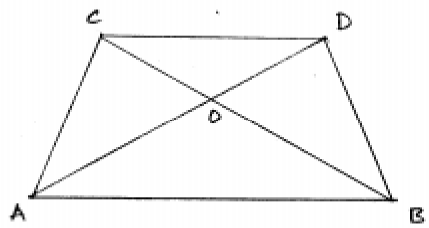
understanding shapes-III special types of quadrilaterals Ex-17.1

17. UNDERSTANDING SHAPES – III

Exercise – 17.1

①



(i) AD = BC

using the property of equal length in Isocaless Trapezium

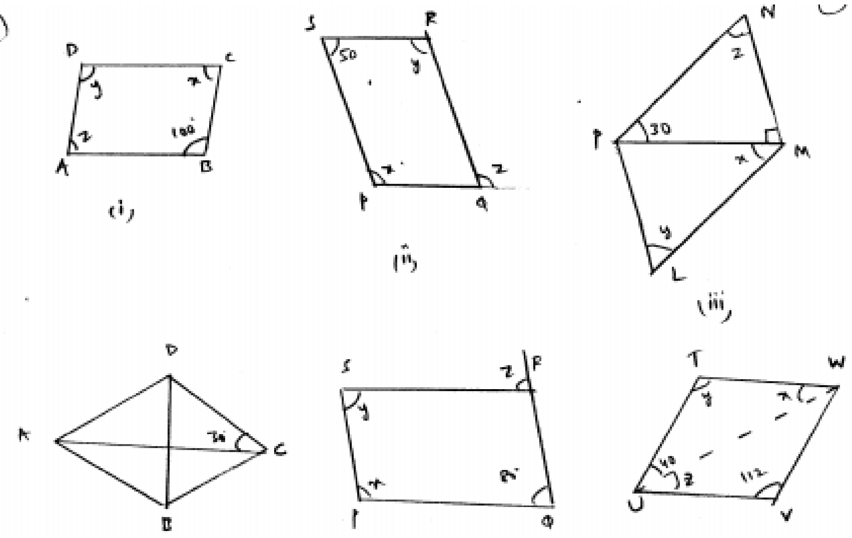
(ii) ∠DCB = ∠ABC (using the property of alternative angles)

= ∠BAD

(iii) OC = OB [Here, Diagonals are equidistant and gets bisected at the point of intersection of two diagonals]

(iv) ∠DAB + ∠CDA = 180° [Sum of two adjacent angles is 180°].

(2)



(i) (ii) (iii) (iv) (v) (vi)

Main properties used here are :-

(1) sum of opposite angles is double of original one. That is, opposite angles are equal.

(2) Sum of two adjacent angle is $180°$.

(i) given opposite angles are equal

$\Rightarrow \angle ADC = \angle ABC$

$\Rightarrow y = 100°$

Sum of adjacent angles $= 180°$

$z + 100° = 180°$

$z = 80°$

Opposite angles are equal

$\angle DAB = \angle DCB$

$\Rightarrow x = z$

$\Rightarrow \boxed{x = 80^\circ}$

(ii) Sum of adjacent angles = 180°

$50 + y = 180^\circ$ $(\angle PSR + \angle SRQ = 180^\circ)$

$\Rightarrow y = 180 - 50$

$\Rightarrow \boxed{y = 130^\circ}$

Opposite angles are equal

$\Rightarrow \angle SRQ = \angle SPQ$

$\Rightarrow y = x$

$\Rightarrow \boxed{x = 130^\circ}$

Opposite angles are equal

$\Rightarrow \angle PSR = \angle RQP$

$50 = 180 - z$ [since z is an exterior angle]

$\boxed{z = 130^\circ}$

(iii) In parallelogram PLMN

Opposite angles are equal;

$z = y$ — (1)

$x = 30^\circ$ [because, they are alternative angles]

$\angle LMN = 30^\circ + 90^\circ$ (from figure)

$\Rightarrow \boxed{\angle LMN = 120^\circ}$

Sum of adjacent angles = 180°

$\angle LMN + \angle MNP = 180^\circ$

$z = 180 - 120$

$\boxed{z = 60^\circ}$

$\boxed{y = 60^\circ}$ —— From (1)

(iv) $x = 90^\circ$ [lines joining the angle are perpendicular each other]

In Δ^{le} OPC,

$x + y + 30^\circ = 180^\circ$ (sum of angles)

$\Rightarrow 90 + y + 30^\circ = 180^\circ$

$\Rightarrow \boxed{y = 120^\circ}$

$\angle ADC = 2y$ $(\because \angle ADO = \angle ODC = y)$

& $\angle ABC = 2z$ $(\because \angle ABO = \angle OBC = z)$

Here, opposite angles are equal

$\Rightarrow 2y = 2z$

$\Rightarrow y = z$

$\Rightarrow \boxed{z = 120^\circ}$

(V) In parallelogram PQRS

opposite angles are equal

$\Rightarrow \angle PSR = \angle PQR$

$\Rightarrow \boxed{y = 80^\circ}$

Sum of adjacent angles is 180°

$\Rightarrow \angle RSP + \angle SPQ = 180^\circ$

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

$\Rightarrow 80 + x = 180^\circ$

$\boxed{x = 100^\circ}$

Sum of adjacent angles is 180°

$\Rightarrow \angle PQR + \angle QRS = 180^\circ$

$80 + 180^\circ - z = 180^\circ$ ($\because z$ is an exterior angle)

