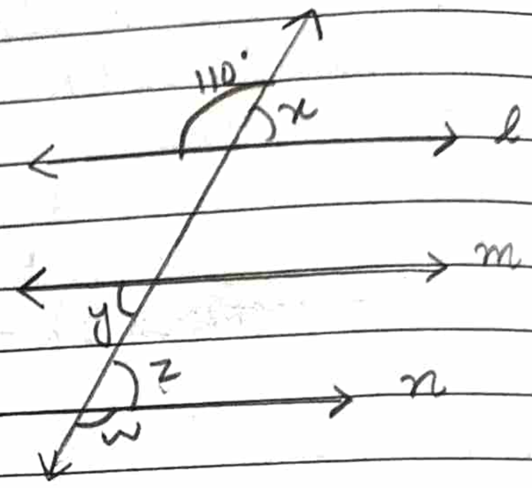
Chapter-10
Parallel Lines

WS-1



Q1: In fig $l \parallel m \parallel n$
"p" is transversal
$\angle 1 = 110$

$\angle l + \angle x = 180°$ ∴ Linear

$110 + x = 180°$

$x = 180 - 110$

$x = 70°$

$\angle x = \angle y$ ∴ Alternate interior angle

∴ $\angle y = 70°$

$\angle y = \angle z = 70°$ ∴ A.I.A

$z = 70°$

$\angle 1 = \angle w$

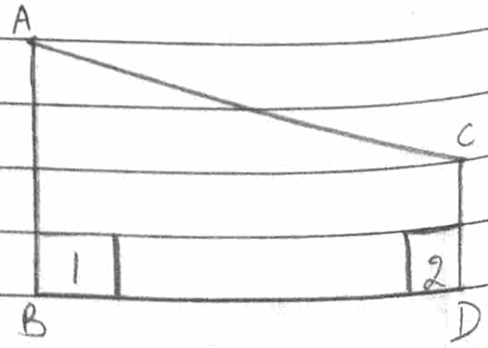
$\angle w = 110°$

So $\angle x = 70°$

$\angle z = 70°$

$\angle w = 110°$

$\angle y = 70°$



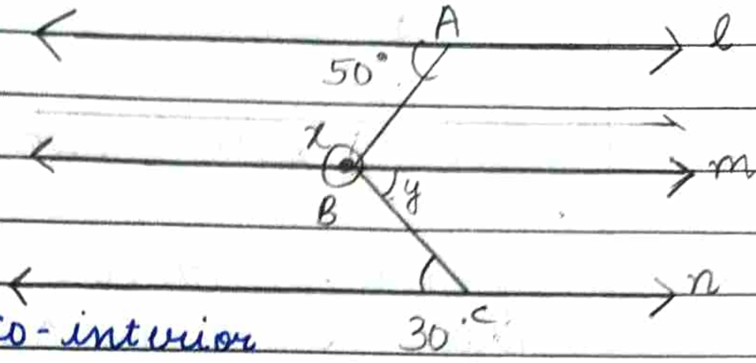
Q2: In fig $\angle 1 = \angle 2 = 90°$

$\angle 1 + \angle 2 = 90° + 90°$

$\angle 1 + \angle 2 = 180°$

But these are co-interior angles, So $AD \parallel BC$

Q4. In fig $l \parallel m \parallel n$

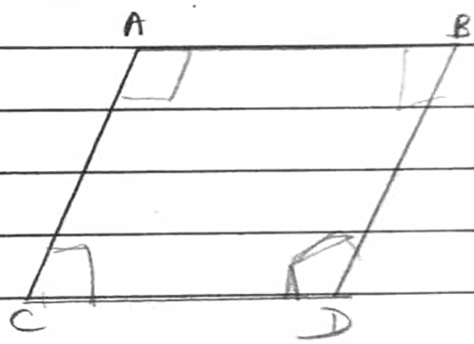


$l \parallel m$, AB is transversal

$x + 50 = 180°$
$x = 180° - 50°$ ∴ co-interior
$x = 130°$

$m \parallel n$, BC is transversal
$y = 30°$ | Alternate Interior Angles
So $\angle x = 130°$, $\angle y = 30°$

Q5. Given = Let in Fig ABCD is a given quadrilateral in which all angles are equal
To prove :- $AB \parallel CD$ and $AD \parallel BC$

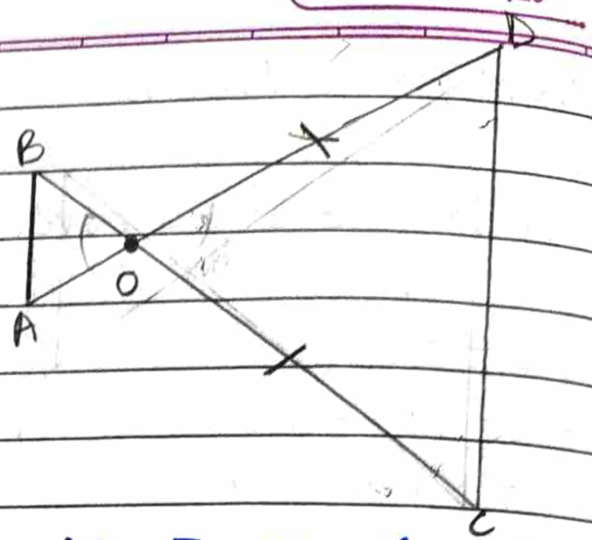


Proof :- $\angle A = \angle B = \angle C = \angle D = x°$ (say)
Using ASP quad. ABCD
$x + x + x + x = 360°$
$4x = 360°$
$x = 90°$

So $\angle A + \angle B + \angle C + \angle D = 90°$
$\angle A + \angle D = 90° + 90°$
$= 180°$
But these are co-interior angles
∴ $AB \parallel CD$

Now $\angle A + \angle B = 90° + 90°$
$= 180°$
Again they are co-interior angles

So $AD \parallel BC$



Q6: Given :- $\angle BAO = \angle DCO$

To prove :- $AB \parallel CD$

Proof :- Since in $\triangle OCD$

$OC = OD$

So $\angle 2 = \angle 3$ (Angles opposite to equal sides)

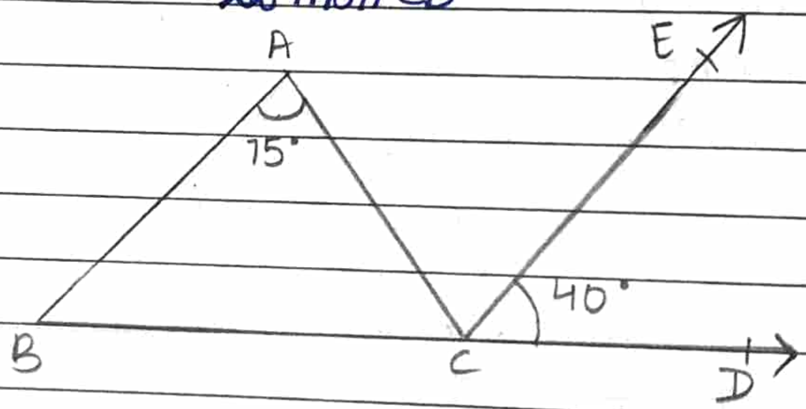
But $\angle 1 = \angle 2$

$\therefore \angle 1 = \angle 3$

But these are alternate interior

So $AB \parallel CD$

7:



