Mathematics NCERT Grade 6, Chapter 4: **Basic Geometrical Ideas**- This chapter will interact about some interesting facts that will help students to know more about the **shapes** around them. The chapter begins with **Points** followed by **A Line Segment**.

- A **point** determines a location. It is usually denoted by capital letters.
- A **line segment** corresponds to the **shortest distance between two points**.

Discussion about the concept of **Line, Intersecting lines, Parallel lines** is also done in the chapter- **Basic Geometrical Ideas**.

- Two **distinct lines** meeting at a **point** are called **intersecting lines**.
- Two **lines** in a **plane** are said to be **parallel** if they do not meet.

After that, the chapter talks about **ray, curves,** and **polygons**.

- A **ray** is a portion of the **line** starting at a point and going in one direction endlessly.
- Any drawing done without lifting the pencil may be called a **curve.**
- A **curve** is said to be closed if its ends are joined; otherwise, it is said to be open.
- A **polygon** is a simple closed curve made up of **line segments.**
- The concept of **vertex, vertices, adjacent sides, diagonals** is explained.

The next topic discussed is **angles**, terms associated with it like **vertex, arms, sides** etc. Not only this, one will come across how to identify the **interior** and **exterior of the angle**.

- An **angle** is made up of two **rays** starting from a **common starting/initial points.**

Later, **triangles, quadrilaterals,** and **circles** are explained in detail with the help of examples and required diagrams.

- A **triangle** is a **three-sided polygon**.
- A **quadrilateral** is a **four-sided polygon**. Different terms associated with quadrilateral also needs to be studied like **opposite sides and angles**, **adjacent sides** and **adjacent angles**.
- A **circle** is a path of a point moving at the **same distance from a fixed point.**
- A region in the interior of a **circle** enclosed by an **arc** on one side and a pair of **radii** on the other two sides is called a **sector.**
- A region in the **interior of a circle** enclosed by a **chord** and an **arc** is called a **segment** of the **circle.**
- The distance around a circle is its **circumference**.
- A **diameter** of a **circle** divides it into two equal parts; each part is a **semi-circle.**

Key points of the chapter **Basic geometrical ideas** are discussed in the end.

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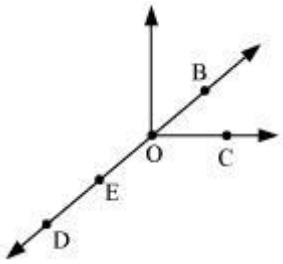
Question 1:

Use the figure to name:



(a) Five points

(b) A line

(c) Four rays

(d) Five line segments

ANSWER:

(a) The five points are D, E, O, B, and C.

(b) $\overleftrightarrow{BD}$

(c) $\overrightarrow{OD}, \overrightarrow{OB}, \overrightarrow{OC}, \overrightarrow{OE}$

(d) $\overline{DE}, \overline{EO}, \overline{OB}, \overline{OC}, \overline{BE}$

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Question 2:

Name the line given in all possible (twelve) ways, choosing only two letters at a time from the four given.

ANSWER:

$\overleftrightarrow{AB}, \overleftrightarrow{BC}, \overleftrightarrow{CD}, \overleftrightarrow{BA}, \overleftrightarrow{CB}, \overleftrightarrow{DC}, \overleftrightarrow{AD}, \overleftrightarrow{DA}, \overleftrightarrow{AC}, \overleftrightarrow{CA}, \overleftrightarrow{BD}, \overleftrightarrow{DB}$

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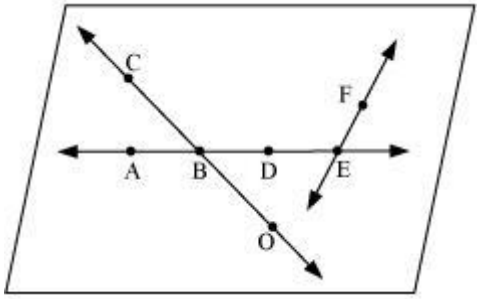
Question 3:

Use the figure to name:



(a) Line containing point E.

(b) Line passing through A.

