PRACTICE DRILL 4—PLUGGING IN

1. At a charity fund-raiser, 200 people each donated x dollars. In terms of x, what was the total number of dollars that was donated?

   (A) $\frac{x}{200}$

   (B) $200x$

   (C) $\frac{200}{x}$

   (D) $200 + x$

2. If 10 magazines cost d dollars, how many magazines can be purchased for 3 dollars?

   (A) $\frac{3d}{10}$

   (B) $30d$

   (C) $\frac{d}{30}$

   (D) $\frac{30}{d}$

> Don't worry about timing yourself on this drill. Focus on the strategy. Plug in for each question so you learn how to use the technique.

3. The zoo has four times as many monkeys as lions. There are four more lions than there are zebras at the zoo. If z represents the number of zebras in the zoo, then in terms of z, how many monkeys are there in the zoo?

   (A) $4z$
   (B) $z + 4$
   (C) $4z + 16$
   (D) $4z + 4$

Occasionally, you may run into a Plugging In question that doesn't contain variables. These questions usually ask about a percentage or a fraction of some unknown number or price. This is the one time that you should Plug In even when you don't see variables in the answer.

Also, be sure you plug in good numbers. Good doesn't mean right because there's no such thing as a right or wrong number to plug in. A good number is one that makes the problem easier to work with. If a question asks about minutes and hours, try 30 or 60, not 128. Also, whenever you see the word percent, plug in 100!

More Practice: Lower Level

4. There were 6 pairs of earrings sold at a price of y dollars each. In terms of y, what is the total amount of money for which these earrings were sold?

(A) $6 + y$
(B) $6y$
(C) 6^y
(D) $6 + 6y$

5. If p pieces of candy costs c cents, 10 pieces of candy will cost

(A) $\frac{pc}{10}$ cents

(B) $\frac{10c}{p}$ cents

(C) $\frac{10p}{c}$ cents

(D) $10pc$ cents

Lower level students can stop here and check answers in Chapter 17.
Middle and Upper level students should keep on drilling!

More Practice: Middle Level

6. If J is an odd integer, which of the following must be true?

(A) $(J \div 3) > 1$
(B) $(J - 2)$ is a positive integer.
(C) $2 \times J$ is an even integer.
(D) $J > 0$

7. On Monday, Sharon ate one-half of a fruit tart. On Tuesday, Sharon then ate one-fourth of what was left of the tart. What fraction of the tart did Sharon eat on Monday and Tuesday?

(A) $\frac{3}{8}$

(B) $\frac{1}{2}$

(C) $\frac{5}{8}$

(D) $\frac{3}{4}$

More Practice: Middle and Upper Levels

8. The price of a suit is reduced by 20%, and then the resulting price is reduced by another 10%. The final price is what percent off of the original price?

(A) 20%
(B) 25%
(C) 28%
(D) 30%

9. If m is an even integer, n is an odd integer, and p is the product of m and n, which of the following is always true?

(A) p is a fraction.
(B) p is an odd integer.
(C) p is divisible by 2.
(D) p is greater than zero.

Middle level students can stop here and check their answers in Chapter 17. Upper level students have more math fun ahead!

More Practice: Upper Level

10. If p is an odd integer, which of the following must be an odd integer?

(A) $p^2 + 3$
(B) $2p + 1$
(C) $p \div 3$
(D) $p - 3$

11. If m is the sum of two positive even integers, which of the following CANNOT be true?

(A) $m < 5$
(B) $3m$ is odd.
(C) m is even.
(D) m^3 is even.

12. Anthony has twice as many baseball cards as Keith, who has one-third as many baseball cards as Ian. If Keith has k baseball cards, how many baseball cards do Anthony and Ian have together?

(A) $\frac{3k}{2}$

(B) $\frac{6k}{2}$

(C) $\frac{8k}{2}$

(D) $\frac{10k}{2}$

13. The product of $\frac{1}{2}b$ and a^2 can be written as

(A) $(ab)^2$

(B) $\frac{a^2}{b}$

(C) $2a \times \frac{1}{2}b$

(D) $\frac{a^2 b}{2}$

14. $x^a = (x^3)^3$

$y^b = \frac{y^{10}}{y^2}$

What is the value of $a \times b$?

(A) 17
(B) 30
(C) 48
(D) 72

15. Hidden Glen Elementary school is collecting donations for a school charity drive. The total number of students in Mr. Greenwood's history class donate an average of y dollars each. The same number of students in Ms. Norris's science class donate an average of z dollars each. In terms of y and z, what is the average amount of donations for each student from both classes?

