PRACTICE SET 6: MEASUREMENT AND GEOMETRY

1. How many inches are in 3 feet?

A. 12

B. 24

C. 36

D. 48

2. A rectangle has length 10 and width 4. Its area is:

A. 40

B. 14

C. 28

D. 20

3. A square has a side length of 6. Its perimeter is:

A. 12

B. 18

C. 20

D. 24

4. A triangle has base 8 and height 5. Its area is:

A. 13

B. 20

C. 40

D. 80

5. How many centimeters are in 2 meters?

A. 200

B. 20

C. 2,000

D. 0.02

6. A circle has radius 4. Its circumference is:

A. 4π

B. 16π

C. 12π

D. 8π

7. A rectangle has length 12 and width 5. Its perimeter is:

A. 17

B. 34

C. 60

D. 24

8. A cube has side length 3. Its volume is:

A. 9

B. 18

C. 27

D. 36

9. How many feet are in 2 miles?

A. 10,560

B. 2,000

C. 5,280

D. 10,000

10. A circle has diameter 10. Its radius is:

A. 20

B. 10

C. 100

D. 5

11. How many ounces are in 1 pound?

A. 16

B. 12

C. 8

D. 32

12. A triangle's three angles sum to:

A. 90°

B. 120°

C. 270°

D. 180°

13. How many millimeters are in 5 centimeters?

A. 0.5

B. 5

C. 50

D. 500

14. A right triangle has legs of 3 and 4. Its hypotenuse is:

A. 5

B. 6

C. 7

D. 12

15. A rectangle has area 48 and length 8. Its width is:

A. 8

B. 4

C. 5

D. 6

16. The area of a circle with radius 5 is:

A. 10π

B. 25π

C. 5π

D. 50π

17. How many grams are in 2 kilograms?

A. 20

B. 200

C. 20,000

D. 2,000

18. A square has area 36. Its side length is:

A. 6

B. 9

C. 12

D. 4

19. How many quarts are in 1 gallon?

A. 2

B. 3

C. 4

D. 8

20. A rectangular prism has length 4, width 3, and height 2. Its volume is:

A. 9

B. 24

C. 48

D. 12

21. The perimeter of a triangle with sides 5, 7, and 9 is:

A. 15

B. 21

C. 24

D. 27

22. 1 liter equals:

A. 10 mL

B. 100 mL

C. 500 mL

D. 1,000 mL

23. A right triangle has legs 6 and 8. Its hypotenuse is:

A. 10

B. 12

C. 14

D. 16

24. A circle has radius 3. Its area is:

A. 3π

B. 6π

C. 9π

D. 18π

25. 1 yard equals how many feet?

A. 12

B. 1

C. 2

D. 3

26. A rectangle's perimeter is 30 cm and its width is 7 cm. Its length is:

A. 7

B. 8

C. 15

D. 23

27. A circle's diameter is 14. Its circumference is:

A. 14π

B. 28π

C. 7π

D. 49π

28. How many cups are in 1 pint?

A. 4

B. 8

C. 1

D. 2

29. A triangle has angles 40° and 80°. Its third angle is:

A. 40°

B. 50°

C. 60°

D. 70°

30. The volume of a cylinder with radius 2 and height 5 is:

A. 20π

B. 10π

C. 25π

D. 40π

31. 1 foot equals how many inches?

A. 6

B. 8

C. 10

D. 12

32. A square with perimeter 20 has area:

A. 20

B. 25

C. 30

D. 100

33. 5 kilograms equals how many grams?

A. 5,000

B. 500

C. 50

D. 50,000

34. A rectangle has dimensions 9 × 6. Its diagonal (by Pythagoras) is:

A. 12

B. 13

C. 11

D. √117

35. How many pints are in 1 gallon?

A. 2

B. 4

C. 8

D. 16

36. The surface area of a cube with side 2 is:

A. 24

B. 12

C. 8

D. 4

37. A triangle has sides 7, 24, and 25. It is:

A. isosceles

B. equilateral

C. obtuse

D. right

38. A rectangle has length 15 ft and width 9 ft. Its area is:

A. 24

B. 135

C. 48

D. 90

39. 1 meter equals how many centimeters?

A. 100

B. 10

C. 1,000

D. 0.01

40. A right triangle has legs 5 and 12. Its hypotenuse is:

A. 11

B. 12

C. 13

D. 17

41. A cube has volume 64. Its side length is:

A. 4

B. 6

C. 8

D. 16

42. The area of a trapezoid with parallel sides 6 and 10 and height 4 is:

A. 16

B. 24

C. 32

D. 40

43. 1 hour equals how many minutes?

A. 100

B. 90

C. 30

D. 60

44. A parallelogram has base 8 and height 5. Its area is:

A. 13

B. 40

C. 26

D. 80

45. The circumference of a circle with radius 7 is:

A. 14π

B. 49π

C. 7π

D. 28π

46. 2 gallons equals how many quarts?

