EXERCISE # 1

A. Very Short Answer Type Questions

- Q.I In a \triangle ABC, D and E are points on the sides AB and AC respectively such that DE || BC.
 - (i) If AD = 6cm, DB = 9cm and AE = 8 cm, find AC.
 - (ii) If $\frac{AD}{DB} = \frac{3}{4}$ and AC = 15 cm find AE.
 - (iii) If $\frac{AD}{DB} = \frac{2}{3}$ and AC = 18 cm, find AE
 - (iv) If AD = 4 cm, AE = 8 cm, DB = x 4 and EC = 3x 19, find x.
 - (v) If AD = 8 cm, AB = 12 cm and AE = 12 cm, find CE.
 - (vi) If AD = 4 cm, DB = 4.5 cm and AE = 8 cm, find AC.
 - (vii) If AD = 2 cm, AB = 6 cm and AC = 9 cm, find AE.
 - (viii) If $\frac{AD}{BD} = \frac{4}{5}$ and EC = 2.5 cm, find AE.
 - (ix) If AD = x, DB = x 2, AE = x + 2 and EC = x 1, find the value of x.
 - (x) If AD = 8x 7, DB = 5x 3, AE = 4x 3and EC = (3x - 1), find the value of x.
 - (xi) AD = 4x 3, AE = 8x 7, BD = 3x 1 and CE = 5x 3, find the value of x.
- **Q.2** In a \triangle ABC, D and E are points on the sides AB and AC respectively. For each of the following cases show that DE || BC :
 - (i) AB = 12 cm, AD = 8 cm, AE = 12 cm and AC = 18 cm.
 - (ii) AB = 5.6 cm, AD = 1.4 cm, AC = 7.2 cm and AE = 1.8 cm
 - (iii) AB = 10.8 cm, BD = 4.5 cm, AC = 4.8 cmand AE = 2.8 cm.
 - (iv) AD = 5.7 cm, BD = 9.5 cm, AE = 3.3 cm and EC = 5.5 cm
- **Q.3** In a \triangle ABC, AD is the bisector of $\angle A$, meeting side BC at D.
 - (i) If BD = 2.5 cm, AB = 5 cm and AC = 4.2 cm, find DC.
 - (ii) If BD = 2cm, AB = 5 cm and DC = 3 cm, find AC

(iii) If AB = 3.5 cm, AC = 4.2 cm and DC = 2.8 cm, find BD.

- (iv) If BC = 10 cm, AC = 14 cm and BC = 6 cm, find BD and DC.
- (v) If AC = 4.2 cm, DC = 6 cm, BC = 10 cm, find AB.
- (vi) If AB = 5.6 cm, AC = 6 cm and DC = 3 cm, find BC.
- (vii) If AB = 5.6 cm, BC = 6 cm and BD = 3.2 cm find AC.
- (viii) If AB = 10 cm, AC = 6 cm and BC = 12 cm, find BD and DC.
- Q.4 In \triangle ABC, \angle B = 2 \angle C and the bisector of \angle B intersects AC and D. Prove that $\frac{BD}{DA} = \frac{BC}{BA}$.
- **Q.5** In fig. if $AB \perp BC$ and $DE \perp AC$. Prove that $\triangle ABC \sim \triangle AED$.



Q.6 In fig. if $\angle P = \angle RTS$, prove that $\triangle RPQ \sim \triangle RTS$.



Q.7 In fig. AD and CE are two altitudes of \triangle ABC.



(i) $\Delta AEF \sim \Delta CDF$

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- (ii) $\triangle ABD \sim \triangle CBE$
- (iii) $\Delta \text{ AEF} \sim \Delta \text{ ADB}$
- (iv) Δ FDC ~ Δ BEC
- **Q.8** In fig. if $BD \perp AC$ and $CE \perp AB$,



- Prove that
- (i) $\Delta AEC \sim \Delta ADB$ (ii) $\frac{CA}{AB} = \frac{CE}{DB}$
- Q.9 E is a point on side AD produced of a parallelogram ABCD and BE intersects CD at F. Prove that \triangle ABE ~ \triangle CFB.
- Q.10 In fig. E is a point on side CB produced of an isosceles triangle ABC with AB = AC. If $AD \perp BC$ and $EF \perp AC$, prove that $\triangle ABD \sim \triangle ECF$.

B. Short Answer Type Questions

Q.11 In fig, AE is the bisector of the exterior \angle CAD meeting BC produced in E. If AB = 10 cm, AC = 6 cm and BC = 12 cm, find CE.



- Q.12 D, E and F are the points on sides BC, CA and AB respectively of \triangle ABC such that AD bisects \angle A, BE bisects \angle B and CF bisects \angle C. If AB = 5 cm, BC = 8 cm and CA = 4 cm, determine AF, CE and BD.
- Q.13 (i) In fig.1, if AB || CD, find the value of x.(ii) In fig.2, if AB || CD, find the value of x.



Fig.2 (iii) In fig.3, AB || CD. If OA = 3x - 19, OB = x - 4, OC = x - 3 and OD = 4, find x.



