PRACTICE DRILL 2—MULTIPLE CHOICE—MIDDLE AND UPPER LEVELS ONLY

While doing the next drill, keep in mind the general test-taking techniques we've talked about: guessing, POE, order of difficulty, pacing, choosing a letter-of-the-day for problems that stump you, and working on the page and not in your head. When you are done, check your answers in Chapter 17. But don't stop there: investigate the drill thoroughly to see how and why you got your answers wrong, and check your time. You should be spending about one minute per question on this drill.

Remember to time yourself during this drill!

1. How many numbers between 1 and 100, inclusive, are both prime and a multiple of 4?

   (A) 0
   (B) 12
   (C) 20
   (D) 25

2. How many factors do the integers 24 and 81 have in common?

   (A) 1
   (B) 2
   (C) 3
   (D) 4

3. If the final total of a dinner bill—after including a 25% tip—is $50, what was the cost of the dinner before including the tip?

   (A) $12.50
   (B) $25.00
   (C) $37.50
   (D) $40.00

4. How many numbers between 10 and 150 inclusive are multiples of both 3 and 5?

   (A) 9
   (B) 10
   (C) 15
   (D) 20

5. $3^4 \times 3^4 \times 3^4 =$

(A) 3^8

(B) 3^{12}

(C) 3^{64}

(D) $3(3^4)$

6. For what integer value of x does $x^4 = 4x + 8$?

(A) 1

(B) 2

(C) 3

(D) 4

7. If $18 = 3(3x - 6)$, then $x + 6 =$

(A) 4

(B) 6

(C) 10

(D) 26

8. What is the largest multiple of 6 that is less than 53?

(A) 36

(B) 48

(C) 52

(D) 54

9. One-third of the cars available for purchase at a used car dealership are silver. If there are 24 silver cars at the dealership, how many used cars are available for purchase?

(A) 8

(B) 24

(C) 48

(D) 72

10. Marie's garden contains 30 yellow roses, 50 red roses, and 40 white roses. Of the roses in her garden, what percent are NOT yellow?

(A) 30%

(B) 50%

(C) 75%

(D) 90%

11. A bookstore sells a signed copy of a particular book for $55 and an unsigned copy for $40. By approximately what percent is the signed copy marked up?

(A) 27%

(B) 30%

(C) 38%

(D) 45%

12. Which of the following is closest to 75% of $49.95?

(A) $7.50
(B) $12.50
(C) $37.00
(D) $40.00

13. Jeffery normally scores 25 points in a basketball game. During the last game of his season, he scored only 15 points. What is the percent change in the number of points he scored?

   (A) 10%
   (B) 40%
   (C) 60%
   (D) 67%

14. The dues to enter a tournament are $24. A team with three participants will split the tournament dues evenly. If they add a fourth person to the team and still split the dues evenly, how much will each participant then pay?

   (A) $2
   (B) $6
   (C) $8
   (D) $32

15. If a regular pentagon has a perimeter of 65, what is the length of each side?

   (A) 5
   (B) 11
   (C) 13
   (D) 16

16. What is the perimeter of a right triangle with legs that measure 3cm and 4cm?

   (A) 12 cm
   (B) 10 cm
   (C) 5 cm
   (D) 4 cm

> Check your answers in Chapter 17.

More Practice—Upper Level Only
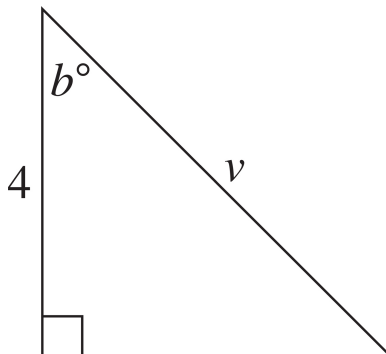
17. If $b = 60$, then $v =$

   (A) 8
   (B) 5
   (C) $4\sqrt{2}$
   (D) 4

18. What is one-fourth of the difference between the number of degrees in a rectangle and the number of degrees in a triangle?

