pay for each vehicle if the dealership instead used the rule p(r(x))?**

Toyota Corolla

Dodge Charger