6. Triangles - Board Exam Questions

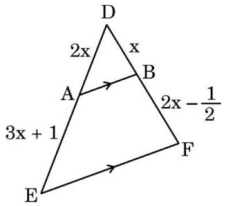
The detailed solution for all the questions can be found at
pschool.in/math/ncert/g10/chap-6

1 Mark Questions (MCQ)

1) If △ABC and △DEF are similar such that 2 AB = DE and BC = 8 cm, then EF is equal to:

2) In triangles ABC and PQR, ∠A = ∠Q and ∠B = ∠R, then AB : AC is equal to:

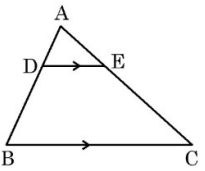
3) In △DEF, AB ∥ EF. The value of x is:



4) It is given that △ABC ~ △QRP such that AB = 9 cm, BC = 5 cm and PR = 2 cm. Length of side QR is:

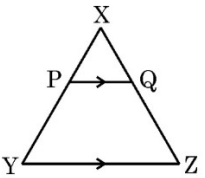
5) It is given that △ABC ~ △EDF. Which of the following is not true?
(a) $\frac{\text{Perimeter of } \triangle ABC}{\text{Perimeter of } \triangle EDF} = \frac{AB}{ED}$ (b) $\frac{AB}{ED} = \frac{AC}{EF}$
(c) ∠A = ∠D, ∠C = ∠F (d) $\frac{AB + BC}{AC} = \frac{DE + DF}{EF}$

6) In the given figure, DE ∥ BC. If $\frac{AD}{DB} = \frac{1}{3}$ and AC = 6 cm, then length AE is



7) Devansh proved that △ABC ~ △PQR using SAS similarity criteria. If he found ∠C = ∠R, then which of the following was proved true?
(a) $\frac{AC}{AB} = \frac{PR}{PQ}$ (b) $\frac{BC}{AC} = \frac{PR}{QR}$
(c) $\frac{AC}{BC} = \frac{PR}{PQ}$ (d) $\frac{AC}{BC} = \frac{PR}{QR}$

8) In the given figure, PQ ∥ YZ such that XP : PY = 2 : 3. If PQ = 5 cm, then YZ equals

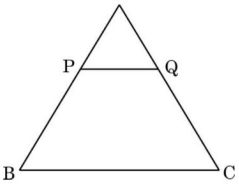


9) The perimeters of two similar triangles are 56 cm and 70 cm respectively. If one side of the first triangle is 14 cm, then the corresponding side of the

second triangle (in cm) is:

10) In triangles ABC and DEF, ∠B = ∠E, ∠F = ∠C and AB = 3 DE. Then, the two triangles are:
(a) congruent but not similar
(b) congruent as well as similar
(c) neither congruent nor similar
(d) similar but not congruent

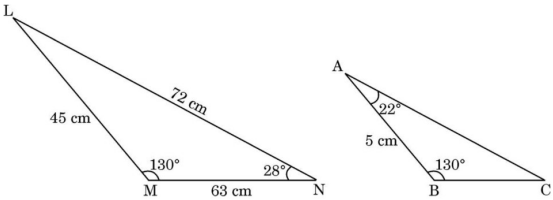
11) In the given figure, PQ ∥ BC. If $\frac{AP}{PB} = \frac{4}{13}$ and AC = 20.4 cm, then the length of AQ is:



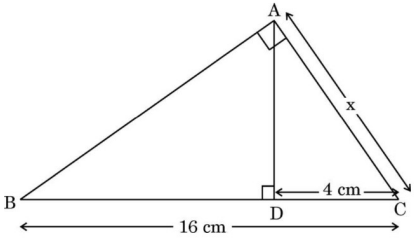
12) Which of the following statements is *incorrect*?
(a) Two congruent figures are always similar (b) A square and a rhombus of the same area are always similar
(c) Two equilateral triangles are always similar (d) Two similar triangles need not be congruent

