Solutions

Warm-Up 6

81. In order for the median to be 5, the average of the middle two numbers must be 5, so their sum must be 10. The greatest element can't be any less than 5, and the least element can't be any less than 1. Therefore the best we can do is 1, 5, 5, 5; the mean is 16/4 = **4**.

82. We can rewrite the equation $x + x^2 = 6$ as $x^2 + x - 6 = 0$ and solve by factoring. This quadratic factors easily as $(x + 3)(x - 2) = 0$, so the solutions are $x = -3$ and $x = 2$. Therefore, the least possible value of integer x is **−3**.

83. The size of the bathtub is not stated, so we can make up a convenient capacity to help us think through this problem. Let's use the LCM of 10 and 15 and suppose that the bathtub holds 30 gallons of water when filled completely. In this case, the faucet would fill the bathtub at a rate of 30 ÷ 10 = 3 gallons per minute, and the drain would empty it at a rate of 30 ÷ 15 = 2 gallons per minute. With the faucet on and the drain open, the bathtub would fill at a rate of 3 − 2 = 1 gallon per minute. Since the tub is already half full, it must already have 15 gallons in it and need 15 more gallons to fill completely. At the rate of 1 gallon per minute, that will take **15** minutes.

84. Let's suppose for a moment that Anu cuts the ribbon so that the difference is exactly 3 inches. Then the shorter piece is (14 − 3) ÷ 2 = 11 ÷ 2 = 5.5 inches long, and the longer piece is 5.5 + 3 = 8.5 inches long. If Anu cuts the ribbon anywhere between the lengths of 5.5 and 8.5 inches, the difference will be less than 3 inches, so the probability is **3/14**.

85. Matt eats 1/4 × 2/3 + 2/3 × 1/3 = 2/12 + 2/9 = 6/36 + 8/36 = 14/36 of the pizza and Matics eats 2/3 × 2/3 + 1/4 × 1/3 = 4/9 + 1/12 = 16/36 + 3/36 = 19/36 of the pizza. That's a total of 14/36 + 19/36 = 33/36 = 11/12, so **1/12** of the pizza must be left.

86. The cyclist took twice as long to walk half the distance, so he must ride his bicycle 2 ÷ 1/2 = **4** times as fast as he walks.

87. We can evaluate $g(f(8))$ by evaluating $f(8)$ first and then using the output of the f function as the input of the g function. Evaluating $f(8)$, we have $f(8) = \sqrt{(8 + 1)} = \sqrt{9} = 3$. Then evaluating $g(3)$, we have $g(3) = 3^2 + 1 = 9 + 1 =$ **10**.

88. The formula for the volume of a cone is $V_{Cone} = (1/3)\pi r^2 h$, where r is the radius and h is the height. Since Sosa's cone has a radius 3 times that of Lola's, its base area is $3^2 = 9$ times as large. Since the height of Sosa's cone is half that of Lola's cone, the ratio of the volumes is **9/2**.

89. We can rewrite the ratio of 6 clanks to 1 clink as 72 clanks to 12 clinks. Now, since we are told that 12 clinks are in 9 clonks, we can see that 72 clanks are in 9 clonks, which means that **8** clanks are in 1 clonk.

90. There are 6 × 6 = 36 possible outcomes when rolling two dice. If we treat the dice as different colors, there are 6 outcomes where one number is twice the other: (1, 2), (2, 4), (3, 6) and, with reversed colors, (2, 1), (4, 2), (6, 3). Thus, the probability of rolling such a pair is 6/36 = **1/6**.