Given :- In fig

$\angle A = 75°$, $CE \parallel AB$, $\angle ECD = 40°$

$AB \parallel CE$, BD is transversal

$\angle B = \angle ECD = 40°$ | corresponding

$\angle B = 40°$

In $\triangle ABC$ by using A.S.P

$\angle A + \angle B + \angle ACB = 180°$

$75 + 40 + \angle ACB = 180°$

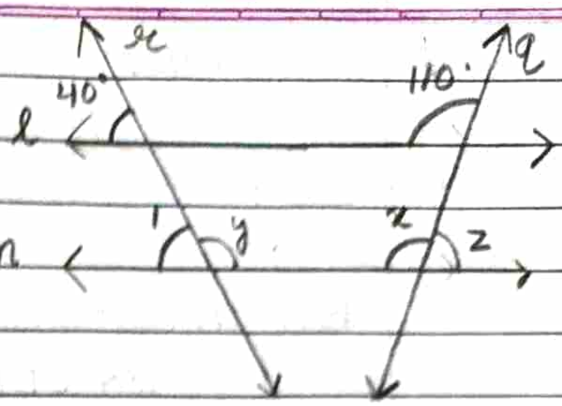
$115 + \angle ACB = 180°$

$\angle ACB = 180° - 115°$

$\angle ACB = 65°$

So other angles are 40° & 65°

Q8: $l \parallel m$



To find $\angle x, \angle y, \angle z$

$l \parallel m$, q is transversal

$\angle x = 110°$ | Corresponding angles

$\angle x + \angle z = 180°$ | Linear Pair

$110° + \angle z = 180°$

$\angle z = 180° - 110°$

$\angle z = 70°$

$l \parallel m$, r is transversal

$\angle 1 = 40°$ | Corresponding angles

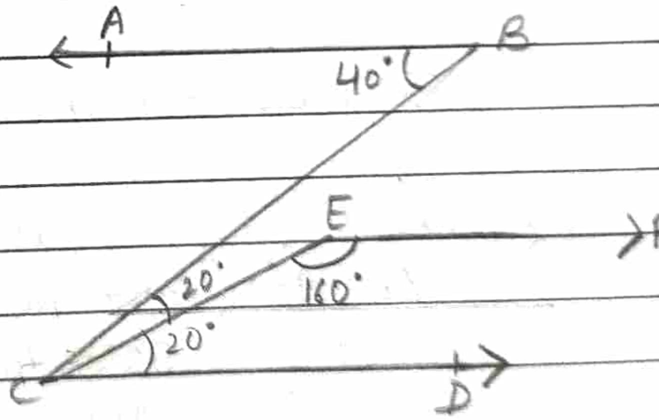
$\angle 1 + \angle y = 180°$ | Linear Pair

$40 + \angle y = 180°$

$\angle y = 180° - 40°$

$\angle y = 140°$

So $\angle x = 110°$, $\angle y = 140°$, $\angle z = 70°$



Q9: Given

In fig $\angle B = 40°$

$\angle E = 160°$

$\angle BCE = \angle ECD = 20°$

To prove (i) $AB \parallel CD$

(ii) $CD \parallel EF$

(iii) $AB \parallel EF$

Proof :- $\angle B = \angle BCD$ | 40° each

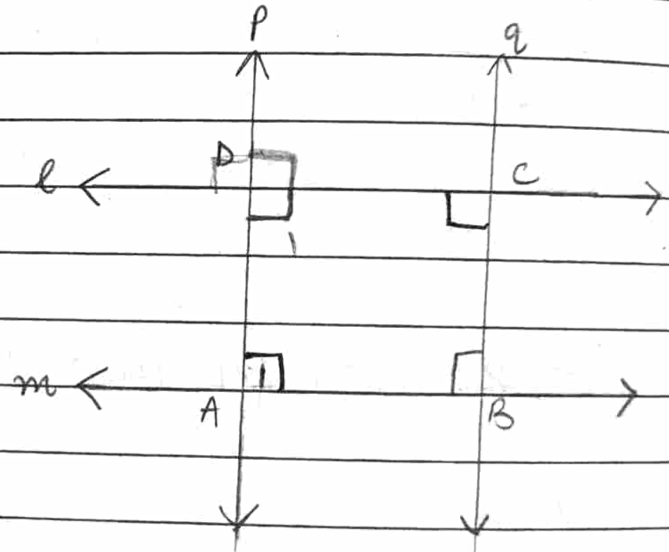
But these are alternate interior angles

So AB || CD

(ii) $\angle E + \angle ECD = 160 + 20$
$= 180°$

But these are co-interior
so CD || EF

(iii) Since
AB || CD | Proved above
and CD || EF
hence AB || EF



WS-2

1. Given -
$l \parallel m$, $p \perp l$
$q \perp m$

To prove - $p \parallel q$

Proof - $l \parallel m$, q is transversal
$\angle 1 = 90°$ [Corresponding angles]
$\angle 1 + \angle D = 90° + 90°$
$= 180°$
But they are co-interior angles $p \parallel q$

2. In quad. ABCD

$\angle A = \angle D = 90°$ [Corresponding angles]

$\angle B + \angle C = 180°$ [Co-interior angles]

$90° + \angle C = 180°$

$\angle C = 90°$

$\therefore$ Since all angles of ABCD are 90° so it is a rectangle

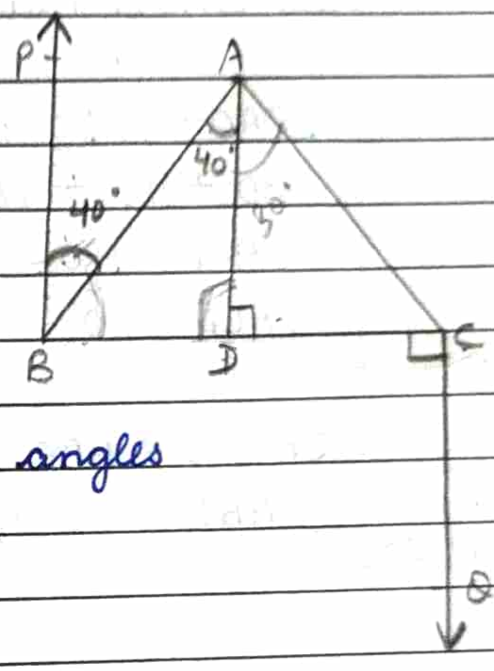
Q3: Given :- In fig ABC is a triangle

AD $\perp$ BC

To prove :- i BP // AD

ii CQ // AD

iii BP // CQ



Proof - i $\angle PBA = \angle BAD = 40°$

But they are alternate interior angles

So BP // AD

(ii) $\angle ADC = \angle DCQ$ [90° each]

