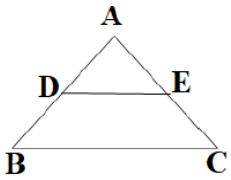
GRADE X

Question Bank (MATHEMATICS)

Chapter-6 Triangles

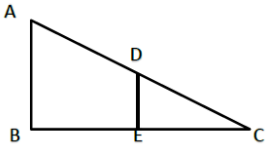
1 marks:

1. In the given figure, $DE \parallel BC, AE = a$ units, $EC = b$ units, $DE = x$ units and $BC = y$ units. Which of the following is true?



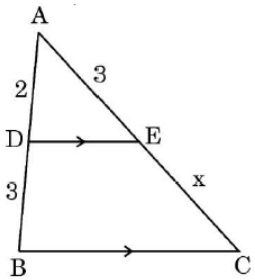
a) $x = \frac{a+b}{ay}$ b) $y = \frac{ax}{a+b}$ c) $x = \frac{ay}{a+b}$ d) $\frac{x}{y} = \frac{a}{b}$

2. In $\Delta ABC, DE \parallel AB$. If $AB = a, DE = x, BE = b, EC = c$ then express x in terms of a, b, c



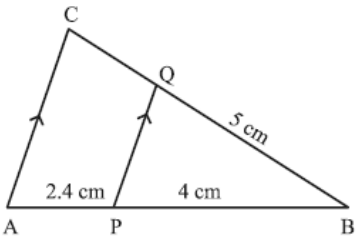
a) $\frac{ac}{b}$ b) $\frac{ac}{b+c}$ c) $\frac{ab}{c}$ d) $\frac{ab}{b+c}$

3. In the given figure, $DE \parallel BC$. The value of x is **[BOARD 2023]**



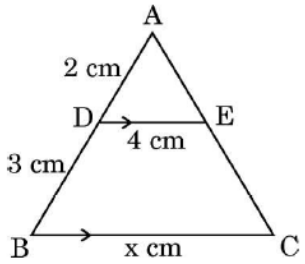
a) 2 cm b) 3 cm c) 5 cm d) $\frac{9}{2}$ cm

4. In the given figure, $PQ \parallel AC$. If $BP = 4\ cm,\ AP = 2.4\ cm, BQ = 5\ cm$ then find the length of BC. **[BOARD 2023]**



a) 8 cm b) 3 cm c) 0.3 cm d) $\frac{25}{3}\ cm$

5. In the given figure, $DE \parallel BC$. The value of x is **[BOARD 2023]**



a) 6 cm b) 12.5 cm c) 8 cm d) 10 cm

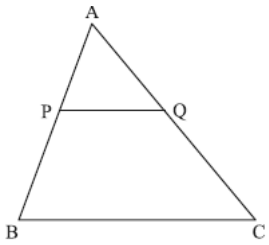
6. ABCD is a trapezium with $AD \parallel BC$ and $AD = 4\,cm$. If the diagonals AC and BD intersect each other at O such that $\frac{AO}{CO} = \frac{DO}{BO} = \frac{1}{2}$ then BC is **[COMPARTMENT 2023]**

a) 6 cm b) 7 cm c) 8 cm d) 9 cm

7. It is given that, $\Delta ABC \sim \Delta EDF$ such that $AB = 5\,cm, AC = 7\,cm, DF = 15\,cm$ and $DE = 12\,cm$ then the sum of the remaining sides of the triangles is

a) 23.05 cm b) 16.8 cm c) 6.25 cm d) 24 cm

8. In figure, $PQ \parallel BC$. Find the length of side AC, given that $PB = 6\,cm, AP = 4\,cm$ and $AQ = 8\,cm$. **[BOARD 2023]**

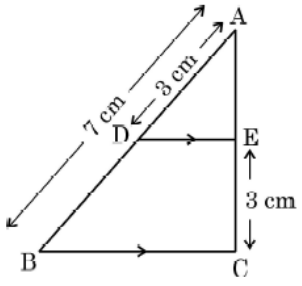


a) 12 cm b) 20 cm c) 6 cm d) 14 cm

9. If in triangles ABC and DEF, $\frac{AB}{DE} = \frac{BC}{FD}$ then they will be similar when **[BOARD 2023]**

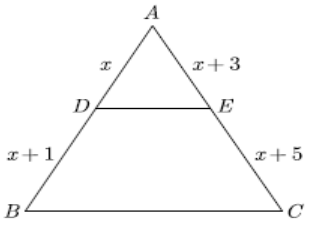
a) $\angle B = \angle E$ b) $\angle A = \angle D$ c) $\angle B = \angle D$ d) $\angle A = \angle F$