13) If in two triangles △DEF and △PQR, ∠D = ∠Q and ∠R = ∠E, then which of the following is not true?
(a) $\frac{DE}{QR} = \frac{DF}{PQ}$ (b) $\frac{EF}{PR} = \frac{DF}{PQ}$
(c) $\frac{EF}{RP} = \frac{DE}{QR}$ (d) $\frac{DE}{PQ} = \frac{EF}{RP}$

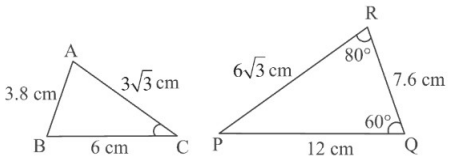
14) The measurements of △LMN and △ABC are shown in the figure given below. The length of side AC is:



15) In the given figure, in △ABC, AD ⊥ BC and ∠BAC = 90°. If BC = 16 cm and DC = 4 cm, then the value of x is:



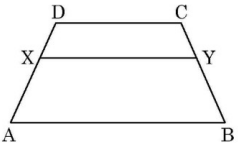
16) △ABC and △PQR are shown in the adjoining figures. The measure of ∠C is:



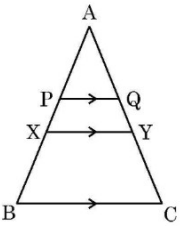
17) E and F are points on the sides AB and AC respectively of a △ABC such that $\frac{AE}{EB} = \frac{AF}{FC} = \frac{1}{2}$. Which of the following relation is true?
(a) EF = 2BC (b) BC = 2EF
(c) EF = 3BC (d) BC = 3EF

18) Which of the following statements is false?
(a) Two right triangles are always similar (b) Two squares are always similar
(c) Two equilateral triangles are always similar (d) Two circles are always similar

19) In the adjoining figure, ABCD is a trapezium in which XY ‖ AB ‖ CD. If $AX = \frac{2}{3}AD$, then CY : YB =



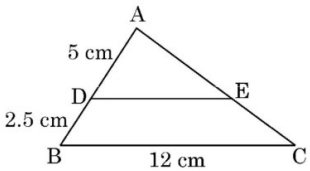
20) In the adjoining figure, PQ ‖ XY ‖ BC, AP = 2 cm, PX = 1.5 cm and BX = 4 cm. If QY = 0.75 cm, then AQ + CY =



21) Given △ABC ~ △PQR, ∠A = 30° and ∠Q = 90°. The value of (∠R + ∠B) is

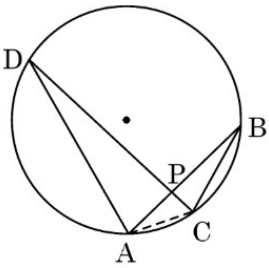
22) If △ABC ~ △DEF, AB = 6 cm, DE = 9 cm, EF = 6 cm and FD = 12 cm, then the perimeter of △ABC is

23) In the given figure △ABC is shown. DE is parallel to BC. If AD = 5 cm, DB = 2.5 cm and BC = 12 cm, then DE is equal to



24) The perimeters of two similar triangles ABC and PQR are 56 cm and 48 cm respectively. PQ/AB is equal to

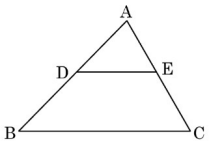
25) AB and CD are two chords of a circle intersecting at P. Choose the correct statement from the following:



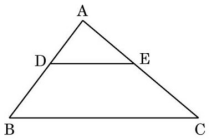
(a) △ADP ~ △CBA (b) △ADP ~ △BPC
(c) △ADP ~ △BCP (d) △ADP ~ △CBP

26) If the diagonals of a quadrilateral divide each other proportionally, then it is a:
(a) parallelogram (b) rectangle
(c) square (d) trapezium