$\Rightarrow \boxed{z = 80^\circ}$

(Vi) In parallelogram TUWV.

opposite angles are equal

$\angle UVW = \angle WTU$

$\Rightarrow \boxed{y = 112^\circ}$

The Diagonal bisect the angle at a point

$\angle TUW = \angle WUV = 40^\circ = z$

$\Rightarrow \boxed{z = 40^\circ}$

& $\angle TWU = \angle WUV = x = x$

$\Rightarrow \angle TUV = \angle TUW + \angle WUV$

$\angle TUV = 80°$

& $\angle TWV = \angle TWU + \angle WUV$

$\angle TWV = 2x$

Opposite angles are equal

$\Rightarrow \angle TWV = \angle TUV$

$\Rightarrow 2x = 80°$

$\Rightarrow \boxed{x = 40°}$

7

(i) Here, the opposite angles $\angle PHE$ and $\angle PLE$ are not equal. This violates the rule of parallelogram. Therefore, the given figure cannot be parallelogram.

(ii) Here, the opposite sides RI & GN are equal, and the other pair of opposite sides GR and NI are equal. The law of equal opposite sides supports parallelogram. This figure can be parallelogram

(iii) Here $5 \neq 6$ &
$4 \neq 3$.
implies the diagonals aren't bisecting at the point of intersection of diagonals
$\Rightarrow$ They cannot form parallelogram

(4) In given parallelogram EPHO,
Sum of adjacent angles = 180°

$\angle EHO + \angle HOP = 180°$

$\angle EHP + \angle PHO + \angle HOP = 180°$

$40 + z + 180 - 70 = 180$ (because exterior angle is 70° at O)

$\Rightarrow \boxed{z = 30°}$

Here $\boxed{y = 40°}$, because, they are alternative angles

Sum of adjacent angles = 180°

$\angle HEP + \angle OHE = 180°$

$x + 40° + z = 180$

$\boxed{x = 110°}$

(5)

In parallelogram, length of opposite sides are

(i) equal

$\Rightarrow \quad 26 = 3y-1$

$26+1 = 3y$

$y = \frac{27}{3}$

$\boxed{y=9}$

& $\quad 3x = 18$

$x = \frac{18}{3}$

$\Rightarrow \boxed{x=6}$

(ii) In parallelogram,

we know diagonals bisect at the point of intersection of diagonals

$\Rightarrow \quad 20 = y-7 \qquad$ & $\quad 16 = x-y$ — (1)

$y = 20+7$

& $\boxed{y=27}$

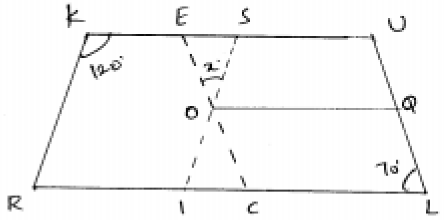
(1) $\Rightarrow$

$16 = x - y$

$16 = x - 27$

$\Rightarrow \boxed{x = 43}$

(6).



Let OQ be the Horizontal line passing through 'O' and parallel to CL.

Here RISK & CLUE are parallelograms

opposite angles are equal.

$\angle RKE = \angle RIE = 120°$

$\angle OIC = 180° - \angle RIE$ (because they lie on same line)

$\boxed{\angle OIC = 60°}$

adjacent sides/angles is equal to 180°

$\angle ULC + \angle LCO = 180°$

$70° + \angle LCO = 180°$

$\boxed{\angle LCO = 110°}$

Now, $\angle OCI = 180° - \angle ICO$

, because they lie on same line

$\boxed{\angle OCI = 70°}$.

In Δ^{le} OCI

$\angle OIC + \angle ICO + \angle COI = 180°$

$60 + 70 + \angle COI = 180$

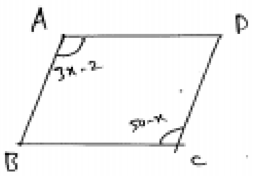
$\Rightarrow \boxed{\angle COI = 50°}$

$\angle ESO = \angle COI$ (vertically opposite angles

$\Rightarrow \boxed{x = 50°}$

7

Let us consider parallelogram ABCD,



opposite angles are equal

$\Rightarrow \angle A = \angle C$

$\Rightarrow (3x-2)° = (50-x)°$

$\Rightarrow 4x = 52$

$\boxed{x = 13°}$.

$\angle A = 3(13)-2) = 37° = \angle C$

$\angle B = \angle D$ (opposite angles)

$\angle B = 180^\circ - \angle A$ (adjacent angles)

$\Rightarrow \angle B = 180^\circ - 33$

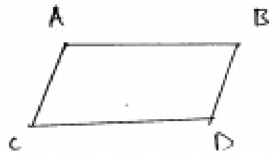
$\Rightarrow \angle B = 150 - 3$

$\boxed{\angle B = 147^\circ = \angle D}$

Therefore, the angles are $33^\circ, 147^\circ, 33^\circ, 147^\circ$

8

let us consider a parallelogram ABCD



Given:

$\angle A = \frac{2}{3} \angle B$

$\angle C = \frac{2}{3} \angle D$

Sum of adjacent sides $= 180^\circ$

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

$\angle A + \frac{2}{3} \angle B = 180^\circ$

$\frac{5}{3} \angle B = 180^\circ$

$\boxed{\angle B = 108^\circ}$

$\Rightarrow \angle A = \frac{2}{3} \angle B$

$= \frac{2}{3} \times 108°$

$\boxed{\angle A = 72°}$

Opposite angles are equal

$\angle A = \angle D = 72°$

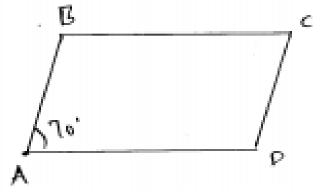
$\angle A = \angle B = 180° - 72 = 108°$

