

## Introduction to Euclid's Geometry

## 1. OBJECTIVE QUESTIONS

1. A solid has  
 (a) no dimension (b) one-dimension  
 (c) two-dimensions (d) three-dimensions

Ans : (d) three-dimensions

A solid is always in three dimensions, surface in two dimensions, line in one dimension.

2. The first known proof that 'the circle is bisected by its diameter' was given by  
 (a) Pythagoras (b) Thales  
 (c) Euclid (d) None of these

Ans : (b) Thales

3. A point is defined as  
 (a) that which has no length no breadth no height  
 (b) small part of a line with no length  
 (c) no dimension, but represented by dot only  
 (d) undefined term, represented by a dot

Ans : (d) undefined term, represented by a dot

4. According to Euclid's definition, the ends of a line are  
 (a) breadth less (b) points  
 (c) length less (d) None of these

Ans : (b) points

By definitions given by Euclid, line ends in points.

5. Axioms are assumed:  
 (a) universal truths in all branches of mathematics  
 (b) theorems  
 (c) definitions  
 (d) universal truth specific to geometry

Ans : (a) universal truths in all branches of mathematics

6. 'Lines are parallel if they do not intersect' is stated in the form of:  
 (a) a postulate (b) a definition  
 (c) an axiom (d) a proof

Ans : (a) a postulate

7. It is known that if  $x + y = 10$ , then  $x + y + z = 10 + z$ . The Euclid's axiom that illustrates this statement is:  
 (a) first axiom (b) second axiom

- (c) third axiom (d) fourth axiom

Ans : (b) second axiom

8. Which of the following needs a proof?  
 (a) Postulates (b) Definition  
 (c) Proposition (d) Axiom

Ans : (c) Proposition

Postulates are the universal truths specific to geometry. Axiom are also universal truths. These truths need not to be proved. Definitions also does not require proof. Only propositions or theorems can be proved using axioms, postulates and definitions.

9. If a point  $C$  lies between two point  $A$  and  $B$  such that  $AC = BC$ , then



- (a)  $AC = AB$  (b)  $AC = \frac{1}{2}AB$   
 (c)  $AB = \frac{1}{2}AC$  (d)  $AC = \frac{1}{3}AB$

Ans : (b)  $AC = \frac{1}{2}AB$

If  $AC = BC$

Then,  $C$  is a midpoint of  $AB$ .

and  $AC = \frac{1}{2}AB$

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10. Two distinct intersecting lines  $l$  and  $m$  cannot have  
 (a) any point in common (b) one point in common  
 (c) two points in common (d) None of these

Ans : (c) two points in common

Two distinct intersecting lines can have almost one point in common. If they have more than one points in common then they coincide with each other.

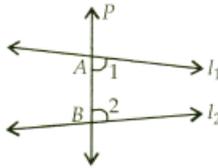


11. Which of the following is not an undefined term?  
 (a) line (b) angle  
 (c) plane (d) point

Ans : (b) angle

Other than 'angle', the terms line, plane and point are not undefined.

12. In the given figure, if  $\angle 1 + \angle 2 < 180^\circ$ , then  $l_1$  and  $l_2$  will eventually meet at



- (a) right side of  $AB$
- (b) left side of  $AB$
- (c) either side of  $AB$
- (d) will never meet

Ans : (a) right side of  $AB$

By Euclid postulates if  $\angle 1 + \angle 2 < 180^\circ$ , the lines will eventually intersect at the point on the side of  $\angle 1$  and  $\angle 2$ .

13. Difference between 'postulate' and 'axiom' is

- (a) there is no difference
- (b) few statements are termed as axioms and other as postulates
- (c) 'postulates' are the assumptions used specially for geometry and 'axioms' are the assumptions used throughout mathematics.
- (d) None of these

Ans : (c) 'postulates' are the assumptions used specially for geometry and 'axioms' are the assumptions used throughout mathematics.

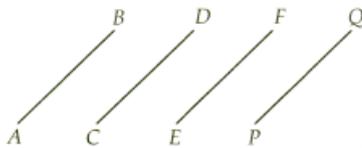
14. Axioms are

- (a) universal truths in all branches of Mathematics
- (b) universal truths specific to geometry
- (c) theorems
- (d) definitions

Ans : (a) universal truths in all branches of Mathematics

Axioms are universal truths in all branches of Mathematics.

