Q1) Two opposite angles of a parallelogram are $(3x-2)^0$ and $(50-x)^0$. Find the measure of each angle of the parallelogram.

Solution:

We know that,

Opposite sides of a parallelogram are equal.

$(3x-2)^0 = (50-x)^0$

$\Rightarrow 3x + x = 50 + 2$

$\Rightarrow 4x = 52$

$\Rightarrow x = 13^0$

Therefore, $(3x-2)^0 = (3*13-2) = 37^0$

$(50-x)^0 = (50-13) = 37^0$

Adjacent angles of a parallelogram are supplementary.

$\therefore x + 37 = 180^0$

$\therefore x = 180^0 - 37^0 = 143^0$

Hence, four angles are : 37^0, 143^0, 37^0, 143^0.

Q2) If an angle of a parallelogram is two-third of its adjacent angle, find the angles of the parallelogram.

Solution:

Let the measure of the angle be x.

Therefore, the measure of the angle adjacent is $\frac{2x}{3}$

We know that the adjacent angle of a parallelogram is supplementary.

Hence, $x + \frac{2x}{3} = 180^0$

$2x + 3x = 540^0$

$\Rightarrow 5x = 540^0$

$\Rightarrow x = 108^0$

Adjacent angles are supplementary

$\Rightarrow x + 108^0 = 180^0$

$\Rightarrow x = 180^0 - 108^0 = 72^0$

$\Rightarrow x = 72^0$

Hence, four angles are 180^0, 72^0, 180^0, 72^0

Q3) Find the measure of all the angles of a parallelogram, if one angle is 24^0 less than twice the smallest angle.

Solution:

$x + 2x - 24 = 180^0$

$\Rightarrow 3x - 24 = 180^0$

$\Rightarrow 3x = 108^0 + 24$

$\Rightarrow 3x = 204^0$

$\Rightarrow x = \frac{204}{3} = 68^0$

$\Rightarrow x = 68^0$

$\Rightarrow 2x - 24^0 = 2*68^0 - 24^0 = 112^0$

Hence, four angles are 68^0, 112^0, 68^0, 112^0.

Q4) The perimeter of a parallelogram is 22cm. If the longer side measures 6.5cm what is the measure of the shorter side?

Solution:

Let the shorter side be 'x'.

Therefore, perimeter = x + 6.5 + 6.5 + x [Sum of all sides]

22 = 2 (x + 6.5)

11 = x + 6.5

$\Rightarrow x = 11 - 6.5 = 4.5$cm

Therefore, shorter side = 4.5cm

Q5) In a parallelogram ABCD, $\angle D = 135^0$. Determine the measures of $\angle A$ and $\angle B$.

Solution:

In a parallelogram ABCD

Adjacent angles are supplementary

So, $\angle D + \angle C = 180^0$

$\angle C = 180^0 - 135^0$

$\angle C = 45^0$

In a parallelogram opposite sides are equal.

$\angle A = \angle C = 45^0$

$\angle B = \angle D = 135^0$

Q6) ABCD is a parallelogram in which $\angle A = 70^0$. Compute $\angle B,\ \angle C$ and $\angle D$.

Solution:

In a parallelogram ABCD

$\angle A = 70^0$

$\angle A + \angle B = 180^0$ [Since, adjacent angles are supplementary]

$70^0 + \angle B = 180^0$ [$\because \angle A = 70°$]

$\angle B = 180^0 - 70^0$

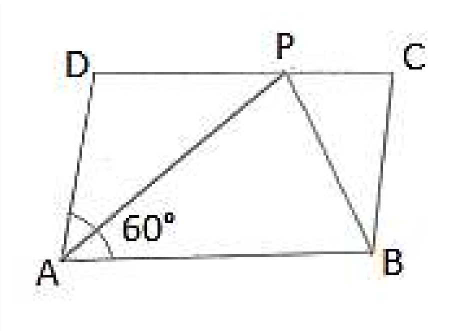
$\angle B = 110^0$

In a parallelogram opposite sides are equal.