10. In the given figure, $DE \parallel BC$. If $AD = 3cm, AB = 7\,cm, EC = 3\,cm$ then length of AE is **[BOARD 2023]**



a) 2 cm b) 2.25 cm c) 3.5 cm d) 4 cm

11. In $\Delta ABC, DE \parallel BC$, find the value of x.



a) 3 b) 2 c) 1 d) 4

12. The perimeters of two similar triangles are 25 cm and 15 cm respectively. If one side of the first triangle is 9 cm, then the corresponding side of second triangle is

a) 5.4 cm b) 5.2 cm c) 4.9 cm d) 5.1 cm

13. If $\Delta PRQ \sim \Delta XYZ$ then

a) $\frac{PR}{XZ} = \frac{RQ}{YZ}$ b) $\frac{PQ}{XY} = \frac{PR}{XZ}$ c) $\frac{PQ}{XZ} = \frac{QR}{YZ}$ d) $\frac{QR}{XZ} = \frac{PR}{XY}$

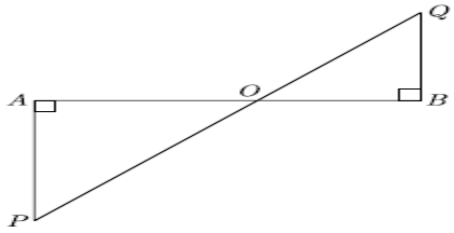
14. If $\Delta ABC \sim \Delta PQR$ with $\angle A = 32°$ and $\angle R = 65°$ then $\angle B$ is **[BOARD 2023]**

a) 32° b) 65° c) 83° d) 97°

15. If $\Delta ABC \sim \Delta DEF$ such that $2AB = DE$ and $BC = 8\,cm$ then find EF.

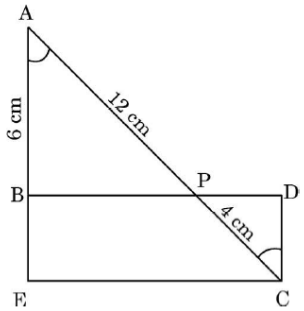
a) 16 cm b) 14 cm c) 12 cm d) 15 cm

16. In the given figure, if $\angle A = 90°, \angle B = 90°, OB = 4.5\,cm, OA = 6\,cm$ *and* $AP = 4\,cm$ then find QB.



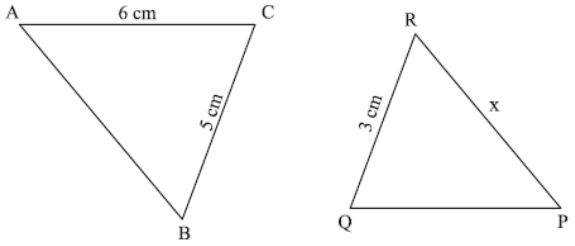
a) 3 cm b) 6 cm c) 4.5 cm d) 3.5 cm

17. In the given figure, $\angle A = \angle C, AB = 6\,cm, AP = 12\,cm, CP = 4\,cm$. Then length of CD is **[BOARD 2023]**



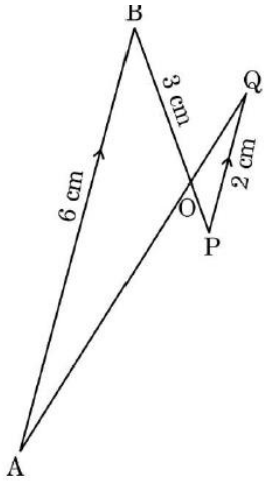
a) 2 cm b) 6 cm c) 8 cm d) 18 cm

18. In the given figure, $\Delta ABC \sim \Delta QPR$. If $AC = 6\ cm, BC = 5\ cm,\ QR = 3\ cm\ and\ PR = x$ then the value of x is **[BOARD 2023]**



a) 3.6 cm b) 2.5 cm c) 10 cm d) 3.2 cm

19. In the given figure, $AB \parallel PQ$. If $AB = 6\ cm,\ PQ = 2\ cm,\ OB = 3\ cm$ then length of OP is **[BOARD 2023]**

