

Republic of the Philippines
Department of Education
National Capital Region
SCHOOLS DIVISION OF TAGUIG CITY AND PATEROS

FIRST TERM DIAGNOSTIC TEST IN MATHEMATICS 6
School Year 2026-2027

Name: _____ Grade & Section: _____
Teacher: _____ Date: _____

Directions: Read each question carefully. Analyze structural properties and execute calculations with precision. Choose the letter of the correct answer and write it on your answer sheet.

1. Which of the following geometric conditions must be met for a single regular polygon to perfectly tessellate a flat, two-dimensional surface without leaving gaps or overlapping?

- A. The interior angle of the polygon must be an exact factor of 360° .
- B. The perimeter of the polygon must be an even multiple of its total number of vertices.
- C. The sum of the exterior angles must be strictly less than 180° .
- D. The polygon must possess at least five reflective operational axes.

2. If a regular polygon has an interior angle of 108° , can it be used to create a regular, single-tile tessellation? Why or why not?

- A. Yes, because 108 is a composite number divisible by both 9 and 12.
- B. No, because 360 divided by 108 results in a non-terminating remainder, leaving fractional gaps at a vertex.
- C. Yes, because any regular polygon with an odd number of edges can tessellate surfaces.
- D. No, because it lacks the necessary line symmetry required for tessellation grids.

3. A structural designer decides to tile a pavilion floor by combining a regular hexagon with other regular polygons around a single vertex. If a regular hexagon has an interior angle of 120° and a square has 90° , what third shape can complete the 360° vertex configuration?

- A. An equilateral triangle (60°)
- B. A regular octagon (135°)
- C. A regular pentagon (108°)
- D. No single shape can complete this because $120 + 90$ leaves 150° , which does not match a regular polygon's interior angle.

4. Consider a surface tessellated entirely with congruent scalene triangles. Which structural property ensures that any triangle, regardless of asymmetry, can completely tile a plane?

- A. The sum of the interior angles of any triangle is exactly 180° , allowing two sets of the three angles to meet perfectly at every vertex to form 360° .
- B. Scalene triangles possess a natural right-angle component when flipped across their longest side.
- C. The longest side of a scalene triangle always matches the shortest side of an adjacent row.
- D. Scalene shapes can only tessellate if they undergo uniform scaling transformation.

5. An architectural draft lines up rows of identical rectangles to tessellate a modern facade. If each rectangle measures 8 cm in length and 3 cm in height, how many complete rectangles are required to tile a rectangular panel section that measures 48 cm by 24 cm?

- A. 36 tiles
- B. 48 tiles
- C. 24 tiles
- D. 12 tiles

6. A triangle has vertices at coordinates A(1, 2), B(4, 2), and C(1, 6). If this shape undergoes a translation defined by the mapping vector $(x + 3, y - 4)$, what are the coordinates of the resulting image vertex C'?

- A. C'(4, 2)
- B. C'(5, 1)
- C. C'(-2, 10)
- D. C'(4, -2)

7. When a geometric figure is reflected across the vertical y-axis on a Cartesian coordinate plane, which parameter of the coordinate pairs changes, and what is its behavior?

- A. The y-coordinate changes sign, while the x-coordinate remains constant.
- B. Both the x-coordinate and y-coordinate change signs simultaneously.
- C. The x-coordinate changes sign, while the y-coordinate remains completely unchanged.
- D. The coordinates swap positions such that the new point becomes (y, x).

8. A right-triangular plate is rotated 180° counter-clockwise about the origin point (0, 0). Which statement correctly describes the geometric structural relationship between the original object and its transformed image?

- A. The image is congruent to the original object but occupies a position in the diagonally opposite quadrant.
- B. The image is reflected and dilated to twice its original area dimensions.
- C. The image changes its clockwise orientation while its inner angle sums expand to 360°.
- D. The original object and the image are no longer congruent due to rotational stress.

9. Square PQRS is plotted in Quadrant I. It is first reflected across the horizontal x-axis and then translated 5 units to the left. In which quadrant will the final transformed image square reside?