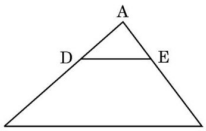
27) In △ABC, DE ∥ BC (as shown in the figure). If AD = 2 cm, BD = 3 cm, BC = 7.5 cm, then the length of DE (in cm) is:



28) In △ABC, DE ∥ BC (as shown in the figure). If AD = 4 cm, AB = 9 cm and AC = 13.5 cm, then the length of EC is:

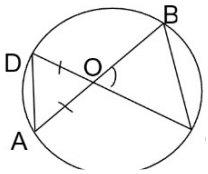


29) In the given figure, in △ABC, DE ∥ BC. If AD = 2.4 cm, DB = 4 cm and AE = 2 cm, then the length of AC is:



30) If a vertical pole of length 7.5 m casts a shadow 5 m long on the ground and at the same time, a tower casts a shadow 24 m long, then the height of the tower is:

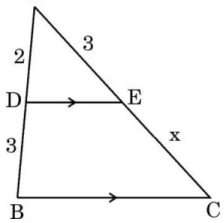
31) O is the point of intersection of two chords AB and CD of a circle. If ∠BOC = 80° and OA = OD then △ODA and △OBC are



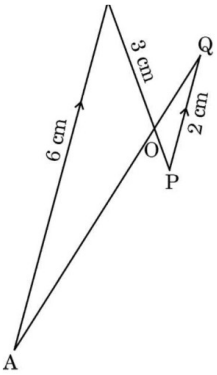
(a) equilateral and similar
(b) isosceles and similar
(c) isosceles but not similar (d) not similar

32) If △ABC ~ △PQR with ∠A = 32° and ∠R = 65°, then the measure of ∠B is:

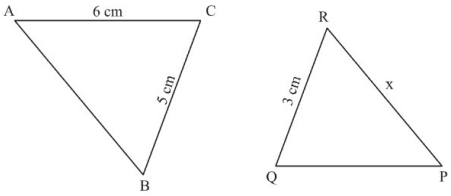
33) In the given figure, DE ∥ BC. If AD = 2 units, DB = AE = 3 units and EC = x units, then the value of x is:



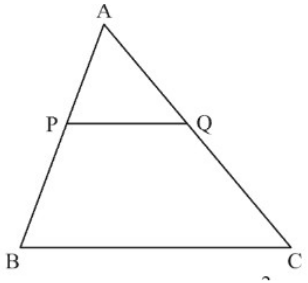
34) In the given figure, AB ∥ PQ. If AB = 6 cm, PQ = 2 cm and OB = 3 cm, then the length of OP is:



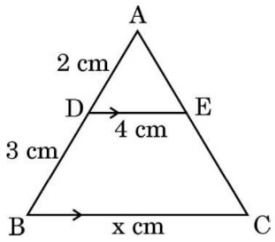
35) In the given figure, △ABC ~ △QPR. If AC = 6 cm, BC = 5 cm, QR = 3 cm and PR = x; then the value of x is:



36) In △ABC, PQ ∥ BC. If PB = 6 cm, AP = 4 cm, AQ = 8 cm, find the length of AC.



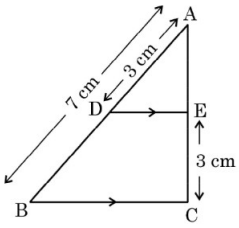
37) In the given figure, DE ∥ BC. The value of x is:



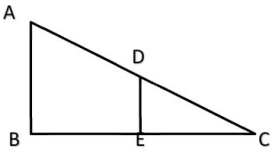
38) In △ABC and △DEF, $\frac{AB}{DE} = \frac{BC}{FD}$. Which of the following makes the two triangles similar?
(a) ∠A = ∠D (b) ∠B = ∠D
(c) ∠B = ∠E (d) ∠A = ∠F