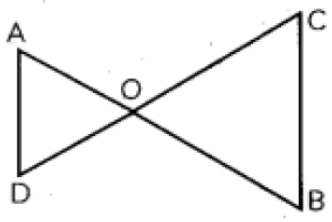


a) 9 cm b) 3 cm c) 4 cm d) 1 cm

20. The area of right angled triangle is 40 cm^2 and its perimeter is 40 cm. The length of its hypotenuse is

a) 16 cm b) 18 cm c) 17 cm d) 19 cm

21. In the figure, if $\frac{OA}{OD} = \frac{OC}{OB}$ then which pair of angles are equal?



a) $\angle A = \angle C, \angle B = \angle D$ c) $\angle A = \angle B, \angle C = \angle D$

b) $\angle C = \angle B, \angle A = \angle D$ d) None of these

22. In ΔABC and $\Delta DEF, \angle B = \angle E, \angle F = \angle C \; and \; AB = 3DE$. Then the two triangles are

a) Congruent but not similar
c) similar but not congruent
b) Neither congruent nor similar
d) congruent as well as similar

23. $\Delta ABC \sim \Delta PQR$. If AM and PN are altitudes of $\Delta ABC \; and \; \Delta PQR$ respectively and $AB^2 : PQ^2 = 4:9$ then $AM : PN$ is

a) 16: 81 b) 4: 9 c) 3: 2 d) 2: 3

24. In the ΔABC, D and E are points on side AB and AC respectively such that $DE \parallel BC$. If $AE = 2\ cm, AD = 3\ cm, BD = 4.5\ cm$ then CE equals

a) 1 cm b) 2 cm c) 3 cm d) 4cm

25. ΔABC is such that $AB = 3cm, BC = 2\ cm, CA = 2.5\ cm. If\ \Delta ABC \sim \Delta DEF \; and \; EF = 4\ cm$ then perimeter of ΔDEF

a) 7.5 cm b) 15 cm c) 22.5 cm d) 30 cm

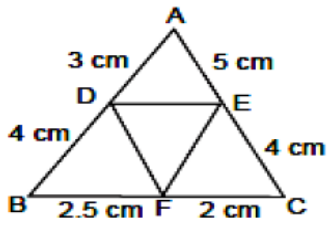
26. If $\Delta ABC \sim \Delta PQR,\ PQ = 6\ cm, AB = 8\ cm$ and perimeter of ΔABC is 36 cm then perimeter of ΔPQR is **[BOARD 2023]**

a) 20.25 cm b) 27 cm c) 48 cm d) 64 cm

27. If $\Delta ABC \sim \Delta EDF$ and ΔABC is not similar to ΔDEF then which of the following is not true?

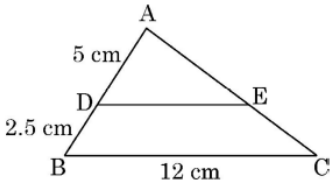
a) $BC.EF = AC.FD$
c) $AB.EF = AC.DE$
b) $BC.DE = AB.EF$
d) $BC.DE = AB.FD$

28. In the given figure, $AD = 3\ cm, AE = 5\ cm, BD = 4\ cm, CF = 2\ cm, CE = 4\ cm, BF = 2.5\ cm$ then



a) $DE \parallel BC$ b) $DF \parallel AC$ c) $EF \parallel AB$ d) none of these

29. In the given figure ΔABC is shown. $DE \parallel BC,\ AD = 5\ cm, DB = 2.5\ cm, BC = 12\ cm$ then DE is **[BOARD 2024]**



a) 10 cm b) 6 cm c) 8 cm d) 7.5 cm

30. The perimeters of two similar triangles ABC & PQR are 56 cm and 48 cm respectively. $\frac{PQ}{AB}$ is **[BOARD 2024]**

a) $\frac{7}{8}$ b) $\frac{6}{7}$ c) $\frac{7}{6}$ d) $\frac{8}{7}$

31. If the diagonals of a quadrilateral divide each other proportionally then it is a **[BOARD 2024]**

a) Parallelogram b) rectangle c) square d) trapezium

Options for Assertion and Reasoning Questions:

a) Both assertion(A) and reason(R) are true and reason(R) is the correct explanation of assertion(A)

b) Both assertion(A) and reason(R) are true but reason(R) is not the correct explanation of assertion(A)

c) Assertion (A) is true but reason (R) is false

d) Assertion (A) is false but reason (R) is true

32. ***Assertion(A):*** In the $\Delta ABC, AB = 24\ cm, BC = 10\ cm\ and\ AC = 26\ cm$ then ΔABC is a right angle triangle.

Reason(R): If in two triangles, their corresponding angles are equal then the triangles are similar.

33. ***Assertion(A):*** If the co-ordinates of the mid-points of the sides AB and AC of ΔABC are $D(3,5)$ and $E(-3,-3)$ respectively then $BC = 20$ units

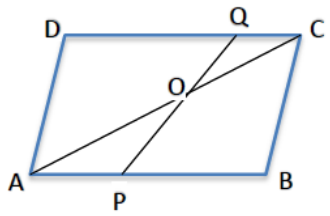
Reason(R): The line joining the mid-points of two sides of a triangle is parallel to the third side and equal to half of it.

34. ***Assertion(A):*** ABCD is a trapezium with $DC \parallel AB$. E and F are points on AD and BC respectively such that $EF \parallel AB$. Then $\frac{AE}{ED} = \frac{BF}{FC}$.

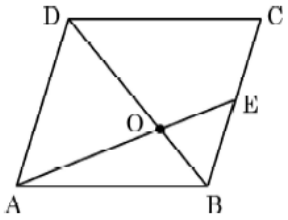
Reason(R): Any line parallel to parallel sides of a trapezium divides the non-parallel sides proportionally. **[BOARD 2024]**

2 marks:

1. 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.



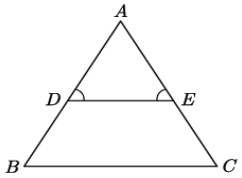
2. ABCD is a parallelogram. AE divides the line segment BD in the ratio 1:2. If $BE = 1.5\,cm$ then find the length of BC. **[BOARD 2023]**



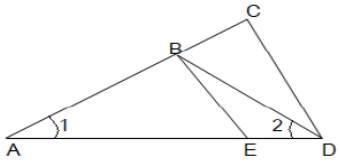
3. ABCD is a trapezium with $AB \parallel CD$ and its diagonals AC and BD intersect each other at O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$. **[BOARD 2023]**

4. In a rectangle ABCD, E is a point on AB such that $AE = \frac{2}{3}AB$. If $AB = 6\,km$ and $AD = 3\,km$, then find DE.

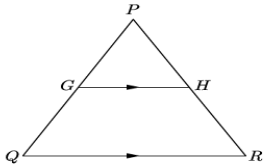
5. In figure, $\angle D = \angle E$ and $\frac{AD}{DB} = \frac{AE}{EC}$ prove that ΔBAC is an isosceles triangle.



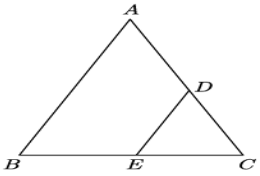
6. In the given figure, $\frac{AD}{AE} = \frac{AC}{BD}$ and $\angle 1 = \angle 2$. Show that $\Delta BAE \sim \Delta CAD$.



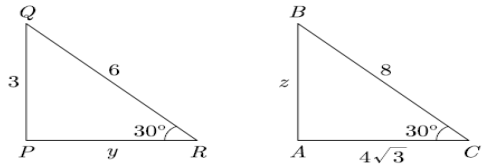
7. In the given figure, G is the mid-point of the side PQ of ΔPQR and $GH \parallel QR$. Prove that H is the mid-point of the side PR.



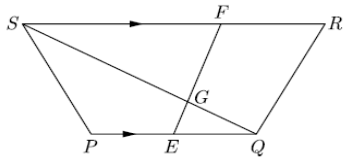
8. In the given figure, $\Delta ABC, DE \parallel AB$. If $AD = 2x, DC = x + 3, BE = 2x - 1$ and $CE = x$ then find the value of x.



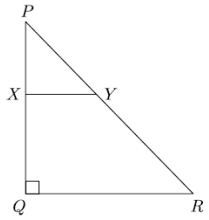
9. In the given figure, $\Delta ABC \sim \Delta PQR$ find the value $y + z$.



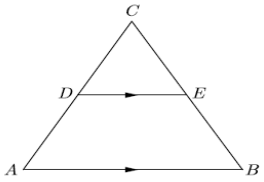
10. In the given figure, PQRS is a trapezium in which $PQ \parallel RS$. On PQ and RS there are points E and F respectively such that EF intersects SQ at G. Prove that $EQ \times GS = GQ \times FS$.



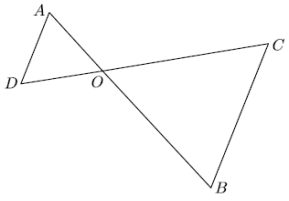
11. In the given figure, PQR is a triangle right angled at Q and $XY \parallel QR$. If $PQ = 6\ cm, PY = 4\ cm$ and $PX : XQ = 1 : 2$. Calculate the length of PR and QR.



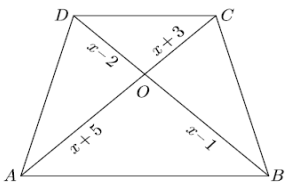
12. In the given figure, $\angle A = \angle B$ and $AD = BE$. Show that $DE \parallel AB$.



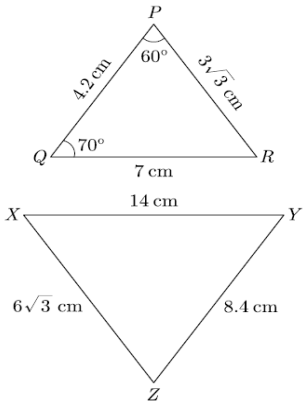
13. In the given figure, $OA \times OB = OC \times OD$ show that $\angle A = \angle C$ and $\angle B = \angle D$.



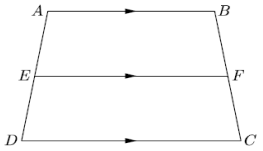
14. In the given figure, if $AB \parallel DC$, find the value of x.



15. In the given figure, find the measure of $\angle X$.

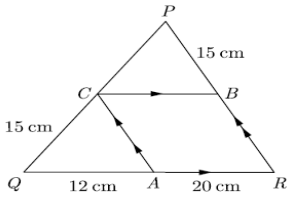


16. In the given figure, if ABCD is a trapezium in which $AB \parallel CD \parallel EF$ then prove that $\frac{AE}{ED} = \frac{BF}{FC}$.



17. ABC is a right triangle right angled at C. Let $BC = a, CA = b, AB = c \; and \; p$ be the length of perpendicular from C to AB. Prove that $cp = ab$.

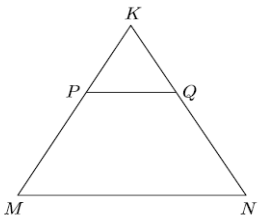
18. In the given figure, $CB \parallel QR$ and $CA \parallel PR$. If $AQ = 12\ cm, AR = 20\ cm, PB = CQ = 15\ cm$, calculate PC and BR.



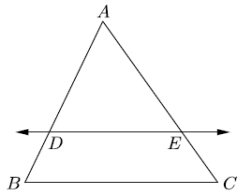
19. In $\Delta\, ABC$, if X and Y are points on AB and AC respectively such that $\frac{AX}{XB} = \frac{3}{4}$, $AY = 5 \; and \; YC = 9$ then state whether XY and BC are parallel or not.

20. If $\Delta\, ABC \sim \Delta\, DEF$ such that $2AB = DE$ and $BC = 8\ cm$ then find EF.

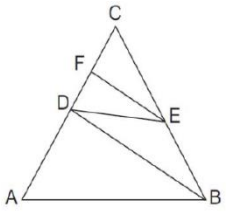
21. In the figure, PQ is parallel to MN, if $\frac{KP}{PM} = \frac{4}{13}$ and $KN = 20.4\ cm$ then find KQ.



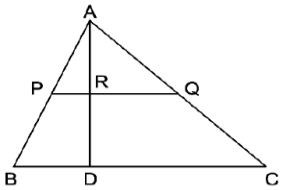
22. In the given figure, in ΔABC, $DE \parallel BC$ such that $AD = 2.4\,cm$, $AB = 3.2\,cm$ and $AC = 8\,cm$, then what is the length of AE?



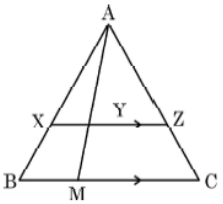
23. In the given figure, $AB \parallel DE$ *and* $BD \parallel EF$ then prove that $DC^2 = CF \times AC$.



24. In the given figure, $AP = 3cm, AR = 4.5\,cm, AQ = 6\,cm, AB = 5\,cm, AC = 10\,cm$. Find the length of AD

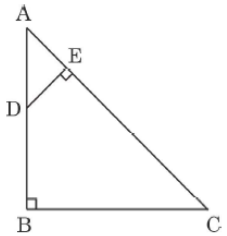


25. In the given figure, $Z \parallel BC$. $AZ = 3\,cm$, $ZC = 2cm$, $BM = 3\,cm, MC = 5\,cm$. Find the length of XY. **[BOARD 2023]**



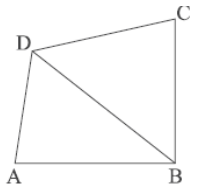
26. In the given figure, $AB \perp BC, DE \perp AC$. Prove that $\Delta ABC \sim \Delta AED$.

[COMPARTMENT 2023]



27. X is a point on the side BC of ΔABC. XM and XN are drawn parallel to AB and AC respectively meeting AB in N and AC in M. MN produced meets CB produced at T. Prove that $TX^2 = TB \times TC$.

28. In the given figure, ABCD is a quadrilateral. Diagonal BD bisects $\angle B$ & $\angle D$ both. Prove that **[BOARD 2024]**

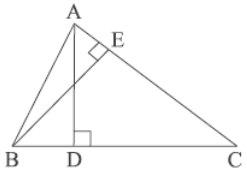


(i) $\Delta ABD \sim \Delta CBD$

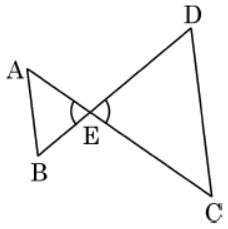
(ii) $AB = BC$.

29. Diagonals AC & BD of a trapezium ABCD intersect at O, where $AB \parallel DC$. If $\frac{DO}{BO} = \frac{1}{2}$ then show that $AB = 2\,CD$. **[BOARD 2024]**

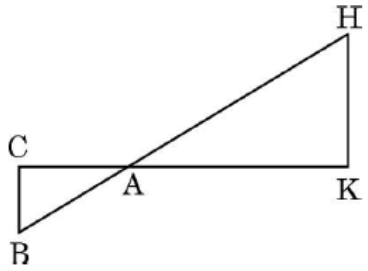
30. In ΔABC, altitudes AD and BE are drawn. If $AD = 7\ cm, BE = 9\ cm, EC = 12\ cm$ then find the length of CD. **[BOARD 2024]**



31. In the given figure, $\frac{EA}{EC} = \frac{EB}{ED}$ prove that $\Delta EAB \sim \Delta ECD$. **[BOARD 2024]**

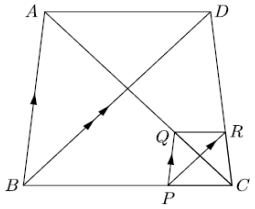


32. In the given figure, $\Delta AHK \sim \Delta ABC$. If $AK = 8\ cm, BC = 3.2\ cm, HK = 6.4\ cm$ then find the length of AC. **[BOARD 2024]**

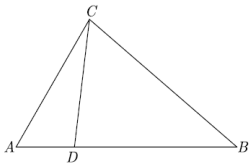


3 marks:

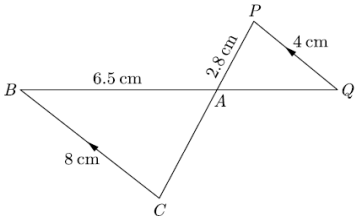
1. Two right triangles ABC and DBC are drawn on the same hypotenuse BC and on the same side of BC. If AC and BD intersect at P, prove that $AP \times PC = BP \times DP$.
2. In the given figure, two triangles ABC and DBC lie on the same side of BC such that $PQ \parallel BA$ and $PR \parallel BD$. Prove that $QR \parallel AD$.



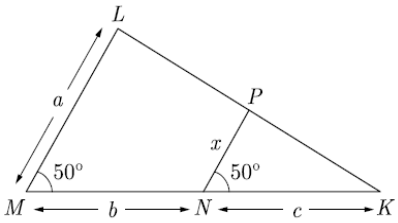
3. In the given figure, if $\angle ACB = \angle CDA$, $AC = 6\ cm$ and $AD = 3\ cm$ then find the length of AB.



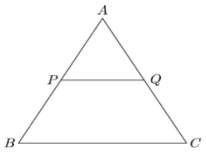
4. In the given figure, $BC \parallel PQ$ and $BC = 8\ cm$, $PQ = 4\ cm, BA = 6.5\ cm, AP = 2.8\ cm$. Find CA and AQ.



5. In the given figure, find the value of x in terms of a, b and c.

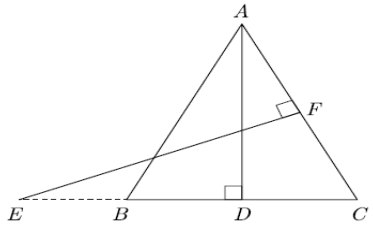


6. In the given figure, P and Q are the points on the sides AB and AC respectively of ΔABC such that $AP = 3.5\ cm,\ PB = 7\ cm, AQ = 3\ cm\ and\ QC = 6\ cm$. If $PQ = 4.5\ cm$ find BC.

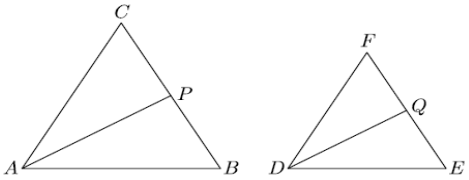


7. Two right triangles ABC and DBC are drawn on the same hypotenuse BC and on the same side of BC. If AC and BD intersect at P, prove that $AP \times PC = BP \times DP$.
8. In the given figure, $AB = AC$. E is a point on CB produced. If AD is perpendicular to BC and EF perpendicular to AC prove that $\Delta\, ABD \sim \Delta\, CEF$.

[BOARD 2023 & COMPARTMENT 2023]



9. In the given figure, $\Delta ABC \sim \Delta DEF$. AP bisects $\angle CAB$ and DQ bisects $\angle FDE$.

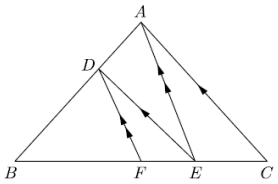


Prove that:

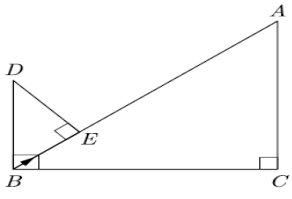
(i) $\frac{AP}{DQ} = \frac{AB}{DE}$

(ii) $\Delta\, CAP \sim \Delta\, FDQ$.

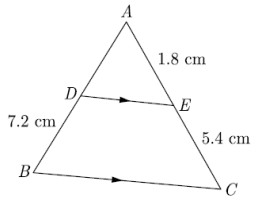
10. In the given figure, $DE \parallel AC$ and $DF \parallel AE$. Prove that $\frac{BE}{FE} = \frac{BE}{EC}$.



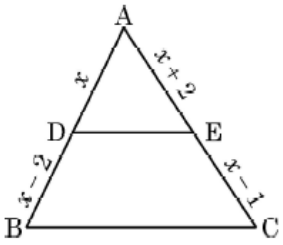
11. In the given figure, $DB \perp BC, DE \perp AB \text{ and } AC \perp BC$. Prove that $\frac{BE}{DE} = \frac{AC}{BC}$



12. A 6m high tree cast a 4 m long shadow. At the same time, a flag pole cast a shadow 50 m long. How long is the flag pole?
13. In the given figure, $DE \parallel BC$. Find the length of side AD, given that $AE = 1.8\, cm, BD = 7.2\, cm \text{ and } CE = 5.4\, cm$



14. In $\Delta ABC, DE \parallel BC$, find the value of x. **[BOARD 2023]**



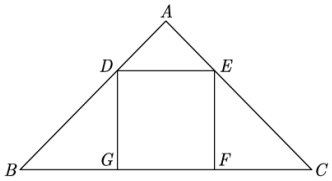
5 marks:

1. 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.

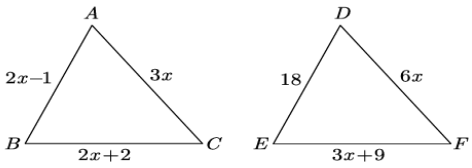
[BOARD 2023, COMPARTMENT 2023 & BOARD 2024]

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.

2. In the given figure, DEFG is a square and $\angle BAC = 90°$. Show that $FG^2 = BG \times FC$.



3. In the given figure, if $\Delta ABC \sim \Delta DEF$ and their sides of lengths (in cm) are marked along them, then find the lengths of sides of each triangle.

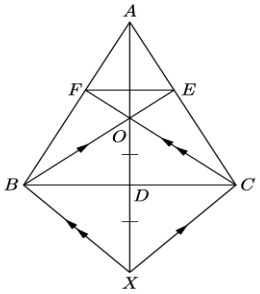


4. In $\Delta ABC, AD$ is a median and O is any point on AD. BO and CO on producing meet AC and AB at E and F respectively. Now AD is produced to X such that $OD = DX$ as shown in figure.

Prove that

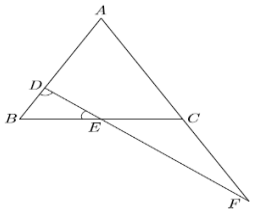
(i) $EF \parallel BC$

(ii) $AO : AX = AF : AB$

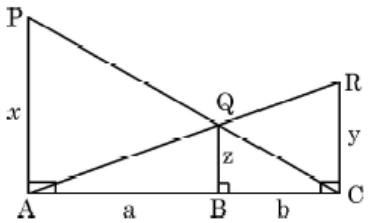


5. In the given figure, $\angle BED = \angle BDE$ and E is the mid-point of BC. Prove that $\frac{AF}{CF} = \frac{AD}{BE}$.

[BOARD 2023]

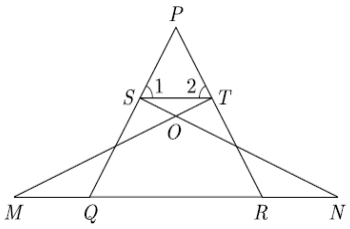


6. In $\Delta ABC, AD$ is the median to BC and in $\Delta PQR, PM$ is the median to QR. If $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AD}{PM}$. Prove that $\Delta\, ABC \sim \Delta\, PQR$.
7. PA, QB and RC are each perpendicular to AC. If $AP = x, QB = z,\ RC = y,$ $AB = a\ and\ BC = b$ then prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$. **[BOARD 2023 & BOARD 2024]**



8. Sides AB and AC and median AM of a triangle ABC are respectively proportional to sides DE and DF and median DN of another triangle DEF. Show that $\Delta\, ABC \sim \Delta\, DEF$. **[BOARD 2023 & BOARD 2024]**
9. Find the length of the second diagonal of a rhombus, whose side is 5 cm and one of the diagonal is 6 cm.
10. In the given figure, $\angle 1 = \angle 2$ and $\Delta\, NSQ \sim \Delta\, MTR$ then prove that $\Delta\, PTS \sim \Delta\, PRO$.

[BOARD 2024]

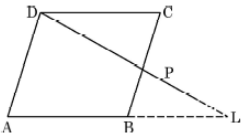


11. ABCD is a parallelogram, P is a point on side BC and DP when produced meets AB produced at L. Prove that

(i) $\frac{DP}{PL} = \frac{DC}{BL}$

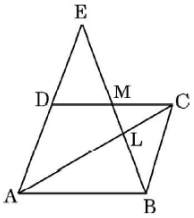
(ii) $\frac{DL}{DP} = \frac{AL}{DC}$

(iii) If $LP : PD = 2 : 3$ then find $BP : BC$. **[BOARD 2023]**



12. 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 $EL = 2\,BL$.

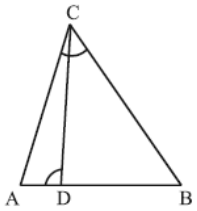
[BOARD 2023 & BOARD 2024]



13. D is a point on the side BC of a triangle ABC such that $\angle ADC = \angle BAC$ then prove that $CA^2 = CB.CD$. **[BOARD 2023]**

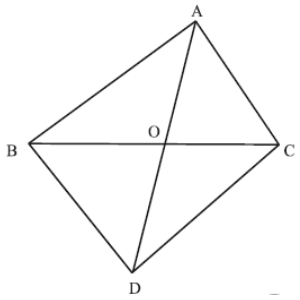
14. If AD and PM are medians of triangles ABC and PQR respectively, where $\Delta ABC \sim \Delta PQR$ then prove that $\frac{AB}{PQ} = \frac{AD}{PM}$. **[BOARD 2023]**

15. In the given figure, $\angle ADC = \angle BCA$ prove that $\Delta ACB \sim \Delta ADC$. Hence find BD if $AC = 8\,cm$ & $AD = 3cm$. **[BOARD 2023]**

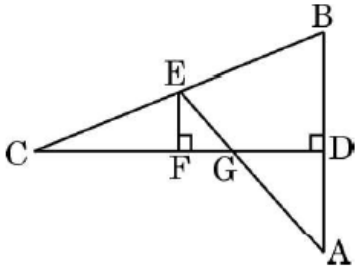


16. In a ΔPQR, N is a point on PR such that $QN \perp PR$. If $PN \times NR = QN^2$ then prove that $\angle PQR = 90°$. **[BOARD 2023 & BOARD 2024]**

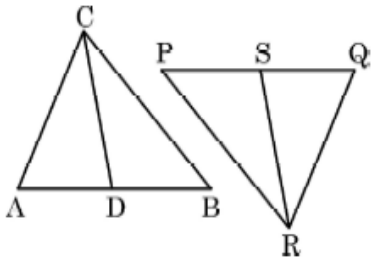
17. In the given figure, ΔABC and ΔDBC are on the same base BC. If AD intersects BC at O prove that $\frac{ar(\Delta ABC)}{ar(\Delta DBC)} = \frac{AO}{DO}$. **[BOARD 2023]**



18. In the given figure, CD is the perpendicular bisector of AB. EF is perpendicular to CD. AE intersects CD at G. Prove that $\frac{CF}{CD} = \frac{FG}{DG}$. **[BOARD 2023]**



19. In the given figure, CD and RS are respectively the medians of ΔABC & ΔPQR. If $\Delta ABC \sim \Delta PQR$ then prove that



(i) $\Delta ADC \sim \Delta PSR$.

(ii) $AD \times PR = AC \times PS$. **[BOARD 2023]**

20. E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\Delta ABE \sim \Delta CFB$. **[BOARD 2024]**