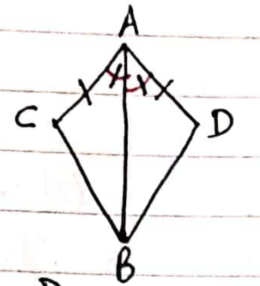
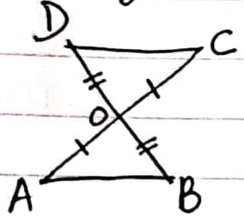
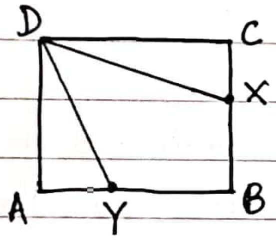
IX Revision Worksheet - (Triangles)

1) 

In the given figure, the congruency rule used in proving $\triangle ACB \cong \triangle ADB$ is
(a) ASA (b) SAS (c) AAS (d) none of these

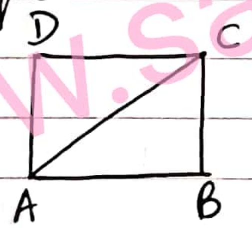
2) 

If the two triangles are congruent, then which among the following is true.
(a) $\triangle OAB \cong \triangle ODC$ (b) $\triangle ABO \cong \triangle DCO$
(c) $\triangle AOB \cong \triangle COD$ (d) $\triangle AOB \cong \triangle CDO$

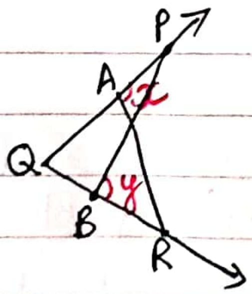
3) 

ABCD is a square and $BX = BY$.
Prove that (i) $\triangle DCX \cong \triangle DAY$
(ii) $DY = DX$
(iii) $\angle DXC = \angle DYA$.

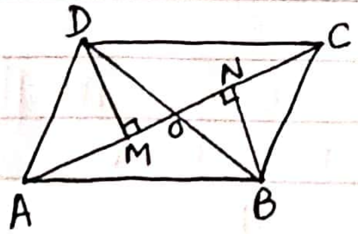
4) Prove that median of an equilateral triangle are equal.

5) 

The diagonal AC of quadrilateral ABCD bisects $\angle BAD$ and $\angle BCD$. Prove that $BC = CD$.

6) 

$PQ = QR$ and $\angle x = \angle y$.
Prove that $AR = PB$.

7) 

In quadrilateral ABCD, BN and DM are drawn perpendicular to AC such that $BN = DM$.
Prove that O is the mid-point of BD.

8) In two triangles, ABC and PQR, $\angle A = 30°$, $\angle B = 70°$, $\angle P = 70°$,

$\angle Q = 80^\circ$ and $AB = RP$, then

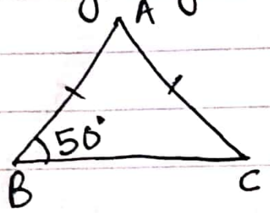
(a) $\triangle ABC \cong \triangle PQR$ (b) $\triangle ABC \cong \triangle QRP$

(c) $\triangle ABC \cong \triangle RPQ$ (d) $\triangle ABC \cong \triangle RQP$

9) In a $\triangle PQR$, if $\angle QPR = 100^\circ$ and $PQ = PR$, then $\angle R$ and $\angle Q$ respectively are (a) $80^\circ, 70^\circ$ (b) $80^\circ, 80^\circ$ (c) $70^\circ, 80^\circ$ (d) $40^\circ, 40^\circ$

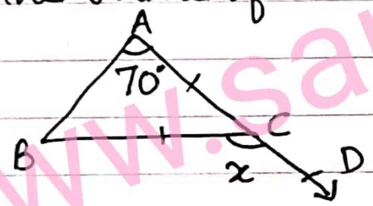
10) In $\triangle PQR$, $\angle R = \angle P$ and $QR = 4$ cm and $PR = 5$ cm. Then the length of PQ is (a) 4 cm (b) 5 cm (c) 2 cm (d) 2.5 cm

11) In $\triangle ABC$, $\angle A = \angle C$ and $BC = 4$ cm and $AC = 3$ cm. What is length of side AB?