39) If △PQR ~ △ABC; PQ = 6 cm, AB = 8 cm and the perimeter of △ABC is 36 cm, then the perimeter of △PQR is

40) In the given figure, DE ‖ BC. If AD = 3 cm, AB = 7 cm and EC = 3 cm, then the length of AE is

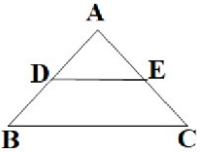


41) In △ABC, DE ‖ AB. If AB = a, DE = x, BE = b and EC = c, then x expressed in terms of a, b and c is:



42) $\triangle ABC \sim \triangle PQR$. If AM and PN are altitudes of $\triangle ABC$ and $\triangle PQR$ respectively and $AB^2 : PQ^2 = 4 : 9$, then $AM : PN =$

43) In the given figure, DE ‖ BC, AE = a units, EC = b units, DE = x units and BC = y units. Which of the following is true?



(a) $x = \frac{a+b}{ay}$ (b) $y = \frac{ax}{a+b}$
(c) $x = \frac{ay}{a+b}$ (d) $\frac{x}{y} = \frac{a}{b}$

44) ABCD is a trapezium with AD ‖ BC and AD = 4 cm. If the diagonals AC and BD intersect each other at O such that $\frac{AO}{OC} = \frac{DO}{OB} = \frac{1}{2}$, then BC =

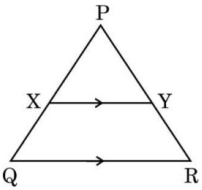
Assertion and Reason

1) ASSERTION (A): ABCD is a trapezium with DC ‖ AB. E and F are points on AD and BC respectively, such that EF ‖ AB. Then $\frac{AE}{ED} = \frac{BF}{FC}$.
REASON (R): Any line parallel to parallel sides of a trapezium divides the non-parallel sides proportionally.

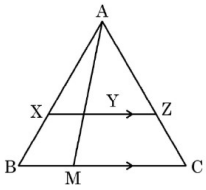
2 Mark Questions

1) In $\triangle$ABC, $DE \parallel BC$. If $AD = x$, $DB = x - 2$, $AE = x + 2$ and $EC = x - 1$, then find the value of x.

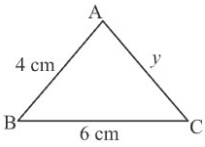
2) In the given figure, $XY \parallel QR$, $\frac{PQ}{XQ} = \frac{7}{3}$ and $PR = 6.3$ cm. Find the length of YR.

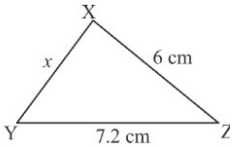


3) In the given figure, XZ is parallel to BC. $AZ = 3$ cm, $ZC = 2$ cm, $BM = 3$ cm and $MC = 5$ cm. Find the length of XY.



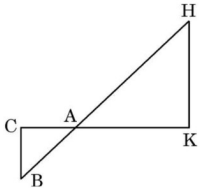
4) In the figure given above, $\triangle ABC \sim \triangle XYZ$, then find the values of x and y.



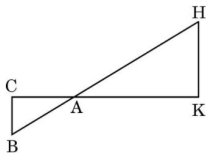


5) If $\triangle ABC \sim \triangle PQR$ in which $AB = 6$ cm, $BC = 4$ cm, $AC = 8$ cm and $PR = 6$ cm, then find the length of $(PQ + QR)$.

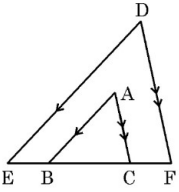
6) In the given figure, $\triangle AHK \sim \triangle ABC$. If $AK = 10$ cm, $BC = 3.5$ cm and $HK = 7$ cm, find the length of AC.



7) In the given figure, $\triangle AHK \sim \triangle ABC$. If $AK = 8$ cm, $BC = 3.2$ cm and $HK = 6.4$ cm, then find the length of AC.



