# Solutions
# Grade 9 Maths
# Chapter 7: Introduction to Euclid's Geometry

## Exercise 1.1

Q1. Define the following terms:

(i) Line segment

(ii) Collinear points

(ii) Parallel lines

(iv) Intersecting lines

(v) Concurrent lines

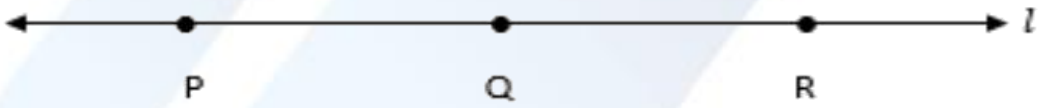
(vi) Ray

(vii) Half-line

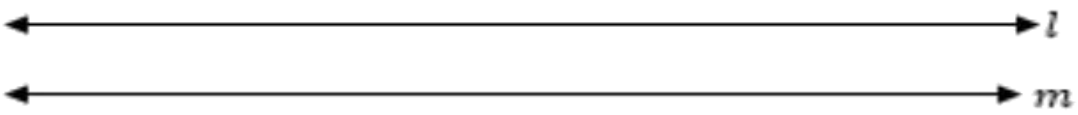
**Solution:**

(i) Given two points P and Q on a line $l$, the segment of line with end points P and Q, is called the line segment PQ. The line segment PQ has fixed length. Line segment PQ is denoted by PQ.


(ii) Three or more points P, Q and R are said to be collinear if they lie on a single straight line.

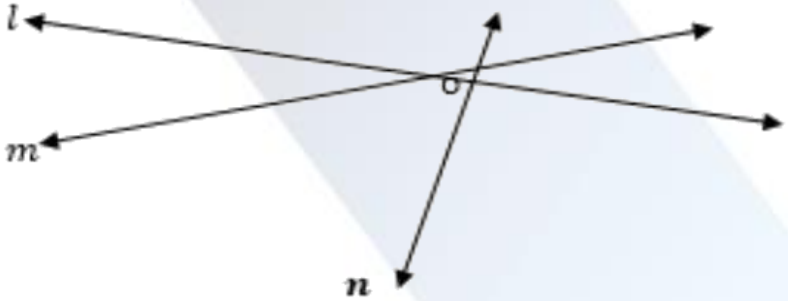



(iii) Parallel lines are lines in a plane which do not meet; that is, two lines in a plane that do not intersect or touch each other at any point are said to be parallel lines. Parallel lines are denoted by $l$||m



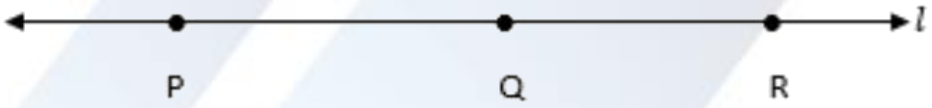
(iv) Two lines are intersecting if they have a common point. The common point is called the point of intersection.


(v) When three or more lines in a plane or higher-dimensional space are said to be concurrent if they intersect at a single point.




(vi) A ray is a line with a single endpoint (or point of origin) that extends infinitely in one direction.

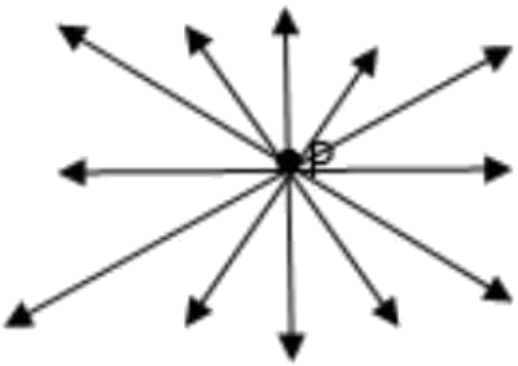
(vii) If P, Q and R be the points on a line $l$, such that Q lies between P and R , and if we remove the poiny Q from the line $l$, the two parts of the line that remains are each called a half line.




Q2. (A) How many lines can pass through a given point?

**Solution:**

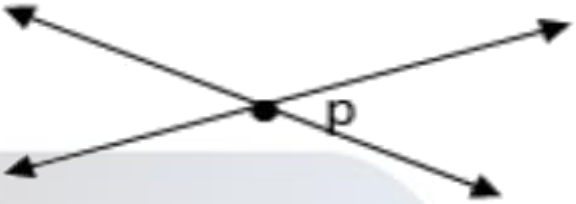
Infinitely Many



(B) In how many points can two distinct lines at the most intersect?

**Solution:**

One point only




Q3. (A) Given two points $P$ and $Q$, find how many line segments do they determine.

**Solution:**

One


(B) Name the line segments determined by the three collinear points P, Q and R.

**Solution:**

Line segments are: $\overline{PQ}$, $\overline{QR}$ and $\overline{PR}$

Q4. Write the truth value (T/F) of each of the following statements:

(i) Two lines intersect in a point.

(ii) Two lines may intersect in two points.

(iii) A segment has no length.

(iv)Two distinct points always determine a line.

(v) Every ray has a finite length.

(vi) A ray has one end point only.

(vii) A segment has one end point only.

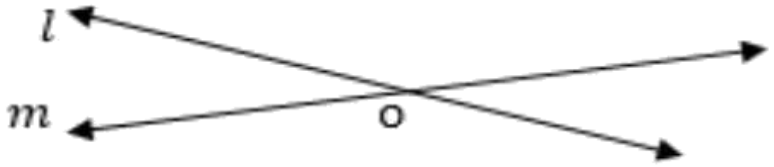
(viii) The ray $AB$ is same as ray $BA$.

(ix) Only a single line may pass through a given point.

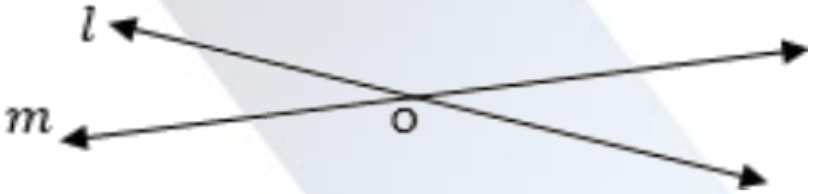
(x) Two lines are coincident if they have only one point in common.

**Solution:**

(i) True




(ii) False




Two lines intersect at one point only.

(iii) False


A line segment has fixed length.

(iv) True

(v) False

(vi) True

(vii) False

A segment has two end points

(viii) False

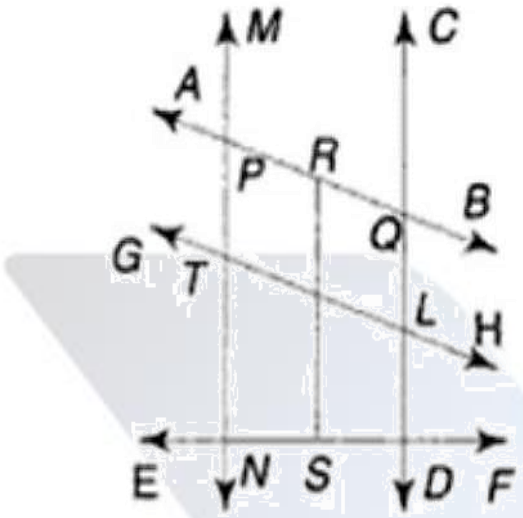
(ix) False

Infinite number of lines can pass through a point

(x) False

Two coincident lines have infinite number of points in common

Q5. In Fig. 7.17, name the following:




(i) Five line segments.

(ii) Five rays.

(iii) Four collinear points.

(iv) Two pairs of non-intersecting line segments.

**Solution:**

(i) Five line segments are: $\overline{PQ}$, $\overline{PN}$, $\overline{RS}$, $\overline{ND}$, $\overline{TL}$

(ii) Five rays are: ray QC, ray PM, ray RB, ray DF, ray LH

(iii) Four Collinear points are: PRQ, PTN, QLD, NSD

(iv) Two pairs of non-intersecting line segments are: PN, RS and PQ, TL

Q6. Fill in the blanks so as to make the following statements true.

(i) Two distinct points in a plane determine a……line.

(ii) Two distinct……in a plane cannot have more than one point in common.

(iii) Given a line and a point, not on the line, there is one and only……line which passes through the given point and is……To the given line.

(iv) A line separates a plane into……parts namely the……The itself.

**Solution:**

(i) Unique

(ii) Lines

(iii) Perpendicular; Perpendicular

(iv) Three, two half planes, line

## CCE - Formative Assessment

Q1. How many least number of distinct points determine a unique line?

**Solution:**

Two


At least two numbers of distinct points determine a unique line.

Q2. How many lines can be drawn through both of the given points?