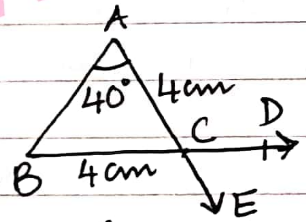
12)


In $\triangle ABC$, $AB = AC$. What will be $\angle BCA$.

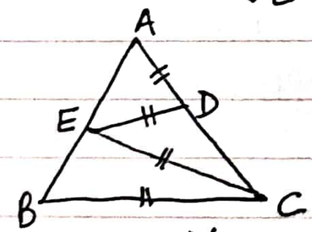
13) Two angles measures $a - 60^\circ$ and $123^\circ - 2a$. If each one is opposite to equal sides of an isosceles $\triangle$, then find the value of a.

14)


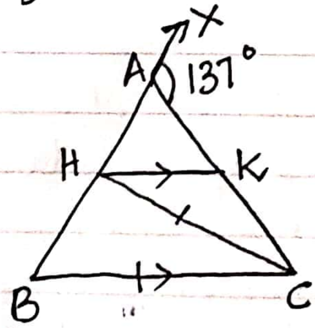
$\triangle ABC$ is an isosceles $\triangle$ with $AC = BC$. Find the value of x.

15)


If $AC = BC = 4$ cm and $\angle A = 40^\circ$, then find $\angle DCE$.

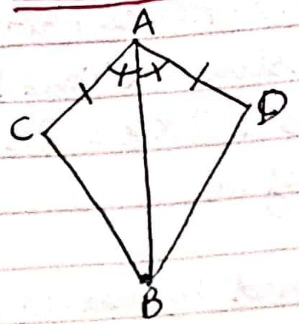
16)


$AB = AC$. D is a point on AC and E on AB such that $AD = ED = EC = BC$. Prove that $\angle A : \angle B = 1 : 3$

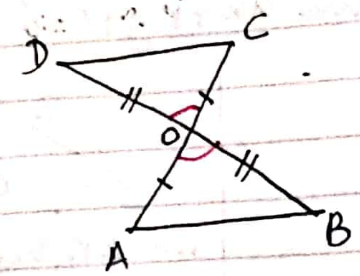
17)


$AB = AC$, $CH = CB$ and $HK \parallel BC$. If $\angle CAX = 137^\circ$, then find $\angle CHK$.

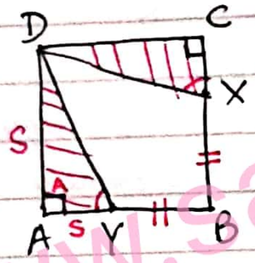
IX Revision Worksheet (Triangles – answers)

1) 

In $\triangle ACB$ and $\triangle ADB$,
$AC = AD$ (given)
$\angle CAB = \angle DAB$ (given)
$AB = AB$ (common side)
$\therefore \triangle ACB \cong \triangle ADB$ (SAS congruency)
(b)

2) 

In $\triangle AOB$ and $\triangle COD$,
$OA = OC$ (given)
$\angle AOB = \angle COD$ (V.O.A)
$OB = OD$ (given)
$\therefore \triangle AOB \cong \triangle COD$ (SAS congruency)
(c)

3) 

Given :- in square ABCD,
$BX = BY$
To prove : (i) $\triangle DCX \cong \triangle DAY$
(ii) $DY = DX$
(iii) $\angle DXC = \angle DYA$