- Q.14 In a $\triangle ABC$, D and E are points on sides AB and AC respectively such that BD = CE. If $\angle B = \angle C$, show that DE || BC.
- **Q.15** In fig. if $\frac{AD}{DC} = \frac{BE}{EC}$ and $\angle CDE = \angle CED$, prove that $\triangle CAB$ is isosceles.

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- Q.16 In ∆ ABC, D is the mid-point of BC and ED is the bisector of the ∠ADB and EF is drawn parallel to BC cutting AC in F. Prove that ∠EDF is a right angle.
- Q.17 The bisectors of the angles B and C of a triangle ABC, meet the opposite side in D and E respectively. If DE || BC, prove that the triangle is isosceles.
- **Q.18** In fig. if $\frac{QT}{PR} = \frac{QR}{QS}$ and $\angle 1 = \angle 2$. Prove

that $\Delta PQS \sim \Delta TQR$



- Q.19 If CD and GH (D and H lie on AB and FE) are respectively bisectors of $\angle ACB$ and $\angle EGF$ and $\triangle ABC \sim \triangle FEG$, prove that (i) $\triangle DCA \sim \triangle HGF$
 - (ii) $\frac{CD}{GH} = \frac{AC}{FG}$
 - (iii) Δ DCB ~ Δ HGE
- **Q.20** If \triangle ABC, if $AD \perp BC$ and $AD^2 = BD \times DC$, prove that $\angle BAC = 90^\circ$.
- **Q.21** In fig. if AD \perp BC and $\frac{BD}{DA} = \frac{DA}{DC}$, prove that \triangle ABC is a right triangle.
- **Q.22** ABC is an isosceles right triangle, right angled at C. Prove that $AB^2 = 2 AC^2$.

- Q.23 In an isosceles triangle ABC, with AB = AC, BD is perpendicular from B to the side AC. Prove that $BD^2 - CD^2 = 2 CD \cdot AD$
- Q.24 In a ∆ABC, the angles at B and C are acute. If BE and CF be drawn perpendiculars on AC and AB respectively, prove that



- (i) $BC^2 = AB \times BF + AC \times CE$.
- (ii) $AC^2 = AB^2 + BC^2 2AB. BF$
- (iii) $AB^2 = BC^2 + AC^2 2AC \cdot CF$
- Q.25 ABC is a right triangle, right angled at C and AC = $\sqrt{3}$ BC. prove that $\angle ABC = 60^{\circ}$.
- **Q.26** In a right-angled triangle if a perpendicular is drawn from the right angle to the hypotenuse, prove that the square of the perpendicular is equal to the area of rectangle contained by the two segments of the hypotenuse.

C. Long Answer Type Questions

- **Q.27** ABCD is a quadrilateral; P, Q, R and S are the points of trisection of sides AB, BC, CD and DA respectively and are adjacent to A and C; prove that PQRS is a parallelogram.
- - (i) $PR \cdot BQ = QR \cdot BP$
 - (ii) $AB \times CQ = BC \times AP$.
- Q.29 In fig. CD and GH are respectively the medians of $\triangle ABC$ and $\triangle EFG$. If $\triangle ABC \sim \triangle FEG$. Prove that

(i) $\triangle ADC \sim \triangle FHG$ (ii) $\frac{CD}{GH} = \frac{AB}{FE}$

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- **Q.30** In trapezium ABCD, AB || DC and DC = 2 AB. EF drawn parallel to AB cuts AD in F and BC in E such that $\frac{BE}{EC} = \frac{3}{4}$. Diagonal DB intersects EF at G. Prove that 7 FE = 10 AB.
- Q.31 Through the vertex D of a parallelogram ABCD, a line is drawn to intersect the sides BA and BC produced at E and F respectively. Prove that

 $\frac{DA}{AE} = \frac{FB}{BE} = \frac{FC}{CD}$

Q.32 In fig. ABC is a right triangle right angled at B and D is the foot of the perpendicular drawn from B on AC. If $DM \perp BC$ and $DN \perp AB$.







Show that (i) $\triangle ADC \sim \triangle BEC$ (ii) $CA \times CE = CB \times CD$ (iii) $\triangle ABC \sim \triangle DEC$ (iv) $CD \times AB = CA \times DE$

- Q.34 ABC is an isosceles triangle with AB = AC and D is a point on AC such that $BC^2 = AC \times CD$. Prove that BD = BC.
- **Q.35** In \triangle PQR, QM \perp PR and PR² PQ² = QR². Prove that QM² = PM × MR.
- **Q.36** Prove that the sum of the squares of the diagonals of a parallelogram is equal to the sum of the squares of its sides.