**Solution:**

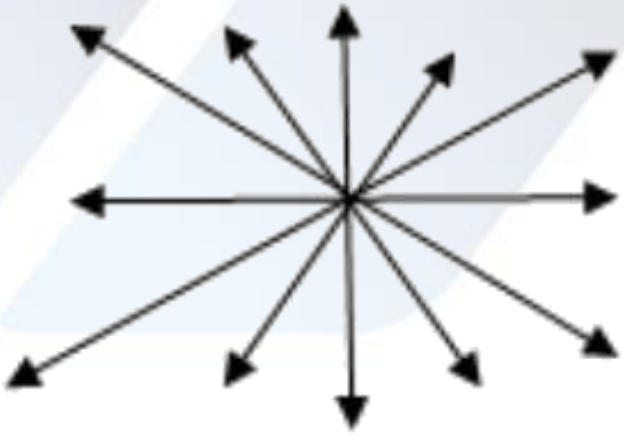
One


As shown above only one line can be drawn through both of the given points.

Q3. How many lines can be drawn through a given point.

**Solution:**

Infinitely many

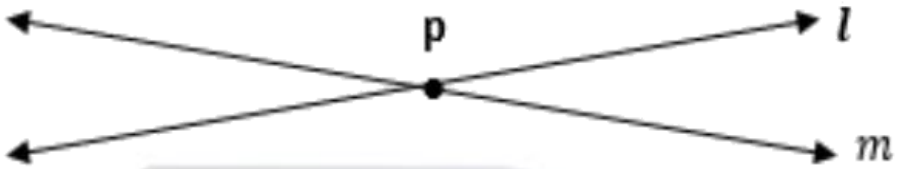


As shown above from a given point infinite lines can be drawn.

Q4. In how many points two distinct lines can intersect?

**Solution:**

One




As shown in the fig only at one point two distinct lines can intersect.

Q5. In how many points a line, not in a plane, can intersect the plane?

**Solution:**

One

If a line intersects a plane that does not contain it, then it intersects the plane in exactly one point.

Q6. In how many points two distinct planes can intersect?

**Solution:**

Infinite

Two planes always intersect in a line if they are not parallel. Therefore there will be infinite points of intersection for two planes.

Q7. In how many lines two distinct planes can intersect.

**Solution:**

One

It is this property which makes the plane "flat." Two distinct lines intersect in at most one point whereas two distinct planes intersect in at most one line. If two coplanar lines do not intersect then they are parallel.

Q8. How many least numbers of distinct points determine a unique plane?

**Solution:**

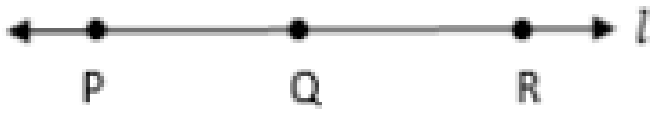
Three non-collinear points

A set of three non-collinear points determine a unique plane.

Q9. Given three distinct points in a plane, how many lines can be drawn by joining them?

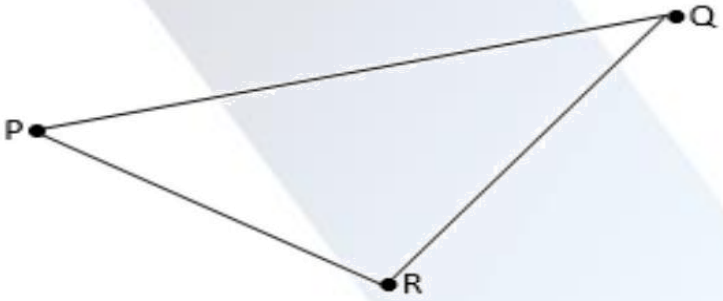
**Solution:**

One if they are collinear and three if they are non-collinear




For Collinear Points:

For three non-collinear points:




As shown in the above figures only one line can be drawn if three points are collinear and three lines can be drawn if three points are non-collinear.

Q10. How many planes can be made to pass through a line and a point not on the line?

**Solution:**

One

Only one plane can be made to pass through a line and a point not on the line.

Q11. How many planes can be made to pass through two points?

**Solution:**

Infinite

Any two distinct points in three dimensional spaces determine a unique line in three dimensional space. This line has infinitely many planes that contain it. And also the two given points.

Q12. How many planes can be made to pass through three distinct points?

**Solution:**

Infinite if they are collinear and only one if they are non-collinear

Infinite planes can pass through three collinear points and only one plane can pass through three noncollinear points.