But they are alternate interior angles

So CQ // AD

(iii) Since

BP // AD
CP // AD [Proved Above]

So BP // CQ

Q5: $\angle DAC = 30°$

In $\triangle ADB$

Using ASP

$\angle BAD + \angle ABD + \angle ADB = 180°$

$40^\circ + \angle ABD + 90^\circ = 180^\circ$

$\angle ABD = 180^\circ - 130^\circ$

$\angle ABD = 50^\circ$

In ΔADC using ASP

$\angle DAC + \angle ADC + \angle ACD = 180^\circ$

$30^\circ + 90^\circ + \angle ACD = 180^\circ$

$\angle ACD = 180^\circ - 120^\circ$

$\angle ACD = 60^\circ$

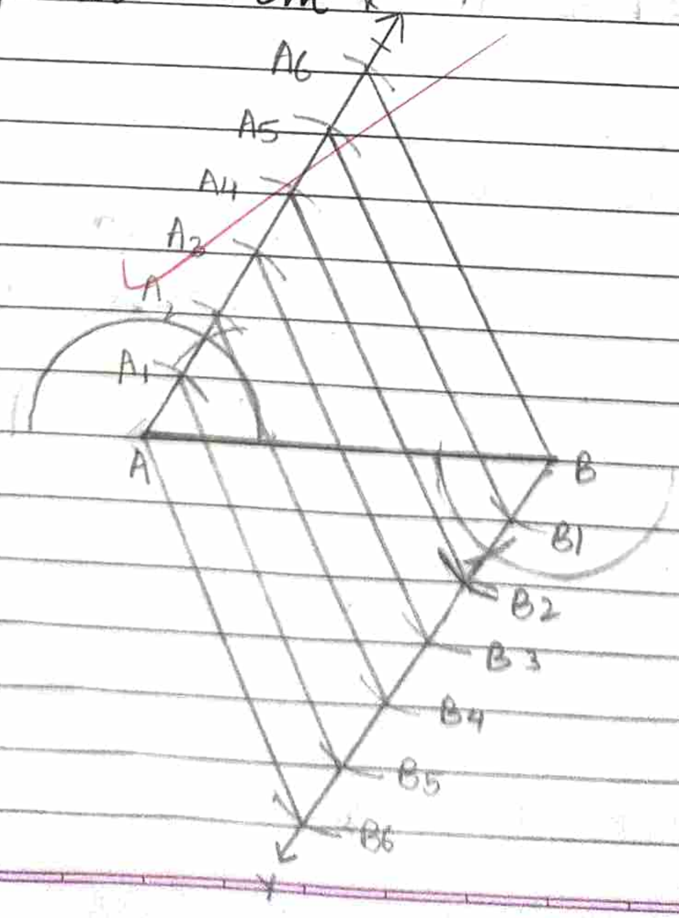
V. Good

So in ΔABC

$\angle ABD = 50^\circ$, $\angle ACD = 60^\circ$

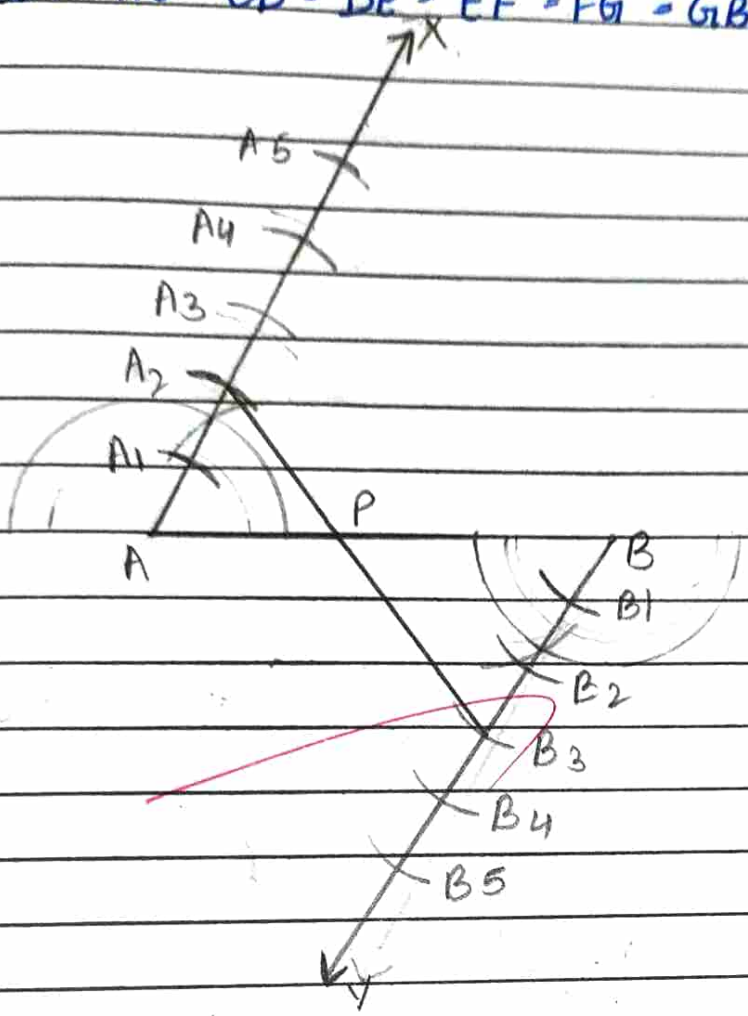
WS-3

Line Segment = 5 cm



Result :- AC = CD = DE = EF = FG = GB

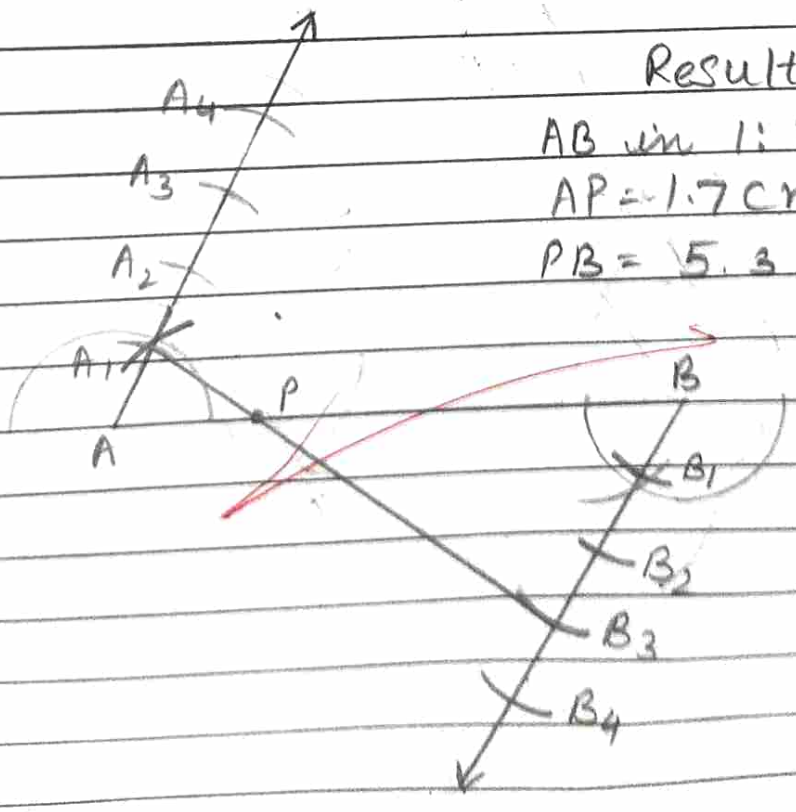
Q3:



Result :- Point P divided given line segment "ab" in 2 : 3

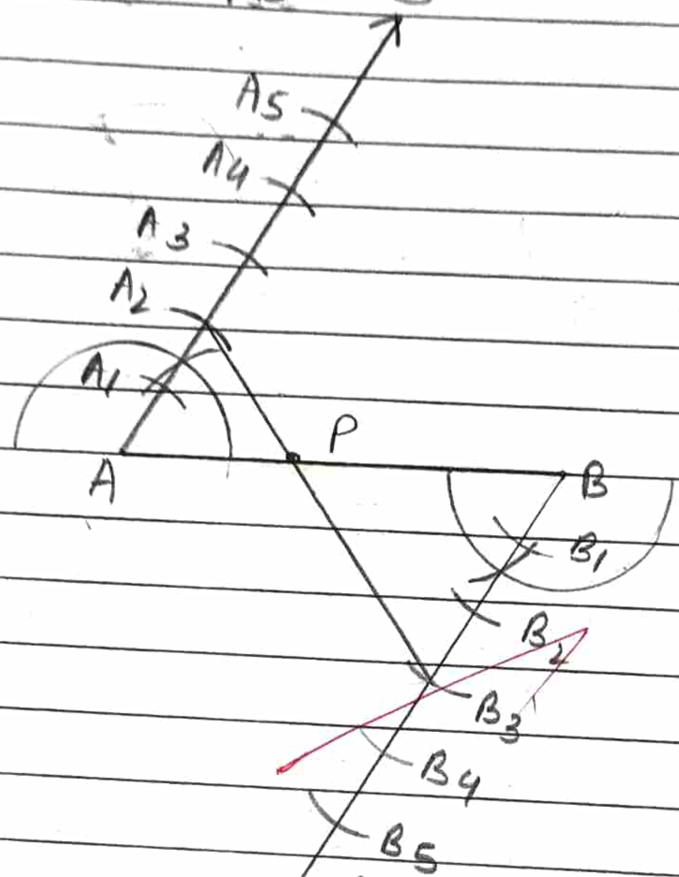
Q5:

Result :- Point P divide AB in 1 : 3
AP = 1.7 cm
PB = 5.3 cm



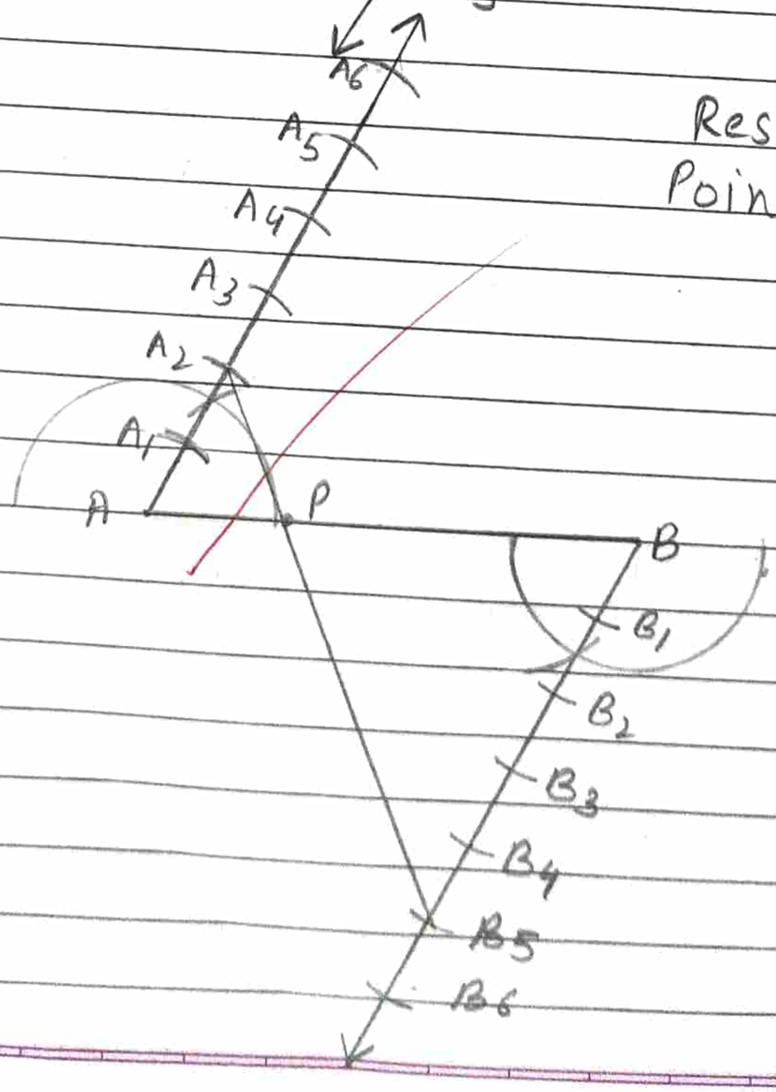
7. $AB = 5.5$ cm

$AP = \frac{2}{3}$ $\quad PB = \frac{AP}{PB} = \frac{2}{3} = 2:3$

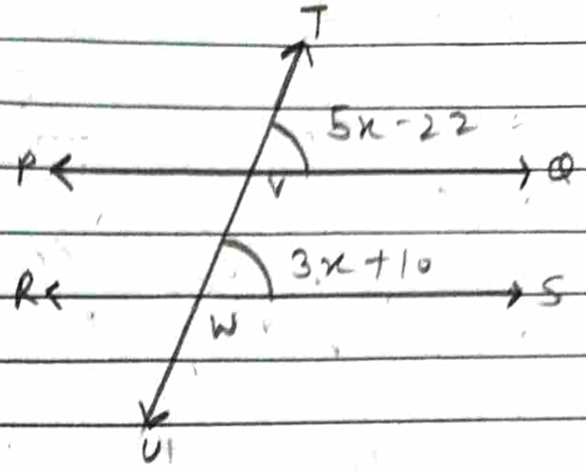


8.