A. 4

B. 6

C. 10

D. 8

47. A cone has radius 3 and height 4. Its volume is:

A. 36π

B. 18π

C. 12π

D. 24π

48. A triangle has base 10 and height 12. Its area is:

A. 120

B. 60

C. 22

D. 72

49. 1 pound equals how many ounces?

A. 8

B. 12

C. 14

D. 16

50. A square has side 9. Its perimeter is:

A. 36

B. 27

C. 18

D. 81

PRACTICE SET 6: ANSWER KEY AND EXPLANATIONS

1. C — 36. One foot equals 12 inches, so 3 feet equals $3 \times 12 = 36$ inches. Length conversions in the U.S. Customary system always rely on the 12-inches-per-foot factor, and multiplying the number of feet by 12 gives the equivalent in inches. This conversion is one of the most frequently tested measurement facts on placement exams.

2. A — 40. The area of a rectangle is length × width, so $A = 10 \times 4 = 40$ square units. Area is a two-dimensional measurement that captures how much surface a shape covers, and for rectangles the formula multiplies the two perpendicular dimensions. Remember to express area in squared units.

3. D — 24. The perimeter of a square is 4 times the side length, so $P = 4 \times 6 = 24$. All four sides of a square are equal in length, which simplifies the perimeter calculation to a single multiplication. Perimeter problems measure the total distance around the outside of a shape.

4. B — 20. The triangle area formula is $A = \frac{1}{2}bh$, so $A = \frac{1}{2}(8)(5) = 20$. Half the product of base and height always yields triangle area, regardless of whether the triangle is right, acute, or obtuse. The height must be measured perpendicular to the base.

5. A — 200. One meter equals 100 centimeters, so 2 meters equals $2 \times 100 = 200$ cm. Metric conversions are based on powers of ten, which makes them faster than U.S. Customary conversions once the prefix factors are memorized. Multiplying by 100 shifts the decimal two places to the right.

6. D — 8π. The circumference formula is $C = 2\pi r$, so $C = 2\pi(4) = 8\pi$. Circumference measures the total distance around a circle, which is directly proportional to the radius. This formula is one of the three foundational circle formulas alongside diameter and area.

7. B — 34. The perimeter formula $P = 2l + 2w$ gives $P = 2(12) + 2(5) = 24 + 10 = 34$. Rectangle perimeter adds the lengths of all four sides, which reduces to twice the length plus twice the width because opposite sides are equal.

8. C — 27. The cube volume formula is $V = s^3$, so $V = 3^3 = 27$ cubic units. Every cube's volume equals the cube of its edge length because all three dimensions (length, width, height) are equal. Volume is always expressed in cubed units.

9. A — 10,560. One mile equals 5,280 feet, so 2 miles equals $2 \times 5{,}280 = 10{,}560$ feet. The 5,280 factor is the standard mile-to-foot conversion and appears regularly on placement exams in word problems involving distances and travel.

10. D — 5. The radius is always half the diameter: $10 \div 2 = 5$. Diameter and radius differ by a factor of 2, and the radius is the distance from the center to any point on the circle while the diameter spans the full width through the center.

11. A — 16. One pound equals 16 ounces in the U.S. Customary system. This conversion is essential for weight-based problems and is one of the standard factors that must be memorized for placement exam success.

12. D — 180°. The three interior angles of any triangle always sum to exactly 180°. This rule — the Triangle Angle Sum Theorem — holds for every triangle regardless of its shape, size, or classification. It is the foundation for many geometry problems that ask you to find a missing angle.

13. C — 50. One centimeter equals 10 millimeters, so 5 cm equals $5 \times 10 = 50$ mm. The metric system's use of powers of ten makes conversions between millimeters, centimeters, meters, and kilometers straightforward once the prefix relationships are understood.

14. A — 5. Using the Pythagorean theorem, $3^2 + 4^2 = 9 + 16 = 25$, and $\sqrt{25} = 5$. The 3-4-5 right triangle is the most commonly encountered Pythagorean triple on placement exams and should be memorized for instant recognition.

15. D — 6. The area formula $A = lw$ gives $48 = 8w$, and dividing by 8 produces $w = 6$. When one dimension of a rectangle and its area are known, dividing the area by the known dimension yields the other dimension.

16. B — 25π. The circle area formula is $A = \pi r^2$, so $A = \pi(5^2) = 25\pi$. Area is proportional to the square of the radius, which means doubling the radius quadruples the area. This relationship often appears in word problems about scaling.

17. D — 2,000. One kilogram equals 1,000 grams, so 2 kg equals $2 \times 1{,}000 = 2{,}000$ g. The prefix "kilo-" always indicates a factor of 1,000 in the metric system.

18. A — 6. The area of a square is $A = s^2$, so $36 = s^2$ and $s = \sqrt{36} = 6$. Square problems that give area require taking the square root to find the side length, and only the positive root is used for physical measurements.

19. C — 4. One gallon contains 4 quarts in the U.S. Customary system. This conversion appears frequently in everyday measurement problems involving liquids and should be memorized.

20. B — 24. The volume of a rectangular prism is $V = lwh$, so $V = 4 \times 3 \times 2 = 24$ cubic units. Rectangular prism volume multiplies the three perpendicular dimensions together.