   (A) 45
   (B) 90
   (C) 120
   (D) 180

19. If one-half the perimeter of a square is equal to its area, what is the length of one side?

   (A) 1
   (B) 2
   (C) 4
   (D) 8

20. The area of a circle with a radius of 3 is equal to the circumference of a circle with a diameter of

   (A) 2
   (B) 4
   (C) 6
   (D) 9

21. Two right circular cylinders have equal volumes. The formula for the volume of a cylinder is $V = \pi r^2 h$, where r is the radius of the cylinder and h is its height. The cylinder has a radius of 3 and a height of 4. If the other cylinder has a radius of 6, what is its height?
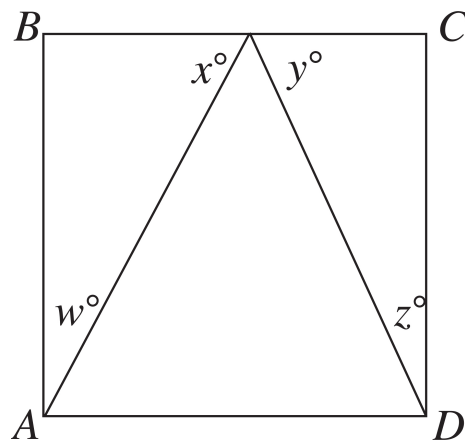
   (A) 1
   (B) 2
   (C) 4
   (D) 8

22. If the perimeter of a square is $36n^2$, what is the length of one side?

   (A) $6n$
   (B) $9n$
   (C) $6n^2$
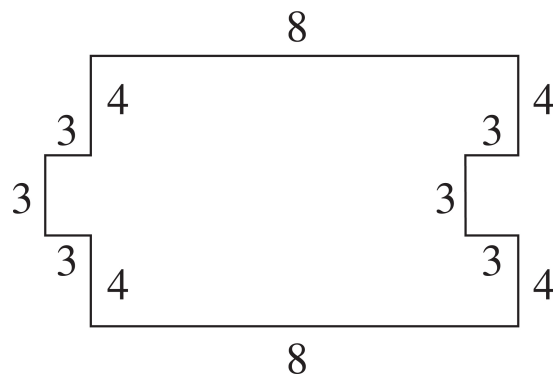   (D) $9n^2$

B

A   C
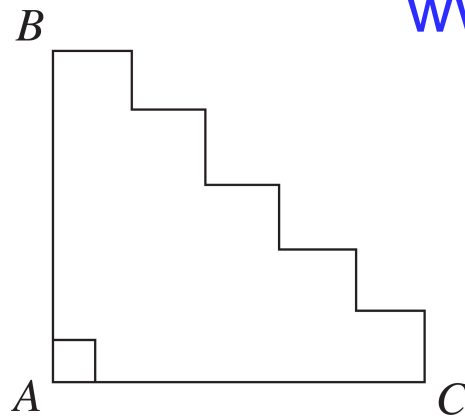
23. If AB = 12 and AC = 20, what is the perimeter of the figure above?

(A) 32
(B) 44
(C) 52
(D) 64

B   C

$x°$ $y°$

$w°$ $z°$

A   D

24. If $ABCD$ is a rectangle, and x = 70, what is the value of $y° + z° − w°$?

(A) 20°
(B) 70°
(C) 90°
(D) 110°

8

4
3   4

3   3

3   4

8
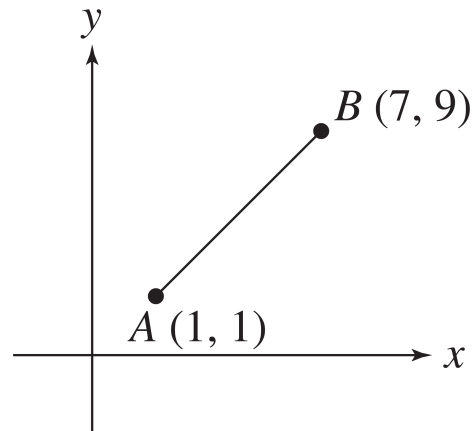
25. What is the area of the figure above if all the angles shown are right angles?

(A) 38

(B) 42

(C) 50

(D) 88
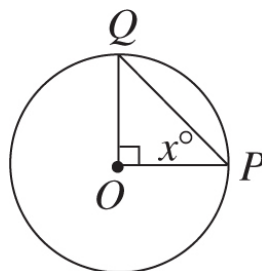
26. How many meters of fencing are needed to surround a yard that measures 32 meters wide by 28 meters long?