$\angle A = \angle C = 70^0$

$\angle B = \angle D = 110^0$

Q7) In Figure 14.34, ABCD is a parallelogram in which $\angle A = 60^0$***. If the bisectors of*** $\angle A$, and $\angle B$ ***meet at P, prove that AD = DP, PC = BC and DC = 2AD.***



Solution:

AP bisects $\angle A$

Then, $\angle DAP = \angle PAB = 30^0$

Adjacent angles are supplementary

Then, $\angle A + \angle B = 180^0$

$\angle B + 60^0 = 180^0$

$\angle B = 180^0 - 60^0$

$\angle B = 120^0$

BP bisects $\angle B$

Then, $\angle PBA = \angle PBC = 30^0$

$\angle PAB = \angle APD = 30^0$ [Alternate interior angles]

Therefore, AD = DP [Sides opposite to equal angles are in equal length]

Similarly

$\angle PBA = \angle BPC = 60^0$ [Alternate interior angles]

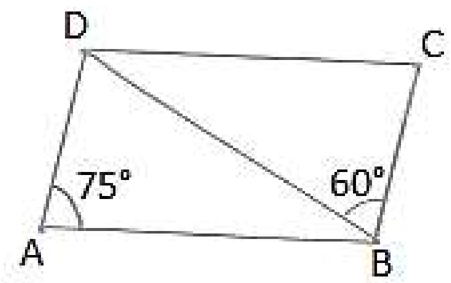
Therefore, PC = BC

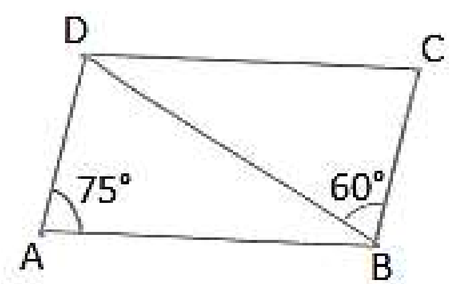
DC = DP + PC

DC = AD + BC [Since, DP = AD and PC = BC]

DC = 2AD [Since, AD = BC, opposite sides of a parallelogram are equal]

Q8) In figure 14.35, ABCD is a parallelogram in which $\angle DAB = 75^0$ and $\angle DBC = 60^0$***. Compute*** $\angle CDB$, and $\angle ADB$.





Solution:

To find $\angle CDB$ and $\angle ADB$

$\angle CBD = \angle ABD = 60^0$ [Alternate interior angle. AD || BC and BD is the transversal]

In $\angle BDC$

$\angle CBD + \angle C + \angle CDB = 180^0$ [Angle sum property]

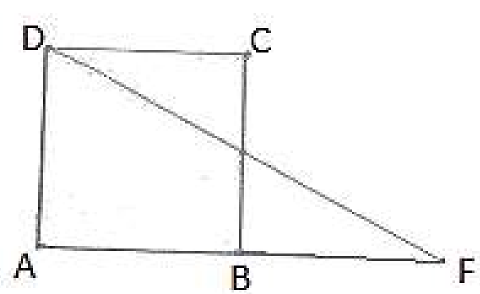
$\Rightarrow 60^0 + 75^0 + \angle CDB = 180^0$

$\Rightarrow \angle CDB = 180^0 - (60^0 + 75^0)$

$\Rightarrow \angle CDB = 45^0$

Hence, $\angle CDB = 45^0,\ \angle ADB = 60^0$

Q9) In figure 14.36, ABCD is a parallelogram and E is the mid-point of side BC. If DE and AB when produced meet at F, prove that AF = 2AB.



Solution:

In ΔBEF and ΔCED

$\angle BEF = \angle CED$ [Verified opposite angle]

BE = CE [Since, E is the mid-point of BC]

$\angle EBF = \angle ECD$ [Since, Alternate interior angles are equal]

$\therefore \Delta BEF \cong \Delta CED$ [ASA congruence]

$\therefore BF = CD \quad [CPCT]$

AF = AB + AF

AF = AB + AB

AF = 2AB.

Hence proved.

Q10) Which of the following statements are true (T) and which are false (F)?

(i) In a parallelogram, the diagonals are equal.

(ii) In a parallelogram, the diagonals bisect each other.

(iii) In a parallelogram, the diagonals intersect each other at right angles.

(iv) In any quadrilateral, if a pair of opposite sides is equal, it is a parallelogram.

(v) If all the angles of a quadrilateral are equal, it is a parallelogram.

(vi) If three sides of a quadrilateral are equal, it is a parallelogram.

(vii) If three angles of a quadrilateral are equal, it is a parallelogram.

(viii) If all the sides of a quadrilateral are equal, it is a parallelogram.

Solution:

(i) False

(ii) True

(iii) False

(iv) False

(v) True

(vi) False

(vii) False

(viii) True