8) In the given figure, $AB \parallel DE$ and $AC \parallel DF$. Show that $\triangle ABC \sim \triangle DEF$. If $BC = 10$ cm, $EB = CF = 5$ cm and $AB = 7$ cm, then find the length DE.

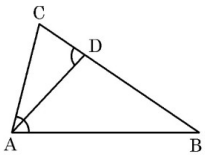


9) A 1.5 m tall boy is walking away from the base of a lamp post which is 12

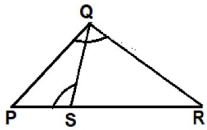
m high, at the speed of 2.5 m/sec. Find the length of his shadow after 3 seconds.

10) In a right-angled triangle ABC, right-angled at B, a perpendicular BD is drawn to the hypotenuse AC. Prove that the triangle BCD is similar to the triangle ACB.

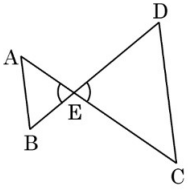
11) D is a point on the side BC of $\triangle ABC$ such that $\angle CAB = \angle CDA$. Show that $CA^2 = CB \times CD$.



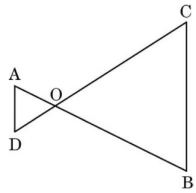
12) In the given figure, if $\angle PQR = \angle QSP$, $PQ = 6$ cm and $PS = 3$ cm, then find the length of PR.



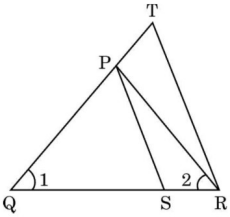
13) In the given figure, $\frac{EA}{EC} = \frac{EB}{ED}$, prove that $\triangle EAB \sim \triangle ECD$.



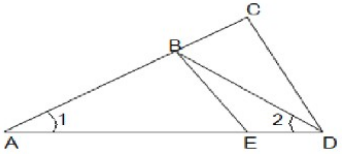
14) In the given figure, $OA \cdot OB = OC \cdot OD$. Show that $\angle A = \angle C$ and $\angle B = \angle D$.



15) In the given figure, $\frac{QR}{QS} = \frac{QT}{PR}$ and $\angle 1 = \angle 2$, show that $\triangle PQS \sim \triangle TQR$.



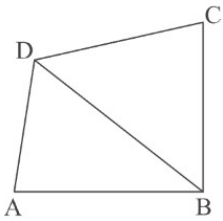
16) In the given figure below, $\frac{AD}{AE} = \frac{AC}{BD}$ and $\angle 1 = \angle 2$. Show that $\triangle BAE \sim \triangle CAD$.



17) AD and PS are medians of triangles ABC and PQR respectively such that $\triangle ABD \sim \triangle PQS$. Prove that $\triangle ABC \sim \triangle PQR$.

18) If AP and DQ are medians of triangles ABC and DEF respectively, where $\triangle ABC \sim \triangle DEF$, then prove that $\frac{AB}{DE} = \frac{AP}{DQ}$.

19) In the given figure, ABCD is a quadrilateral. Diagonal BD bisects ∠B and ∠D both. Prove that: (i) $\triangle ABD \sim \triangle CBD$ (ii) $AB = BC$

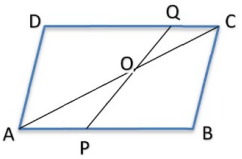


20) In parallelogram ABCD, side AD is produced to a point E and BE intersects CD at F. Prove that $\triangle ABE \sim \triangle CFB$.

21) ABCD is a trapezium in which AB is parallel to DC and its diagonals intersect each other at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

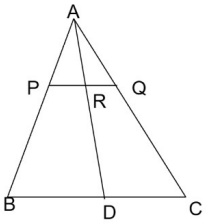
22) The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\frac{AO}{OC} = \frac{BO}{OD}$. Show that quadrilateral ABCD is a trapezium.