There fore the angles are $72°, 108°, 72°, 108°$

(9)

let the parallelogram be ABCD

& given $\angle A = 70°$



Sum of adjacent angles $= 180°$

$\angle A + \angle D = 180°$

$70 + \angle D = 180°$

$\boxed{\angle D = 110°}$

opposite angles are equal

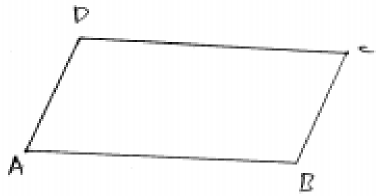
$\angle A = \angle C = 70°$

& $\angle B = \angle D = 110°$

Therefore angles are $70°, 110°, 70°, 110°$

(10)

Let us consider a parallelogram ABCD



Given

$\angle A : \angle B = 1:2$

$\Rightarrow \quad \angle A = x \quad \& \quad \angle B = 2x$

Sum of adjacent angles $= 180°$

$\angle A + \angle B = 180°$

$x + 2x = 180$

$\boxed{x = 60°}$

$\Rightarrow \quad \angle A = 60° \quad , \quad \angle B = 120°$

opposite angles are equal

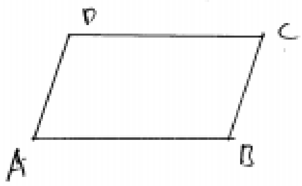
$\angle A = \angle C = 60°$

$\angle B = \angle D = 120°$

Therefore, the angles are $60°, 120°, 60°, 120°$

(11)

Given parallelogram APCD



Given $\angle A = 70°$

Sum of adjacent angles $= 180°$

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

$70^\circ + \angle B = 180^\circ$

$\boxed{\angle B = 110^\circ}$

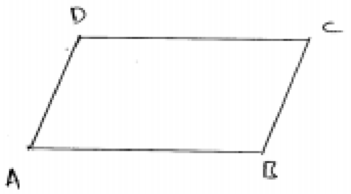
Opposite angles are equal

$\angle A = \angle C = 70^\circ$

& $\angle B = \angle D = 110^\circ$

Therefore angles are $70^\circ, 110^\circ, 70^\circ, 110^\circ$

(13) Given parallelogram is 120° ABCD



Given

$\angle D + \angle B = 130^\circ$

But $\angle D = \angle B$ (opposite angles)

$\Rightarrow \quad 2\angle D = 130^\circ$

$\Rightarrow \quad \boxed{\angle D = \angle B = 65^\circ}$

Sum of adjacent angles $= 180^\circ$

$\angle A + \angle D = 180^\circ$

$\angle A = 180 - 65$

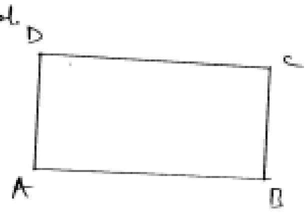
$\boxed{\angle A = 115^\circ}$

Opposite angles are equal

$\Rightarrow$ $\boxed{\angle A = \angle C = 115^\circ}$

(14) Given quadrilateral is ABCD

Given, all angles are equal.



let $\angle A = \angle B = \angle C = \angle D = x$ (say)

$x + x + x + x = 360^\circ$

($\because$ Sum of angles in quadrilateral is 360°)

$\Rightarrow$ $4x = 360^\circ$

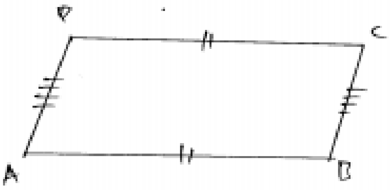
$\Rightarrow$ $x = \frac{360}{4}$

$\Rightarrow$ $\boxed{x = 90^\circ}$

Yes, this quadrilateral can be parallelogram, because, opposite angles are equal and sum of adjacent sides is equal to 180°.

The special type of parallelogram here is Rectangle, because all it's angles are equal to 90°.

(15) Given parallelogram is ABCD



Given

$AB = 4cm$

$BC = 3cm$

We know,

$AB = DC = 4cm$ (opposite sides)

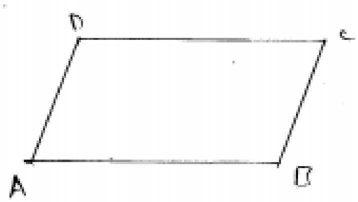
$BC = AD = 3cm$ (opposite sides)

Perimeter $= AB + BC + CD + DA$

$= 4 + 3 + 4 + 3$

$\boxed{P = 14cm}$

(16) Given parallelogram is ABCD



Let the small side be x

$AD = BC = x$ cm

The greater side length $= (x+25)$ cm

$\Rightarrow AB = CD = (x+25)$ cm

perimeter $= AB + BC + CD + DA$

$= x + x+25 + x + x+25$

$= 4x+50$

But,

given that perimeter = 150 cm

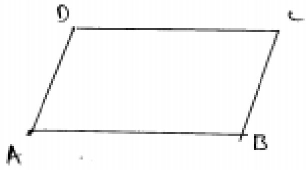
$\Rightarrow \quad 4x + 50 = 150$

$\Rightarrow \quad \boxed{x = 25 \text{ cm}}$

$\therefore \quad AB = CD = 25\text{cm}$

& $\quad AD = BC = 50\text{cm}$

(17) Given parallelogram is ABCD



length of shorter side $= \underline{4.8 \text{ cm}}$

$\boxed{AD = BC = 4.8 \text{ cm}}$ (opposite sides)

length of longer side = Short side length + $\frac{1}{2}$ short side length

$= (1.5)$ short side length

$= (1.5)(4.8)$

length of longer side $= 7.2$ cm

$\Rightarrow \quad \boxed{AB = CD = 7.2 \text{ cm}}$ [opposite sides

perimeter $= AB + BC + CD + DA$

$= 4.8 + 7.2 + 4.8 + 7.2$

$\boxed{P = 24 \text{ cm}}$

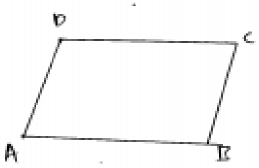
(18)

Given parallelogram is ABCD,

Given

$\angle A = (3x-4)^\circ$

& $\angle B = (3x+10)^\circ$



Sum of adjacent angles = 180°

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

$3x-4+3x+10 = 180$

$6x = 180-6$

$\boxed{x = 29^\circ}$

$\Rightarrow \quad \angle A = 3(29)-4 \quad \& \quad \angle B = 3(29)+10$

$\Rightarrow \quad \boxed{\angle A = 83^\circ} \quad \& \quad \boxed{\angle B = 117^\circ}$

Opposite angles are equal.

$\boxed{\angle A = \angle C = 83^\circ \quad \& \quad \angle B = \angle D = 117^\circ}$

(19)

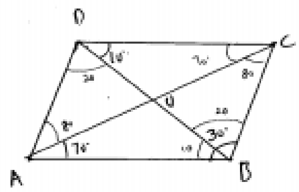
Given parallelogram is ABCD,

Diagonals bisect at 'O',

Given $\angle ABC = 30^\circ$

$\angle BDC = 10^\circ$

$\angle CAB = 70^\circ$



Sum of adjacent angles = $180°$

$\angle CBA + \angle BAD = 180°$

$\angle CBA + \angle BAC + \angle CAD = 180°$

$30 + 70 + \angle CAD = 180°$

$\boxed{\angle CAD = 80°}$

Given

$\angle BDC = 10°$

$\angle BDC = \angle DBA = 10°$ (alternative angles)

$\angle DBA + \angle CBD = \angle CBA =$ (from figure)

$10 + \angle CBD = 30°$

$\boxed{\angle CBD = 20°}$

$\angle CBD = \angle BDA = 20°$ (alternative angles)

$\angle ACB = \angle CAD = 80°$ (alternative angles)

$\angle DCA = \angle CAB = 70°$ (alternative angles)

From Δ^{le} OBC,

$\angle OBC + \angle BOC + \angle BCO = 180°$

$20 + \angle BOC + 80 = 180°$

$\Rightarrow \boxed{\angle BOC = 80°}$

$\angle BOC = \angle BOC = \angle DOA = 80°$ [opposite angles]

From Δ^{le} ODC

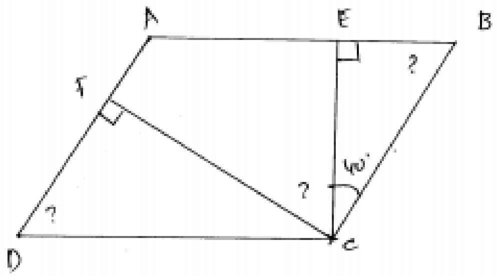
$\angle ODC + \angle DCO + \angle COD = 180°$

$20° + 70° + \angle COD = 180°$

$\boxed{\angle COD = 100°}$

$\boxed{\angle COD = \angle AOB = 100°}$ (opposite angles)

(20) Given figure :-



From Δ^{le} EBC

$\angle EBC + \angle BCE + \angle CEB = 180°$

$\angle EBC + 40 + 90 = 180$

$\boxed{\angle EBC = 50°}$

$\angle ABC = \angle ADC$ [in parallelogram ABCD, opposite angles are equal]

$\Rightarrow \boxed{\angle ADC = 50°}$

In Δ^{le} DFC

$\angle DFC + \angle FCD + \angle CDF = 180^\circ$

$90 + \angle FCD + 50 = 180$

$\boxed{\angle FCD = 40^\circ}$

In parallelogram ABCD,

Sum of adjacent angles $= 180^\circ$

$\angle ADC + \angle DCB = 180^\circ$

$\angle ADC + \angle DCF + \angle FCE + \angle ECB = 180^\circ$

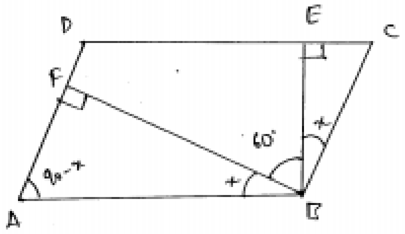
$50 + \angle DCF + \angle FCE + \angle ECB = 180^\circ$

$50 + 40 + \angle FCE + 40 = 180$

$\boxed{\angle FCE = 50^\circ}$

(21)

Let the parallelogram be ABDC as shown



$\angle FBE = 60^\circ$ (given)

Let $\angle BEC = x^\circ$

From Δ^{le} BEC

$\angle BEC + \angle ECB + \angle CBE = 180^\circ$

$90 + \angle ECB + x = 180$

$\boxed{\angle ECB = 90 - x^\circ}$

In parallelogram ABCD,

$\angle DCB = \angle DAB$ (opposite angles)

$\Rightarrow \quad \angle DCB = \angle DAB = (90 - x)^\circ$

In Δ^{le} AFB,

$\angle AFB + \angle FBA + \angle BAF = 180^\circ$

$90 + \angle FBA + 90 - x^\circ = 180^\circ$

$\Rightarrow \quad \boxed{\angle FBA = x^\circ}$

In parallelogram ABCD,

Sum of adjacent angles $= 180^\circ$

$\angle DAB + \angle ABC = 180^\circ$

$\angle DAB + \angle ABF + \angle FBE + \angle EBC = 180^\circ$

$90 - x + x + 60 + x = 180$

$\boxed{x = 30^\circ}$

Now,

$\angle DAB = \angle DCB = 90 - x$

$= 90 - 30$

$\boxed{\angle DAB = \angle DCB = 60}$

$\angle ABC = \angle ABF + \angle FBE + \angle EBC$

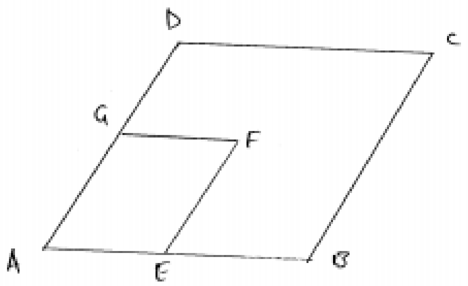
$= 60 + 2x$

$= 60 + 2(30)$

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

$\boxed{\angle ABC = \angle ADC = 120^\circ}$ (opposite angles in parallelogram)

(22) Given Figure



ABCD and AEFG = parallelograms

Given $\angle C = 55^\circ$

from parallelogram ABCD

$\angle C = \angle A$ (opposite angles)

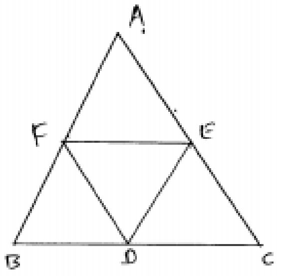
$\Rightarrow \boxed{\angle A = 55^\circ}$

From parallelogram AEFG

$\angle A = \angle F$ (opposite angles)

$\Rightarrow \boxed{\angle F = 55^\circ}$

23 Given figure



BDEF and CDFE are parallelograms

In BDEF

FE = BD — (opposite sides) — 1

In DCFE

DC = FE — (opposite sides) — 2

1 & 2 ⇒

$\boxed{BD = DC}$

24 Given condition

DE = DF — 3

In BDEF, DE = BF (opposite sides) — 1

In DCFE, DF = EC (opposite sides) — 2

1, 2, 3 ⇒ $\boxed{BF = EC}$ — 4

In AFDE, FD = AE — (opposite sides) — (5)

In EDAF, ED = AF — (opposite sides) — (6)

(1),(5),(6) =>

$\boxed{AE = AF}$ — (7)

(4),(7) =>

AE + EC = AF + FB

=> $\boxed{AC = AB}$

∴ The given Δ^{le} is isoceless Δ^{le}

(25)

(i) OB = OD

because diagonals of parallelogram bisect each other.

(ii) ∠OBY = ∠ODX

They are alternative angles

(iii) ∠BOY = ∠DOX

They are opposite angles

(iv) $\underline{\Delta BOY \cong \Delta DOX}$.

because $\underline{OB = OD}$,

$\underline{\angle OBY = \angle ODX}$,

& $\underline{\angle BOY = \angle DOX}$

By angle- side- angle Symmetry, we can say that these Δ^{les} are similar to each other.

(26)

(i) $\underline{\angle A = \angle C}$ (True), opposite angles in Parallelogram are always equal.

(ii) $\angle FAB = \frac{1}{2} \angle A$ (True). Because AF is the angular bisector of $\angle A$

(iii) $\angle DCE = \frac{1}{2} \angle C$ [True] Because CE is the angular bisector of $\angle C$

(iv) $\angle CEB = \angle FAB$ [True]

Because,

we know $\angle A = \angle C$

But $\angle A = \frac{1}{2} \times 4 \; (\angle FAB)$ and

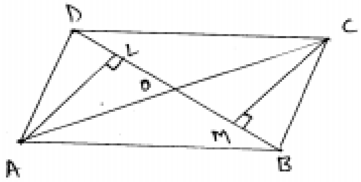
$\angle C = 2\angle DCE$

$\Rightarrow \boxed{\angle CEB = \angle FAB}$

(v) CE ∥ AF (True).

because corresponding angles are equal

(27) Given parallelogram is ABCD



Here $\angle LOA$ & $\angle COM$ are equal

$\angle LOA = \angle COM$

$\angle ALO = \angle CMO$ (Right angles)

$AO = OC$ [because diagonals get bisected at it's point of intersection]

By ASA symmetry,

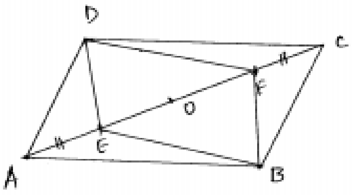
$\Delta CMO \cong \Delta ALO$

$\Rightarrow \boxed{AL = CM}$

28)

(28)

In parallelogram ABCD,



OB = OD

AO = CO

[Diagonals bisect at their point of intersection]

$\cancel{AE} + EO = OF + \cancel{CF}$

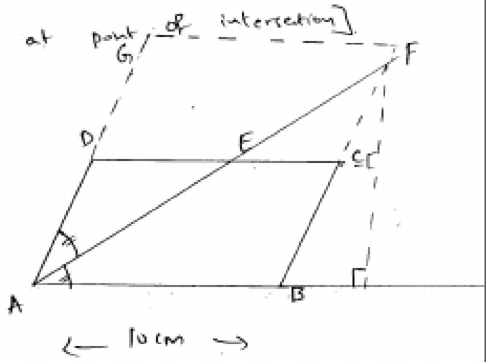
$\Rightarrow$ $\boxed{EO = OF}$

Here OB = OD, & OE = OF

$\Rightarrow$ DEBF can be a parallelogram

[because diagonals bisect each other at point of intersection]

(29)



Given ABCD is a parallelogram

Given

AB = 10 cm

AD = 6 cm

assume a point 'G' such that the produced line of AD and Horizontal line through F intersect at.

Now, the parallelogram, ABFG,

The bisector is intersecting (passing through other vertex

$\Rightarrow$ Their sides are equal

$\Rightarrow$ AB = BF

$\Rightarrow$ AB = BC + CF

$\Rightarrow$ 10 = 6 + CF

$\Rightarrow$ $\boxed{CF = 4\text{ cm}}$

Special types of quadrilaterals Ex 17.2

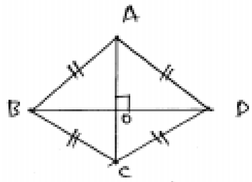
Exercise – 17.2 (1)

(1)

(i) True

AB ∥ CD

AD ∥ BC



Rhombus

(ii) True

AB = BC = CD = DA

(iii) False,

It has four pairs of equal sides

(iv) False,

angles need not be right angle

(v) True,

Diagonals bisect each other at right angles

(vi) False,

Diagonals need not be equal

(vii) True

AB = BC = CD = DA

(viii) True, every Rhombus is a parallelogram

(ix) a closed figure with four sides is called quadrilateral [True]

(X) True

If the angles, are equal to 90°,
Rhombus becomes Square

(Xi) False,
Rhombus may become Square, but not always

(2)

(i) all sides are equal

(ii) one angle is right angle

(iii) Equal

(iv) Bisect ; right

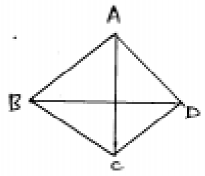
(v) Rhombus

(3) If Diagonals of parallelogram are not perpendicular, then it is not rhombus; Because Diagonals in rhombus always bisect each other at right angles

(4) No, the perpendicularity condition alone doesn't satisfy the rhombus, the sides of quadrilateral must be equal to make rhombus

⑤

Given ABCD is a rhombus.



Given $\angle ACB = 40^\circ$

we know

$\angle ACB = \angle ACD = 40^\circ$ [bisecting angles]

$\Rightarrow$ $\angle BCD = \angle BCA + \angle ACD$

$\boxed{\angle BCD = 80^\circ}$

$\angle ADB = \angle BDC$ [bisecting angles]

$\Rightarrow$ adjacent angles sum $= 180^\circ$

$\angle ADC + \angle BCD = 180^\circ$

$80^\circ + \angle BDC + \angle ADB = 180^\circ$

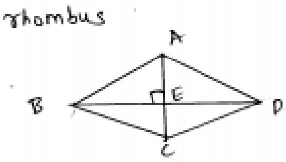
$2(\angle BDC) = 100$

$\boxed{\angle BDC = 100/2}$

$\boxed{\angle BDC = 50^\circ}$

⑥

let ABCD be given rhombus



Given

$AC = 12cm$

$BD = 16cm$

④

$AE = \frac{1}{2} AC$ [Diagonals bisect each other]

$BE = \frac{1}{2} BD$

$\Rightarrow$ $AE = 6$ cm ; $BD = 8$ cm

we know Δ^{le} AEB is Right-angled Δ^{le}

$\Rightarrow$ $AB^2 = BE^2 + AE^2$

(Hypotenus law)

$AB = \sqrt{BE^2 + AE^2}$

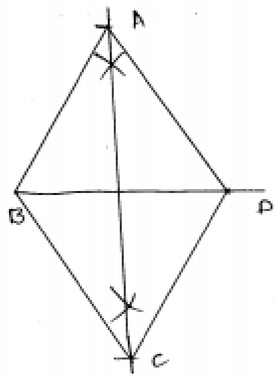
$= \sqrt{8^2 + 6^2}$

$= \sqrt{64 + 36}$

$AB = 10$ cm

$\Rightarrow$ $\boxed{\text{length of the side} = 10 \text{ cm}}$

⑦



1. Draw a Horizontal line BD = 6cm
2. Taking more than Half on the compass, draw arcs from both points B and D

(3) Draw a vertical line through the Intersection points of arcs

(4) Make a point A on the vertical line at 5 cm from Horizontal line to the upper part

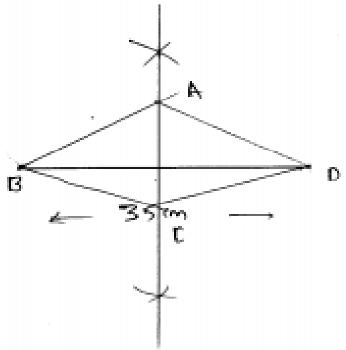
(5) Make a point 'C' on the vertical line at 5cm from Horizontal line to downward.

(6) Join ABCD,

(7) Thus required ABCD rhombus is formed.

(8) Sol:-

Steps followed here :-



(1) Draw a line BD = 3.5 cm

(2) Taking more than half radius draw arcs on both sides on life line through point B and D

(3) Draw a vertical line through intersection points. of arcs

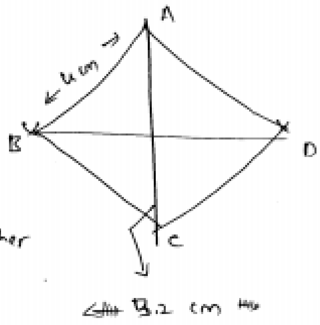
(4) Take angle = 20̊ and Draw a point A on line from B to upwards

(5) Take angle = 20° and draw a point 'c' on line from B to downwards.

(6) Join ABCD,

(7) Thus, the required rhombus is formed.

(9) Sol:-



(1) Draw a vertical line AB = 3.2 cm.

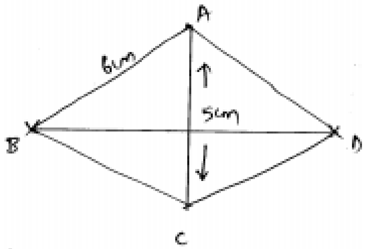
(2) Taking radius as 4cm, Draw arcs from A and C on either side of the line

(3) The Intersection points are B and D,

(4) Join ABCD,

(5) The required Rhombus ABCD is done.

(10) Sol:-



(1) Draw a vertical line AC = 5 cm

(2) Taking radius = 6cm, Draw arcs on either side of AC from A & C points

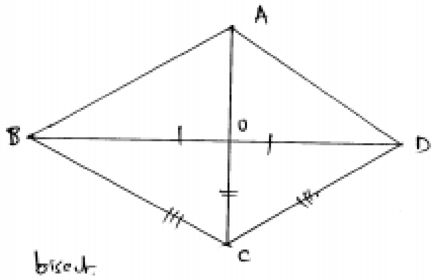
(3) The New point of intersection of arcs is called to be B and D.

(4) Join ABCD

(5) Thus the required rhombus is formed.

(11)

Here ABCD is a rhombus,



(i) Here

OD = OB [diagonals bisect each other

OC = OC [Common side]

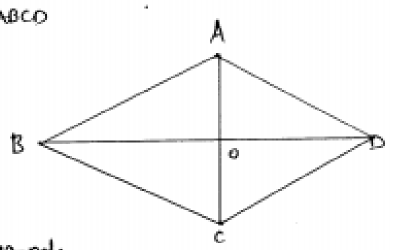
BC = CD [side of rhombus]

By S-S-S congruency, $\Delta BOC \cong \Delta DOC$

(ii) Since ΔBOC & ΔDOC are congruent to each other, their alternative angles will also be equal.

(12)

Let us consider a, Rhombus ABCD



let us Considers

ΔABO & ΔAOD

Here

OB = OD [Diagonals bisect each other]

OA = OA [common side]

AB = AD [Sides of rhombus]

$\Rightarrow$ $\Delta AOB \cong \Delta AOD$

$\Rightarrow$ $\angle AOB = \angle OAD$

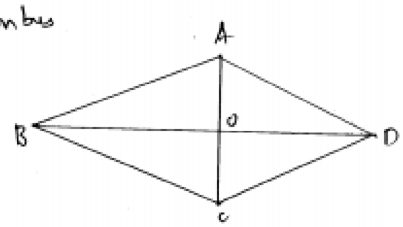
$\Rightarrow$ Ac is bisecting $\angle A$

Similarly,

every diagonal bisects the given angle

(13) Given ABCD is rhombus

Let 'O' be centre,



Given AB = 10cm.

BD = 16cm

BO = $\frac{1}{2}$ BD (because diagonals bisect each other)

$\Rightarrow$ $\boxed{BO = 8cm}$

In Δ^{le} AOB

$AB^2 = AO^2 + OB^2$ [Hypotenuse theorem]

$10^2 = AO^2 + 8^2$

$AO^2 = 100 - 64$

$\boxed{AO = 6cm}$

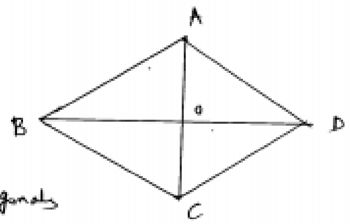
AC = 2AO (because diagonals bisect each other)

$\Rightarrow$ $\boxed{AC = 12cm}$

(14) Given ABCD is a rhombus

Given AC = 6cm

BD = 8cm



$AO = \frac{1}{2}AC$
$BO = \frac{1}{2}BD$ (because diagonals bisect each other)

$\Rightarrow$ AO = 3cm , BO = 4cm

From Δ^{le} AOB

$AO^2 + BO^2 = AB^2$ (Hypotenuse theorem)

$AB = \sqrt{3^2 + 4^2}$

$= \sqrt{9+16}$

$= \sqrt{25}$

AB = 5 cm

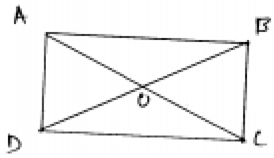
$\boxed{\text{length of the quadrilateral} = 5cm}$

Special types of quadrilaterals Ex 17.3

Exercise - 17.3 (1)

(1)

(i) True $AB = DC$ & $AD = BC$



(ii) False $AD \neq DC$

(iii) True

(iv) True

(v) False [Need not be]

(vi) False

(vii) True [$AC = BD$ & $AO = OC$; $DO = OB$]

(viii) False [They are not $\perp^r$]

(ix) False [They posses different lengths]

(x) True

(xi) True

(xii) False [because all squares are parallelograms].

(2)

(i) True

(ii) True

(iii) True

(iv) False, (Diagonal = $\sqrt{2} \times$ side)

(3)

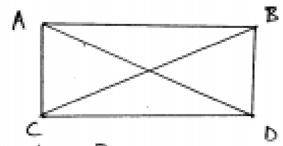
(i) angles are right angles

(ii) angles are right angles

(iii) all sides are equal

(4) No, In rectangle, the length of diagonals are equal and they do bisect each other

(5) Given Rectangle ABCD,



Here AD = BC

[Diagonals are of equal length in Rectangle]

$\angle BAC = \angle ACD = 90°$ [Right angles]

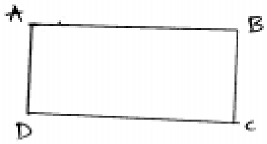
AC = AC = common sides

By S-A-S Congruency.

$\boxed{\Delta ACB \cong \Delta CAD}$

6 Let the Rectangle be ABCD

Given $AD : DC = 2:3$



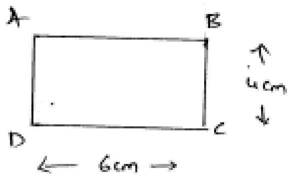
let $AD = 2x$
$DC = 3x$

Perimeter $= 2(AD + DC)$
$= 2[2x+3x]$
$= 10x$

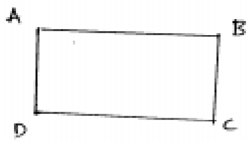
But, given that perimeter is 20cm

$\Rightarrow 10x = 20$
$\boxed{x = 2\text{ cm}}$

$\Rightarrow$ sides of Rectangle are 4 cm and 6cm.



7 Let the Rectangle be ABCD



Given length : Breadth $= 5:4$

let length $= 5x$
& breadth $= 4x$

Perimeter is given by $p = 2(\text{length} + \text{breadth})$

$= 2[5x + 4x]$

$= 18x$

But, given that perimeter is 90 cm

$\Rightarrow 18x = 90$

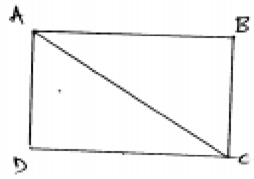
$x = \frac{90}{18}$

$\boxed{x = 5}$

Sides of Rectangle are given by $= 5x, 4x, 5x, 4x$

$= 25$ cm, 20cm, 25cm, 20cm

(8) Given the Rectangle be ABCD



Given $AD = 5$ cm

$DC = 12$ cm

From Δ^{le} ADC,

$AD^2 + DC^2 = AC^2$ (Hypotenuse theorem)

$AC = \sqrt{5^2 + 12^2}$

$= \sqrt{25 + 144}$

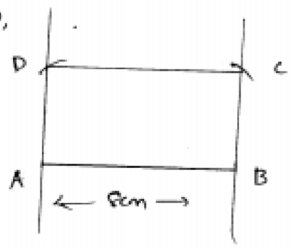
$= \sqrt{169}$

$AC = 13$ cm

length of the diagonal = 13 cm

(9) Sol :-

1) Draw a Horizontal line AB = 8cm,



2) Draw vertical lines through A & B.

3) with radius of 10cm, from vertex A, cut an arc on vertical line through B. The point of intersection is named as 'C'.

4) with radius of 10cm from vertex B, cut an arc on vertical line through A. The point of intersection is named as 'D'.

5) Join ABCD

6) thus the required Rectangle ABCD is obtained

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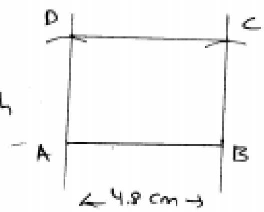
(10) Sol :-

(1) Draw AB = 4.8 cm , a horizontal line



(2) Draw two vertical lines through A and B.

(3) with radius of 4.8cm, from vertex A, cut a vertical line through 'A'. The point of intersection is named as 'D'.

(4) With radius of 4.8cm, from vertex B, cut a vertical line passing through 'B'. The point of intersection is named as 'C'.

(5) Join ABCD

(6) thus, the rectangle ABCD is formed.

---

(11)

(i) Four sides of equal length:-

* Square
* Rhombus

(ii) Four right angles

* Square
* Rectangle.

(12)

(i) A Square is always named as quadrilateral.

(ii) Opposite sides are parallel and equal

(iii) All sides are equal and opposite sides are parallel

(iv) Opposite sides are equal and each angle is right angle.

(13)

(i) parallelogram, rectangle, rhombus, Square

(ii) Rhombus, Square

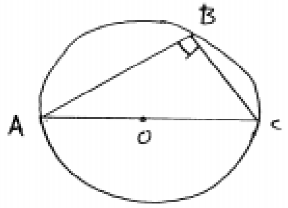
(iii) Square, Rectangle.

(14)

let us draw a line AC (Hypotenuse

→ Now, draw a circle with 'AC' as diameter.

→ If 'B' is the point such that it makes 90°, then,



OB = OA = OC = radius.

Hence proved.

(15)

(i) By whether all the angles are equal to right angles

(ii) By measuring the length of the diagonals