(A) 60 meters
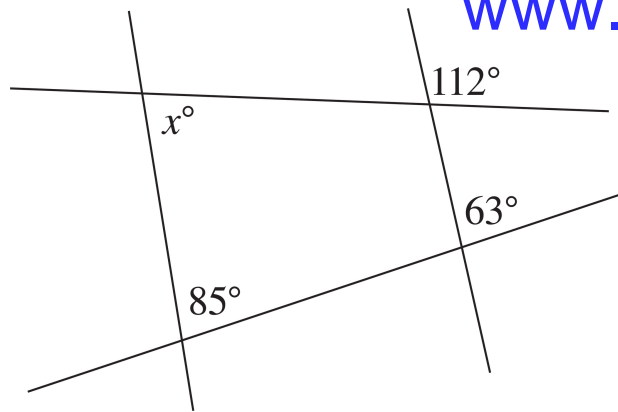
(B) 120 meters

(C) 448 meters

(D) 896 meters

27. What is the slope of a line that is perpendicular to line segment *AB*?

(A) $-\dfrac{4}{3}$

(B) $-\dfrac{3}{4}$

(C) $\dfrac{3}{4}$

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

28. *PO* and *QO* are radii of the circle with center *O*. What is the value of *x*?

(A) 30°

(B) 45°

(C) 60°

(D) 90°

112°

x°

63°

85°

29. What is the value of x°?

(A) 117°
(B) 100°
(C) 95°
(D) 46°

B —— O —— C

6

A
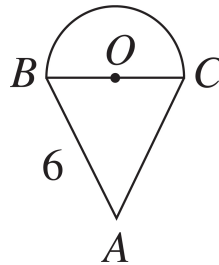
30. What is the perimeter of this figure if *ABC* is an equilateral triangle?

(A) 6 + 3π
(B) 6 + 6π
(C) 12 + 3π
(D) 12 + 6π

M   8   N

10   10

L
Q   P   O

31. If *MNPQ* is a square, what is the area of the trapezoid?

(A) 48
(B) 64
(C) 88
(D) 112

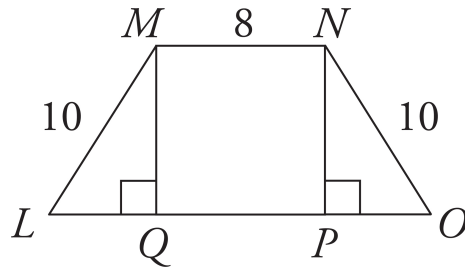## Practice Drill 2—Multiple Choice—Middle and Upper Levels Only

1. **A**

    Since 4 is not a prime number and no multiple of 4 will be prime either, there will not be any numbers in common. Therefore, the correct answer is (A).

2. **B**

    First, list all the factors of 24: 1 and 24, 2 and 12, 3 and 8, 4 and 6. Next, list all the factors of 81: 1 and 81, 3 and 27, 9 and 9. The only factors that 24 and 81 have in common are 1 and 3, so there are two factors in common. The correct answer is (B).

3. **D**

    Guesstimate and let the answer choices help here. If the final bill after 25% tip is $50, $12.50 and $25 are way too small. The tip would be either the same amount as or more than the cost! Eliminate (A) and (B). Try one of the two remaining answer choices. $40 looks easiest to work with, so let's start there. If the cost is $40, 25% of 40 is calculated by multiplying $\frac{25}{100}$ (40) = 10. $40 + $10 = $50, so that's our answer. The correct answer is (D).

4. **B**

    List all the numbers from 10 to 150, inclusive, that are multiples of 3 and 5: 15, 30, 45, 60, 75, 90, 105, 120, 135, and 150. Inclusive means to include the ends of the range, so 150 should be included in this list. There are 10 numbers listed, so the correct answer is (B).

5. **B**

    When multiplying by the same base, add the exponents together. 4 + 4 + 4 = 12, so the answer should be 3^{12}. The correct answer is (B).

6. **B**

    Let the answer choices help here. Remember that exponents mean multiplying a number by itself, so the numbers on the right side of the equation are going to have the same factors as x. Since 4 and 8 are not multiples of 3, eliminate (C). 1 is too small, since 1 to any power is 1 and the right side of the equation has to be at least 8. Eliminate (A). Try one of the remaining two answer choices. Smaller numbers are easier to use with exponents, so try (B). 2^4 = 2 x 2 x 2 x 2 = 16 and 4(2) + 8 = 16, so that works. The correct answer is (B).

7. **C**

    First, distribute 3 on the right-hand side of the equation. Since $3(3x – 6) = 9x – 18$, $18 = 9x– 18$. Add 18 to both sides to isolate x: $36 = 9x$. Divide both sides by 9 to find that $x = 4$. Not so fast! Remember the question asks for $x + 6$, so 4 + 6 = 10. The correct answer is (C).