23) ABCD is a parallelogram. Point P divides AB in the ratio 2 : 3 and point Q divides DC in the ratio 4 : 1. Prove that OC is half of OA.

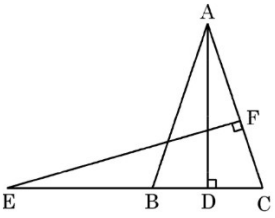


<u>3 Mark Questions</u>

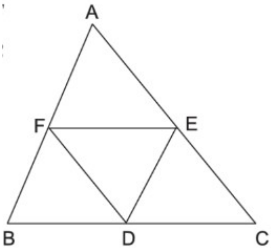
1) In △ABC, P and Q are points on AB and AC respectively such that PQ is parallel to BC. Prove that the median AD drawn from A on BC bisects PQ.



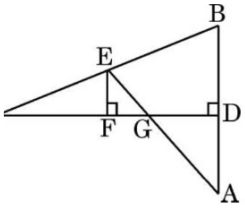
2) In the given figure, E is a point on the side CB produced of an isosceles triangle ABC with $AB = AC$. If $AD \perp BC$ and $EF \perp AC$, then prove that $\triangle ABD \sim \triangle ECF$.



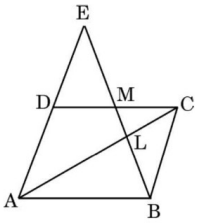
3) In △ABC, D, E and F are midpoints of BC, CA and AB respectively. Prove that $\triangle FBD \sim \triangle DEF$ and $\triangle DEF \sim \triangle ABC$.



4) In the given figure, CD is the perpendicular bisector of AB. EF is perpendicular to CD. AE intersects CD at G. Prove that $\frac{CF}{CD} = \frac{FG}{DG}$.

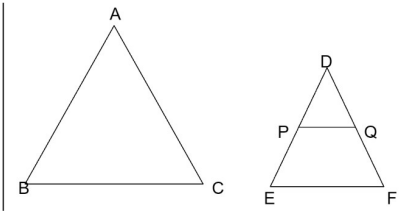


5) In the given figure, ABCD is a parallelogram. BE bisects CD at M and intersects AC at L. Prove that $EL = 2BL$.



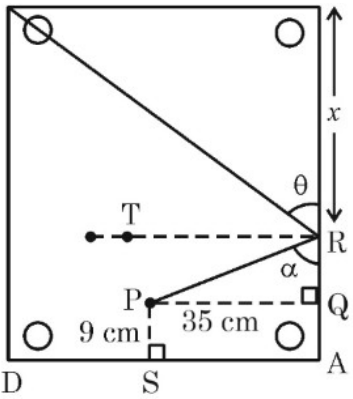
4 Mark Questions

1) Triangle is a very popular shape used in interior designing. The picture given above shows a cabinet designed by a famous interior designer.
Here the largest triangle is



represented by △ABC and smallest one with shelf is represented by △DEF. PQ is parallel to EF.
(i) Show that $\triangle DPQ \sim \triangle DEF$. (1)
(ii) If $DP = 50$ cm and $PE = 70$ cm then find $\frac{PQ}{EF}$. (1)
(iii) If $2AB = 5DE$ and $\triangle ABC \sim \triangle DEF$ then show that $\frac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF}$ is constant. (2)
OR If AM and DN are medians of triangles ABC and DEF respectively then prove that $\triangle ABM \sim \triangle DEN$.

2) Carom board is a very popular game. The board is a square of side length 65 cm. It has circular pockets in each corner.
Ansh strikes a disc, kept at position P with a striker. The disc, hits the boundary of the board at R and goes straight to pocket at corner C. It is given that $PS = 9$ cm, $PQ = 35$ cm, $BR = x$, $\angle PRQ = \alpha$ and $\angle CRB = \theta$.



(i) Using law of reflection i.e. $\angle PRT = \angle CRT$, prove that $\theta = \alpha$. (1)
(ii) Prove that $\triangle PQR \sim \triangle CBR$ given that PQ is perpendicular to AB. (1)
(iii) (a) Find the value of x using similarity of triangles. (2)
OR (b) If $\frac{\text{Area } \triangle PQR}{\text{Area } \triangle CBR} = \frac{PQ^2}{CB^2}$, then find the value of x.

5 Mark Questions

1) State and prove the Basic Proportionality Theorem: if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

2) If a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points then it divides the two sides in the same ratio. Prove it. Also, state the converse of the above statement.

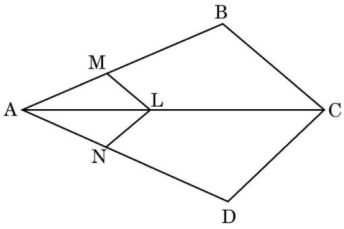
3) Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.
Hence: in △PQR, a line ℓ intersects the sides PQ and PR at L and M respectively such that $LM \parallel QR$. If $PL = 5.7$ cm, $PQ = 15.2$ cm and $MR = 5.5$ cm, find the length of PM (in cm).

4) Prove that a line drawn parallel to one side of a triangle to intersect the other two sides in distinct points, divides the other two sides in the same ratio.
Using the above theorem solve the following: PQRS is a trapezium with $PQ \parallel SR$. X and Y are points on non-parallel sides PS and QR respectively such that $XY \parallel PQ$. Show that $\frac{PX}{XS} = \frac{QY}{YR}$.

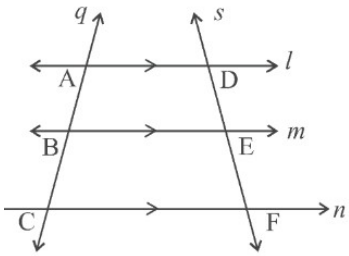
5) Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then the other two sides are divided in the same ratio.
Using the above theorem prove that a line through the point of intersection of the diagonals and parallel to the base of the trapezium

divides the non parallel sides in the same ratio.

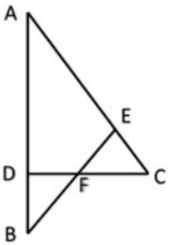
6) Prove that a line drawn parallel to one side of a triangle to intersect the other two sides in distinct points divides the other two sides in the same ratio. Hence, in the figure given below, prove that $\frac{AM}{MB} = \frac{AN}{ND}$ where $LM \parallel CB$ and $LN \parallel CD$.



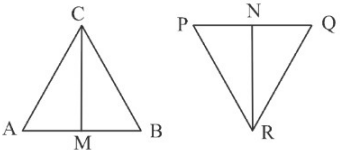
7) State basic proportionality theorem. Use it to prove the following: If three parallel lines l, m, n are intersected by transversals q and s as shown in the adjoining figure, then $\frac{AB}{BC} = \frac{DE}{EF}$.



8) State and prove the Basic Proportionality Theorem. Also, in the given figure, $\angle CEF = \angle CFE$ and F is the midpoint of DC; prove that $\frac{AB}{BD} = \frac{AE}{FD}$.



9) In the given figure, CM and RN are respectively the medians of △ABC and △PQR. If $\triangle ABC \sim \triangle PQR$, then prove that: (i) $\triangle AMC \sim \triangle PNR$ (ii) $\triangle CMB \sim \triangle RNQ$

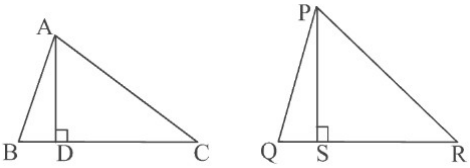


10) If AD and PM are medians of triangles ABC and PQR, respectively where $\triangle ABC \sim \triangle PQR$, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.

11) Sides AB and BC and median AD of triangle ABC are respectively proportional to sides PQ and QR and median PM of △PQR. Show that $\triangle ABC \sim \triangle PQR$.

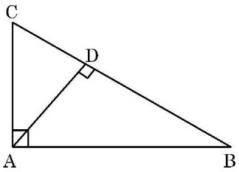
12) Sides AB and AC and median AD to △ABC are respectively proportional to sides PQ and PR and median PM of another triangle PQR. Show that $\triangle ABC \sim \triangle PQR$.

13) The corresponding sides of △ABC and △PQR are in the ratio 3 : 5. $AD \perp BC$ and $PS \perp QR$ as shown in the following figures:



(i) Prove that $\triangle ADC \sim \triangle PSR$. (ii) If $AD = 4$ cm, find the length of PS. (iii) Using (ii) find ar(△ABC) : ar(△PQR).

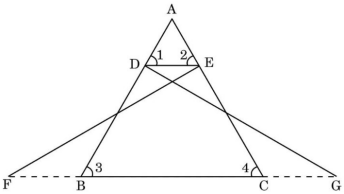
14) In the adjoining figure, △CAB is a right triangle, right angled at A and $AD \perp BC$. Prove that $\triangle ADB \sim \triangle CDA$. Further, if $BC = 10$ cm and $CD = 2$ cm, find the length of AD.



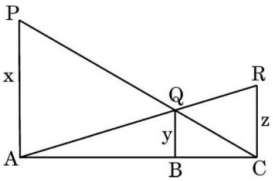
15) In △ABC, if $AD \perp BC$ and $AD^2 = BD \times DC$, then prove that $\angle BAC = 90^\circ$.

16) D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$, prove that $CA^2 = CB \cdot CD$

17) In the given figure, $\triangle FEC \cong \triangle GDB$ and $\angle 1 = \angle 2$. Prove that $\triangle ADE \sim \triangle ABC$.



18) In the given figure, PA, QB and RC are perpendicular to AC. If $PA = x$ units, $QB = y$ units and $RC = z$ units, prove that $\frac{1}{x} + \frac{1}{z} = \frac{1}{y}$.

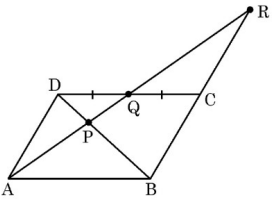


19) The diagonal BD of a parallelogram ABCD intersects the line segment AE at the point F, where E is any point on the side BC. Prove that $DF \times EF = FB \times FA$.

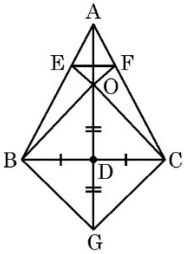
20) E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\triangle ABE \sim \triangle CFB$.

21) Through the mid-point M of the side CD of a parallelogram ABCD, the line BM is drawn intersecting AC in L and AD (produced) in E. Prove that $EL = 2BL$.

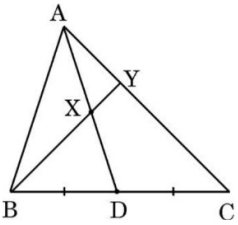
22) Through the mid-point Q of side CD of a parallelogram ABCD, the line AR is drawn which intersects BD at P and produced BC at R. Prove that (i) $AQ = QR$ (ii) $AP = 2PQ$ (iii) $PR = 2AP$



23) D is the mid-point of side BC of △ABC. CE and BF intersect at O, a point on AD. AD is produced to G such that $OD = DG$. Prove that (i) OBGC is a parallelogram. (ii) $EF \parallel BC$ (iii) $\triangle AEF \sim \triangle ABC$



24) In △ABC, AD is a median. X is a point on AD such that $AX : XD = 2 : 3$. BX is extended so that it intersects AC at Y. Prove that $BX = 4XY$.



25) As shown in the given figure, a girl of height 90 cm is walking away from the base of a lamp post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground, find the length of her shadow after 4 seconds.