Result :-
Point



Brain Teasers



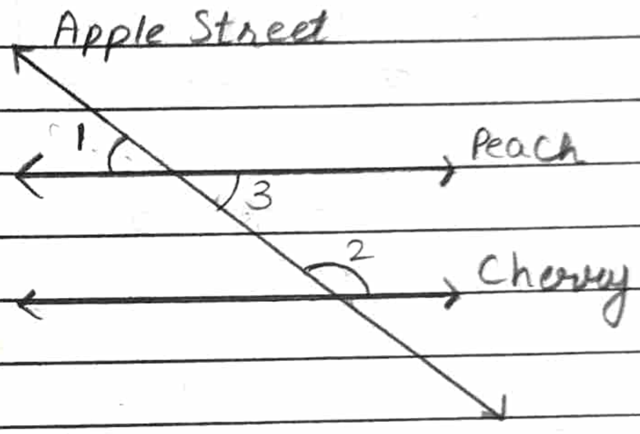
c) Since $PQ \parallel RS$, TU is transversal

$5x-22 = 3x+10$

$5x-3x = 10+22$

$2x = 32$

$x = 16$



d) $m\angle 1 = 2x+36$

$\angle 2 = 7x-9$

$\angle 1 = \angle 3 = 2x+36$ (V.O.A)

$\angle 2 + \angle 3 = 180^\circ$

$7x-9+2x+36 = 180^\circ$

$9x+27 = 180^\circ$

$9x = 180-27$

$9x = 153$

$x = \frac{\cancel{153}\ 17}{\cancel{9}}$

$x = 17.$

$\angle 1 = 2x+36$

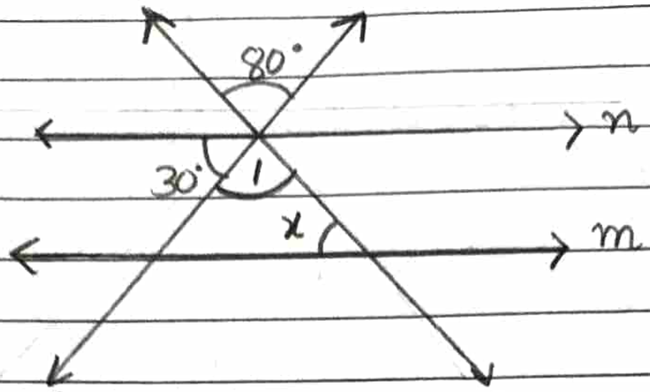
Put $x=17$

$\angle 1 = 2 \times 17 + 36$

$\angle 1 = 34+36$

$\angle 1 = 70^\circ$

e)



$m \parallel n$

$\angle 1 = 80°$ | V.O.A

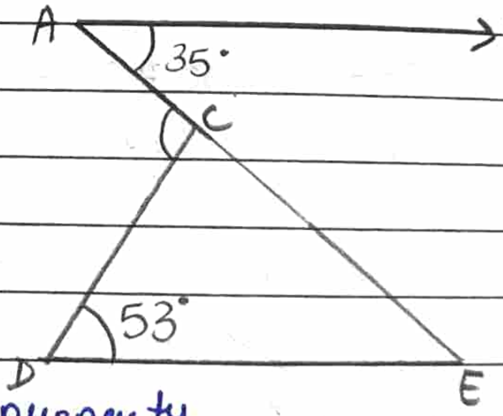
$(30 + \angle 1) + x = 180°$ | Co- interior angles

$30 + 80 + x = 180$

$110 + x = 180$

$x = 180 - 110$

$x = 70°$



B a) $AB \parallel DE$, AE is transversal

$\angle E = \angle A$ | Alt. interior Angles

$\angle E = 35°$

$\angle ACD = \angle D + \angle E$ | Exterior angle property

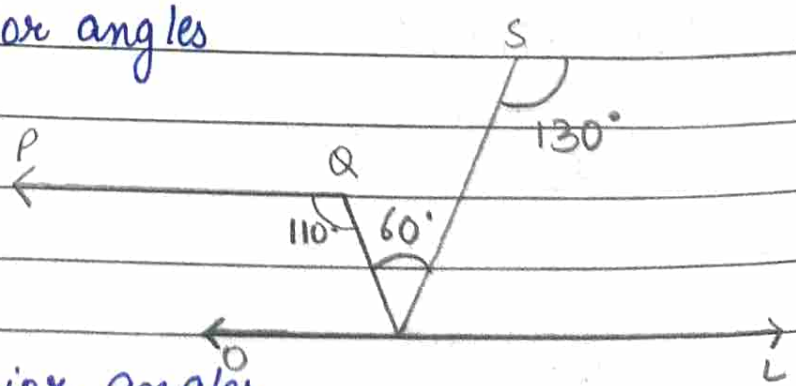
$\angle ACD = 53° + 35°$

$\angle ACD = 88°$

b) $PQ \parallel OL$, QR is transversal

$\angle 1 + 110° = 180°$ | Co-interior angles

$\angle 1 = 70°$



Now $\angle TSR = \angle SRO = 130°$

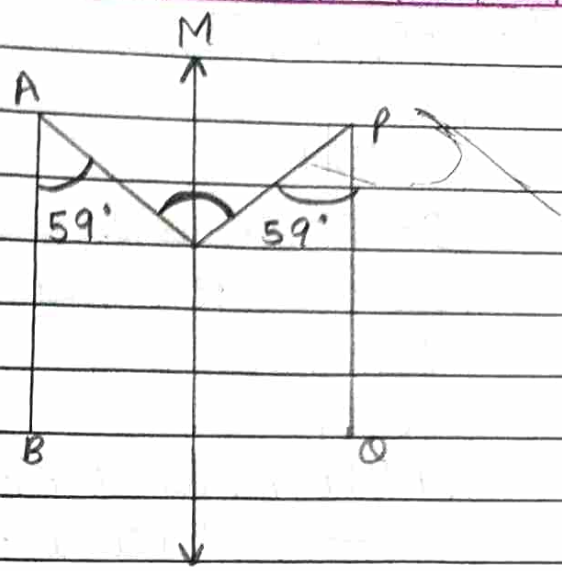
But these are alt. interior angles

So $OL \parallel ST$

c) $AB \parallel PQ$

$\angle A = \angle P = 59°$

Draw $CD \parallel AB \parallel PQ$
through pt. M



$AB \parallel CD$, AM is transversal

$\angle 1 = 59°$ | A.I.A

Similarly $CD \parallel PQ$

$\angle 2 = 59°$ | A.I.A

$y = \angle 1 + \angle 2$

$y = 59° + 59°$

$y = 118°$

e) $l \parallel m$

$\angle 1 = 45$ | V.O.A

$(5x + 35) + \angle 1 = 180°$ | Co-interior angles

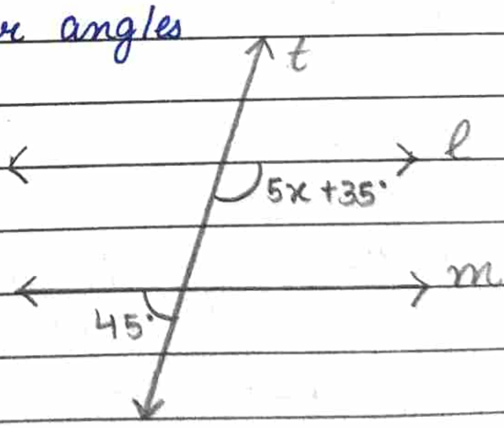
$5x + 35 + 45 = 180°$

$5x + 70 = 180°$

$5x = 110°$

$x = \frac{\cancel{110}}{\cancel{5}}$ 22

$x = 22$



d)