- A. Quadrant II
- B. Quadrant III
- C. Quadrant IV
- D. It depends entirely on the original coordinates of the vertices of the square.

10. A designer creates a pattern by rotating an asymmetric polygon 90° clockwise about a fixed point, repeating the step four times until the pattern closes. What type of transformation symmetry is created, and what happens to the perimeter of the shape during this process?

- A. Rotational symmetry is established, and the perimeter of the shape remains invariant.
- B. Reflectional symmetry is established, and the perimeter decreases with each rotation.
- C. Translational symmetry is established, and the perimeter scales exponentially.
- D. Glide reflectional symmetry is established, and the perimeter doubles.

11. Evaluate the exact sum of the following decimal values: $45.089 + 7.9123 + 128.45$.

- A. 181.4513
- B. 180.4513
- C. 181.3513
- D. 175.4413

12. Find the precise difference when 38.456 is subtracted from 102.1.

- A. 63.644
- B. 64.744
- C. 63.544
- D. 73.654

13. A purchasing officer for a school district buys laboratory equipment worth ₱4,567.25, textbooks worth ₱12,890.80, and multimedia materials worth ₱8,120.45. If the school district allocated a budget of ₱30,000.00 for these items, how much budget surplus remains?

- A. ₱4,421.50
- B. ₱5,421.50
- C. ₱4,321.50
- D. ₱4,422.50

14. A civil engineer measures three segments of an infrastructure project. The first segment is 14.8295 km, the second is 9.074 km, and the third is 22.5 km. If the contractor has already paved 31.652 km of the total distance, what is the length of the remaining unpaved segment?

- A. 14.7515 km
- B. 15.7515 km
- C. 14.6515 km
- D. 13.7515 km

15. Maria's bank account had a balance of ₱15,430.50. She deposited two checks valued at ₱3,450.75 and ₱1,200.40. The next day, she paid a utility bill of ₱2,895.65 and withdrew ₱5,000.00 cash. What is her final account balance?

- A. ₱12,185.00
- B. ₱12,186.00
- C. ₱11,185.00
- D. ₱13,185.00

16. Compute mentally the product of 45.68 multiplied by 0.01.

- A. 456.8
- B. 4.568
- C. 0.4568
- D. 0.04568

17. What is the value obtained when 0.73 is multiplied by 1000?

- A. 73
- B. 730
- C. 7300

D. 7.3

18. An agro-industrial firm packs premium organic rice into bags weighing 12.55 kg each. If a customer orders 45 bags, and the firm charges ₱62.50 per kilogram of rice, what is the total gross value of the transaction?

- A. ₱35,296.88
- B. ₱35,196.88
- C. ₱34,296.88
- D. ₱35,295.00

19. A manufacturing plant produces 120 custom metal brackets per hour, each requiring 0.35 kg of steel. If raw steel costs ₱48.75 per kilogram, what is the hourly raw material cost for running the production line?

- A. ₱2,047.50
- B. ₱2,147.50
- C. ₱1,947.50
- D. ₱2,048.00

20. A delivery vehicle travels 14.5 km per liter of fuel during highway operations. Fuel costs ₱58.40 per liter. If the driver travels a total highway distance of 261 km, how much will the required fuel cost for this trip?

- A. ₱1,051.20
- B. ₱1,151.20
- C. ₱1,050.00
- D. ₱1,251.20

21. Convert the fraction $\frac{2}{9}$ into its equivalent decimal representation by dividing the numerator by the denominator.

- A. 0.2222... (Non-terminating, repeating)
- B. 0.25 (Terminating)
- C. 0.2020... (Non-terminating, repeating)
- D. 0.2333... (Non-terminating, repeating)

22. Evaluate the quotient when 45 is divided by 0.6.

- A. 7.5
- B. 75
- C. 750
- D. 0.75

23. What is the mental result when 345.82 is divided by 0.01?

- A. 3.4582
- B. 34.582
- C. 34,582
- D. 3,458.2

24. Compute the exact value when 0.84 is mentally divided by 1000.

- A. 0.00084

- B. 0.0084
- C. 840
- D. 0.000084

25. A string measures exactly 7 meters long. It is cut into equal pieces, each measuring 0.3 meters. How many full pieces can be cut, and what is the remaining length of the string?