8. **B**

Let the answer choices help here. Since 36, 48, and 54 are multiples of 6, eliminate (C), which is not a multiple. The question asks for the largest multiple *less* than 53, so of these choices, 48 fits this description. The correct answer is (B).

9.   **D**

The questions states that $\frac{1}{3}$ of the cars are silver and that there are 24 silver cars. Therefore, 24 × 3 equals the total number of cars, or 72. The correct answer is (D).

10.   **C**

Add all the roses up to find that 30 yellow roses + 50 red roses + 40 white roses = 120 total roses. The roses that are not yellow are the 50 red and 40 white, which makes 90. $\frac{90}{120} = \frac{3}{4}$ or 75%. The correct answer is (C).

11.   **C**

To find the percent difference, find the difference and divide by the original value. The difference in price is $15, and the original value is $40, since $55 is a markup, which is approximately 38%. The correct answer is (C).

12.   **C**

Guesstimate here. 75% is more than half, and 49.95 is essentially 50. Eliminate (A) and (B) since those are both less than half. $\frac{40}{50}$ is $\frac{4}{5}$, which is larger than $\frac{3}{4}$, so eliminate (D). The correct answer is (C).

13.   **B**

To find the percent change, find the difference in points and divide that by the original value, 25. 25 − 15 = 10, which is the difference, or 0.4, which equals 40%. The correct answer is (B).

14.   **B**

If the team adds a fourth person and splits the dues evenly, $\frac{\$24}{4}$ = $6 per person. The correct answer is (B).

15.   **C**

A regular figure means that all the sides are equal. A pentagon has 5 sides, so to find each individual side, divide the perimeter by the number of sides: 65 ÷ 5 = 13. The correct answer is (C).

16.   **A**

To find the perimeter of a shape, add all the sides together. First, find the hypotenuse by recognizing this is a special right triangle (3-4-5) or using the Pythagorean Theorem: $3^2 + 4^2 = c^2$, which simplifies to $9 + 16 = 25 = c^2$, and $\sqrt{25} = 5$. Add $3 + 4 + 5$ to find the perimeter of the triangle is 12. The correct answer is (A).

More Practice: Upper Level Only

17. **A**

If $b° = 60°$, the other angle must be 30 since $180° - 90° - 60° = 30°$, which is a special right triangle. In a 30-60-90 triangle, the sides measure x, $x\sqrt{3}$, and $2x$, respectively. Therefore, since the side across from the 30° angle is 4, which is x. Then v, the hypotenuse, is twice that value. $4(2) = 8$, so $v = 8$. The correct answer is (A).

18. **A**

Translate this question very carefully into math. *What* translates to the unknown x, *is* to =, *of* to multiplication, and *difference* to subtraction. There are 360 degrees in a rectangle and 180 degrees in a triangle. Therefore, the equation should read $x = \frac{1}{4}(360 - 180)$. Remember PEMDAS and work inside the parentheses first. $x = \frac{1}{4}(180)$, so $x = 45$. The correct answer is (A).

19. **B**

The perimeter of a square is = 4s and the area of a square is = s^2. Since one-half the perimeter is equal to the area, $\frac{1}{2}(4s) = s^2$. Now solve for s. $2s = s^2$. Divide both sides by s to get $s = 2$. The correct answer is (B).

20. **D**

Use your formulas. Area of a circle = πr^2 and Circumference of a circle = $2\pi r = \pi d$. So the area of a circle with radius 3 is $\pi(3^2) = 9\pi$. That means the circumference of the other circle is 9π. Since $9\pi = \pi d$, the diameter is equal to 9. The correct answer is (D).

21. **A**

Use the formula given to find the volume of the first cylinder: $V = \pi r^2 h = \pi(3)^2(4) = 36\pi$. If the other cylinder is equal in volume to the first cylinder, then plug in the volume and radius of the other cylinder to find its height: $36\pi = \pi(6)^2 h$ simplifies to $36\pi = \pi(36)h$. Divide both sides by 36 to get $1 = h$. The correct answer is (A).

22. **D**

Use your formula. Since the perimeter of a square is 4 times the length of one side, you can divide the perimeter by 4 to get the length of one side. $36n^2/4 = 9n^2$ The correct answer is (D).

23. **D**

The length of *AB* is the same as all the different heights added together on the right-hand side of the figure. Therefore, the perimeter will contain two lengths of 12. Similarly, the length of *AC* is the same as all the different lengths added together that are across the figure (in this case, above *AC*), so there will be two lengths of 20. To find the perimeter, add all the sides: *P* = 12 + 12 + 20 + 20 = 64. The correct answer is (D).