(A) $\frac{z}{y}$

(B) $\frac{(y + z)}{2}$

(C) $(y + z)$

(D) $2(y + z)$

16. What is the greatest common factor of $(3xy)^3$ and $3x^2y^5$?

(A) xy
(B) $3x^2y^5$
(C) $3x^2y^3$
(D) $27x^3y^3$

Practice Drill 4—Plugging In

1. **B**

This is a Plugging In question because there are variables in the choices and the question stem contains the phrase *in terms of*. Plug in a value, work through the problem to find a target answer, and then check each of the choices to see which yields the target answer. For instance, plug in x = \$3. The question asks for the total amount of money donated, so 3 × 200 = 600. \$600 is the target answer. Now, plug 3 into the choices for x to see which choice matches your target answer (600). Eliminate (A) because $\frac{3}{200}$ is way too small. Choice (B) works because 200(3) = 600. Eliminate (C) because $\frac{200}{3}$ is too small. Eliminate (D) because 200 + 3 or 203 ≠ 600. The correct answer is (B).

2. **D**

This is a Plugging In question because there are variables in the choices. Plug in a value, work through the problem to find a target answer, and then check each of the choices to see which yields the target answer. For instance, plug in 6 for d dollars. If 10 magazines cost \$6, then \$3 would buy 5 magazines—you spend half as much money, so you can get only half as many magazines. So 5 is the target answer. Now, plug 6 into the choices to see which answer yields 5, the target answer. Eliminate (A) because $\frac{3 \times 6}{10} = \frac{18}{10} = 1.8$ does not equal 5. Eliminate (B) because 30(6) is way too large. Choice (C) is a fraction, $\frac{6}{30} = \frac{1}{5}$, so it will not equal 5. Choice (D) works, as $\frac{30}{6} = 5$, so keep this choice. The correct answer is (D).

3. **C**

This is a Plugging In question because there are variables in the choices and the question stem contains the phrase *in terms of*. Plug in a value, work through the problem to find a target answer, and then check each of the choices to see which yields the target answer. *The zoo has four times as many monkeys as lions*, so, for instance, plug in 40 for the monkeys, which translates to 4 × lions = 40, so there are 10 lions. *There are four more lions than zebras*, which means that 10 − 4 = 6 zebras, so z = 6. The question asks *how many monkeys are there in the zoo*, so the target answer is 40. Now, plug 6 into the choices for z to see which choice matches your target answer (40). Eliminate (A) because 4 × 6 = 24 is not equal to 40. Eliminate (B) because 6 + 8 = 14 is still too small. Since 4(6) + 16 = 40, keep (C). Remember to try all four choices when plugging in, so check (D) as well. 4(6) + 4 = 28, which is too small, so eliminate (D). The correct answer is (C).

More Practice: Lower Level

4. **B**

This is a Plugging In question because there are variables in the choices and the question stem contains the phrase *in terms of*. Plug in a value, work through the problem to find a target answer, and then check each of the choices to see which yields the target answer. For instance, say that y = the price of one pair of earrings. The total amount of money for 6 pairs of earrings would be $6 \times 10 = 60$, which is the target answer. Now, plug 10 into the choices for y to see which choice matches your target answer (60). Eliminate (A) because $6 + 10 = 16$, which does not equal 60. Keep (B) because $6(10) = 60$. Remember to check the remaining choices when plugging in. 6^{10} is a very large number, much greater than 60, so eliminate (C). Eliminate (D) as well because $6 + 6(10) = 66$, which does not equal 60. The correct answer is (B).

5. **B**

This is a Plugging In question because there are variables in the choices. Plug in a value, work through the problem to find a target answer, and then check each of the choices to see which yields the target answer. For instance, say that p pieces of candy is equal to 5 pieces, and c cents is 10 cents. Therefore, 10 pieces of candy will cost 20 cents—you have twice as many pieces, so it will cost twice as much money. So, the target answer is 20. Now, plug in your values for p and c into the choices to find the choice that equals your target answer (20). Eliminate (A) because $\frac{5 \times 10}{10} = \frac{50}{10} = 5$, which is too small. $\frac{10 \times 10}{5} = \frac{100}{5} = 20$, so keep (B). Remember to check the remaining choices when plugging in. $\frac{10 \times 5}{10} = \frac{50}{10} = 5$, so eliminate (C) as well. Cross off (D) because $10(5)(10) = 500$, which is way too large. The correct answer is (B).

