#CRESTInnovator

CREST Mathematics Olympiad (CMO)
Worksheet for
Class 9

Topic

Euclid's Geometry Lines and Angles

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Worksheet on Euclid's Geometry Lines and Angles

1. **Which of the following axioms states that if a ray stands on a line, then the sum of the two adjacent angles so formed is 180° and the reverse is also true?**

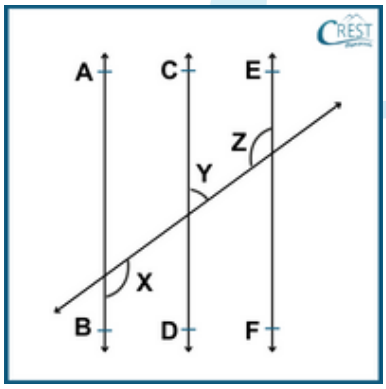
   a. Adjacent angles axiom
   b. Straight angles axiom
   c. Linear pair axiom
   d. Supplementary angles axiom

2. **Which of the following is NOT true for Euclid's postulates?**

   Postulate I: It is possible to draw a circle with any centre and diameter.
   Postulate II: A straight line can be drawn from any given point to another point.
   Postulate III: Lines that coincide with each other are equal.
   Postulate IV: There is only one line that goes through both of them if there are two different points.
   Postulate V: A terminated line can be extended infinitely.

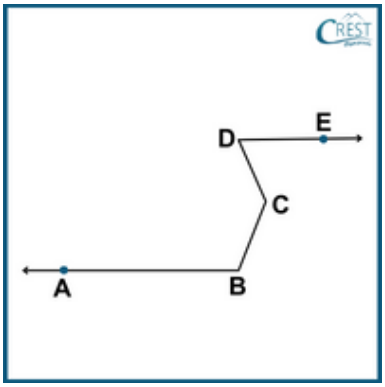
   a. Only I and II
   b. Only II and III
   c. Only III and IV
   d. Only III and IV

3. **What is the value of angle z if AB || CD || EF and the angle y is one-third of angle x?**



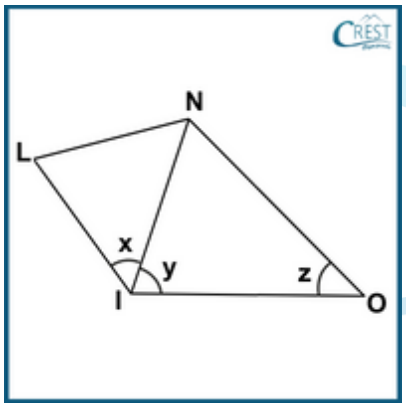
   a. 120°
   b. 128°
   c. 135°
   d. 144°

4. **Which of the following is true if AB || DE?**



a. ∠ABC + ∠BCD + ∠CDE = 180º
b. ∠ABC + ∠BCD − ∠CDE = 180º
c. ∠ABC + ∠BCD + ∠CDE = 270º
d. ∠ABC + ∠CDE − ∠BCD = 180º

5. **What is the value of x, y and z if LI is parallel to ON, angle x is three-sevenths of the angle y and angle y is 1 $\frac{2}{5}$ times of angle z?**



a. ∠x = 36°; ∠y = 72°; ∠z = 45°
b. ∠x = 36°; ∠y = 72°; ∠z = 60°
c. ∠x = 36°; ∠y = 84°; ∠z = 45°
d. ∠x = 36°; ∠y = 84°; ∠z = 60°

Answer Key

1. c - Linear pair axiom

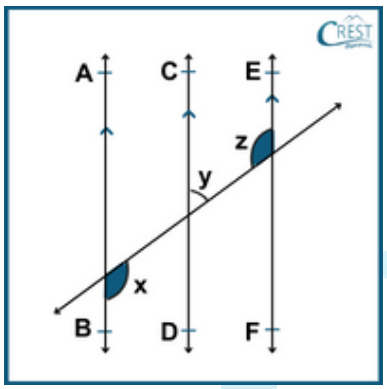
Explanation: If a ray stands on a line, then the sum of the two adjacent angles so formed is 180° and the reverse is also true. This property is known as the linear pair axiom.

2. c - Only III and IV

Explanation: III and IV are Euclid's axioms, not postulates.

3. c - 135°

Explanation: In the given figure, x and z are alternate angles (AB || EF) and y and z are co-interior angles (CD || EF).

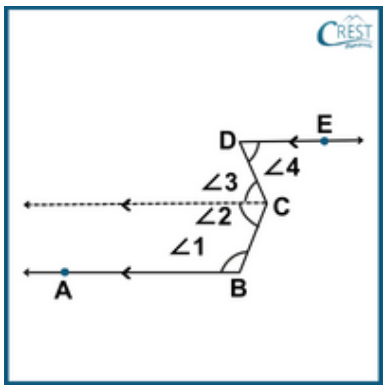


∠x = ∠z (alternate angles, AB || EF)

According to the question, ∠y = 1/3 ∠x
⇒∠y = ⅓ ∠z
∠y + ∠z = 180° (co-interior angles, CD || EF)
⇒ ⅓ ∠z + ∠z = 180°
⇒ 4/3 ∠z = 180°
⇒ ∠z = 180° × 3/4
∴ ∠z = 135°
Hence, ∠x = ∠z = 135°

4. b - ∠ABC + ∠BCD − ∠CDE = 180°

Explanation: Draw a line CF through point C, making it parallel to both AB and DE. Hence, AB || CF || DE. BC and CD are transversals.
The labelled diagram is shown as:



∠1 + ∠2 = 180° (Co-interior angles, AB || CF) ……(i)
∠3 = ∠4 (Alternate angles, CF || DE) ……(ii)
Adding (i) and (ii), we get:
∠1 + ∠2 + ∠3 = 180° + ∠4
⇒ ∠1 + (∠2 + ∠3) = 180° + ∠4
⇒ ∠ABC + ∠BCD = 180° + ∠CDE
∴ ∠ABC + ∠BCD − ∠CDE = 180º

5. d - ∠x = 36°; ∠y = 84°; ∠z = 60°

Explanation: Angle x is three-sevenths of the angle y.
⇒ ∠x = 3/7 × ∠y
Angle y is 1 ⅖ times of angle z.
⇒ ∠y = 1 ⅖ × ∠z
⇒ ∠y = 7/5 × ∠z
∴ ∠z = 5/7 × ∠y
∠x + ∠y + ∠z = 180° (Co-interior angles, LI || ON)
⇒ (3/7 × ∠y) + ∠y + (5/7 × ∠y) = 180° [Put values of ∠x and ∠z in terms of ∠y]
⇒ (3/7 + 1 + 5/7) × ∠y = 180° [Take ∠y as common]
⇒ (3 + 7 + 5)/7 × ∠y = 180° [Take LCM as 7]
⇒ 15/7 × ∠y = 180°
⇒ ∠y = 180° × 7/15
∴ ∠y = 84°
∠x = 3/7 × ∠y
⇒ ∠x = 3/7 × 84°
∴ ∠x = 36°
∠z = 5/7 × ∠y
⇒ ∠z = 5/7 × 84°
∴ ∠z = 60°

More Questions Coming Soon – Keep Learning!

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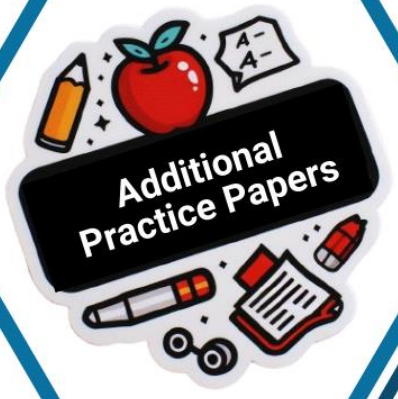

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