Proof :- Since ABCD is a square,
$AB = BC \rightarrow (1)$
But $BY = BX \rightarrow (2)$ (given)
$(1)-(2)$, $AB - BY = BC - BX$
$\Rightarrow AY = XC \rightarrow (3)$

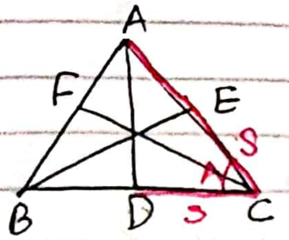
(i) In $\triangle DCX$ and $\triangle DAY$,
$DC = DA$ (sides of a square)
$\angle DCX = \angle DAY$ (each 90°)
$XC = AY$ (proved above)
$\therefore \triangle DCX \cong \triangle DAY$ (SAS congruency)

(ii) Thus, $DY = DX$ (by CPCT)

(iii) Also, $\angle DXC = \angle DYA$ (by CPCT)

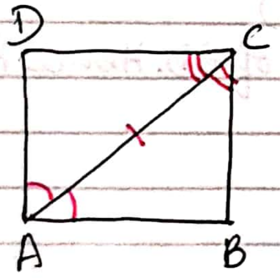
Hence Proved.

4)



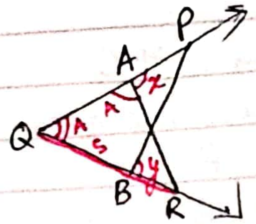
Given: an equilateral ΔABC.
AD, BE and CF are medians.
To prove: $AD = BE = CF$.
Proof:- Since ΔABC is an equilateral triangle, $AB = BC = AC \rightarrow (1)$
and $\angle A = \angle B = \angle C = 60° \rightarrow (2)$
In ΔADC and ΔBEC, $AC = BC$ (from eq:(1))
$\angle ACD = \angle BCE$ (common angle)
$DC = CE$ ($\because BC = AC \Rightarrow \frac{1}{2}BC = \frac{1}{2}AC$; AD and BE are medians)
$\therefore \Delta ADC \cong \Delta BEC$ (SAS congruency)
Thus $AD = BE$ (by CPCT) $\rightarrow (3)$
In ΔADB and ΔCFB, $AB = CB$ (from eq:(1))
$BD = FB$ ($\frac{1}{2}BC = \frac{1}{2}AB$; AD and CF are medians)
$\angle ABD = \angle CBF$ (common angle)
$\therefore \Delta ADB \cong \Delta CFB$ (SAS congruency)
Thus $AD = CF$ (by CPCT) $\rightarrow (4)$
From (3) and (4), $AD = BE = CF$. Hence Proved.

5)



Given: in quadrilateral ABCD, AC bisects $\angle BAD$ and $\angle BCD$.
To prove: $BC = CD$.

Proof:- Since AC bisects $\angle BAD$ and $\angle BCD$,
$\angle BAC = \angle DAC \rightarrow (1)$
and $\angle BCA = \angle DCA \rightarrow (2)$
In ΔABC and ΔADC, $\angle BAC = \angle DAC$ (from eq:(1))
$\angle BCA = \angle DCA$ (from eq:(2))
$AC = AC$ (common side)
$\therefore \Delta ABC \cong \Delta ADC$ (ASA Congruency)
Thus $BC = CD$ (by CPCT). Hence Proved.

6) 

Given: $PQ = QR$

$\angle x = \angle y$

To prove: $AR = PB$

Proof :- $\angle x = \angle y$ (given)

$\Rightarrow 180^\circ - \angle x = 180^\circ - \angle y$ (linear pair)

$\Rightarrow \angle RAQ = \angle PBQ \rightarrow (1)$

In $\triangle RAQ$ and $\triangle PBQ$, $\angle RAQ = \angle PBQ$

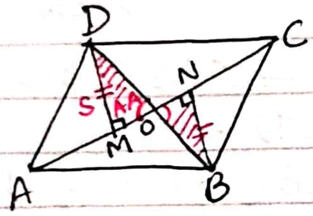
$\angle RQA = \angle BQP$ (common angle)

$QR = PQ$ (given)

$\therefore \triangle RAQ \cong \triangle PBQ$ (AAS congruency)

Thus $AR = PB$ (by CPCT)

Hence Proved.