More Practice: Middle Level

6. **C**

In this question, J is an odd integer, so plug in an odd integer for J. Since this is a *must be*question, see if there is a number that would make the answer untrue. Plug in 1 for J to make (A) untrue, since $\frac{1}{3}$ is not greater than 1. This number for J will also eliminate (B) since $1 - 2 = -1$, which is not a positive integer. Choice (C) is true since $2 \times 1 = 2$, which is an even integer. Eliminate (D) since J could be negative. For example, if $J = -3$, -3 is not greater

than 0. Check that value for (C) to be sure it always works. Again, if $J = -3$, then $2 \times -3 = -6$, which is still an even integer. Since it always works, the correct answer is (C).

7. **C**

When there are percents or fractions without a starting or ending value in the question stem, feel free to use Plugging In. What number would make the math easy? 8 is a common denominator for $\frac{1}{4}$ and $\frac{1}{2}$, so draw a picture of a fruit tart and divide it into 8 equal parts. Shade in the number of pieces she has eaten. On Monday, she ate $\frac{1}{2}$ of the pie, so $\frac{1}{2}$ of 8 is $\frac{4}{8}$ or 4 slices, leaving 4 slices for later. The next day, she ate $\frac{1}{4}$ of what was left. $\frac{1}{4}$ of 4 slices is 1, so she ate 1 slice. There are now 3 out of 8 slices left. Beware of choosing (A), however! The question asks how much she ate, so add up the slices she consumed. There should be 5 slices shaded (4 + 1 = 5), so the correct answer is (C).

More Practice: Middle and Upper Levels

8. **C**

When there are percents or fractions without a starting or ending value in the question stem, feel free to use Plugging In. For instance, plug in \$100 for the starting price of the suit. It is *reduced by 20%*, so 20% of \$100 is equal to $\frac{1}{5}(100) = \frac{100}{5} = 20$. That is the amount the suit is reduced. Subtract that from \$100 to find the resulting price: \$100 – \$20 = \$80. The suit is then *reduced by 10%*, so 10% of \$80 is $\frac{10}{100}(80) = \frac{1}{10}(80) = \frac{80}{10} = 8$. Subtract this from \$80 to find the final price of the suit: \$80 – \$8 = \$72. The final price is \$72. The *final price is what percent off of the original* is another way of asking the *final price is what percent less than the original*. So, use the percent change formula: $\%\text{ change} = \frac{\text{difference}}{\text{original}} \times 100$. The difference is \$100 – \$72 = 28. The original price was \$100. Therefore, $\frac{28}{100}(100) = 28$. The correct answer is (C).

9. **C**

Try plugging in values that satisfy the question stem, and eliminate choices. It may be necessary to plug in twice on *must be true* or *always true* questions. If m is an even number, let $m = 2$, and let $n = 3$ since it must be an odd integer. If p is the product of $m$and n, then $p = (2)(3) = 6$. Now check the choices. Eliminate (A) because p is not a fraction. Eliminate (B) as well since p is not an odd integer. Keep (C) because 6 is divisible by 2. Finally, keep (D) because 6 is greater than zero. Plug in again to compare the remaining

choices. Perhaps keep one number the same, so $n = 3$, but make $m = -2$ instead of 2. Now $p = (-2)(3) = -6$. Choice (C) still works since -6 is divisible by 2, but (D) no longer works since p is less than zero. Since it is always true, the correct answer is (C).

More Practice: Upper Level

10. **B**

Since there are variables in the choices, plug in a value for p, paying attention to the restrictions in the question. If p is an odd integer, make sure to plug in an odd integer, for instance $p = 3$. Now, test the choices to see which one can be eliminated. Cross off (A) because $(3)^2 + 3 = 9 + 3 = 12$, which is not odd. Choice (B) works since $2(3) + 1 = 6 + 1 = 7$, which is odd. Choice (C) works since $\frac{3}{3} = 1$. Choice (D) does not work since $3 - 3 = 0$. Remember 0 is even, not odd. Plug in a second time for the remaining choices. Try $p = 5$. Choice (B) still works because $2(5) + 1 = 10 + 1 = 11$, but eliminate (C) because $\frac{5}{3}$ is no longer an integer. The correct answer is (B).

11. **B**

The wording on this problem is tricky: it asks for which CANNOT be true, so try to find examples that COULD be true to eliminate choices. Pay attention to the restrictions in the problem, and plug in two positive even integers: say 4 and 6. Thus, $4 + 6 = 10 = m$. Next, eliminate choices that WORK. Choice (A) does not work since 10 is greater than 5. Keep it. Choice (B) does not work because $3(10) = 30$, which is even, not odd. Keep it. Eliminate (C) because $m = 10$, which is even, so it works. Eliminate (D) as well because 10^3 ends in a zero, which is also even, so this statement works. Now, plug in a second time for the remaining choices. Try new numbers, and remember that the numbers do not have to be distinct from one another. Try plugging in 2 for both positive even integers. Thus, $2 + 2 = 4 = m$. Check the remaining answers and eliminate the choices that WORK. For (A), 4 is less than 5. That works, so eliminate (A). For (B), $3(4) = 12$, which does not work since it's even, so keep it. The only choice left is (B), which is the correct answer.