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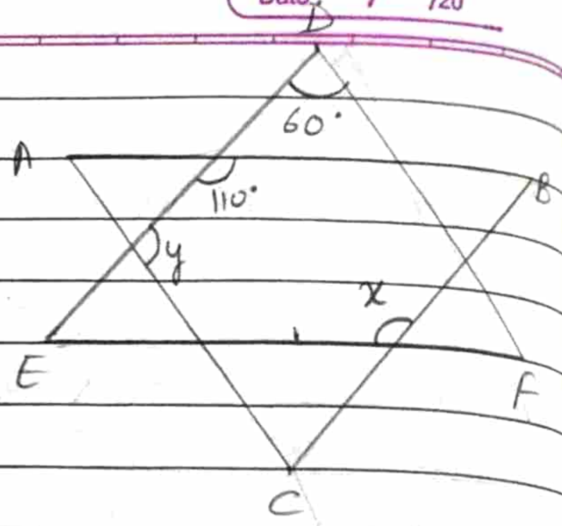
d) $\overline{AB} \parallel \overline{EF}$, $\overline{DE} \parallel \overline{BC}$

$\overline{AC} \parallel DF$



DE∥BC, AB is transversal

$\angle B + 110 = 180°$ (Co interior)

$\angle B = 70°$

AB∥EF, BC is transversal

$\angle B + x = 180°$ (Co-interior)

$70 + x = 180°$

$x = 110°$

AC∥DF, DE is transversal

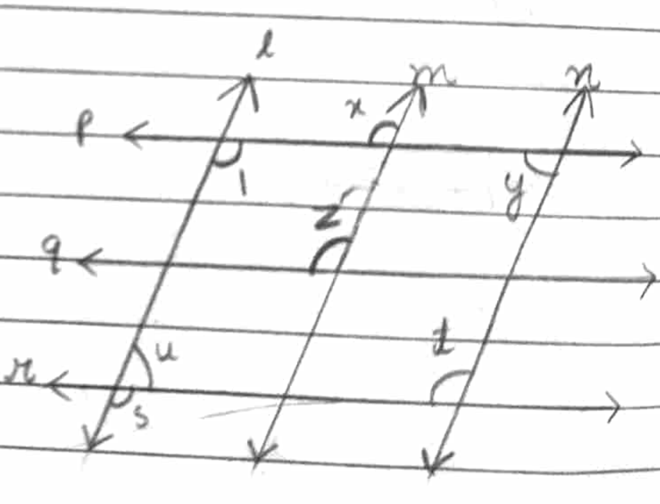
$\angle D + y = 180°$ (Co-interior)

$60 + y = 180°$

$y = 120°$

2. $l \parallel m \parallel n$

$p \parallel q \parallel r$



$\angle 1 = 85°$

$l \parallel m \parallel n$, p is transversal

$\angle 1 = x$ (A.I.A)

$x = 85°$

$\angle 1 + \angle y = 180°$ (Co-Interior angles)

$85° + \angle y = 180°$

$\angle y = 180° - 85°$

$\angle y = 95°$

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p || q || r, n is transversal

$y + t = 180^\circ$ (Co-interi

$t = 180 - 95$

$t = 85^\circ$

$\angle t = \angle s$ (A.I.A)

$\angle s = 85^\circ$

$\angle s + \angle u = 180^\circ$ (Linear pair)

$\angle u = 180^\circ - 85^\circ$

$\angle u = 95^\circ$

$\angle x = \angle z$ (Corresponding angles)

So $\angle z = 85^\circ$

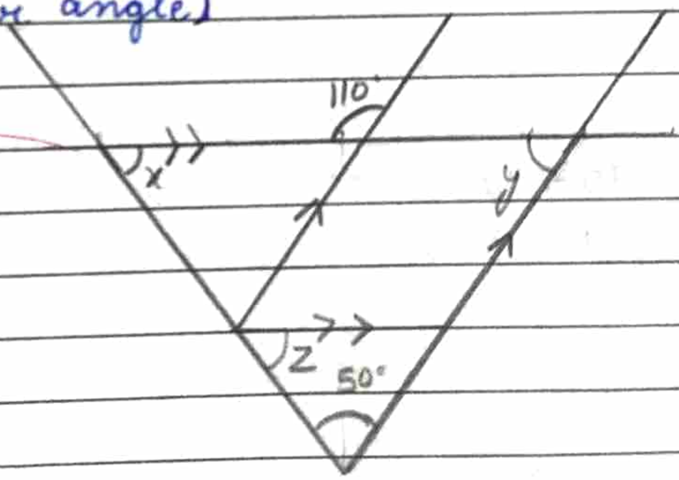
HOTS

1. $\angle 1 = 110^\circ$ (V.O.A)

$\angle 1 + y = 180^\circ$ (Co interior angle)

$110 + y = 180^\circ$

$y = 70^\circ$



In ΔACF by ASP

$x + \angle y + \angle F = 180^\circ$

$x + 70 + 50 = 180^\circ$

$x = 180^\circ - 120^\circ$

$x = 60^\circ$

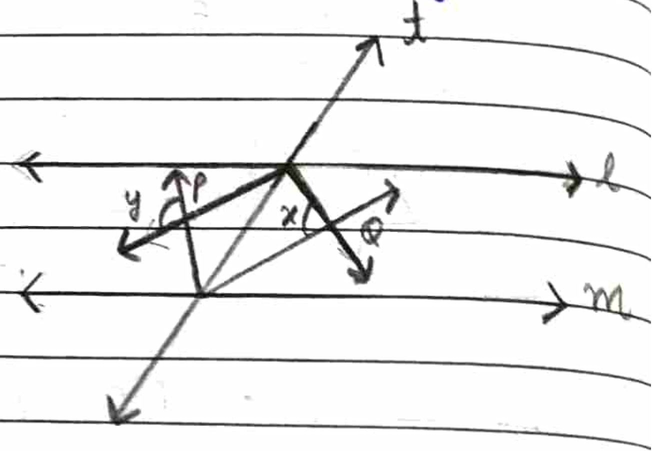
$\angle x = \angle z$ (corresponding $\angle s$)

$\angle z = 60^\circ$

So $x = 60^\circ$, $y = 70^\circ$ & $z = 60^\circ$

2. $l \parallel m$, t is transversal

BP, EP, BQ, EQ are bisectors of interior angles



$\angle 1 = \frac{1}{2} \angle ABC$

$\angle 2 = \frac{1}{2} \angle BED$

$\angle 3 = \frac{1}{2} \angle CBE$

$\angle 4 = \frac{1}{2} \angle BEF$

$\angle ABE + \angle BED = 180^\circ$ (Co-interior Angles)