(c) Line on which O lies

(d) Two pairs of intersecting lines.

ANSWER:

(a) $\overleftrightarrow{AE}$

(b) $\overleftrightarrow{AE}$

(c) $\overleftrightarrow{OC}$

(d) $\overleftrightarrow{OC}$ and $\overleftrightarrow{AE}$, $\overleftrightarrow{AE}$ and $\overleftrightarrow{EF}$

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Question 4:

How many lines can pass through (a) one given point? (b) Two given points?

ANSWER:

(a) Infinite number of lines can pass through a single point.

(b) Only one line can pass through two given points.

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Question 5:

Draw a rough figure and label suitably in each of the following cases:

(a) Point P lies on $\overline{AB}$.

(b) $\overleftrightarrow{XY}$ and $\overleftrightarrow{PQ}$ intersect at M.

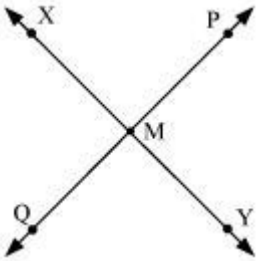
(c) Line *l* contains E and F but not D.

(d) $\overleftrightarrow{OP}$ and $\overleftrightarrow{OQ}$ meet at O.

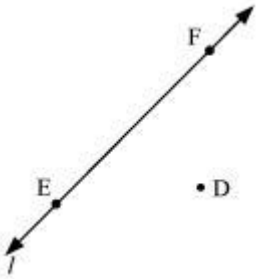
ANSWER:

(a)

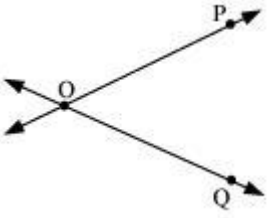
(b)



(c)



(d)



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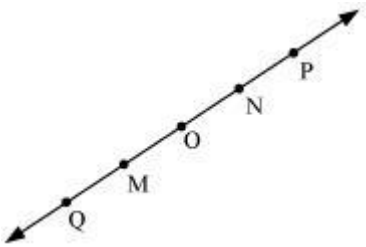
Question 6:

Consider the following figure of line $\overleftrightarrow{MN}$. Say whether following statements are true or false in context of the given figure.



(a) Q, M, O, N, P are points on the line $\overleftrightarrow{MN}$.

(b) M, O, N are points on a line segment $\overline{MN}$.

(c) M and N are end points of line segment $\overline{MN}$.

(d) O and N are end points of line segment $\overline{OP}$.

(e) M is one of the end points of line segment $\overline{QO}$.

(f) M is point on ray $\overrightarrow{OP}$.

(g) Ray $\overrightarrow{OP}$ is different from ray $\overrightarrow{QP}$.

(h) Ray $\overrightarrow{OP}$ is same as ray $\overrightarrow{OM}$.

(i) Ray $\overrightarrow{OM}$ is not opposite to ray $\overrightarrow{OP}$.

(j) O is not an initial point of $\overrightarrow{OP}$.

(k) N is the initial point of $\overrightarrow{NP}$ and $\overrightarrow{NM}$.

ANSWER:

(a) True

(b) True

(c) True

(d) False

(e) False

(f) False

(g) True

(h) False

(i) False

(j) False

(k) True

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Question 1:

Classify the following curves as (i) Open or (ii) Closed.

ANSWER:

(a) Open

(b) Closed

(c) Open

(d) Closed

(e) Closed

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Question 2:

Draw rough diagrams to illustrate the following:

(a) Open curve (b) Closed curve.

ANSWER:

(a) Open curve

(b) Closed curve

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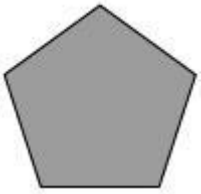
Question 3:

Draw any polygon and shade its interior.

ANSWER:



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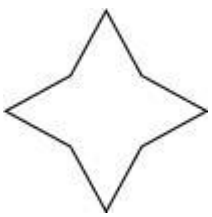
Question 4:

Consider the given figure and answer the questions:

(a) Is it a curve? (b) Is it closed?



ANSWER:

(a) Yes

(b) Yes

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Question 5:

Illustrate, if possible, each one of the following with a rough diagram:

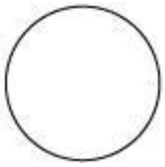
(a) A closed curve that is not a polygon.

(b) An open curve made up entirely of line segments.

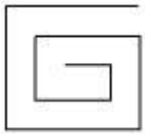
(c) A polygon with two sides.

ANSWER:

(a)



(b)



(c) This is not possible as the polygon having the least number of sides is a triangle, which has three sides in it.

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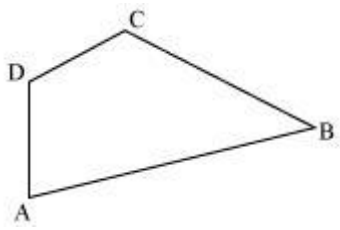
Question 1:

Name the angles in the given figure.



ANSWER:

∠BAD, ∠ADC, ∠DCB, ∠CBA

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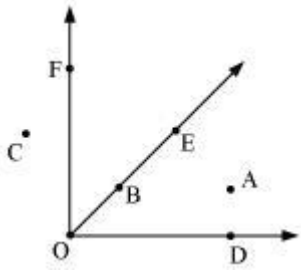
Question 2:

In the given diagram, name the point (s)



(a) In the interior of ∠DOE

(b) In the exterior of ∠EOF

(c) On ∠EOF

ANSWER:

(a) A

(b) C, A, D

(c) B, E, O, F

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Question 3:

Draw rough diagrams of two angles such that they have

(a) One point in common.

(b) Two points in common.

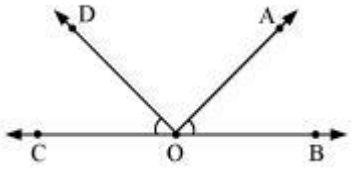
(c) Three points in common.

(d) Four points in common.

(e) One ray in common.

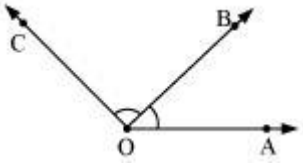
ANSWER:

(a)



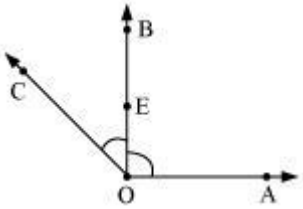
∠COD and ∠AOB have point O in common.

(b)



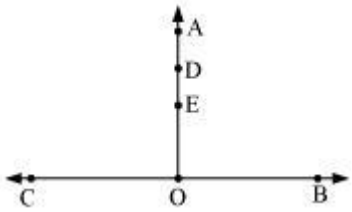
∠AOB and ∠BOC have points O and B in common.

(c)



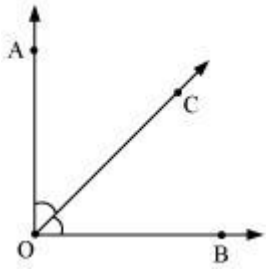
∠AOB and ∠BOC have points O, E, B in common.

(d)



∠BOA and ∠COA have points O, E, D, A in common.

(e)



Ray $\overrightarrow{OC}$ is common between ∠BOC and ∠AOC.

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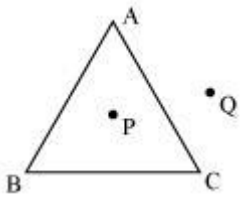
Question 1:

Draw a rough sketch of a triangle ABC. Mark a point P in its interior and a point Q in its exterior. Is the point A in its exterior or in its interior?

ANSWER:



Point A lies on the given ΔABC.

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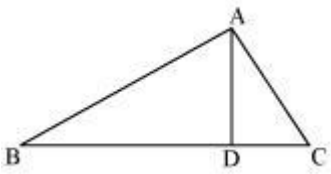
Question 2:



(a) Identify three triangles in the figure.

(b) Write the names of seven angles.

(c) Write the names of six line segments.

(d) Which two triangles have ∠B as common?