12. **D**

This is a Plugging In question because there are variables in the choices. Plug in a value, work through the problem to find a target answer, and then check each of the choices to see which yields the target answer. For instance, plug in 20 for Anthony. Since Anthony has *twice as many baseball cards as Keith*, Keith has $\frac{1}{2}$ the number of cards that Anthony has. Therefore, Keith must have 10 cards, and $k = 10$. Keith has *one-third as many baseball cards as Ian*, so Ian has 3 times as many as Keith has: $10 \times 3 = 30$, or 30 cards. Together,

Anthony and Ian have 20 + 30 = 50, so 50 is the target answer. Now, plug in 10 for *k* to find which choice yields 50, your target answer. Eliminate (A) because $\frac{3 \times 10}{2} = \frac{30}{2} = 15$, not 50. Eliminate (B) because $\frac{6 \times 10}{2} = \frac{60}{2} = 30$ is still too small. Choice (C) is still too small, as $\frac{8 \times 10}{2} = \frac{80}{2} = 40$. Choice (D) works because $\frac{10 \times 10}{2} = \frac{100}{2} = 50$. The correct answer is (D).

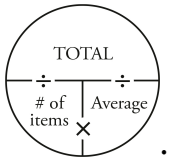
13. **D**

This is a Plugging In question because there are variables in the choices. Plug in a value, work through the problem to find a target answer, and then check each of the choices to see which yields the target answer. Let $b = 4$ and $a = 3$. Finding the *product* means multiply, so $\frac{1}{2}(4) \times 3^2 = 2 \times 9 = 18$. The target answer is 18. Now, plug in your values for *b*and *a* into the choices to find the choice that equals your target answer (18). Eliminate (A) since $(3 \times 4)^2 = (12)^2 = 144$, which is too big. Eliminate (B) since $\frac{3^2}{4} = \frac{9}{4}$ and is not equal to 18. Also eliminate (C) since $2(3) \times \frac{1}{2}(4) = 6 \times 2 = 12$, which does not equal 18. Choice (D) works: $\frac{3^2 \times 4}{2} = \frac{9 \times 4}{2} = \frac{36}{2} = 18$. Keep it. The correct answer is (D).

14. **D**

Use MADSPM to simplify the exponents in the equations first. When raising a power to a power, multiply the exponents together. For the first equation, $\left(x^3\right)^3 = x^{3\times3} = x^9$, so $a = 9$. When dividing by the same base, subtract the exponents. For the second equation, $\frac{y^{10}}{y^2} = y^{10-2} = y^8$, so $b = 8$. The question asks to find $a \times b$, so $9 \times 8 = 72$. The correct answer is (D).

15. **B**

Since the question involves averages, use the Average Pie 

. However, save yourself some time by reading carefully! Notice that the classes have an equal number of students donating money. Because of this, simply plug in values for the averages since it doesn't

matter how many actual students are donating money from each class. You only need values for the average of each class, so start there. Those two averages will become the numbers for your total in the next part of the problem. For instance, plug in \$3 as the average, y, for Mr. Greenwood's class, and \$5 for z, the average for Ms. Norris's class. Add these two numbers to find the total amount of money donated ($3 + 5 = 8$), and put 8 in the *total* spot. There are 2 classes donating money, so the *# of items* is 2. Find the average by dividing: $\frac{8}{2} = 4$. The target answer is 4. Now, plug in 3 for y and 5 for z to find which choice yields 4, the target answer. Eliminate (A) because $\frac{5}{3} \neq 4$. Choice (B) works because $\frac{3+5}{2} = \frac{8}{2} = 4$. Eliminate (C) because $3 + 5 \neq 4$. Finally, eliminate (D) because $2(3 + 5) = 2(8) = 16$, which is way too large. The correct answer is (B).

16. **C**

First, simplify the first expression: $(3xy)^3 = 3^3x^3y^3 = 27x^3y^3$. While comparing it to the other expression, $3x^2y^5$, you can work with one aspect of the expression at a time. Start with the coefficients: the greatest common factor of 3 and 27 is 3. Eliminate (A) and (D) since neither contains 3. Both of the remaining answers contain x^2, so compare y in the two expressions. One has $y^3 = y \times y \times y$ and the other has $y^5 = y \times y \times y \times y \times y$. The greatest common factor is y^3 since both expressions have at least 3 y's. Eliminate (B). The correct answer is (C).