21. B — 21. The perimeter of any polygon is the sum of its side lengths: $5 + 7 + 9 = 21$. Triangle perimeter problems are straightforward addition when all three sides are given.

22. D — 1,000 mL. One liter equals 1,000 milliliters. The prefix "milli-" indicates one-thousandth, so 1,000 milliliters combine to make one full liter.

23. A — 10. Applying the Pythagorean theorem, $6^2 + 8^2 = 36 + 64 = 100$, and $\sqrt{100} = 10$. This is a 3-4-5 Pythagorean triple scaled by 2, producing the common 6-8-10 triangle.

24. C — 9π. The circle area formula $A = \pi r^2$ gives $A = \pi(3^2) = 9\pi$. Squaring the radius before multiplying by π is essential.

25. D — 3. One yard equals 3 feet in the U.S. Customary system. Yards are commonly used in construction, landscaping, and athletics.

26. B — 8. The perimeter formula $P = 2l + 2w$ gives $30 = 2l + 14$, so $2l = 16$ and $l = 8$. Perimeter problems with one known dimension solve by isolating the unknown.

27. A — 14π. The circumference formula $C = \pi d$ gives $C = \pi(14) = 14\pi$. When the diameter is given directly, using $C = \pi d$ is faster than converting to radius first.

28. D — 2. One pint equals 2 cups in the U.S. Customary system. This is a foundational cooking measurement conversion.

29. C — 60°. The three angles of a triangle sum to 180°, so the third angle is $180 - 40 - 80 = 60°$. This follows directly from the Triangle Angle Sum Theorem.

30. A — 20π. The cylinder volume formula is $V = \pi r^2 h$, so $V = \pi(2^2)(5) = 20\pi$. Cylinder volume multiplies the circular base area by the height.

31. D — 12. One foot equals 12 inches. This is the fundamental U.S. Customary length conversion.

32. B — 25. A square with perimeter 20 has side length $20 \div 4 = 5$, and the area is $5^2 = 25$. Square problems often chain formulas — first finding the side length, then using it to calculate area.

33. A — 5,000. One kilogram equals 1,000 grams, so 5 kg equals 5,000 g.

34. D — $\sqrt{117}$. The diagonal of a rectangle forms a right triangle with the sides. Applying the Pythagorean theorem gives $9^2 + 6^2 = 81 + 36 = 117$, so the diagonal is $\sqrt{117}$. This value does not simplify to a whole number.

35. C — 8. One gallon contains 8 pints, since 1 gallon = 4 quarts and 1 quart = 2 pints, giving $4 \times 2 = 8$ pints per gallon.

36. A — 24. The surface area of a cube is $6s^2$, so $SA = 6(2^2) = 6(4) = 24$. A cube has six identical square faces, and multiplying one face's area by six gives total surface area.

37. D — right. Applying the Pythagorean theorem: $7^2 + 24^2 = 49 + 576 = 625 = 25^2$. Since the three sides satisfy $a^2 + b^2 = c^2$, the triangle is a right triangle. The 7-24-25 triangle is another common Pythagorean triple.

38. B — 135. The rectangle area formula $A = lw$ gives $A = 15 \times 9 = 135$ square feet.

39. A — 100. One meter equals 100 centimeters. The prefix "centi-" indicates one-hundredth, so 100 centimeters make one full meter.

40. C — 13. Using the Pythagorean theorem, $5^2 + 12^2 = 25 + 144 = 169$, and $\sqrt{169} = 13$. The 5-12-13 Pythagorean triple is one of the most common on placement exams.

41. A — 4. The cube volume formula $V = s^3$ gives $s^3 = 64$, so $s = \sqrt[3]{64} = 4$. Taking the cube root reverses the volume formula to find the edge length.

42. C — 32. The trapezoid area formula is $A = \frac{1}{2}(b_1 + b_2)h$, so $A = \frac{1}{2}(6 + 10)(4) = \frac{1}{2}(16)(4) = 32$. The formula averages the parallel sides and multiplies by the height.

43. D — 60. One hour equals 60 minutes. This is a fundamental time conversion.

44. B — 40. The parallelogram area formula $A = bh$ gives $A = 8 \times 5 = 40$. Parallelogram area uses the perpendicular height, not the slanted side length.

45. A — 14π. The circumference formula $C = 2\pi r$ gives $C = 2\pi(7) = 14\pi$.

46. D — 8. One gallon equals 4 quarts, so 2 gallons equal 8 quarts. Simple multiplication converts between related U.S. Customary volume units.

47. C — 12π. The cone volume formula is $V = (1/3)\pi r^2 h$, so $V = (1/3)\pi(9)(4) = 12\pi$. The 1/3 factor distinguishes cone volume from cylinder volume of the same base and height.

48. B — 60. The triangle area formula $A = \frac{1}{2}bh$ gives $A = \frac{1}{2}(10)(12) = 60$.

49. D — 16. One pound equals 16 ounces. This weight conversion appears frequently in measurement word problems.

50. A — 36. A square with side length 9 has perimeter $P = 4s = 4(9) = 36$.