ANSWER:

(a) ΔABC, ΔACD, ΔADB

(b) ∠ABC, ∠ADB, ∠ADC, ∠ACB, ∠BAD, ∠CAD, ∠BAC

(c) $\overline{AB}, \overline{BC}, \overline{CA}, \overline{AD}, \overline{BD}, \overline{CD}$

(d) ΔABD and ΔABC

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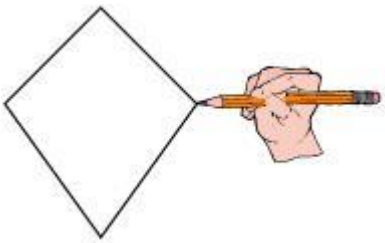
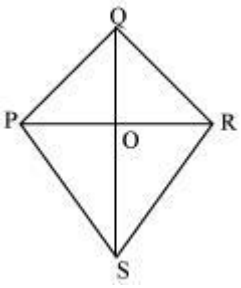
Question 1:

Draw a rough sketch of a quadrilateral PQRS. Draw its diagonals. Name them. Is the meeting point of the diagonals in the interior or exterior of the quadrilateral?



ANSWER:



Diagonals are PR and QS. They meet at point O which is in the interior of &mnSq1PQRS.

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Question 2:

Draw a rough sketch of a quadrilateral KLMN. State,

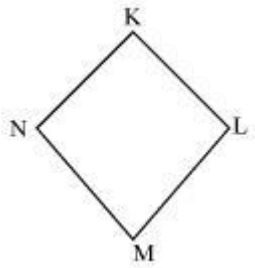
(a) Two pairs of opposite sides,

(b) Two pairs of opposite angles,

(c) Two pairs of adjacent sides,

(d) Two pairs of adjacent angles.

ANSWER:



(a) $\overline{KL}$, $\overline{NM}$ and $\overline{KN}$, $\overline{ML}$

(b) ∠KLM and ∠KNM

∠LKN and ∠LMN

(c) $\overline{KL}$, $\overline{KN}$ and $\overline{NM}$, $\overline{ML}$

$\overline{KL}$, $\overline{LM}$ and $\overline{NM}$,$\overline{NK}$

(d) ∠K, ∠L and ∠M, ∠N

∠K, ∠N and ∠L, ∠M

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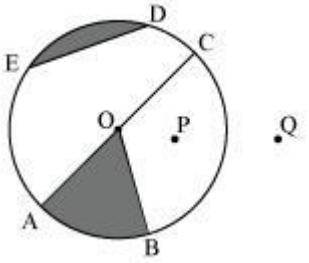
Question 1:

From the figure, identify:



(a) The centre of circle (e) Two points in the interior

(b) Three radii (f) a point in the exterior

(c) a diameter (g) a sector

(d) a chord (h) a segment

ANSWER:

(a) O

(b) $\overline{OA}, \overline{OB}, \overline{OC}$

(c) $\overline{AC}$

(d) $\overline{ED}$

(e) O, P

(f) Q

(g) AOB (shaded region)

(h) DE (shaded region)

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Question 2:

(a) Is every diameter of a circle also a chord?

(b) Is every chord of circle also a diameter?

ANSWER:

(a) Yes. The diameter is the longest possible chord of the circle.

(b) No

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Question 3:

Draw any circle and mark

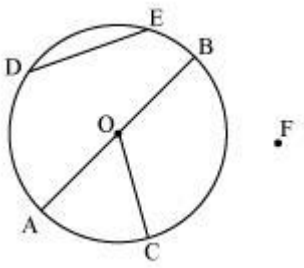
(a) Its centre (e) a segment

(b) a radius (f) a point in its interior

(c) a diameter (g) a point in its exterior

(d) a sector (h) an arc

ANSWER:



(a) O

(b) $\overline{OA}$

(c) $\overline{AB}$

(d) COA

(e) DE

(f) O

(g) F

(h) $\overset{\frown}{AC}$

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Question 4:

Say true or false:

(a) Two diameters of a circle will necessarily intersect.

(b) The centre of a circle is always in its interior.

ANSWER:

(a) True. They will always intersect each other at the centre of the circle.

(b) True