15. If  $AB = CD$ ,  $CD = EF$  and  $EF = PQ$  then which one of the following is not true?



- (a)  $AB = PQ$
- (b)  $CD = PQ$
- (c)  $AB = EF$
- (d)  $AB \neq CD$

Ans : (d)  $AB \neq CD$

Using Axiom, things which are equal to same thing are equal.

We get,  $AB = CD = EF = PQ$   
 $AB \neq CD$  is not true.

16. Euclid's axiom 1 is

- (a) Things which are equal to the same thing are equal to one another.
- (b) If equals are added to equals, the wholes are equal.
- (c) Given two distinct points, there is a unique line

that passes through them.

- (d) None of these

Ans : (a) Things which are equal to the same thing are equal to one another.

Euclid's Axiom 1 : 'Things equal to same thing are equal to each other.'

17. Euclid's axiom 5 is

- (a) The things which coincide with one another are equal.
- (b) If equals are subtracted from equals, the remainders are equal.
- (c) The whole is greater than the part.
- (d) None of these

Ans : (c) The whole is greater than the part.

Euclid's Axiom 5 : 'The whole is greater than the part.'

18. For every line 'l' and a point P not lying on it, the number of lines that pass through P and parallel to 'l' are

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

Ans : (b) 1

19. Greeks emphasised on:

- (a) deductive reasoning
- (b) inductive reasoning
- (c) practical use of geometry
- (d) infinitely many solutions

Ans : (c) practical use of geometry

20. Which of the following needs a proof?

- (a) Axiom
- (b) Theorem
- (c) Postulate
- (d) Definition

Ans : (c) Postulate

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21. Euclid's Postulate 1 is

- (a) A straight line may be drawn from any point to any other point.
- (b) A terminated line can be produced indefinitely.
- (c) All right angles are equal to one another.
- (d) None of these

Ans : (a) A straight line may be drawn from any point to any other point.

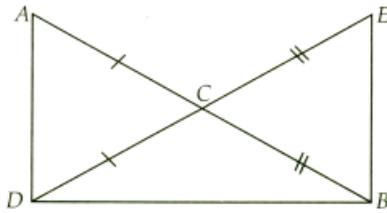
Euclid's Postulate 1 : 'A straight line may be drawn from any point to any other point.'

22. The word geometry comes from the Greek word 'geo' and 'meterrion' which means

- (a) 'Geography' and 'meter'
- (b) 'Globe' and 'meter'
- (c) 'Go' and 'to measure'
- (d) 'Earth' and 'to measure'

Ans : (d) 'Earth' and 'to measure'

23. In the given figure,  $AC = DC$  and  $CB = CE$ . Using an Euclid's axiom, we have



- (a)  $AB = 2DE$
- (b)  $AB = DE$
- (c)  $AD = BE$
- (d) None of these

Ans : (b)  $AB = DE$

We have,  $AC = DC$  and  $CB = CE$   
By using Euclid's axiom 2, if equals are added to equals, then wholes are equal.

$$AC + CB = DC + CE$$

$$AB = DE$$

24. Priya and Pooja have the same amount of money. If each gets ₹4000 more, how will their new amounts be compared?

- (a) Amount with Priya is less than that with Pooja
- (b) Amount with Pooja is less than that with Priya
- (c) Both have same amount of money
- (d) None of these

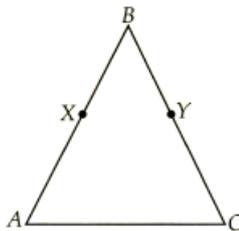
Ans : (c) Both have same amount of money

Let ₹  $x$  be the money each of Priya and Pooja had. Priya and Pooja will have amount ₹  $(x + 4000)$  each after adding ₹ 4000.

According to Euclid's second axiom, when equals are added to equals, the wholes are equal.

So, Priya and Pooja again have equal amount of money.

