## Drill 7

1. **A** To find the value of $f(2)$ when given the equation of $f(x)$, you need to make $x = 2$ every time it appears in the function:

$f(2) = 0.5(2^3) - 4(2^2) + 2 - 2$
$f(2) = 0.5(8) - 4(4) + 2 - 2$
$f(2) = 4 - 16 + 2 - 2$
$f(2) = -12$

This is (A).

2. **A** Use the two equations provided, keeping in mind that $x$ represents the initial amount on the line of credit and $y$ the initial amount on the credit card. The initial equation shows that $x + y = 10{,}000$, so the debts of the line of credit and the credit card must add up to 10,000. The second equation has the $x$ value multiplied by 1.24. This must mean that the amount owed on the line of credit, $x$, is 1.24 times greater than the initial amount on the line of credit. Therefore, the amount Jerry owes on the line of credit must have increased, so choose (A).

Choice (B) cannot be true by using similar logic. Initially, Jerry owed $y$ dollars on his credit card. After six months, the value is $0.76y$. The amount owed on the credit card after six months is 0.76 times the initial amount. Because 0.76 is less than 1, the amount owed on the credit card decreased, not increased, over the six month period.

Choices (C) and (D) require solving the system of equations. On the test, save answers like these until you've considered all the other choices, as either one of the answers is definitely true (such as (A) here), every answer but one is false (which makes the remaining answer correct), or multiple choices require some work. We can use the work for (C) to work (D) here.

To solve the system of equations, you have a few options. Often it's best to stack the equation and add or subtract to cancel out a variable. Here, you can't simply stack; you have to multiply one equation first. Cancel out the $x$ terms by multiplying the first equation by 1.24, then stacking and subtracting:

$1.24[x + y = 10{,}000] \rightarrow 1.24x + 1.24y = 12{,}400$

Now stack and subtract:

$1.24x + 1.24y = 12{,}400$

$-\ [1.24x + 0.76y = 10{,}480]$

$0.48y = 1{,}920$

Divide both sides by 0.48 and you find that $y = 4{,}000$. Substitute $y = 4{,}000$ into the equation $x + y = 10{,}000$ and you find that $x + 4{,}000 = 10{,}000$, or $x = 6{,}000$. Therefore, initially Jerry owed 6,000 on his line of credit and 4,000 on his credit card. This disproves (C). Six months later, he owes more on his line of credit and less on his credit card, so (D) is definitely false as well.

3. **B** The transformations represented by $g(x) = -f(x) + 1$ are as follows. The negative sign in front of $f(x)$ means that $g(x)$ is flipped upside-down from $f(x)$; eliminate (C), as it's the same direction as $f(x)$. The "+ 1" moves the whole graph up one unit. The easiest point to look for is the $y$-intercept. The $y$-intercept of $f(x)$ is at 0; the graph of $g(x)$ therefore has a $y$-intercept of 1. Out of the remaining answers only (B) has a $y$-intercept of 1.

4. **C** Plug in the values you are given. The units let you know what value goes where: 17 kg gives you $m$, and 19,763 is $K$. This makes the equation the following:

$$19,763 = \frac{1}{2}(17)v^2$$

Now you want to isolate v. Start by multiplying both sides by 2 to clear the fraction:

$$2 \cdot 19,763 = 17v^2$$

Divide both sides by 17:

$$\frac{2 \cdot 19,763}{17} = v^2$$

Finally, take the square root of both sides. Be sure to take the square root of both the numerator and denominator of the fraction:

$$\sqrt{\frac{2 \cdot 19,763}{17}} = v$$

This is (C).

5. **B** There are a couple of ways to go about this question. One way is to grab your calculator and find the value of $1 + \frac{3}{4} + \frac{9}{16} + \frac{27}{64} + \frac{81}{256}$ (stopping there and not going on forever). You find that it equals 3.05. Because you stopped the sequence early (i.e. before the infinite term), you know the answer needs to be greater than 3.05. Choice (A) equals 1.33; you can eliminate that answer. Choice (B) equals 4. That's greater than 3.05 (actually, a lot greater); it may seem too big, but it's worth keeping for now. Choice (C) equals 0.57; definitely too small, so eliminate it. Choice (D) equals 3; that's close to 3.05, but you know the answer MUST be greater than 3.05, so (D) can't be the answer. Eliminate (D) and choose (B).

Another approach is to use the equation provided and see how it applies to the second scenario. The first scenario, $1 + \left(-\frac{3}{5}\right) + \left(-\frac{3}{5}\right)^2 + \left(-\frac{3}{5}\right)^3 + \left(-\frac{3}{5}\right)^4$, has the sum of a sequence in which the terms after the first are consecutive powers of $-\frac{3}{5}$. In the equation given we see the $-\frac{3}{5}$ in the denominator being subtracted from 1. In the new scenario, $1 + \frac{3}{4} + \frac{9}{16} + \frac{27}{64} + \frac{81}{256}$, $\frac{3}{4}$ is equal to $\left(\frac{3}{4}\right)^1$, $\frac{9}{16}$ is equal to $\left(\frac{3}{4}\right)^2$, and so on. Therefore, all the terms after the first are consecutive powers of $\frac{3}{4}$. Our equation to find the sum of this sequence should therefore be $s = \frac{1}{1 - \frac{3}{4}}$, which is (B).