- A. 23 pieces with 0.1 meters remaining
- B. 23 pieces with 0.01 meters remaining
- C. 21 pieces with 0.7 meters remaining
- D. 22 pieces with 0.4 meters remaining

26. A cooperative farm splits 157.5 kg of cacao beans into smaller commercial packs weighing 2.5 kg each. These packs are then sold at ₱320.00 per pack. What is the total revenue generated if all packs are sold?

- A. ₱20,160.00
- B. ₱19,160.00
- C. ₱20,260.00
- D. ₱21,160.00

27. A chemical laboratory technician contains 18.6 liters of acid solution. The technician fills 12 identical large flasks with 1.25 liters each, and pours the remaining acid equally into 4 small vials. How many liters of acid solution does each small vial receive?

- A. 0.90 liters
- B. 0.775 liters
- C. 0.875 liters
- D. 0.650 liters

28. Evaluate the mathematical product resulting from multiplying the following combination: $\frac{3}{4} \times 16 \times 2\frac{1}{2}$.

- A. 30
- B. 24
- C. 32
- D. 28

29. Calculate the product of $\frac{5}{8}$ multiplied by $\frac{4}{15}$, simplified to its lowest terms.

- A. $\frac{1}{6}$
- B. $\frac{2}{3}$
- C. $\frac{5}{24}$
- D. $\frac{3}{10}$

30. A textile workshop uses $2\frac{3}{4}$ meters of linen fabric to manufacture one designer polo shirt. If the shop orders enough fabric to make 24 shirts, how many total meters of linen fabric must be delivered?

- A. 66 meters
- B. 64 meters
- C. 58 meters
- D. 72 meters

31. A water reservoir loses $\frac{4}{15}$ of its total capacity to evaporation during a prolonged dry spell. If the initial volume of the reservoir was 45,000 cubic meters, how many cubic meters of water evaporated?

- A. 12,000 cubic meters
- B. 15,000 cubic meters
- C. 18,000 cubic meters
- D. 9,000 cubic meters

32. An infrastructure investor owns $\frac{3}{5}$ of a prime commercial plot. He decides to sell $\frac{1}{4}$ of his total share to a partner. If the entire plot is valued at ₱12,000,000.00, what is the monetary value of the portion sold to the partner?

- A. ₱1,800,000.00
- B. ₱3,000,000.00
- C. ₱2,400,000.00
- D. ₱1,500,000.00

33. A master chef starts with a 10-kilogram container of imported flour. She uses $2\frac{1}{4}$ kg for pastries and twice that amount for artisanal bread loaves. How many kilograms of flour remain in the container?

- A. $3\frac{1}{4}$ kg
- B. $4\frac{1}{2}$ kg
- C. $5\frac{1}{2}$ kg
- D. $3\frac{1}{2}$ kg

34. A mechanical repair yard receives 48 liters of specialty lubricating oil. Mechanics consume $\frac{1}{3}$ of the oil for heavy truck maintenance and $\frac{1}{4}$ of the remaining oil for generators. How many liters of specialty oil are left unconsumed?

- A. 24 liters
- B. 16 liters
- C. 20 liters
- D. 32 liters

35. A student allocates $\frac{1}{3}$ of his daily allowance for transportation, $\frac{2}{5}$ for meals, and saves the remaining balance. If his total daily allowance is ₱150.00, how much money does he save each day?

- A. ₱40.00
- B. ₱110.00
- C. ₱50.00
- D. ₱35.00

36. Determine the final value when $5\frac{1}{3}$ is divided by $\frac{4}{9}$.

- A. 12
- B. $\frac{16}{27}$
- C. $10\frac{2}{3}$
- D. 14

37. Divide a whole number 12 by the mixed number $1\frac{1}{2}$. What is the simplified quotient?

- A. 8

- B. 18
- C. 6
- D. 9

38. Evaluate the quotient when $\frac{3}{5}$ is divided by $\frac{9}{10}$, reduced to its simplest fractional form.

- A. $\frac{2}{3}$
- B. $\frac{27}{50}$
- C. $1\frac{1}{2}$
- D. $\frac{4}{5}$

39. A warehouse supervisor must distribute $18\frac{3}{4}$ kg of industrial adhesive into smaller cans that hold exactly $\frac{3}{4}$ kg each. How many small cans can be filled to maximum capacity?