24. **B**

Notice the three triangles that have been created within the rectangle. Look at the two right angles that surround the larger triangle in the middle. For the right triangle on the left, the value of *x* is given (70); therefore, to find *w*, simply subtract 90 and 70 from 180 to get *w* = 20. For the right triangle on the right, *y* and *z* must add up to 90 since a triangle has 180°. Finally, plug in these values into the equation given: $y° + z° − w° = 90 − 20 = 70$. The correct answer is (B).

25. **D**

Notice that the part that juts out on the left side of the shape would fit into the indented part on the right side of the shape. Filling in the hole would make a rectangle with a length of 8 and a width of 4 + 3 + 4 = 11. To find the area of a rectangle, use the formula: $A = l \times w$. Therefore, $A = 8 \times 11 = 88$. The correct answer is (D).

26. **B**

The length of fencing needed to surround a yard is the same as the perimeter. Draw a rectangle and label the length as 28 and the width as 32. Remember, in a rectangle opposite sides are equal to each other. Calculate the perimeter by adding all the sides: 28 + 28 + 32 + 32 = 120. The correct answer is (B).

27. **B**

The slope of a line is found using the formula $\frac{rise}{run}$ or $\frac{y_2 - y_1}{x_2 - x_1}$. Therefore, the slope of line segment *AB* is $\frac{9-1}{7-1} = \frac{8}{6} = \frac{4}{3}$. To find the slope of the line perpendicular to this line segment, take the negative reciprocal. The reciprocal of $\frac{4}{3}$ is $\frac{3}{4}$. Change the sign to get $-\frac{3}{4}$. The correct answer is (B).

28. **B**

Even though the length of the radius is unknown, it is still possible to find the angle measurements. There is a 90° angle in the center of the circle, and both OQ and OP are radii of the circle, which means they are the same length. Therefore, this is an isosceles right

triangle, meaning the two smaller angles are congruent. All triangles have 180°, so 180° – 90° = 90°. The two smaller angles add up to 90°, so $\frac{90°}{2} = 45°$. The correct answer is (B).

29. **D**

Notice that the four intersecting lines form a quadrilateral. All quadrilaterals contain 360°, so keep a tally of the vertices and find the missing angle x. Since 85 is already provided, 360° – 85° = 275° All straight lines add up to 180°, so use the exterior angles to find the interior angles. For example, if one of the exterior angles is 63°, the supplementary angle must be 117°. Subtract this from 275° to find that 275° – 117° = 158°. The other exterior angle, 112°, is opposite the interior vertex. Since opposite angles are equal, the interior vertex must also be 112°. Subtract this from the current total to find that 158° – 112° – 46°. The missing angle x is 46°. The correct answer is (D).

30. **C**

Since *ABC* is an equilateral triangle, all 3 sides are equal to 6. Label *AC* as 6 and *BC* as 6. The question asks for the perimeter of the figure. There are two sides of the triangle that are part of the figure's perimeter, so add them together: *AB* + *AC* = 6 + 6 = 12. Eliminate (A) and (B) since the answer must have a 12 in it. Now find the rounded portion, which is half of the circumference (i.e., a semicircle). Since *BC* is 6, note that the diameter of the semicircle is also 6. If *C* = πd, then half of the circumference is $\frac{1}{2}\pi d$. Plug in the value for the diameter and simplify: $\frac{1}{2}\pi(6) = 3\pi$. The full expression for the perimeter will then read 12 + 3π. The correct answer is (C).

31. **D**

Break the trapezoid into two triangles and a square. Next, figure out the missing segment lengths. If *MN*= 8 and *MNQP* is a square, then *NP, QP*, and *MQ* also equal 8. Next find *LQ* and *PO*. You may notice that these are 6-8-10 right triangles. Otherwise, use the Pythagorean Theorem to find the base of the triangles: $a^2 + 8^2 = 10^2$. Solve for *a*: $a^2 + 64 = 100$. Subtract 64 from both sides to get $a^2 + 36$. Then take the square root of both sides, and $a = 6$. To find the areas of the triangles, plug the base and the height into the formula $A = \frac{1}{2}bh = \frac{1}{2}(6)(8) = 24$. There are two triangles, so 24 + 24 = 48. To find the area of square *MNQP*, plug the side length into the formula $A = s^2 = 8^2 = 64$. Finally, add the areas: 2 triangles + 1 square = 48 + 64 = 112. The correct answer is (D).