7) 

Given: in quadrilateral ABCD,

$BN \perp AC$; $DM \perp AC$

$BN = DM$.

To prove: O is the mid-point of BD.

Proof :- In $\triangle BON$ and $\triangle DOM$,

$BN = DM$ (given)

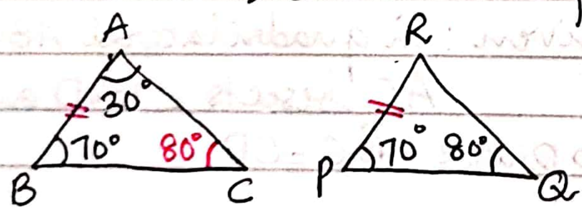
$\angle BNO = \angle DMO$ (each 90°)

$\angle BON = \angle DOM$ (V.O.A)

$\therefore \triangle BON \cong \triangle DOM$ (AAS congruency)

Thus $BO = DO$ (by CPCT)

$\Rightarrow$ O is the mid-point of BD. Hence Proved.

8) 

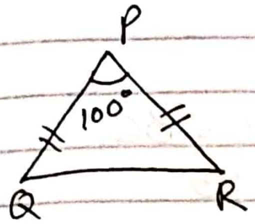
Using angle sum property in $\triangle ABC$,

$\angle C = 180^\circ - (\angle A + \angle B)$

$= 180^\circ - (70^\circ + 30^\circ)$

$= 180^\circ - 100^\circ = 80^\circ$

$\therefore \triangle ABC \cong \triangle RPQ$ (c)

9) 

Since $PQ = PR$, $\angle Q = \angle R$ (angles opposite to equal sides)

Using angle sum property in $\triangle PQR$,

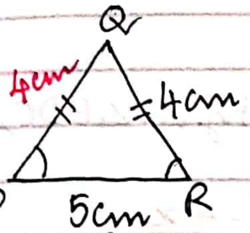
$\angle P + \angle Q + \angle R = 180°$

$\angle Q + \angle R = 180° - 100° = 80°$

$2\angle Q = 80°$ [$\because \angle Q = \angle R$]

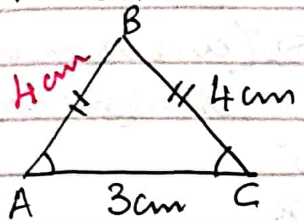
$\angle Q = \frac{80°}{2} = 40°$

$\therefore \angle R = \angle Q = 40°$ (d)

10) 

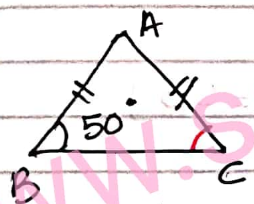
Since $\angle P = \angle R \Rightarrow PQ = QR$ [sides opposite to equal angles]

$= 4cm$ (a)

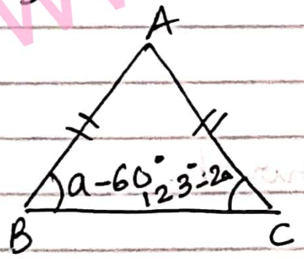
11) 

Since $\angle A = \angle C \Rightarrow AB = BC$ [side opposite to equal angles]

$= \underline{\underline{4cm}}$

12) 

Since $AB = AC$, $\angle ABC = \angle BCA = 50°$ [angles opposite to equal sides]

13) 

In isosceles $\triangle ABC$, since $AB = AC$,

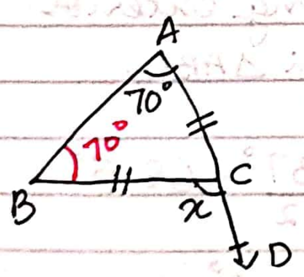
$\angle B = \angle C$ [angles opposite to equal sides]

