CHAPTER TEST: LINES AND ANGLES

Mathematics | Class IX (2026/LINANG/09/001)

Time: 1.5 Hours **Max. Marks: 40**

General Instructions:

1. All questions are compulsory.
2. Section A contains 8 MCQs (1 mark each).
3. Section B contains 4 Very Short Answer questions (2 marks each).
4. Section C contains 3 Short Answer questions (3 marks each).
5. Section D contains 2 Long Answer questions (5 marks each).
6. Section E contains 1 Case Study (5 marks total).

Section A (8 Marks)

1. If an angle is half of its complement, find the measure of the angle.

   (a) 30°

   (b) 45°

   (c) 60°

   (d) 90°

2. If two interior angles on the same side of a transversal intersecting two parallel lines are in the ratio $2 : 3$, then the greater of the two angles is:

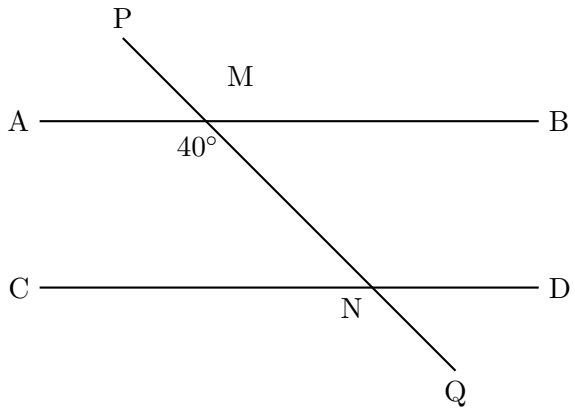
   (a) 54°

   (b) 108°

   (c) 120°

   (d) 136°

3. In the given figure, $AB \parallel CD$ and a transversal PQ intersects them at points M and N respectively. If $\angle AMN = 40^\circ$, find the value of $\angle MNC$. State the reason used at each step.



(a) $45°$

(b) $40°$

(c) $60°$

(d) $30°$

4. If a transversal intersects two parallel lines, then the bisectors of any two corresponding angles are:

   (a) Perpendicular

   (b) Parallel

   (c) Intersecting

   (d) None of these

5. An angle which is greater than $180°$ but less than $360°$ is called:

   (a) Acute angle

   (b) Obtuse angle

   (c) Reflex angle

   (d) Straight angle

6. If lines $l \parallel m$ and $m \parallel n$, then:

   (a) $l \parallel n$

   (b) $l \perp n$

   (c) l and n intersect

   (d) None of these

7. If the difference between two supplementary angles is $40°$, then the angles are:

   (a) $70°, 110°$

   (b) $60°, 100°$

   (c) $80°, 120°$

   (d) $50°, 90°$

8. The supplement of an angle is one-third of itself. The angle is:

   (a) $45°$

   (b) $135°$

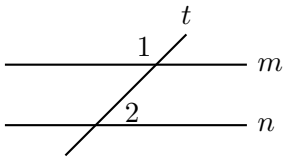
   (c) $145°$

   (d) $60°$

Section B (8 Marks)

1. Two lines AB and CD intersect at O. If $\angle AOC + \angle BOE = 70°$ and $\angle BOD = 40°$, find $\angle BOE$.

2. In the figure, prove that $m \parallel n$ if $\angle 1 = 60°$ and $\angle 2 = 120°$.



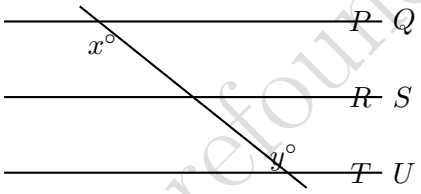
3. If the bisectors of a pair of corresponding angles formed by a transversal with two parallel lines are parallel, prove this property conceptually.

4. Find the value of x for which the lines l and m are parallel, given co-interior angles are $(2x - 10)^\circ$ and $(3x + 20)^\circ$.

Section C (9 Marks)

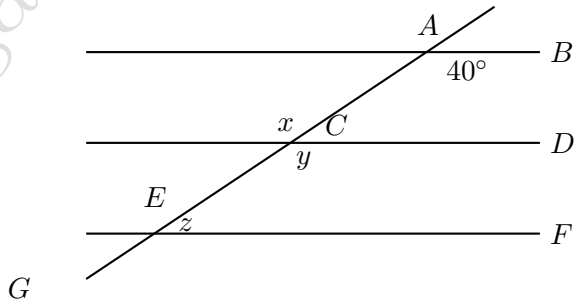
1. Prove that if a transversal intersects two lines such that a pair of alternate interior angles is equal, then the two lines are parallel.

2. In the figure below, $PQ \parallel RS \parallel TU$. A transversal intersects these lines, forming angles as shown. If the angles are related such that $x = 2y - 10$, find the value of x and y.



Section D (10 Marks)

1. In the figure, $AB \parallel CD \parallel EF$. A transversal AG intersects these parallel lines at points A, C, and E. If $\angle GAB = 40^\circ$, find the values of x, y, and z.



2. Theorem: Prove that the sum of the angles of a triangle is 180° using the concept of parallel lines and transversals. Draw a proper diagram to support your proof.

Section E (5 Marks)

1. **Case Study**
   In modern architectural design, slanted roofs are not just aesthetic choices but are functional for rain and snow drainage. An architect is designing a residential villa where the main roof

support consists of two parallel wooden beams, L_1 and L_2. A cross-beam T (transversal) is installed to provide structural stability, connecting the two parallel beams. To ensure the load is distributed evenly, the architect must ensure that the angles formed by the cross-beam are mathematically precise. If the interior angle formed by the cross-beam with the first wooden beam is $(2x + 10)^\circ$ and the alternate interior angle formed with the second beam is $(3x - 20)^\circ$, the entire stability of the truss depends on these calculations. Furthermore, the architect needs to consider the co-interior angles to prevent the wood from splitting under tension. These geometric principles of parallel lines and transversals are fundamental in ensuring that the villa remains safe for habitation for decades to come.

(a) Find the value of x.

(b) What is the measure of the alternate interior angle?

(c) What is the measure of the co-interior angle to the angle $(2x + 10)^\circ$?

(d) If the lines were not parallel, would the sum of co-interior angles necessarily be 180°?

(e) If the cross-beam was perpendicular to beam L_1, what would be the angle it makes with L_2?

***** End of Question Paper *****