ANSWER KEY

A. VERY SHORT ANSWER TYPE :

1.	(i) 12 cm,	(ii) 6.43 cm,	(iii) 7.2 cm,	(iv) 11 cm,	(v) 6 cm,					
	(vi) 17 cm,	(vii) 3 cm,	(viii) 2 cm,	(ix) $x = 4$,	(x) x = 1,					
	(xi) x = 1									
3.	(i) 2.1 cm,	(ii) 7.5 cm,	(iii) 2.3 cm,	(iv) 2.5 cm, 3.5 cm,						
	(v) 2.8 cm,	(vi) 5.8 cm,	(vii) 4.9 cm,	(viii) 7.5 cm, 4.5	5 cm					
B. SHORT ANSWER TYPE :										

11. 18

12. 5/3 cm, 32/13 cm, 40/9 cm

13. (i) 3, (ii) 2, (iii) 11 or 8

EXERCISE # 2

Short Answer Type Questions

- Q.1 For a triangle ABC, the true statement is (A) $AC^2 = AB^2 + BC^2$ (B) AC = AB + BC(C) AC > AB + BC (D) AC < AB + BC
- Q.2 If AD, BE and CF are the medians of a triangle ABC, then the true statement is –



(A)
$$AB^2 + BC^2 + AC^2 = AD^2 + BE^2 + CF^2$$

(C)
$$3(AB^2 + BC^2 + AC^2)$$

$$= 4 (AD2 + BE2 + CF2)$$

(D) AB² + BC² + AC²
$$= 3 (AD2 + BE2 + CF2)$$

(E) AB² + AC² = 2AD² + 1/2 BC²

- Q.3 The distance between the tops of two trees 20 m and 28 m high is 17 m. Find the horizontal distance between the trees.
- Q.4 Triangle ABC is such that AB = 3 cm, BC = 2 cm and CA = 2.5 cm. Triangle DEF is similar to \triangle ABC. If EF = 4 cm, then find the perimeter of \triangle DEF.
- **Q.5** In \triangle ABC, AB = 3 cm, AC = 4 cm and AD is the bisector of $\angle A$. Then find BD : DC.
- **Q.6** In an equilateral triangle ABC, if $AD \perp BC$, then prove that $3AB^2 = 4AB^2$.
- Q.7 ABC is a triangle and DE is drawn parallel to BC cutting the other sides at D and E. If AB =3.6 cm, AC = 2.4 cm and AD = 2.1 cm, then find AE.

- **Q.8** In a right angled triangle, one of the angles is 60°. Find the side opposite to this angle.
- Q.9 In \triangle ABC, AD is the median through A and E is the mid point of AD and BE produced meets AC in F. Then, find AF.



Q.10 In the adjoining figure, AB = AC and $AP \perp BC$. Then,



Q.11 If ABCD is a square and DCE is an equilateral triangle in the given figure, then find \angle DAE.



- **Q.12** If in the Δ 's ABC and DEF, angle A is equal to angle E, both are equal to 40°, AB : ED = AC : EF and angle F is 65°, then find angle B.
- Q.13 In the adjoining figure, XY is parallel to AC. If xy divides the triangle into equal parts, then find the value of $\frac{AX}{AB}$.

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- Q.14 The ratio of the corresponding sides of two similar triangles is 1 : 3. Find the ratio of their corresponding heights.
- Q.15 The areas of two similar triangles are 49 cm² and 64 cm² respectively. Find the ratio of their corresponding sides.
- Q.16 The areas of two similar triangles are 12 cm² and 48 cm². If the height of the smaller one is 2.1 cm, then find the corresponding height of the bigger one.
- **Q.17** In the adjoining figure, ABC and DBC are two triangles on the same base BC, $AL \perp BC$ and DM \perp BC. Then find, $\frac{\text{area}(\Delta \text{ABC})}{\text{area}(\Delta \text{DBC})}$?



Q.18 In the adjoining figure, AB = 10 cm, BC = 15 cm AD : DC = 2 : 3, then find $\angle ABC$.



- Q.19 In \triangle ABC, D and E are points on AB and AC respectively such that $DE \parallel BC$. If AE = 2 cm, EC = 3 cm and BC = 10 cm, then find DE.
- Q.20 In Δ ABC, the medians BE and CF intersect at G. AGD is a line meeting BC in D. If GD is 1.5 cm, then find AD.



Q.21 In the given figure, $\angle ABC = 90^{\circ}$ and BM is a median, AB = 8 cm and BC = 6 cm. Then, find length BM.



- Q.22 If D, E, F are respectively the mid points of the sides BC , CA and AB of Δ ABC and the area of Δ ABC is 24 sq. cm, then find the area of Δ DEF.
- A 25 m long ladder is placed against a Q.23 vertical wall inside a room such that the foot of the ladder is 7 m from the foot of the wall. If the top of the ladder slides 4 m downwards, then find the foot of the ladder will slide by how much.

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				KEY								
1. (D)	2. (C)	3. 15 m	4. 15 cm	5. 3 : 4	7. 1.4 cm							
8. $\frac{\sqrt{3}}{2} \times \text{Hyp}$	otenuse	9. $\frac{1}{3}$ AC	10. (C)	11. 15°	12. 75°							
13. $\frac{1}{\sqrt{2}}$	14. 1 : 3	15. 7 : 8	16. 4.2 cm	17. $\frac{AO}{OD}$	18. 40°							
19. 4 cm	20. 4.5 cm		21. 5 cm	22. 6 cm^2	23. 8 m							