- A. 25 cans
- B. 24 cans
- C. 20 cans
- D. 15 cans

40. A container holds $6\frac{2}{3}$ liters of liquid fertilizer. If a gardener uses $\frac{5}{6}$ of a liter of this fertilizer per garden bed plot, how many complete plots can be treated using the contents of the container?

- A. 8 plots
- B. 10 plots
- C. 6 plots
- D. 9 plots

41. A long-distance athlete drinks $\frac{1}{4}$ liter of electrolyte fluid at every hydration station along a marathon route. If she consumes a total of $3\frac{1}{2}$ liters of fluid, how many hydration stations did she visit?

- A. 14 stations
- B. 12 stations
- C. 16 stations
- D. 10 stations

42. A timber beams supplier cuts a large wood log measuring $7\frac{1}{2}$ meters in length into structural blocks. Each block is $1\frac{1}{4}$ meters long. If each block is sold for ₱450.00, what is the total sales revenue generated from the log?

- A. ₱2,700.00
- B. ₱3,150.00
- C. ₱2,250.00
- D. ₱1,800.00

43. In a senior science laboratory, there are 18 desktop computers and 24 microscopes. What is the simplified part-to-part ratio of computers to microscopes?

- A. 3:4
- B. 4:3
- C. 3:7
- D. 4:7

44. A mixed community orchard contains 35 mango trees and 45 rambutan trees, making a total of 80 fruit trees. What is the simplified part-whole ratio of mango trees to the entire tree population?

- A. 7:16
- B. 7:9
- C. 9:16
- D. 5:16

45. The ratio of male engineers to female engineers in a construction firm is exactly 5:3. If the total number of engineers in the firm is 72, what fraction of the total engineer workforce is female?

- A. $\frac{3}{8}$
- B. $\frac{5}{8}$
- C. $\frac{3}{5}$
- D. $\frac{1}{3}$

46. Which of the following numerical ratio pairs represents a true set of equivalent ratios?

- A. 4:5 and 16:20
- B. 3:7 and 9:14
- C. 2:3 and 6:12
- D. 5:8 and 15:18

47. Find the missing term 'x' that satisfies the equivalent ratio proportion relationship $6:15 = 14:x$.

- A. $x = 35$
- B. $x = 30$
- C. $x = 28$
- D. $x = 45$

48. The ratio of the length to the width of a standard agricultural plot is 7:4. If the actual width of the plot is measured at 28 meters, what is the exact physical length of the plot?

- A. 49 meters
- B. 35 meters
- C. 56 meters
- D. 42 meters

49. A recipe for industrial food processing uses 3 cups of water for every 7 cups of concentrated juice base. If a technician uses 42 cups of concentrated juice base for a large batch, how many cups of water must be mixed?

- A. 18 cups
- B. 21 cups
- C. 14 cups
- D. 24 cups

50. In a local school council election, Candidate A and Candidate B received votes in the ratio of 5:8. If Candidate B won the election by a margin of 126 votes over Candidate A, how many total valid votes were cast in the election?

- A. 546 votes
- B. 336 votes
- C. 210 votes

D. 450 votes

DIAGNOSTIC TEST IN MATHEMATICS 6 - ANSWER KEY
(For Teacher's Institutional Use Only)

1. A	3. D	5. B	7. C	9. B
11. A	13. A	15. A	17. B	19. A
21. A	23. C	25. A	27. B	29. A
31. A	33. A	35. A	37. A	39. A
41. A	43. A	45. A	47. A	49. A
2. B	4. A	6. A	8. A	10. A
12. A	14. A	16. C	18. A	20. A
22. B	24. A	26. A	28. A	30. A
32. A	34. A	36. A	38. A	40. A
42. A	44. A	46. A	48. A	50. A