$\frac{1}{2} \angle ABE + \frac{1}{2} \angle BED = \frac{1}{2} \times 180^\circ$

$\angle 1 + \angle 2 = 90^\circ$ — 1

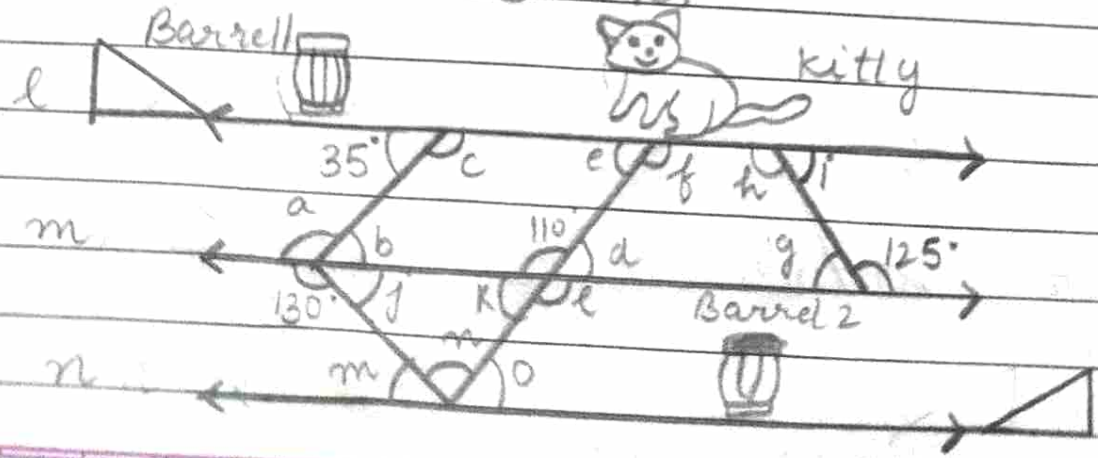
In ΔBPE by ASP

$\angle 1 + \angle 2 + \angle P = 180^\circ$ (Using -1)

$90 + \angle P = 180^\circ$

$\angle P = 90^\circ$

Enrichment Questions



Enrichment Questions

In fig $l \parallel m \parallel n$

$b = 35^\circ$ | V.O.A

$35 + c = 180^\circ$ | Linear Pair

$\angle c = 145^\circ$

$\angle c = \angle a = 145^\circ$ | A.I.A

$\angle a = 145^\circ$

$130^\circ + j = 180^\circ$

$j = 180^\circ - 130^\circ$

$j = 50^\circ$

$\angle y = \angle m = 50^\circ$

$m = 50^\circ$

$l = 110^\circ$ | V.O.A

$a + 110 = 180^\circ$

$a = 180^\circ - 110^\circ$ $\quad a = 70^\circ$

$d = k = 70^\circ$ | V.O.A

$k = 70^\circ$

$\angle k = \angle o =$ | A.I.A

$m + n + o = 180^\circ$ | Sum of angles on a straight line.

$\angle o = 180^\circ - 120^\circ$

$\angle o = 60^\circ$

$\angle f = 110^\circ$ | A.I.A

$\angle d = \angle e = 70^\circ$

$\angle e = 70^\circ$

$h = 125$

$h + i = 180^\circ$

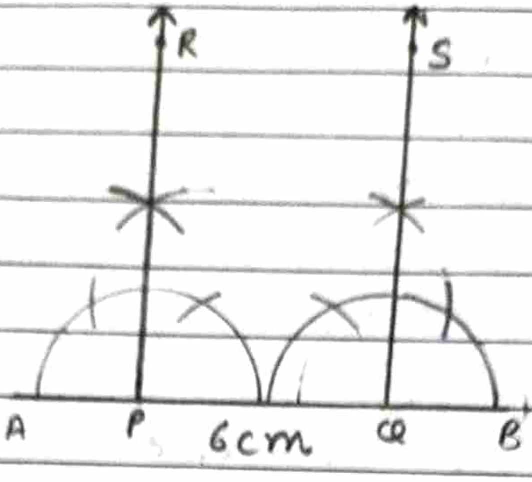
$i = 180^\circ - 125^\circ$ $\angle i = 55^\circ$

$\angle i = \angle g = 55^\circ$ | A.I.A

$\angle g = 55^\circ$

WS-1

Q3



PR // QS

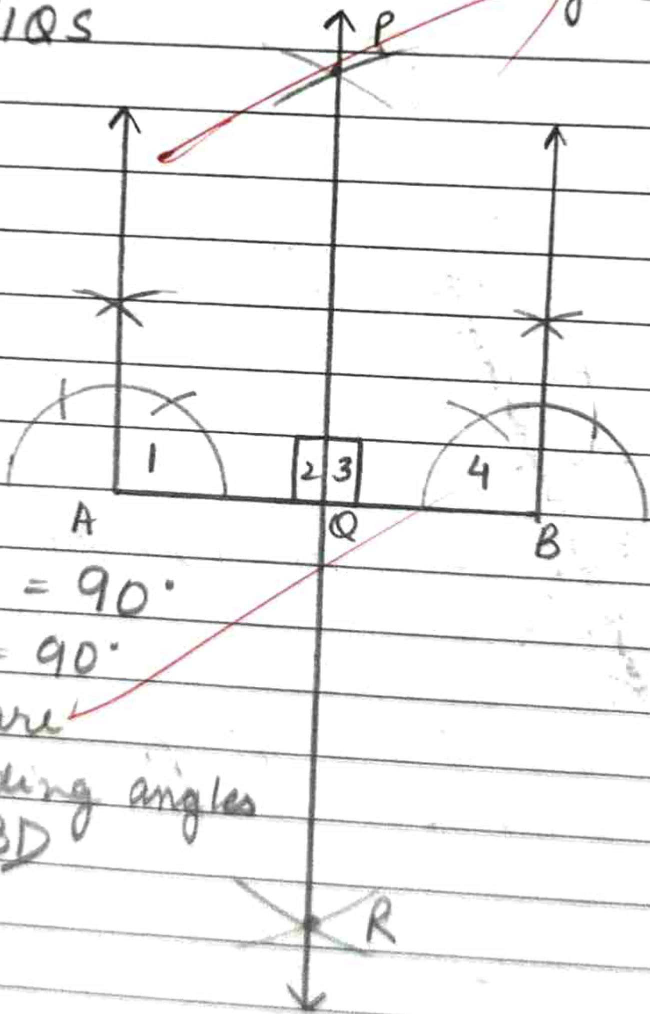
$\angle P + \angle Q = 90^\circ + 90^\circ = 180^\circ$

