Grade IX

Lesson : 5 INTRODUCTION TO EUCLID'S GEOMETRY

Objective Type Questions

I. Multiple choice questions

1. Difference between 'Postulate' and 'axiom' is

   a) there is no difference

   b) few statements are termed as axiom other postulates

   c) 'postulates' are the assumptions used especially for geometry and 'axioms' are the assumption used throughout mathematics.

   d) none of these

   Sol : (c)

2. For every line 'l' and a point P not lying on it. The number of lines that passes through P and parallel to 'l' are

   a) 2 b) 1 c) no line d) 3

   Sol : (b)

3. Mehul is of same age as Tanya. Charis is also of same age as Tanya. The Euclid's axiom that illustrates the relative age of Mehul and Charis is

   a) first Axiom b) second Axiom c) third Axiom d) fourth Axiom

   Sol: The Euclid's axiom that illustrates the relative age of Mehul and Charis is. "the things which are equal to the same thing are equal to one another", which is Euclid's first axiom.

   $\therefore Correctoption\ is\ (a)$

4. To solve theequation a – 20 = 15, we use Euclid's …… axiom.

   a) first b) second c) third d) fourth

   Sol : To solve the equation a – 20 = 15, we add 20 on both sides. Thus

$a - 20 + 20 = 15 + 20$

$\Rightarrow \quad a = 35$

Here, we use Euclid's axiom, "If equals are added to the equals, the wholes are equal", which is Euclid's second axiom

$\therefore Correctoption\ is\ (b)$

5. Proved statement based on deductive reasoning by using postulates and axiom is known as a

   a) statement only b) proposition c) theorem d) Both (b) and (c)

   Sol : (d)

6. If straight line falling on two straight lines makes the interior angles on the same side of it. Whose sum is 120^0, then the two straight lines, if produced indefinitely, meet on the side on which the sum of angles is [NCERT Exemplar]

   a) less than 120^0, b) greater than 120^0, c) equal to 120^0, d) greater than 180^0,

   Sol : (c)

7. Area of rectangle is equal to area of triangle and area of triangle is $25\ cm^2$. Find the area of square whose area is equal to area of rectangle.

   Sol: Since the things which are equal to the same thing are equal to one another, So, the area of square $25\ cm^2$,

8. A line cannot be added to a rectangle nor can an angle be compared with the hexagon. What do you conclude?

   Sol: Magnitude of same kind can be compared and added but magnitude of different kinds cannot be compared.

9. Every thing equal itself, What does it justify?

   Sol : If two things are same, then they are equal. It is the justification of principle of superposition.

10. How many common points do two distinct lines have?

    Sol: Two distinct lines cannot have more than one point in common

11. Let $\angle A = \angle B$ and $\angle B = \angle C$. State the Euclid's axiom according to which relation between $\angle A$ and $\angle C$ is established?

Sol: Euclid's axiom is "Things which are equal to same thing are equal to one another".

I. Short answer type questions

1. Which of the following statements are true and which are false? Justify your answer.

(i) If two circles are equal, then their radii are unequal.

(ii) Given two distinct points, there is a unique line that passes through them.

Sol: (i) False: If two circles superimpose exactly on one another, then they coincide. So their centres and region bounded by their boundaries must also coincide. Therefore, their radii will also be coincide. Hence equal circles have equal radii.

(ii) True: Only one line can be passed through two distinct points.

2. It is known that $p + q = 6$ and $p = r$. Show that $r + q = 6$.

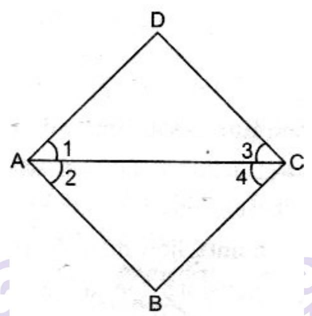
Sol: Given $p + q = 6$ and $p = r$

So, from Euclid's axiom, that if equals are added to equals, the wholes are equal.

Therefore, we get $p + q = r + q$

$\Rightarrow$ $r + q = 6$ Hence proved.

3. **In the given figure, if $\angle 2 = \angle 4$ and $\angle 4 = \angle 1$, then prove that $\angle 1 = \angle 2$**

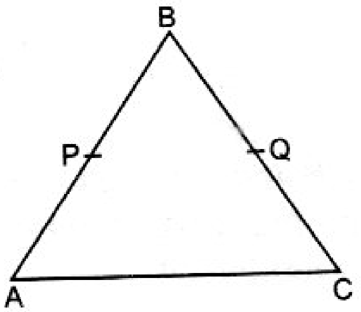


Sol. Given : $\angle 2 = \angle 4$ and $\angle 4 = \angle 1$ using Euclid's axiom, things which are equal to the same thing are equal to one another.

Hence, $\angle 2 = \angle 4 = \angle 1$

$\Rightarrow$ $\angle 1 = \angle 2$ Hence proved.

4. **In the given figure, if AB = BC and AP = CQ, then prove that BP = BQ**



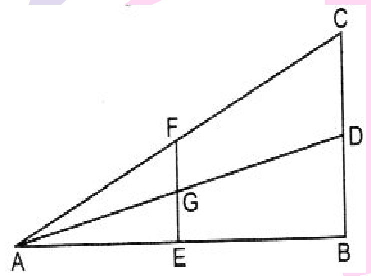
Sol: Given	AB = BC	........(i)
and	AP = CQ	........(ii)

According to Euclid's axiom, if equals are subtracted from equals, the remainders are equal.

AB – AP = BC – CQ [Given AP = CQ]

$\Rightarrow$ BP = BQ Hence proved.

5. **By using Euclid's axioms, complete the following statements with the name of straight line from the figure.**



(i) If AE is subtracted from AB, then AB – AE = ____________

(ii) If GE is added to FG, then result is equal to= ____________

(iii) If GD is added to AG, the whole is equal to = ____________

(iv) If AF is subtracted from AC, the remainder is equal to = ____________

Sol. (i) EB (ii) FE (iii) AD (iv) CF

6. Solve the equation, x – 10 = 25 and state which axiom do you use here.

Sol : $x - 10 = 25$

On adding 10 both sides, we have

$x - 10 + 10 = 25 + 10 \implies x = 35$

Here, we use Euclid axiom, "If equal be added to the equal, the whole are equal."

7. Ram and Ravi have the same weight. If they each gain weight by 2kg. How will there new weights be compared? [NCERT Exemplar]

Sol: Let the weight of Ram and Ravi be x kg each On gaining 2kg weight, new weight of Ram and Ravi = (x+2) kg.

But according to Euclid's axiom, the wholes are equal. So, weight of Ram and Ravi are again equal.

8. Prove that every line segment has one and only one mid-point on it.

Sol : Let R is the mid-point of PQ, such that PR = QR.

To prove: PQ has one and only one mid-point R.

Proof: Let T be the mid-point of PQ other than R, then

$PR = \frac{1}{2}PQ \implies PT = \frac{1}{2}PQ$

Therefore PR = PT

Which possible only when R and T coincide with each other.

Hence proved.

9. **In the given figure PR = QS, then show that PQ = RS. Name the mathematician whose postulate / axiom is used for the same. [CBSE 2014,15]**

Sol : PR = QS

Subtracting QR on both sides, we have

$\Rightarrow$ PR – QR = QS – QR $\Rightarrow$ PQ = RS

We used here Euclid's axiom to prove the result which states that if equals are subtracted from equals, then remainders are equal.