Exercise 16.2

Q.1

Show that

Given

ΔABC,O is the mid point of $\overline{BC}$

$\overline{OB} \cong \overline{OC}$

To prove

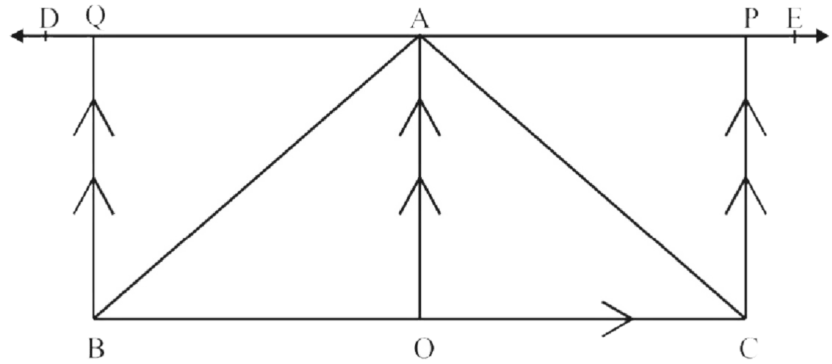
Area ΔABO = area ΔACO

Construction

Draw $\overline{DE} \parallel \overline{BC}$

$\overline{CP} \parallel \overline{OA}$

$\overline{BQ} \parallel \overline{OA}$



Proof

Statements	Reasons
$\overline{BQ} \parallel \overline{OA}$	Construction
$\overline{OB} \parallel \overline{AQ}$	Construction
$\parallel^{gm}$ BOAQ	Base of same
$\parallel^{gm}$ COAP	Parallel line of $\overleftrightarrow{DE}$
$\overline{OB} \cong \overline{OC}$	O is the mid point of $\overline{BC}$
Area of $\parallel^{gm}$ BOAQ= Area of $\parallel^{gm}$ COAP … (i)	
Area of $\Delta ABO = \frac{1}{2}$ Area of $\parallel^{gm}$ BOAQ	
Area of ΔACO $= \frac{1}{2}$ Area of $\parallel^{gm}$ COAP	
Area of ΔABO = Area of ΔACO	Dividing equation (i) both side by (ii)

So median of a triangle divides it into two triangles of equal area.

Q.2 **Prove that a parallelogram is divided by its diagonals into four triangles of equal area.**

Given:

In parallelogram ABCD, $\overline{AC}$ and $\overline{BD}$ are its diagonals, which meet at I

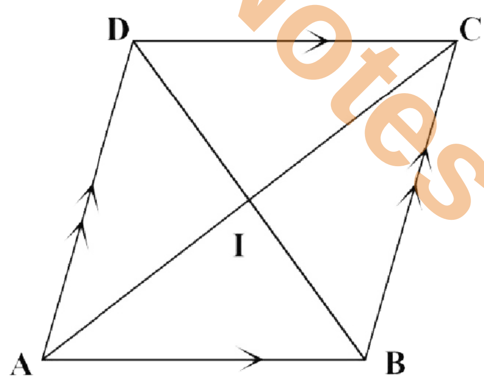
To prove:

Triangles ABI, BCI CDI and ADI have equal areas.

Proof:

Triangles ABC and ABD have the same base $\overline{AB}$ and are between the same parallel lines $\overline{AB}$ and $\overline{DC}$ $\therefore$ they have equal areas.

Or area of ΔABC =area of Δ ABD



Or area of Δ ABI + area of Δ BCI= area of Δ ABI+ area of Δ ADI
⇒ Area of Δ BCI = area of Δ ADI ... (i)
Similarly area of Δ ABC = area of Δ BCD
⇒ Area of Δ ABI +area of Δ BCI = area of Δ BCI + area of Δ CDI
⇒ Area of Δ ABI = area of Δ CDI… (ii)

As diagonals of a parallelogram bisect each other I is the midpoint of $\overline{AC}$ so $\overline{BI}$ is a median of Δ ABC

∴ Area of Δ ABI = area of Δ BCI… (iii)

$\Delta CDI \cong \Delta AOI$

$\overline{BI} \cong \overline{DI}$

Area of Δ ABI = area of Δ BCI = area of Δ CDI= area of Δ ADI

Q.3 Divide a triangle into six equal triangular parts

Given

Δ ABC

To prove

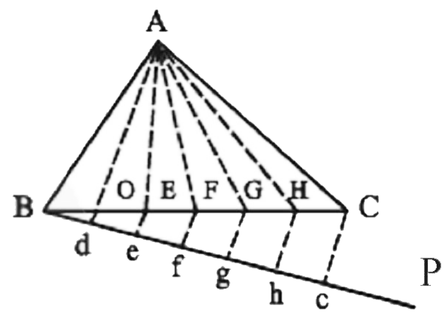
To divide Δ ABC into six equal part triangular parts

Construction

Take $\overrightarrow{BP}$ any ray making an acute angle with $\overline{BC}$ draw six arcs of the same radius on $\overrightarrow{BP}$ i.e $m\overline{Bd} = mde = mef = mfg = mgh = mhc$

Join c to C and parallel line segments as

$\overline{cC} \| \overline{hH} \| \overline{gG} \| \overline{fF} \| \overline{eE} \| \overline{do}$



Join A to O,E,F,G,H

Proof

Base $\overline{BC}$ of Δ ABC has been divided to six equal parts.
We get six triangles having equal base and same altitude
Their area is equal
Hence ΔBOA=ΔOEA=ΔEFA=ΔFGA=ΔGHA=ΔHCA