25. In the given figure, if  $AB = BC$  and  $BX = BY$ , then



- (a)  $AX = CY$
- (b)  $AC = XY$
- (c)  $AY = CX$
- (d) none of these

Ans : (a)  $AX = CY$

Given that,  $AB = BC$  and  $BX = BY$   
By using Euclid's axiom 3, if equal are subtracted from equals, then the remainders are equal.

$$AB - BX = BC - BY$$

$$AX = CY$$

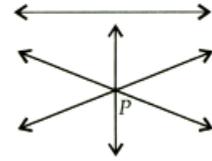
26. For every line  $l$  and for every point  $P$  (not on  $l$ ), there does not exist a unique line through  $P$

- (a) Which is not parallel to  $l$ .

- (b) Which is perpendicular to  $l$ .
- (c) Which is coincident with  $l$ .
- (d) None of these

Ans : (a) Which is not parallel to  $l$ .

There can be infinite lines that can be drawn through  $P$  not  $\parallel$  to  $l$  but there exist a unique line through  $P$  which is parallel to  $l$ .



27. If a point  $A$  lies in between  $B$  and  $C$ , then

- (a)  $BC = \frac{1}{2}AC$
- (b)  $AC = 2 \cdot BC$
- (c)  $AC = BC$
- (d)  $AB + AC = BC$

Ans : (d)  $AB + AC = BC$

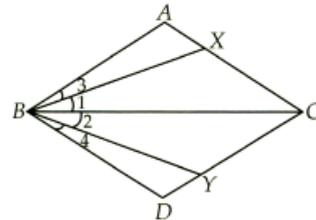
$A$  lies in between  $B$  and  $C$  then  $BC$  coincides with  $BA + AC$



$$BC = BA + AC$$

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28. In the give figure, we have  $\angle 1 = \angle 2, \angle 3 = \angle 4$ . Then.



- (a)  $\angle ABC = \angle DBC$
- (b)  $\angle ABC \neq \angle DBC$
- (c)  $\angle BAX = \angle BXC$
- (d) none of these.

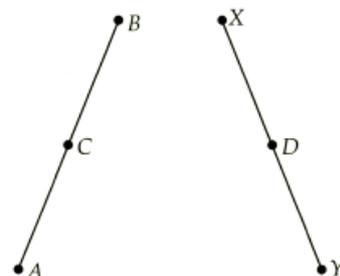
Ans : (a)  $\angle ABC = \angle DBC$

Here,  $\angle 1 = \angle 2$  and  $\angle 3 = \angle 4$ . By using Euclid's Axiom 2, if equals are added to equals, then the wholes are equal.

$$\angle 1 + \angle 3 = \angle 2 + \angle 4$$

$$\angle ABC = \angle DBC$$

29. In the given figure,  $AC = XD, C$  is mid-point of  $AB$  And  $D$  is mid-point of  $XY$ . Using an Euclid's axiom, we have



- (a)  $AB = XY$
- (b)  $AX = BC$
- (c)  $BY = AC$
- (d) none of these

Ans : (a)  $AB = XY$

$C$  is the mid-point of  $AB$

$$AB = 2AC$$

Also,  $D$  is the mid-point of  $XY$

$$XY = 2XD$$

By Euclid's sixth axiom "Things which are double of same things are equal to one another."

$$AC = XD$$

$$2AC = 2XD$$

$$AB = XY$$

30. Two distinct lines  
 (a) always intersect.  
 (b) always either intersect or are parallel.  
 (c) always have two common points.  
 (d) are always parallel.

Ans : (b) always either intersect or are parallel.

Two distinct lines can either intersect or parallel. It may be possible that point of intersection is either 1 or infinite which means they coincide.

## 2. FILL IN THE BLANK

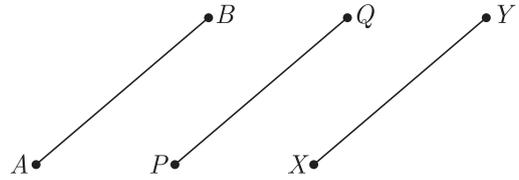
**DIRECTION :** Complete the following statements with an appropriate word/term to be filled in the blank space(s).

