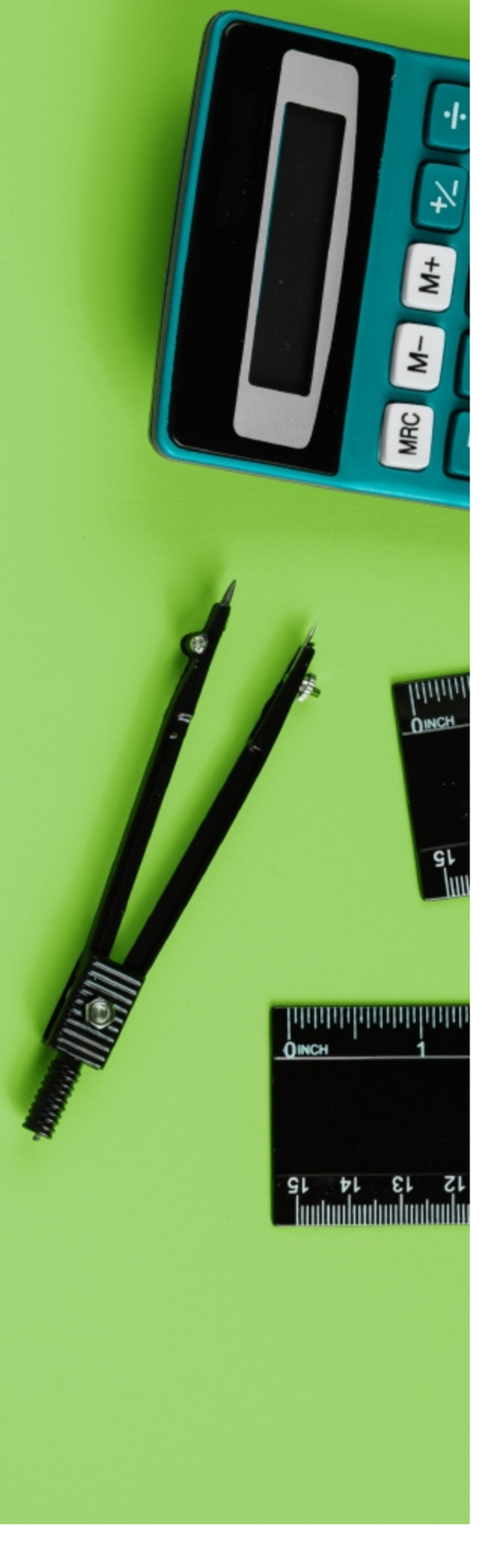
RD Sharma Solutions

Class 7

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Exercise 14.2

1. In Fig. 58, line *n* is a transversal to lines *l* and *m*. Identify the following:
   (i) Alternate and corresponding angles in Fig. 58 (i).
   (ii) Angles alternate to $\angle d$ and $\angle g$ and angles corresponding to angles $\angle f$ and $\angle h$ in Fig. 58 (ii).
   (iii) Angle alternate to $\angle PQR$, angle corresponding to $\angle RQF$ and angle alternate to $\angle PQE$ in Fig. 58 (iii).
   (iv) Pairs of interior and exterior angles on the same side of the transversal in Fig. 58 (ii).

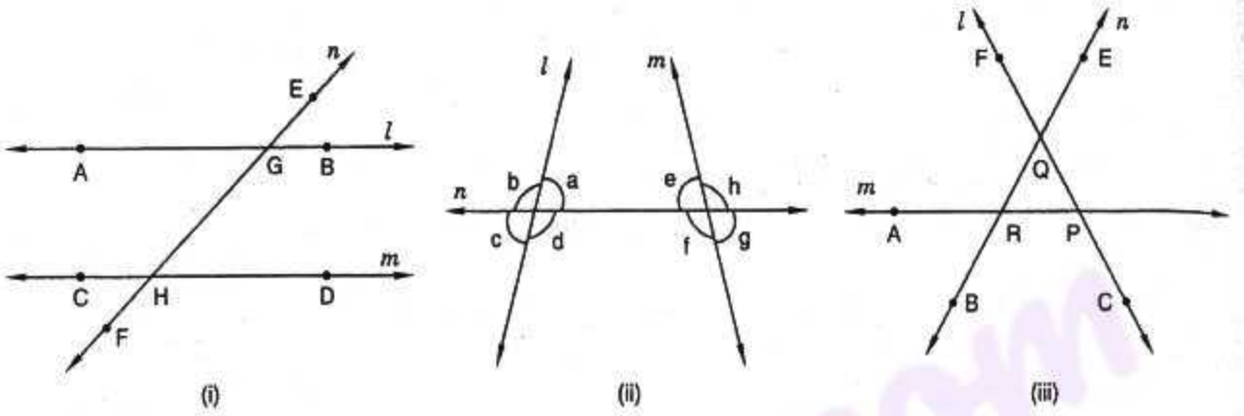


Fig. 58

Solution: (i) In figure (i)

Alternate angles: $\angle BGH$ and $\angle CHG$; $\angle AGH$ and $\angle DHG$

Corresponding angles: ($\angle EGB$, $\angle GHD$) ($\angle EGA$, $\angle GHC$)

($\angle BGH$, $\angle DHF$) ($\angle AGH$, $\angle CHF$)

(ii) Angles alternate to $\angle d$ is $\angle e$, $\angle g$ is $\angle b$

Angles corresponding to $\angle f$ is $\angle a$ and $\angle h$ is $\angle c$.

(iii) Angle alternate to $\angle PQR$ is $\angle QRA$

Corresponding to $\angle RQF$ is $\angle BRA$

Alternate to $\angle PQE$ is $\angle QRP$

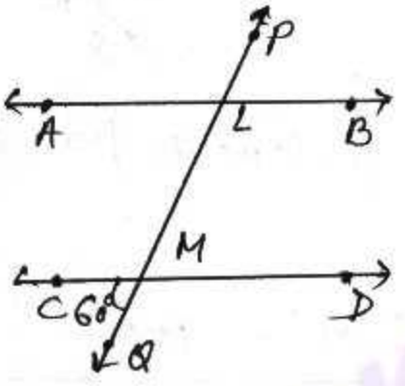
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(iv) Pair of interior angles → (∠a, ∠e) (∠d, ∠f)

Pair of exterior angles → (∠b, ∠h) (∠c, ∠g)

Q.2 In fig 59, AB and CD are parallel lines intersected by a transversal PQ at L and M respectively.

If ∠CMQ = 60°, find all other angles in the figure



Solution: ∵ ∠ALM = ∠CMQ = 60° (corresponding angles)

∵ ∠CMQ + ∠DMQ = 180° (linear pair)

⇒ 60° + ∠DMQ = 180°

⇒ ∠DMQ = 180° − 60° = 120°

Now ∠DMQ = ∠BLM = 120° (corresponding angles)

∠DMQ = ∠CML (vertically opposite angles)

⇒ ∠CML = 120°

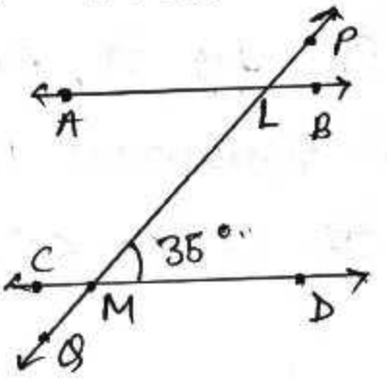
also ∠ALM = ∠PLB = 60°

∠BLM = ∠ALP = 120° { vertically opposite angles }

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Q.3 In fig. 60, AB and CD are parallel lines intersected by a transversal PQ at L and M respectively. If $\angle LMD = 35°$, find $\angle ALM$ and $\angle PLA$



Solution:

$\because \angle ALM = \angle LMD$ (alternate angle)

$\Rightarrow \angle ALM = 35°$

$\because \angle ALM + \angle PLA = 180°$ (linear pair)

$\Rightarrow 35° + \angle PLA = 180°$

$\Rightarrow \angle PLA = 180° - 35° = 145°$

---

4. The line *n* is transversal to line *l* and *m* in Fig. 61. Identify the angle alternate to ∠13, angle corresponding to ∠15, and angle alternate to ∠15.

Q.4

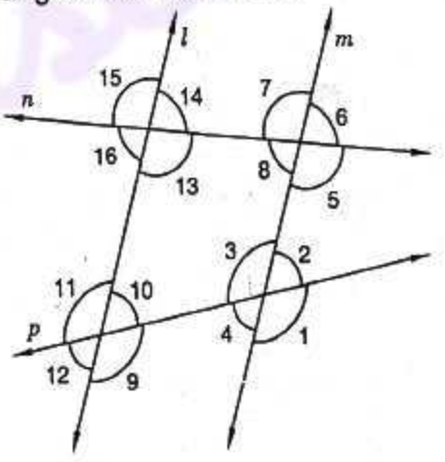


Fig. 61

Solution: here angle alternate to $\angle 13$ is $\angle 7$

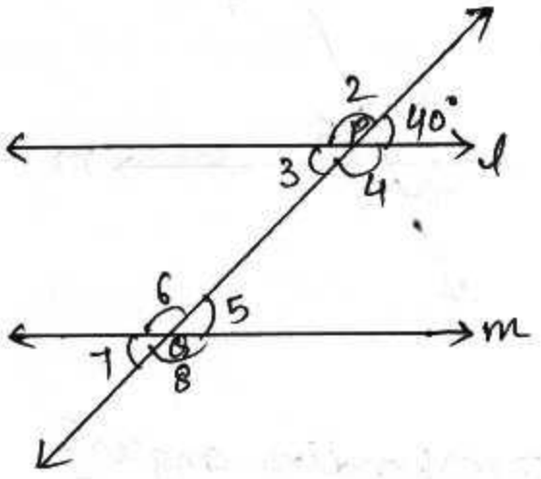
Corresponding angle to $\angle 15$ is $\angle 7$.

alternate angle to $\angle 15$ is $\angle 5$.

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Q.5 In fig 62, line l and m are such that $l \parallel m$, n is a transversal. If $\angle 1 = 40^\circ$. find all the angles and check that all corresponding angles and alternate angles are equal.



Solution: Given that $\angle 1 = 40^\circ$

$\because \angle 1 + \angle 2 = 180^\circ$

$\Rightarrow 40^\circ + \angle 2 = 180^\circ \Rightarrow \angle 2 = 180^\circ - 40^\circ = 140^\circ$

$\because \angle 2 = \angle 4$; $\angle 1 = \angle 3$ (vertically opp. angles)

$\Rightarrow \angle 4 = 140^\circ$ & $\angle 3 = 40^\circ$

Now, $\angle 2 = \angle 6$ (corresponding angles)

$\Rightarrow \angle 6 = 140^\circ$

Now, $\angle 6 + \angle 5 = 180^\circ$

$\Rightarrow 140^\circ + \angle 5 = 180^\circ \Rightarrow \angle 5 = 180^\circ - 140^\circ$

$= 40^\circ$

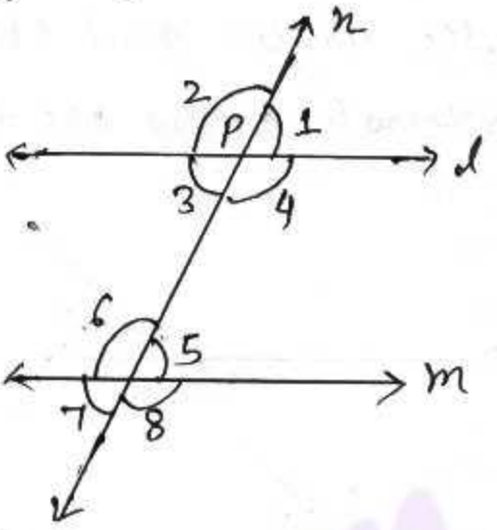
$\because \angle 5 = \angle 7 = 40^\circ$

$\angle 6 = \angle 8 = 140^\circ$ { vertically opposite angles }

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Q.6 In fig. 63, line $l \parallel m$ and a transversal n cuts them at P and Q respectively. If $\angle 1 = 75°$, find all other angles.



Solution

$\because \angle 1 = 75°$

$\because \angle 1 + \angle 2 = 180°$ (linear pair)

$\Rightarrow 75° + \angle 2 = 180°$

$\Rightarrow \angle 2 = 180° - 75° = 105°$

also $\angle 1 = \angle 5 = 75°$ {corresponding angles}

$\angle 2 = \angle 6 = 105°$

Now $\angle 1 = \angle 3 = 75°$

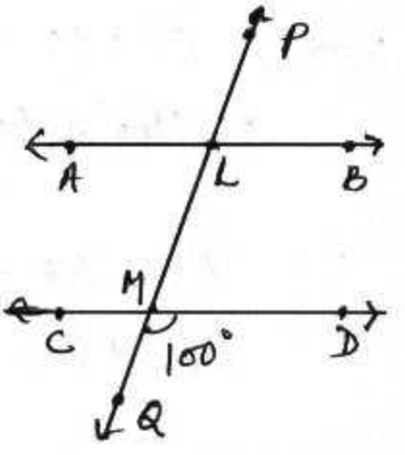
$\angle 2 = \angle 4 = 105°$

$\angle 5 = \angle 7 = 75°$

$\angle 6 = \angle 8 = 105°$

{vertically opposite angles}

Q.7 In fig. 64, AB || CD and a Transversal PQ cuts them at L and M respectively. If $\angle QMD = 100°$ find all other angles.



Solution: given, $\angle QMD = 100°$

$\because \angle CMQ + \angle QMD = 180°$

$\Rightarrow \angle CMQ + 100° = 180°$

$\Rightarrow \angle CMQ = 180 - 100° = 80°$

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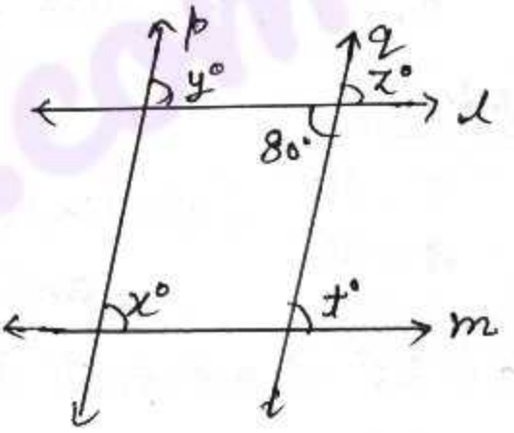
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$\because$ $\angle DMB = \angle CML = 100^\circ$
$\angle CMB = \angle DML = 80^\circ$ { vertically opposite angles }

Also, $\angle DMB = \angle BLM = 100^\circ$
$\angle CMB = \angle ALM = 80^\circ$ { corresponding angles }

also $\angle BLM = \angle ALP = 100^\circ$
$\angle ALM = \angle BLP = 80^\circ$ { vertically opposite angles }

Q.8 In fig 65, $l \parallel m$, and $P \parallel q$. Find the values of x, y, z, t.



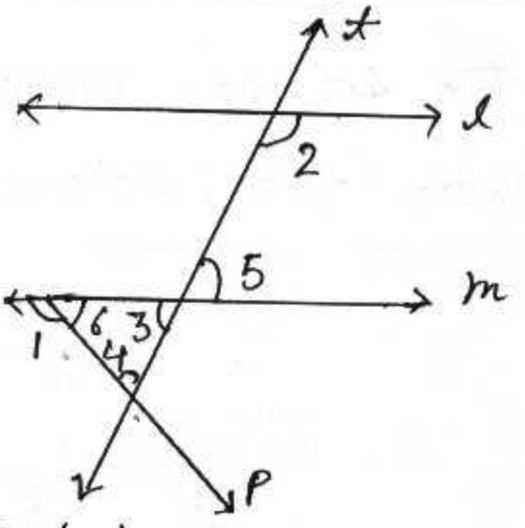
Solution: $y = 80^\circ$ (Alternate angles)

$z = 80^\circ$ (vertically opp.)

$\because$ $x = y = 80^\circ$ (corresponding angles)

$x = t^\circ = 80^\circ$ (corresponding angles)

Q.9 In fig. 66, line $l \parallel m$, $\angle 1 = 120^\circ$ and $\angle 2 = 100^\circ$, find out $\angle 3$ and $\angle 4$.



Solution: let $\angle 2 + \angle 5 = 180^\circ$

$\Rightarrow 100^\circ + \angle 5 = 180^\circ$

$\Rightarrow \angle 5 = 180^\circ - 100^\circ$

$= 80^\circ$

$\because$ $\angle 3 = \angle 5$ (v. opp. angles)

$\Rightarrow \angle 3 = 80^\circ$

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also $\angle 1 + \angle 6 = 180^\circ$

$\Rightarrow 120^\circ + \angle 6 = 180^\circ \Rightarrow \angle 6 = 180^\circ - 120^\circ$

$= 60^\circ$

Now $60^\circ + \angle 3 + \angle 4 = 180^\circ$ (Angle sum property)

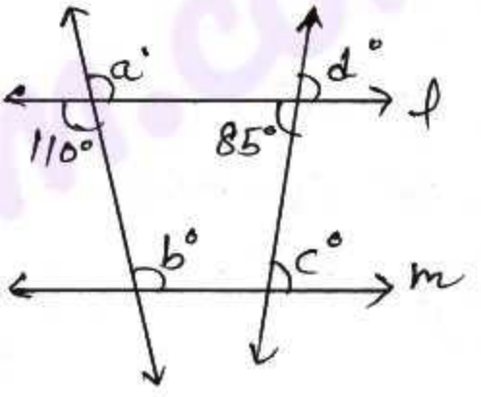
$\Rightarrow 60^\circ + 80^\circ + \angle 4 = 180^\circ$

$\Rightarrow 140^\circ + \angle 4 = 180^\circ \Rightarrow \angle 4 = 180^\circ - 140^\circ$

$= 40^\circ$

Q.10 In fig. 67, line $l \parallel m$, find the values of a, b, c, d. Give reasons.

Solution:



$a = 110^\circ$
$d = 85^\circ$ { vertically opp. angles }

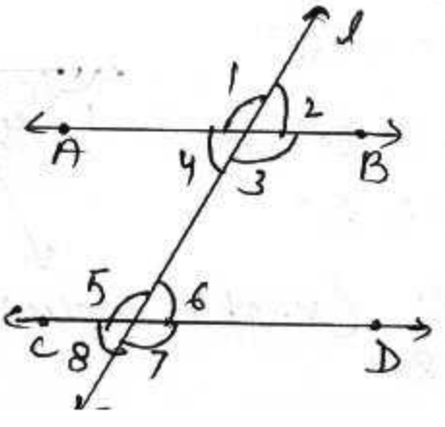
$c = 85^\circ$ (alternate int. $\angle$s)

$a = b$ (corresponding angles)

$\Rightarrow b = 110^\circ$

$\therefore a = 110^\circ, b = 110^\circ, c = 85^\circ, d = 85^\circ$.

Q11 In fig. 68, AB || CD and $\angle 1$ and $\angle 2$ are in the ratio 3:2. Determine all angles 1 to 8.



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Solution: $\angle 1 : \angle 2 = 3 : 2$

Let $\angle 1 = 3x$, $\angle 2 = 2x$

$\therefore \angle 1 + \angle 2 = 180^\circ$ (linear pair)

$\Rightarrow 3x + 2x = 180^\circ$

$\Rightarrow 5x = 180^\circ \Rightarrow x = \frac{180}{5} = 36^\circ$

$\therefore \angle 1 = 3x = 3 \times 36 = 108^\circ$, $\angle 2 = 2x = 2 \times 36^\circ = 72^\circ$

Now $\angle 1 = \angle 3$ (vertically opp.)

$\Rightarrow \angle 3 = 108^\circ$.

also $\angle 1 = \angle 5$ (corresponding angles)

$\Rightarrow \angle 5 = 108^\circ$.

Similarly $\angle 2 = \angle 4 = 72^\circ$ { vertically opposite angles }
$\angle 5 = \angle 7 = 108^\circ$

also $\angle 2 = \angle 6 = 72^\circ$ (corresponding angles)

& $\angle 6 = \angle 8$ (vertically opp. angles)

$\therefore$ 72°

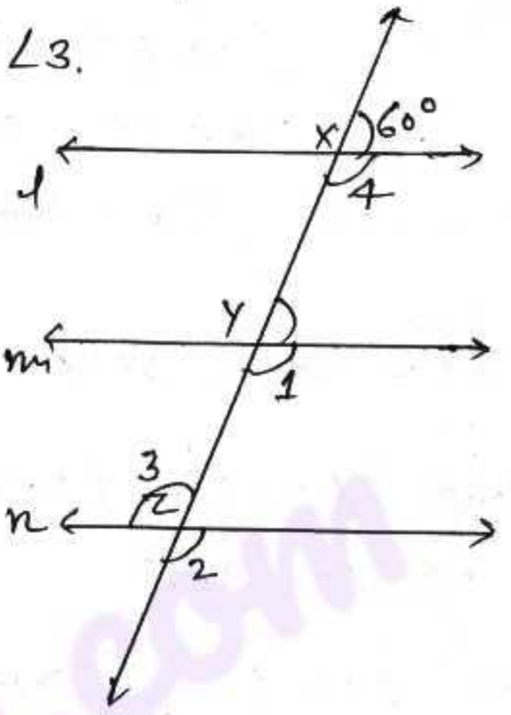
Hence. $\angle 1 = 108^\circ$, $\angle 2 = 72^\circ$, $\angle 3 = 108^\circ$, $\angle 4 = 72^\circ$

$\angle 5 = 108^\circ$, $\angle 6 = 72^\circ$, $\angle 7 = 108^\circ$, $\angle 8 = 72^\circ$

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Q.12 In fig. l, m and n are parallel lines intersected by transversal p at X, Y and Z respectively. Find $\angle 1$, $\angle 2$ and $\angle 3$.



Solution: $\because 60^\circ + \angle 4 = 180^\circ$

$\Rightarrow \angle 4 = 180^\circ - 60^\circ = 120^\circ$

$\because l \parallel m$, then

$\angle 1 = \angle 4$ (corresponding $\angle$s)

$\Rightarrow \angle 1 = 120^\circ$

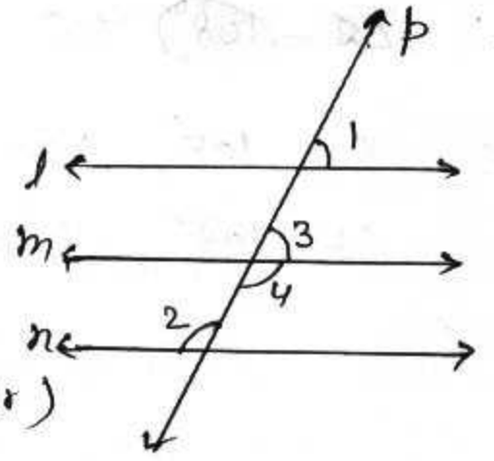
also $\angle 1 = \angle 3$ (alternate int. angles)

$\Rightarrow \angle 3 = 120^\circ$

and $\angle 2 = \angle 3$ (vertically opp. $\angle$s)

$\Rightarrow \angle 2 = 120^\circ$

Q.13 In fig $l \parallel m \parallel n$, $\angle 1 = 60^\circ$, find $\angle 2$



Solution: $\because l \parallel m$

$\Rightarrow \angle 1 = \angle 3$ (corresponding angles)

$\Rightarrow \angle 3 = 60^\circ$

also $\angle 3 + \angle 4 = 180^\circ$ (linear pair)

$\Rightarrow 60^\circ + \angle 4 = 180^\circ$

$\Rightarrow \angle 4 = 180^\circ - 60^\circ = 120^\circ$

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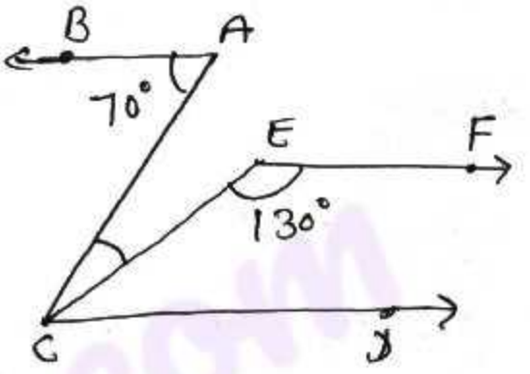
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$\because m \parallel n$

$\angle 2 = \angle 4$ (alternate interior angles)

$\Rightarrow \angle 2 = 120^\circ$

Q.14 In fig 71, If $AB \parallel CD$ and $CD \parallel EF$, find $\angle ACE$



Solution:

here $\because CD \parallel EF$

then $\angle CEF + \angle ECD = 180^\circ$ (co-interior angles)

$\Rightarrow 130^\circ + \angle ECD = 180^\circ$

$\Rightarrow \angle ECD = 180^\circ - 130^\circ = 50^\circ$

also $\angle BAC = \angle ACD = 70^\circ$ (alternate interior angles)

Now $\angle ACE = \angle ACD - \angle ECD$

$= 70^\circ - 50^\circ$

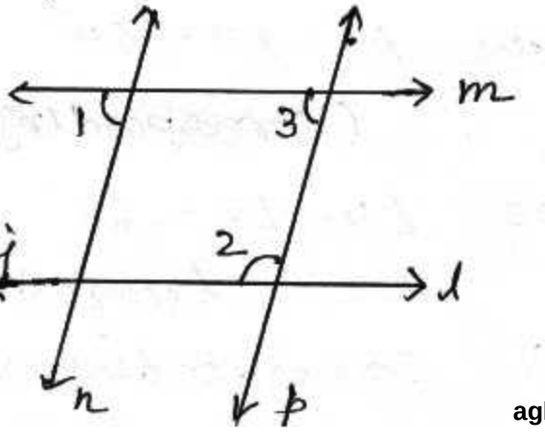
$= 20^\circ$

Q.15 In fig. If $l \parallel m$, $n \parallel p$, and $\angle 1 = 85^\circ$, find $\angle 2$.

Solution: Given $\angle 1 = 85^\circ$

$\because n \parallel p$

$\Rightarrow \angle 1 = \angle 3 = 85^\circ$ (corresponding angles)



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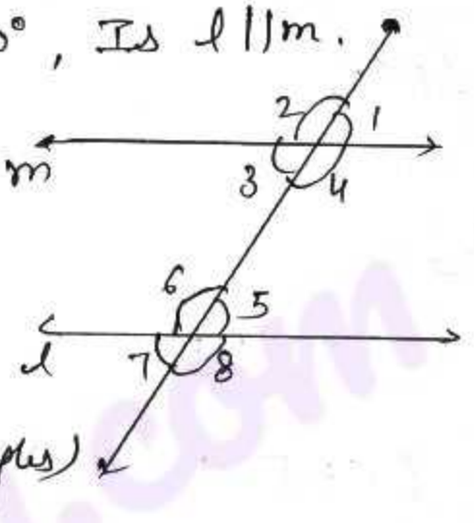
also, $l \parallel m$

$\angle 2 + \angle 3 = 180^\circ$ (co-interior angles)

$\Rightarrow \angle 2 + 85^\circ = 180^\circ$

$\Rightarrow \angle 2 = 180^\circ - 85^\circ = 95^\circ$

Q.16 In fig, a transversal n cuts two lines l and m. If $\angle 1 = 70^\circ$, $\angle 7 = 80^\circ$, Is $l \parallel m$.



Solution:

$\because \angle 1 = \angle 70^\circ$

$\because \angle 1 = \angle 3 = 70^\circ$ (vertically opposite angles)

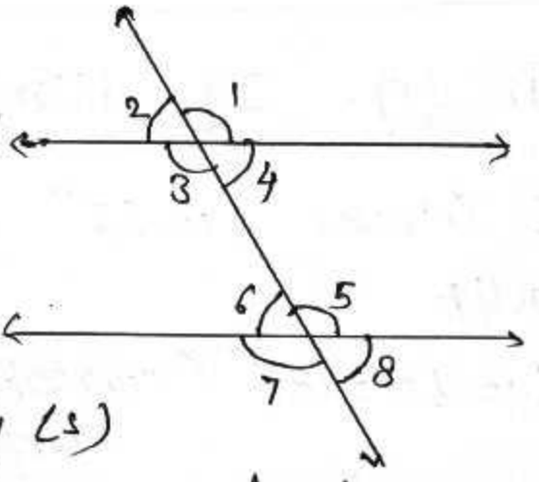
here $\angle 3 = 70^\circ$

$\angle 7 = 80^\circ$

$\because \angle 3 \neq \angle 7$ which are corresponding angles.

hence l is not parallel to m.

Q.17 In fig. a transversal cuts two lines l and m such that $\angle 2 = 65^\circ$ and $\angle 8 = 65^\circ$. Are the lines parallel.?



Solution:

here $\angle 2 = \angle 4 = 65^\circ$

Vertically opp. $\angle$s

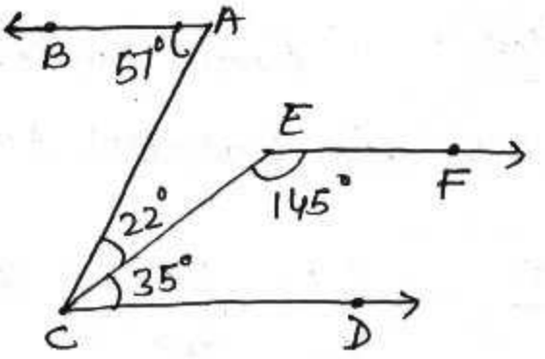
also $\angle 4 = \angle 8 = 65^\circ$

(corresponding $\angle$s)

$\because$ Corresponding angles are equal, lines are parallel

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Q18 In fig. Show that AB || EF



Solution:

$\angle ACD = 22^\circ + 35^\circ$

$= 57^\circ$

$\therefore \angle ACD = \angle BAC$

These are alternate angles, then AB || CD

also $\angle ECD + \angle CEF = 35^\circ + 145^\circ$

$= 180^\circ$

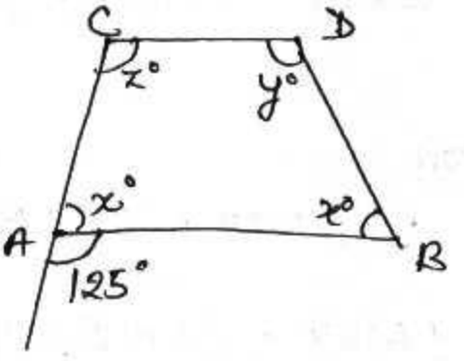
i.e Sum of Co-Interior angles is 180°

then CD || EF

Now AB || CD, CD || EF

$\Rightarrow$ AB || EF

Q.19 In fig. AB || CD, Find the values of x, y, z.



Solution: $\because x + 125^\circ = 180^\circ$

$\Rightarrow x = 180^\circ - 125^\circ$

$= 55^\circ$

$\because x + y = 180^\circ$ (Co-Interior angles)

$\Rightarrow 55^\circ + y = 180^\circ$

$y = 180 - 55^\circ = 125^\circ$

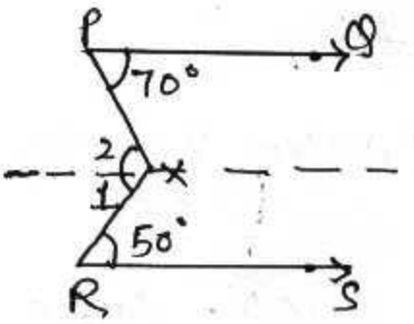
also $z = 125^\circ$ (Corresponding angles)

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Q.20 In fig., find out $\angle PXR$, if $PQ \parallel RS$

Solution: Draw a line from X which is parallel to PQ and RS



Now $\angle 1 = 50°$ { alternate Int $\angle$s }
$\angle 2 = 70°$

$\because \angle 1 + \angle 2 = \angle PXR$

$\Rightarrow 50° + 70° = \angle PXR$

$\Rightarrow \angle PXR = 120°$

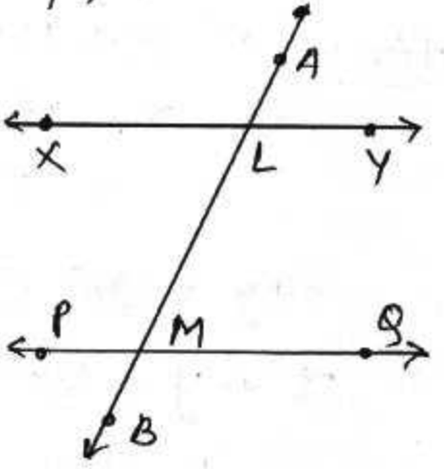
Q.21 In fig. 78, we have

(i) $\angle MLY = 2\angle LMQ$, find $\angle LMQ$

(ii) $\angle XLM = (2x-10)°$ and $\angle LMQ = x+30°$, find x

(iii) $\angle XLM = \angle PML$, find $\angle ALY$

(iv) $\angle ALY = (2x-15)°$, $\angle LMQ = (x+40)°$, find x



Solution

(i) $\because \angle MLY = 2\angle LMQ$

$\because \angle MLY + \angle LMQ = 180°$ (co-Int. $\angle$s)

$\Rightarrow 2\angle LMQ + \angle LMQ = 180°$

$\Rightarrow 3\angle LMQ = 180°$

$\Rightarrow \angle LMQ = \frac{180}{3} = 60°$

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(ii) $\because \angle XLM = \angle LMB$ (alternate interior angles)

$\Rightarrow (2x-10)^\circ = (x+30)^\circ$

$\Rightarrow 2x - x = 30^\circ + 10^\circ$

$\Rightarrow x = 40^\circ$.

(iii) $\because \angle XLM + \angle PML = 180^\circ$ (co-interior angles)

$\Rightarrow \angle XLM + \angle XLM = 180^\circ$ ($\because \angle XLM = \angle PML$)

$\Rightarrow 2\angle XLM = 180^\circ$

$\Rightarrow \angle XLM = \frac{180}{2} = 90^\circ$

also $\angle ALY = \angle XLM$ (vertically opposite angles)

$\Rightarrow \angle ALY = 90^\circ$

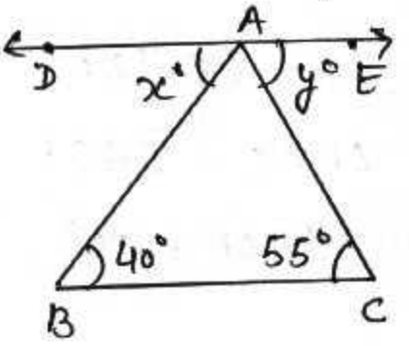
(iv) $\because \angle ALY = \angle LMB$ (alternate interior angles)

$\Rightarrow (2x-15)^\circ = (x+40)^\circ$

$\Rightarrow 2x - x = 40^\circ + 15^\circ$

$\Rightarrow x = 55^\circ$

Q.22 In figure, DE $\parallel$ BC. Find the values of x and y.



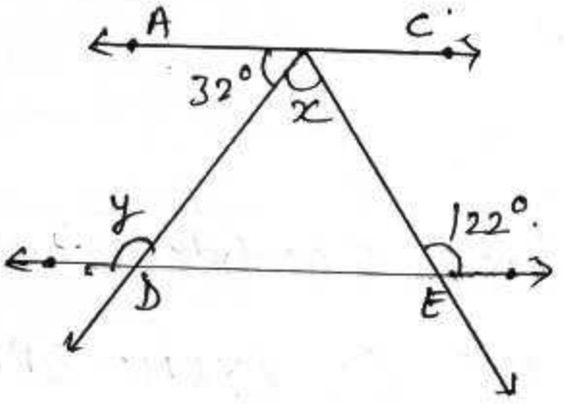
Solution: here, DE $\parallel$ BC

$x = 40^\circ$ (alternate angle)

$y = 55^\circ$ (alternate angles)

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Q.23 In fig. 80, line AC || line DE and $\angle ABD = 3$
Find out the angles x and y if $\angle E = 122°$



Solution : $\because y + 32° = 180°$ (co-interior angles)

$\Rightarrow y = 180 - 32°$

$= 148°$

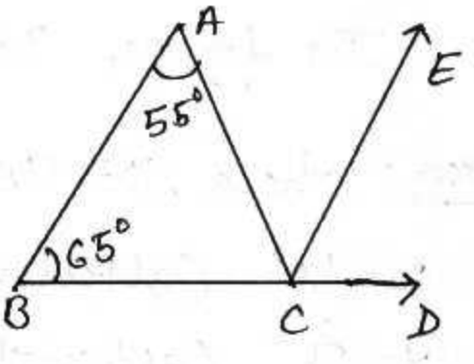
also $32 + x = 122°$ (alternate interior angles)

$\Rightarrow x = 122 - 32°$

$x = 90°$

$\therefore x = 90°, y = 148°$

Q.24 In fig. side BC of $\triangle ABC$ has been produced to D and CE || BA. If $\angle ABC = 65°$, $\angle BAC = 55°$, find $\angle ACE$, $\angle ECD$ and $\angle ACD$.



Solution : $\because CE \| BA$

$\angle BAC = \angle ACE$

$\Rightarrow \angle ACE = 55°$

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In $\triangle ABC$

$\angle A + \angle B + \angle ACB = 180^\circ$

$\Rightarrow 55^\circ + 65^\circ + \angle ACB = 180^\circ$

$\Rightarrow 120^\circ + \angle ACB = 180^\circ \Rightarrow \angle ACB = 180 - 120^\circ$

$= 60^\circ$

<u>Also</u> $\angle ACB + \angle ACD = 180^\circ$

$\Rightarrow 60^\circ + \angle ACD = 180^\circ$

$\Rightarrow \angle ACD = 180 - 60^\circ$

$= 120^\circ$

Now $\angle ACD = \angle ACE + \angle ECD$

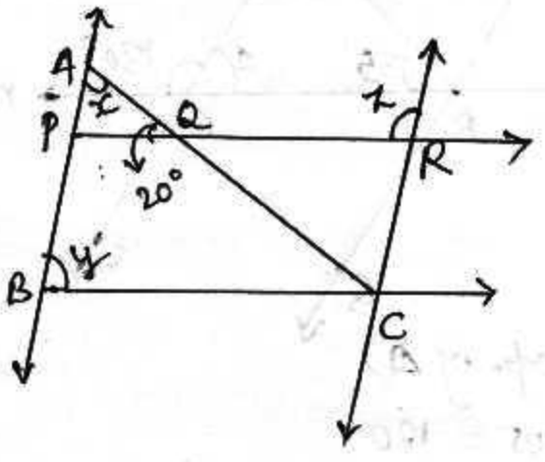
$\Rightarrow 120^\circ = 55^\circ + \angle ECD$

$\Rightarrow \angle ECD = 120 - 55^\circ$

$= 65^\circ$

<u>Q.25</u>

In fig. 82, line $CA \perp AB$ || line CR and line PR || line BD. Find $\angle x$, $\angle y$ and $\angle z$.



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Solution: In figure $CA \perp AB$

$\Rightarrow \quad x = 90^\circ$

Now In $\triangle APQ$

$x + 20^\circ + \angle APQ = 180^\circ$ (Angle sum property of triangle)

$\Rightarrow \quad 90^\circ + 20^\circ + \angle APQ = 180^\circ$

$\Rightarrow \quad 110^\circ + \angle APQ = 180^\circ$

$\Rightarrow \quad \angle APQ = 180^\circ - 110^\circ$

$= 70^\circ$

$\because \quad y = \angle APQ$ (corresponding angle)

$\Rightarrow \quad y = 70^\circ$

also, $\angle APQ + z = 180^\circ$

$\Rightarrow \quad 70 + z = 180$

$z = 180 - 70 = 110^\circ$

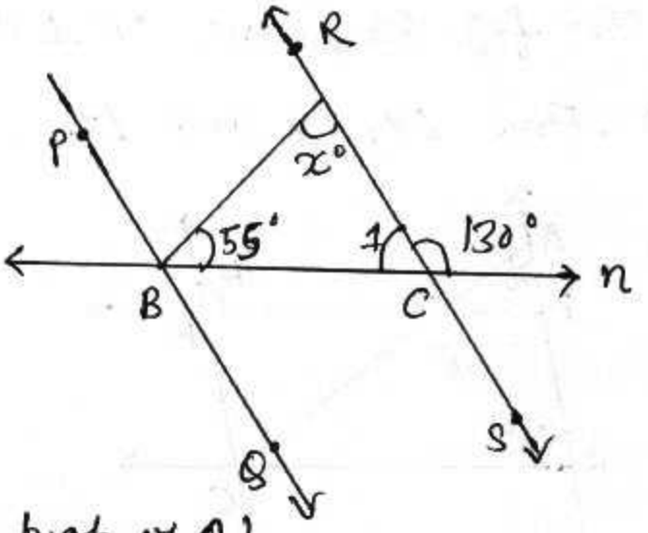
Q.26 In fig. $PQ \parallel RS$. Find the value of x

Solution

$\because \quad \angle 1 + 130^\circ = 180^\circ$

(linear pair)

$\Rightarrow \quad \angle 1 = 180^\circ - 130^\circ = 50^\circ$



also $55^\circ + x + \angle 1 = 180^\circ$

(Angle sum prop. of Δ)

$\Rightarrow \quad 55 + x + 50 = 180 \quad \Rightarrow x + 105 = 180$

$\Rightarrow x = 180 - 105^\circ = 75^\circ$

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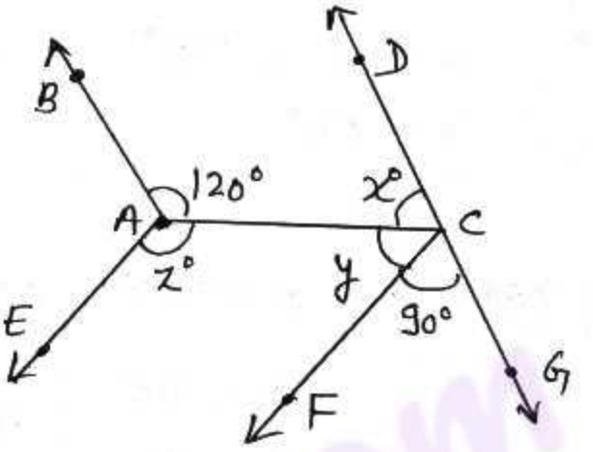
Q.27 In fig. AB || CD, AE || CF; $\angle FCG = 90°$, $\angle BAC = 120°$. Find the values of x, y and z.

Solution:

$\because\ 120° + x = 180°$ (co-interior angles)

$\Rightarrow x = 180 - 120°$

$= 60°$



Now $x + y + 90° = 180°$ (Angles on straight line)

$\Rightarrow 60° + y + 90° = 180°$

$\Rightarrow 150° + y = 180° \Rightarrow y = 180° - 150°$

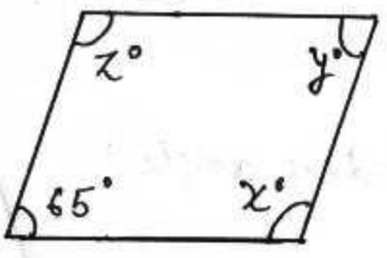
$y = 30°$

also, $y + z = 180°$ (co-interior angles)

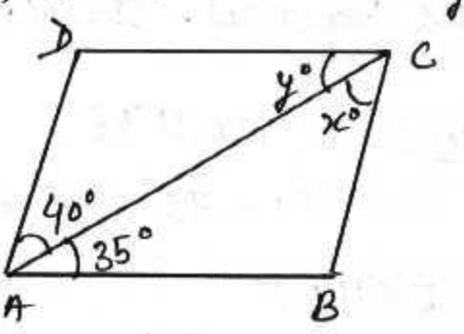
$\Rightarrow 30° + z = 180° \Rightarrow z = 180° - 30°$

$= 50°$

Q.28 In fig AB || CD, AC || BD, find the values of x, y, z.



(i)



(ii)

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Solution : In fig (i)

$65^\circ + x^\circ = 180^\circ$ (co-interior angles)

$\Rightarrow \quad x = 180 - 65^\circ = 115^\circ$

also $\quad x = z = 115^\circ$

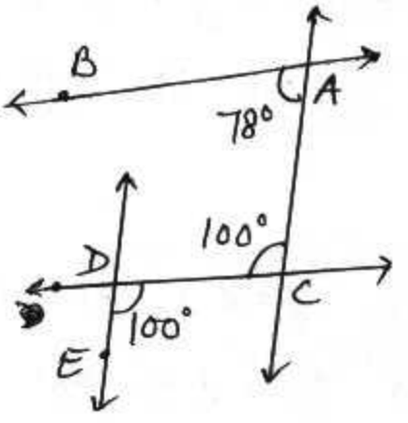
$y = 65^\circ$

In fig (ii) $\because$ AB || CD , AC || BD

$x = 40^\circ$ } Alternate Interior angles}

$y = 35^\circ$ }

Q.29 In fig. State which lines are parallel and why?



Solution : In given figure

$\angle EDC = \angle DCA = 100^\circ$

$\therefore$ AC || DE , because alternate interior angles are equal.

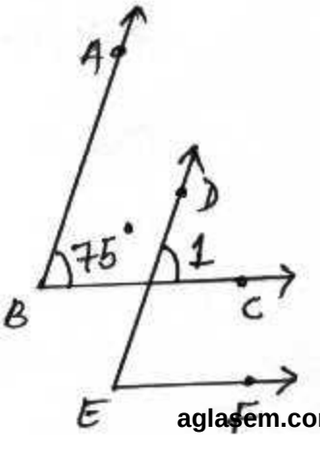
Q.30 In fig. the corresponding arms of $\angle ABC$, and $\angle DEF$ are parallel. If $\angle ABC = 75^\circ$, find $\angle DEF$.

Solution : $\because$ AB || DE

$\angle 1 = 75^\circ$ (corresponding angle)

also BC || EF

$\angle DEF = \angle 1 = 75^\circ$ (corresponding angle)



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