$a - 60° = 123° - 2a$

$a + 2a = 123° + 60°$

$3a = 183°$

$\therefore a = \frac{183°}{3} = \underline{\underline{61°}}$

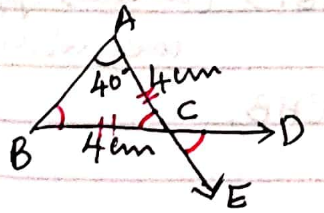
14) 

Since $AC = BC$, $\angle A = \angle B$ [angles opposite to equal sides]

$= 70°$

Using exterior angle property in $\triangle ABC$,

$x = 70° + 70° = \underline{140°}$

15) 

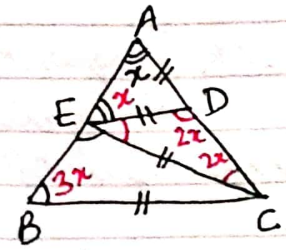
Since $AC = BC$, $\angle A = \angle B = 40°$ [angles opposite to equal sides]

Using angle sum property in $\triangle ABC$,

$\angle ACB = 180° - (40° + 40°) = 180° - 80° = 100°$

$\therefore \angle DCE = \angle ACB = \underline{\underline{100°}}$ [V.O.A]

16)



Given: $AB = AC$

$AD = ED = EC = BC$

To prove: $\angle A : \angle B = 1:3$

Proof:- Let $\angle A$ be x.

Then, $\angle DEA = \angle DAE = x$ [$\because AD = DE$]

Using exterior angle property in $\triangle AED$,

$$\angle EDC = \angle DEA + \angle DAE$$
$$= x + x = 2x$$

Since $ED = EC$, $\angle EDC = \angle ECD = 2x$

Then, using angle sum property in $\triangle EDC$,

$$\angle DEC = 180° - (2x + 2x) = 180° - 4x$$

Then, $\angle CEB + \angle DEC + \angle AED = 180°$ (angles on a straight line)

$$\Rightarrow \angle CEB + 180° - 4x + x = 180°$$
$$\Rightarrow \angle CEB = \cancel{180°} - \cancel{180°} + 4x - x$$
$$= 3x$$

Thus, $\angle ECB = \angle CBE = 3x$ [$\because CE = CB$]

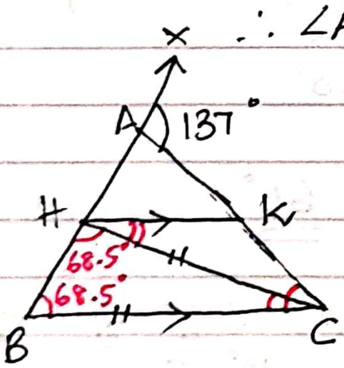
$$\Rightarrow \angle B = 3x$$

$\therefore \angle A = x$ and $\angle B = 3x$

$$\Rightarrow \frac{\angle A}{\angle B} = \frac{x}{3x} = \frac{1}{3}$$

$\therefore \angle A : \angle B = 1:3$. Hence Proved.

17)



Since $AB = AC$, using exterior angle property in $\triangle ABC$,

$$\angle B + \angle C = 137°$$
$$\angle B = \angle C = \frac{137°}{2} = 68.5°$$

Since $CH = CB$, $\angle CBH = \angle CHB = 68.5°$ (angles opposite to equal sides)

Using angle sum property in $\triangle CHB$,

$$\angle BCH = 180° - (68.5° + 68.5°)$$
$$= 180° - 137°$$
$$= 43°$$

$\therefore \angle CHK = \angle BCH = \underline{\underline{43^\circ}}$ [alternate interior angles since $HK \parallel BC$ and HC is the transversal]