- ..... are the assumptions which are obvious universal truths.  
 Ans : Axioms
- Lines which are parallel to the same line are ..... to each other.  
 Ans : parallel
- Two distinct intersecting lines cannot be ..... the same line.  
 Ans : parallel
- Things which are double of the same things are ..... one another.  
 Ans : equal
- Things which are equal to the same thing are ..... to one another.  
 Ans : equal
- If equals are subtracted from equals, the remainder are .....  
 Ans : equal
- For every line  $l$  and for every point  $P$  not lying on  $l$ , there exists a unique line  $m$  passing through  $P$  and parallel to .....  
 Ans :  $l$

## 3. TRUE/FALSE

**DIRECTION :** Read the following statements and write your answer as true or false.

1. In figure, if  $AB = PQ$  and  $PQ = XY$ , then  $AB = XY$ .



Ans : True

2. A terminated line can be produced indefinitely on both the sides.

Ans : True

3. A line segment has one end-point only.

Ans : False

4. Only one line can pass through a single point.

Ans : False

5. There are an infinite number of lines which pass through two distinct points.

Ans : False

6. If two circles are equal, then their radii are equal.

Ans : True

## 4. MATCHING QUESTIONS

**DIRECTION :** In the section, each question has two matching lists. Choices for the correct combination of elements from Column-I and Column-II are given as options (a), (b), (c) and (d) out of which one is correct.

1. Match the following :

Column-I		Column-II	
(P)	Postulate 1	(1)	A terminated line can be produced indefinitely.
(Q)	Postulate 2	(2)	All right angles are equal to one another.
(R)	Postulate 3	(3)	A straight line may be drawn from any one point to any other point.
(S)	Postulate 4	(4)	A circle can be drawn with any centre and any radius.

	P	Q	R	S
(a)	1	3	2	4
(b)	4	3	2	1

	P	Q	R	S
(c)	3	1	4	2
(d)	3	4	1	2

Ans : (c) P – 3, Q – 1, R – 4, S – 2

2. Match the following :

Column-I		Column-II	
(P)	Only one line can pass through	(1)	one point
(Q)	Infinite number of lines can pass through	(2)	common
(R)	Two distinct lines can not have more than one point in	(3)	two points
(S)	Two distinct points always determine	(4)	a line

	P	Q	R	S
(a)	1	4	3	2
(b)	3	1	2	4
(c)	3	2	1	4
(d)	4	2	1	3

Ans : (b) P – 3, Q – 1, R – 2, S – 4

3. Match the following :

Column-I		Column-II	
(P)	A point	(1)	has length and breadth
(Q)	A line	(2)	has no part
(R)	A surface	(3)	has breadth less length
(S)	Ends of a line segment	(4)	points

	P	Q	R	S
(a)	4	2	3	1
(b)	2	4	3	1
(c)	1	4	3	2
(d)	2	3	1	4

Ans : (d) P – 2, Q – 3, R – 1, S – 4

## 5. ASSERTION AND REASON

**DIRECTION :** In each of the following questions, a statement of Assertion is given followed by a corresponding statement of Reason just below it. Of the statements, mark the correct answer as

- (a) Both assertion and reason are true and reason is the correct explanation of assertion.
- (b) Both assertion and reason are true but reason is

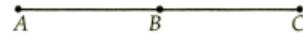
not the correct explanation of assertion.

- (c) Assertion is true but reason is false.
- (d) Assertion is false but reason is true.

1. **Assertion :** Given two distinct points, there is a unique line that passes through them.

**Reason :** If  $A, B$  and  $C$  are three points on a line and  $B$  lies between  $A$  and  $C$  then  $AB + BC = AC$ .

Ans : (b) Both assertion and reason are true but reason is not the correct explanation of assertion.



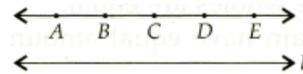
$$AB + BC = AC$$

2. **Assertion :** If lines  $AB, AC, AD$  and  $AE$  are parallel to line  $l$ , the point  $A, B, C, D, E$  are collinear.

**Reason :** One and only one line can be drawn through  $A$  and parallel to  $l$ .

Ans : (a) Both assertion and reason are true and reason is the correct explanation of assertion.

Through a point not on the line  $l$ , one and only one line can be parallel to  $l$ .



So through  $A; AB, AC, AD$  and  $AE$  are all parallel to  $l$  means they all should coincide.

$A, B, C, D, E$  should be collinear.

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