In Class Exercises Set A

Answers and Explanations (Difficulty Level)

1) The answer is **C)**. To compare two exponents, make sure that they are first in the same base. In this problem, the bases start out with different values, but to solve the problem, recognize that 8 = 2^3. From there, apply a property of exponents: a power raised to a power is equal to the product of the two powers. 8^{2x} simplifies to $2^{3(2x)}$ = 2^{6x}. As both sides of the equation have the same base, you can now compare $6x = 5x + 4$. Subtract 5x from both sides to get $x = 4$. (1)

2) The answer is **B)**. Arjun's savings are being multiplied by a fixed rate on a given time interval: this is exponential growth. B is the correct answer, as the bacteria doubling in size each hour is an example of this same situation. A, C, and D are all linear, not exponential models, as the functions do not increase by the same multiplicative factor, but by the same additive rate (Boy's $100/year, the Pirates' 5 wins/month, and the Penguins' ~57 wins/year). (1)

3) The answer is **B)**. The value for mass must start at m = 10 for t = 0, which works if t is in the numerator of the exponential term [10 * base^0 = 10]. If m decreases by a half every 5730 years, then the only correct setup is to have ½ raised to an exponent with t in the numerator such that the function would evaluate to half of its value in 5730 years. The way to do this is raise ½ to the t/5730 power, as plugging in t = 5730 returns half the initial mass. (2)

4) The answer is **C)**. $\frac{f(10)}{f(5)} = \frac{b^{10k-h}}{b^{5k-h}}$. Using properties of exponents, we find that the answer must be b raised to the difference between the two exponents, or (10k – h) – (5k – h). As you can see, h ends up cancelling out, leaving us with b^{5k} as our final answer. (3)

5) The answer is **B)**. The root of a product is equal to the product of the individual roots. First take the cube root of 64, which is 4. Next, take the cube root of the exponential terms by dividing the exponents by 3 (using properties of exponents). x^8 has two full x^3 terms, with x^2 left over, hence $x^2\sqrt[3]{x^2}$. y^{10} has three full y^3 terms, with y left over, hence $y^3\sqrt[3]{y}$. (2)

6) The answer is **A)**. Out of the 24% of students who have 2+ siblings, 60% have pets; therefore, 100% − 60% = 40% of them do not have pets. To find the proportion out of all students, we can simply multiply the two together, getting (.24)(.40) = 9.6%. Multiply this by the total student population, 2000, to get 192 students. (2)

7) The answer is **3**. If the absolute value of a term is equal to another term, then the term within the absolute value can be equal to either the second term itself or its opposite. Hence, we can set x+5 equal to either 8 or -8. From here, subtract 5 from both sides to find that x can be either 3 or −13, but since there's no negatives in the grid-in, it must be 3. (2)

8) The answer is **27**. We can translate this problem into math terms: $x\sqrt[3]{x} = 3\sqrt[3]{x^2}$. Note that due to properties of radicals, the exponent on the left side can be rewritten as 1 + 1/3 = 4/3, while the one on the right can be rewritten as 2/3. Dividing both sides by $x^{\frac{2}{3}}$ yields $x^{\frac{2}{3}} = 9$. From there, raise both sides to the 3/2 to find $x = 27$. (3)