But they are co-interior angles

So PR // QS

WS-2

Q4



Result: $\angle 1 = \angle 3 = 90^\circ$

$\angle 2 = \angle 4 = 90^\circ$

But they are corresponding angles

So, AB//PR//BD

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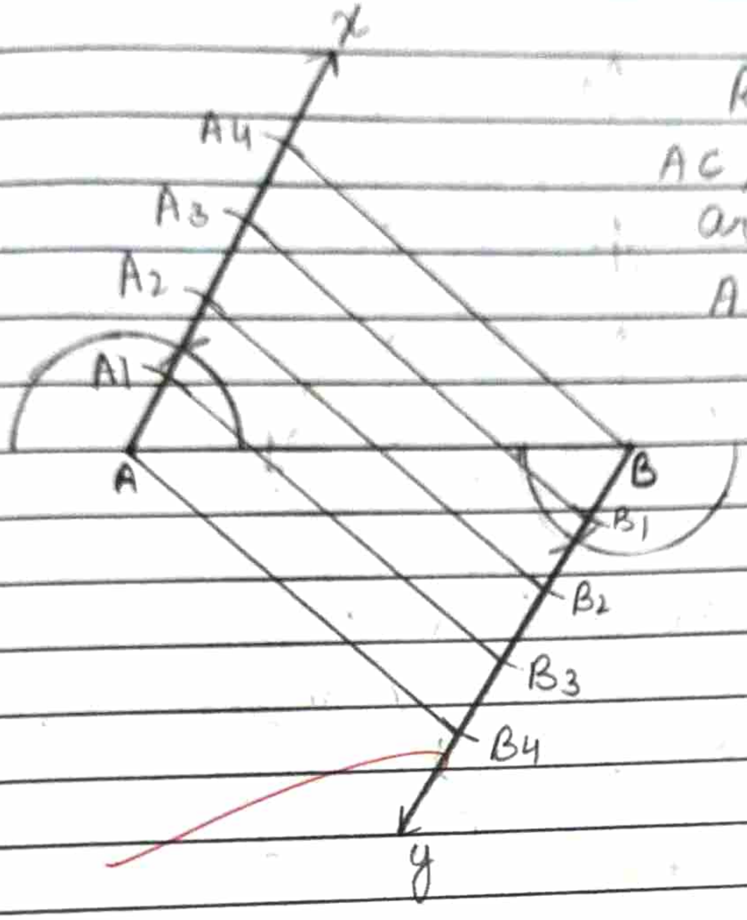
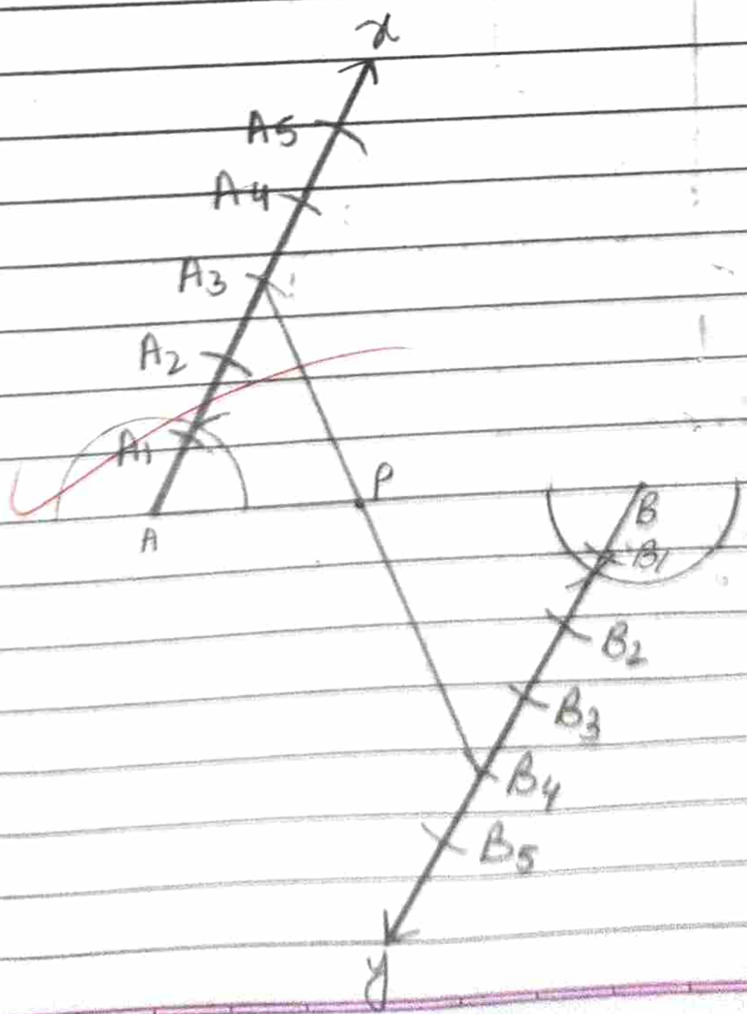
WS-3

Q2:

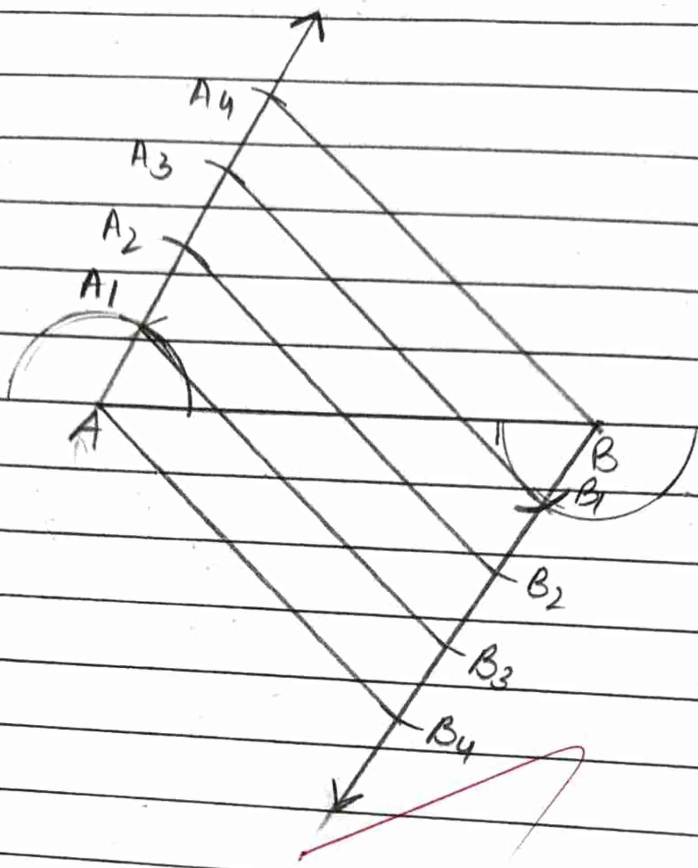


Result :-
AC, CD, DE & EB are 4 equal parts of AB

Q4:



Q6:



Brain Teasers

Q3: