MATHS

BOOKS - ICSE

MID-POINT AND ITS CONVERSE(INCLUDING INTERCEPT THEOREM)

Questions

1. The figure formed by joining the mid-points of the adjacent sides of a quadrilateral is a (a) parallelogram (b) rectangle (c)square (d) rhombus

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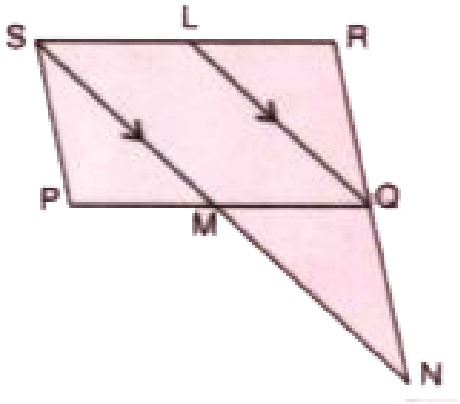
2. In parallelogram PQRS. L is mid-point of side SR and SN is drawn parallel to LQ which meets RQ produced prove that :



$$SP = \frac{1}{2}RN$$

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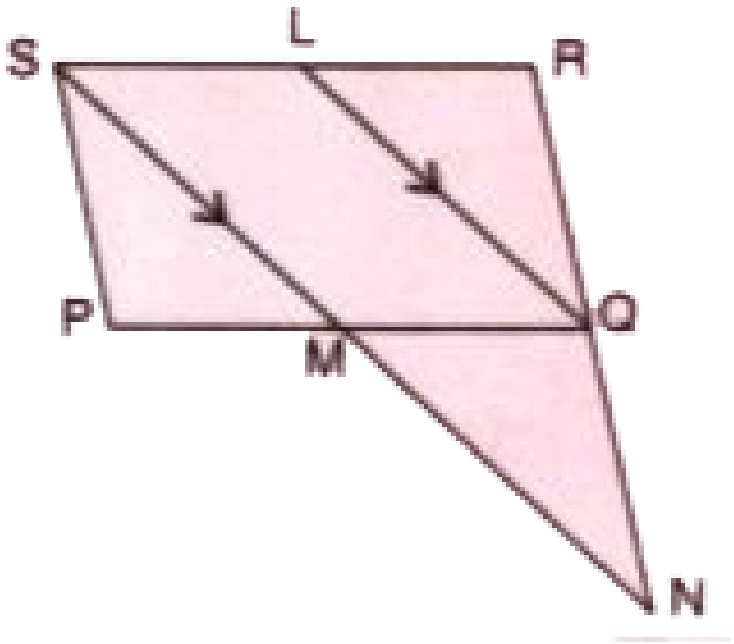
3. In parallelogram PQRS. L is mid-point of side Sr and SN is drawn parallel to LQ which meets RQ produced prove that :



$SN = 2LQ$

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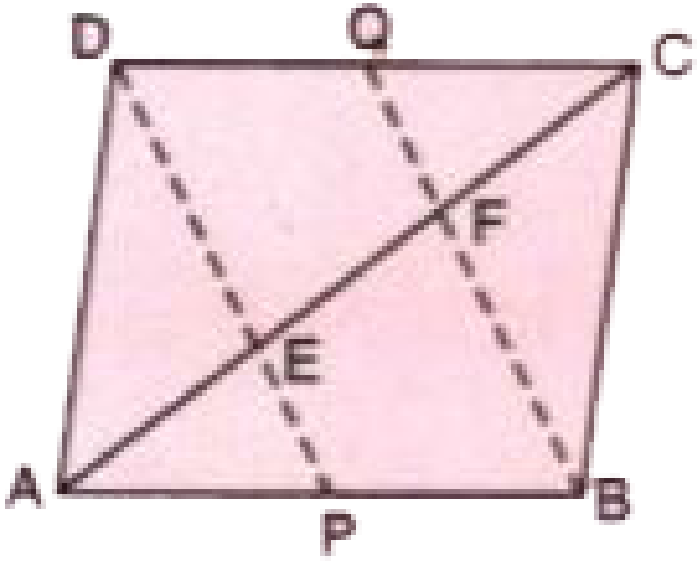
4. The adjoining figure shows a parallelogram ABCD in which P is mid-point of AB and Q is

mid-point of CD. Prove that $AE = EF = FC$.



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5. In a right-angled triangle $ABC, \angle ABC = 90^\circ$ and D is mid-point of AC. Prove that $BD = \frac{1}{2}AC$.

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6. In triangle ABC, BE ad CF are median M is a point on BE produced such that BE=EM and N is point on CF produced such that CF=FN. Prove that

NAM is a straight line

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7. In triangle ABC, BE ad CF are median M is a point on BE produced such that BE=EM and N

is point on CF produced such that CF=FN. Prove that

A is the mid-point of MN

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8. E is the mid-point of the side AD of the tarapezium ABCD with $AB \| DC$. A line through E drawn parallel to AB intersects BC at F. Show that F is the mid-points of BC.

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9. In a trapezium ABCD, AB/DC, E is mid-point of aD. A line through E and parallel to AB intersects BC at point F. Show that:

2EF=AB+DC

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10. Prove by vector method that the line segment joining the mid-points of the diagonals of a trapezium is parallel to the parallel sides and equal to half of their difference.

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11. Use the intercept Theorem to prove that the converse of the Mid-point Theorem

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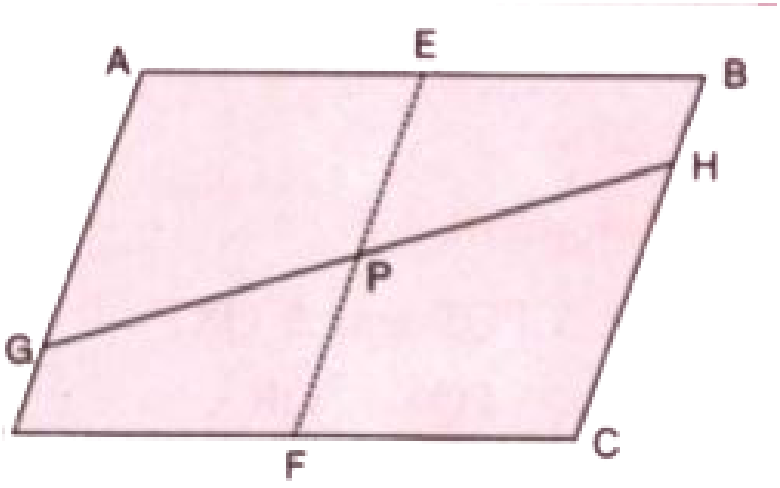
12. ABCD is a parallelogram. E is the mid-point of AB and F is the mid-point of CD. GH is any line that intersects AD, EF and BC at G, P and H

respectively. Prove that : GP=PH



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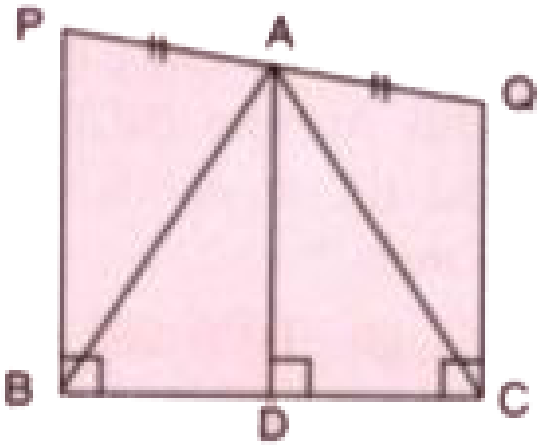
13. Use the information, given in the adjoining figure, to show that AB=AC



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Exercise 12 A

1. In triangle ABC, M is mid-point of AB and a straight line through M and parallel to BC cuts

AC at N. Find the lengths of AN and MN, if BC = 7 cm and AC = 5 cm.

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2. Prove that the figure obtained by joining the mid-points of the adjacent sides of a rectangle is a rhombus.

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3. D, E and F are the mid-points of the sides AB, BC and CA of an isosceles triangle ABC in which AB = BC. Prove that ΔDEF is also isosceles.

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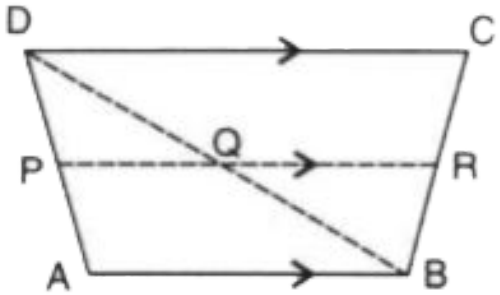
4. The following figure shows a trapezium ABCD in which AB // DC. P is the mid-point of AD and PR // AB. Prove that:

$$PR = \frac{1}{2}(AB + CD)$$



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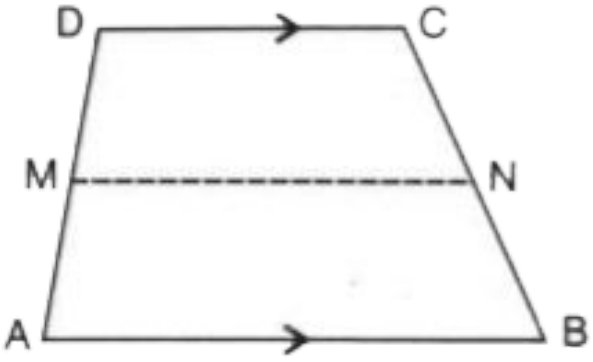
5. The figure, given below, shows a trapezium ABCD. M and N are the mid-points of the nonparallel sides AD and BC respectively. Find:



MN, if AB = 11 cm and DC = 8 cm.

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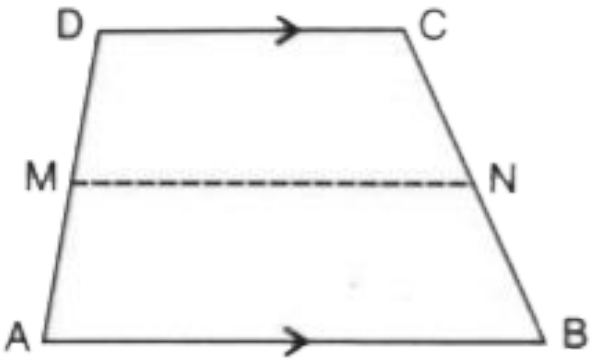
6. The figure, given below, shows a trapezium ABCD. M and N are the mid-points of the nonparallel sides AD and BC respectively. Find:



AB, if DC = 20 cm and MN = 27 cm

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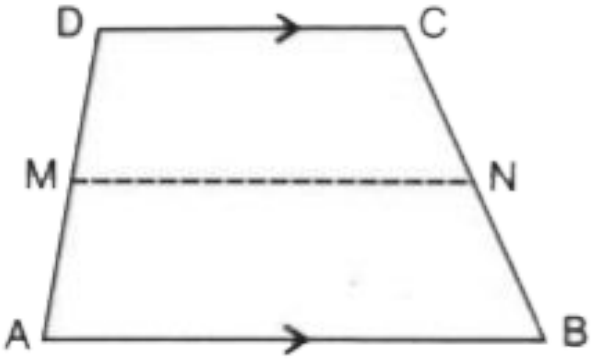
7. The figure, given below, shows a trapezium ABCD. M and N are the mid-points of the nonparallel sides AD and BC respectively. Find:



DC, if MN = 15 cm and AB = 23 cm.

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8. The diagonals of a quadrilateral intersect at right angles. Prove that the figure obtained by joining the mid-points of the adjacent sides of the quadrilateral is a rectangle.

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9. L and M are the mid-points of sides AB and DC respectively of parallelogram ABCD. Prove that segments DL and BM trisect diagonal AC.

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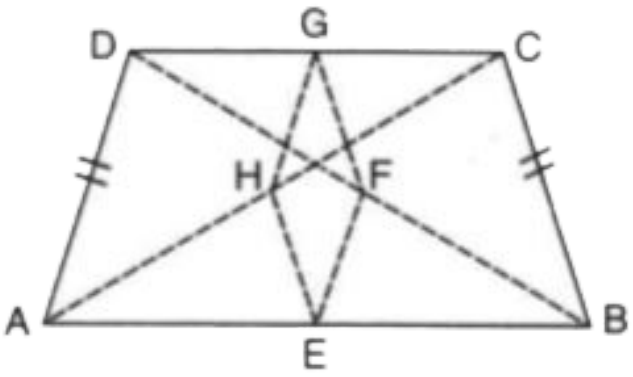
10. ABCD is a quadrilateral in which AD = BC. E, F, G and H are the mid-points of AB, BD, CD and

AC respectively. Prove that EFGH is a rhombus.



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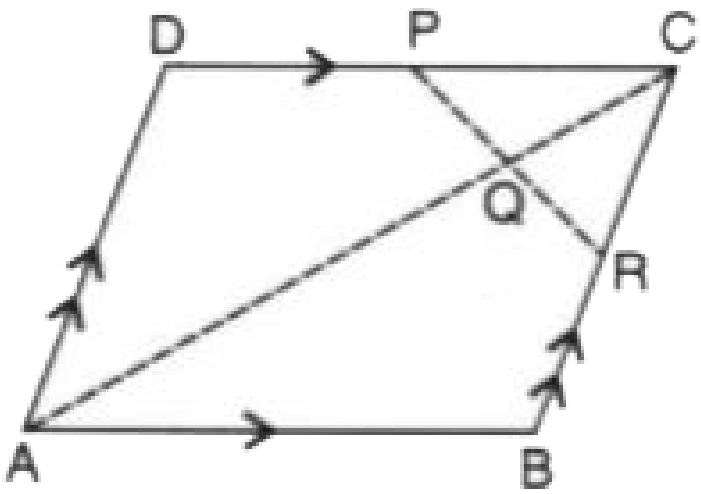
11. A parallelogram ABCD has P the mid-point of DC and Q a midpoint of AC such that $CQ = \frac{1}{4}AC$. PQ produced meets BC at R. Prove that:



R is the mid-point of BC

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12. A parallelogram ABCD has P the mid-point of DC and Q a point of AC such that

$CQ = \frac{1}{4}AC$. PQ produced meets BC at R. Prove that:

$PR = \frac{1}{2}DB$.

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13. D, E and F are the mid-points of the sides AB, BC and CA respectively of A ABC. AE meets DF at O. P and Q are the mid-points of OB and OC respectively. Prove that DPOF is a parallelogram.

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14. In triangle ABC, P is the mid-point of side BC. A line through P and parallel to CA meets AB at point Q and a line through Q and parallel to BC meets median AP at point R. Prove that :

$AP = 2AR$

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15. In triangle ABC, P is the mid-point of side BC. A line through P and parallel to CA meets

AB at point Q and a line through Q and a line through Q and parallel to BC meets median AP at point R. Prove that :

$BC = 4QR.$

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16. In trapezium ABCD, AB is parallel to DC. P and Q are the mid-points of AD and BC respectively. BP product meets CD produced at point E. Prove that :

Point P bisects BE,

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17. In trapezium ABCD, AB is parallel to DC. P and Q are the mid-points of AD and BC respectively. BP produced meets CD produced at point E. Prove that :

PQ is parallel to AB.

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18. In a triangle ABC, AD is a median and E is mid-point of median AD. A line through B and

E meets AC at point E. Prove that : AC = 3AF

Draw DG parallel to BF, which meets AC at point G.

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19. D and F are the mid-points of sides AB and AC of a triangle ABC. A line through F and parallel to AB meets BC at point E.

Prove that BDFE is a parallelogram

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20. D and F are the mid-points of sides AB and AC of a triangle ABC. A line through F and parallel to AB meets BC at point E.

Find AB, if $EF = 4.8cm$.

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21. In Δ ABC, AD is the median and DE is parallel to BA, where E is a point in AC. Prove that BE is also a median.

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22. In A ABC, E is mid-point of the median AD and BE produced meets side AC at point Q. Show that BE : EQ = 3:1.

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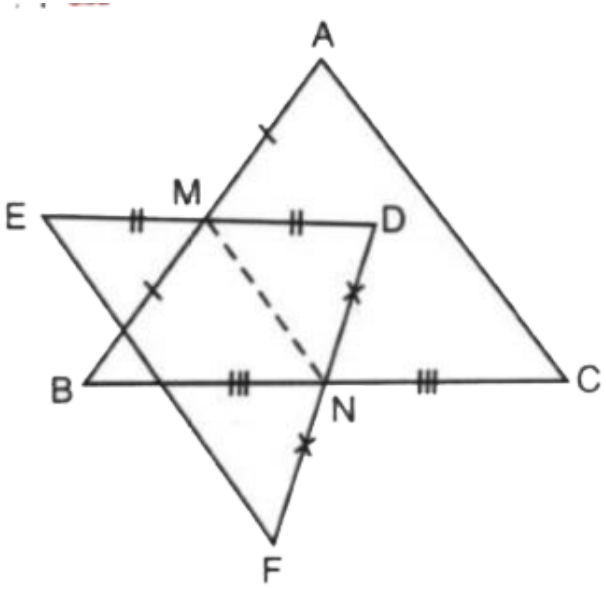
23. In the given figure, M is mid-point of AB and DE, whereas N is mid-point of BC and DF.

Show that : EF = AC.



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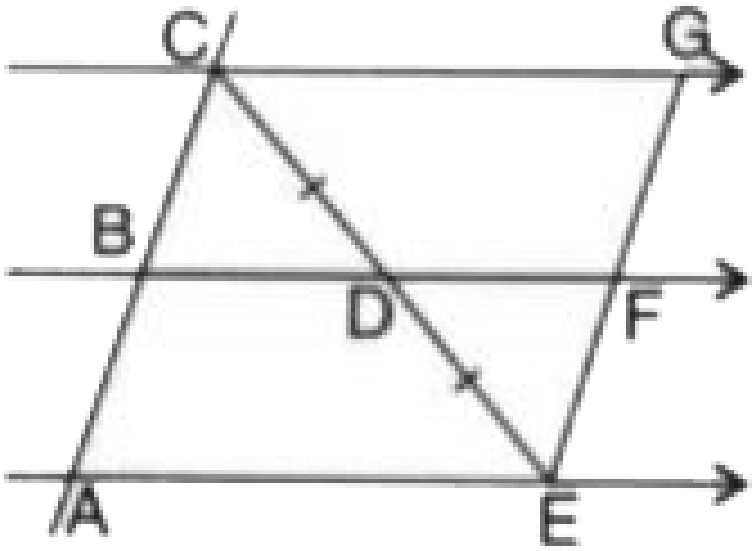
Exercise 12 B

1. Use the following figure to find :



BC, if AB = 7.2 cm.

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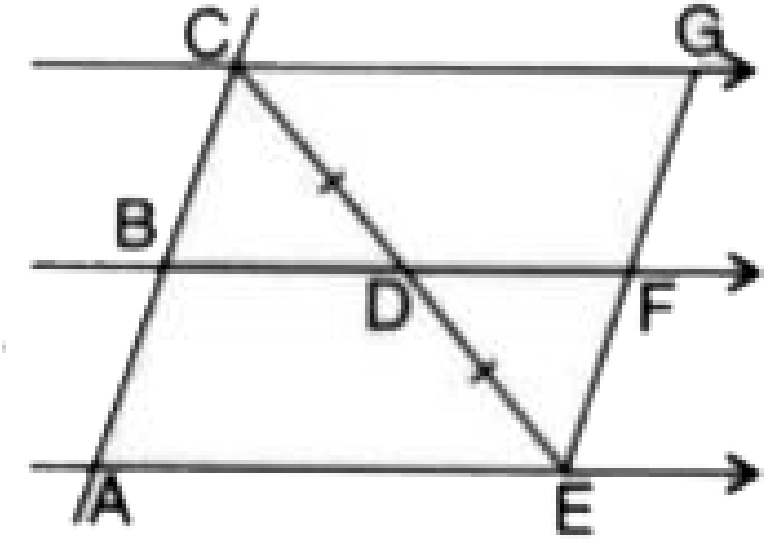
2. Use the following figure to find :



GE, if FE = 4 cm. B

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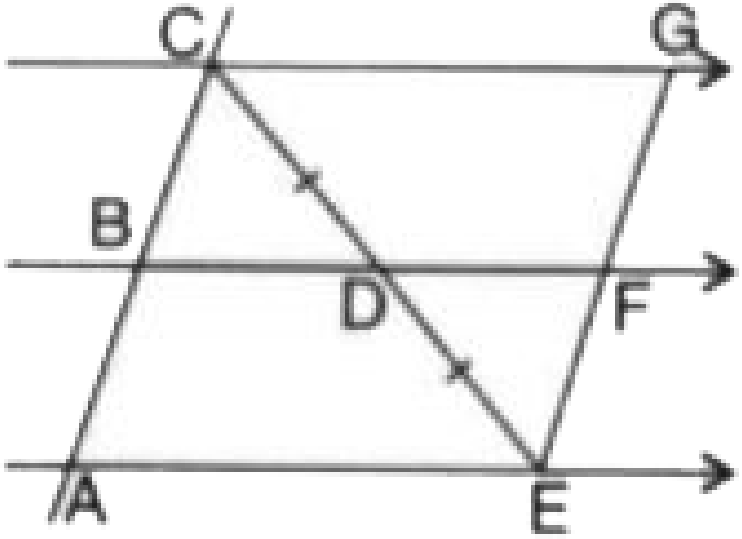
3. Use the following figure to find :



AE, if BD = 4.1 cm.

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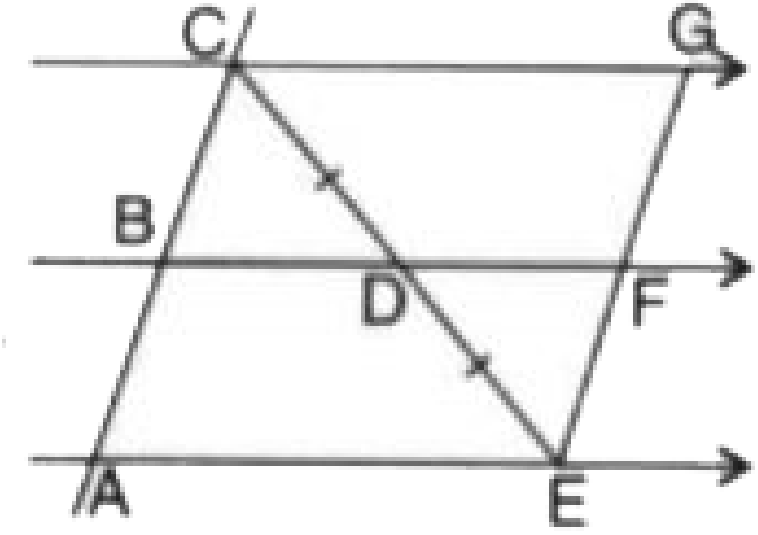
4. Use the following figure to find :



DF, if CG = 11 cm.

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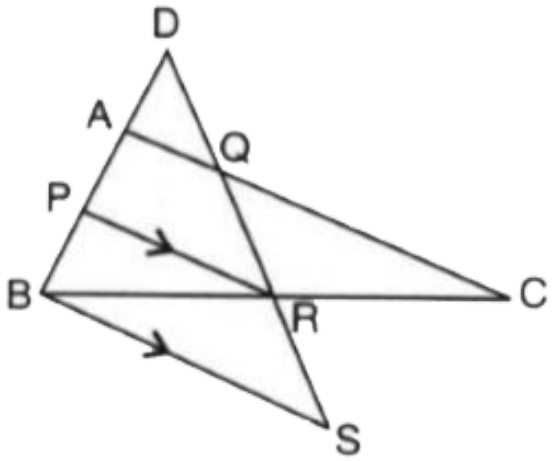
5. In the figure, given below, 2AD = AB, P is mid-point of AB, Q is mid-point of DR and PR // BS.

Prove that:



AQ//BS

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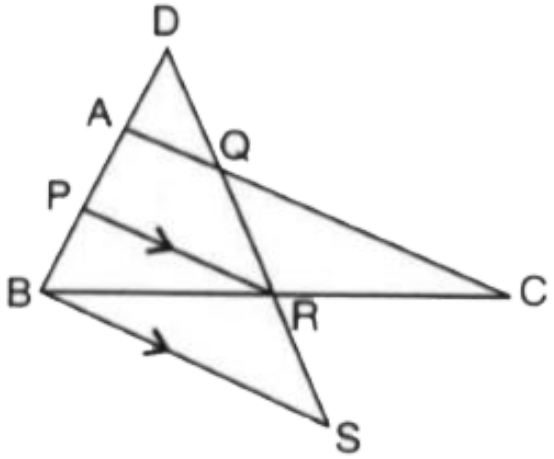
6. In the figure, given below, 2AD = AB, P is mid-point of AB, Q is mid-point of DR and PR // BS. Prove that:



DS=3RS

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7. The side AC of a triangle ABC is produced to point E so that $CE = \frac{1}{2}$ AC. D is the mid-point of BC and ED produced meets AB at F. Lines through D and C are drawn parallel to AB which meet AC at point P and EF at point R respectively. Prove that:

$3DF = EF$

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8. The side AC of a triangle ABC is produced to point E so that $CE = \frac{1}{2}$ AC. D is the mid-point of BC and ED produced meets AB at F. Lines through D and C are drawn parallel to AB which meet AC at point P and EF at point R respectively. Prove that:

$4CR = AB$

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9. In triangle ABC, the medians BP and CQ are produced upto points M and N respectively such that BP = PM and CQ = QN. Prove that:

M, A and N are collinear.

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10. In triangle ABC, the medians BP and CQ are produced upto points M and N respectively such that $BP = PM$ and $CQ = QN$. Prove

that :

A is the mid-point of MN.

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11. In triangle ABC, angle B is obtuse. D and E are mid-points of sides AB and BC respectively and F is a point on side AC such that EF is parallel to AB. Show that BEFD is a parallelogram.

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12. In parallelogram ABCD, E and F are mid-points of the sides AB and CD respectively. The lines segments AF and BF meet the line segments ED and EC at points G and H respectively. Prove that :

triangle HEB and FHC are congruent.

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13. In parallelogram ABCD, E and F are mid-points of the sides AB and CD respectively. The lines segments AF and BF meet the line

segments ED and EC at points G and H respectively. Prove that :

GEHF is a parallelogram.

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14. In triangle ABC, D and E are points on side AB such that AD = DE = EB. Through D and E, lines are drawn parallel to BC which meet side AC at points F and G respectively. Through F and Glines are drawn parallel to AB which

meet side BC at points M and N respectively.

Prove that : BM = MN = NC.

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15. In triangle ABC, M is mid-point of AB, N is mid-point of AC and D is any point in base BC. Use Intercept Theorem to show that MN bisects AD.

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16. If the quadrilateral formed by joining the mid points of the adjacent sides of quadrilateral ABCD is a rectangle, show that the diagonals AC and BD intersect at right angle.

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17. In triangle ABC, D and E are mid-points of the sides AB and AC respectively. Through E, a straight line is drawn parallel to AB to meet BC

at F. Prove that BDEF is a parallelogram. If AB = 16 cm, AC = 12 cm and BC = 18 cm, find the perimeter of the parallelogram BDEF.

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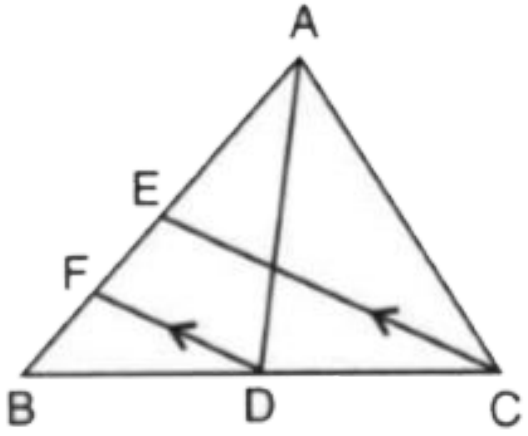
18. In the given figure, AD and CE are medians and DF||CE. Prove that : $Fb = \frac{1}{4}AB$.



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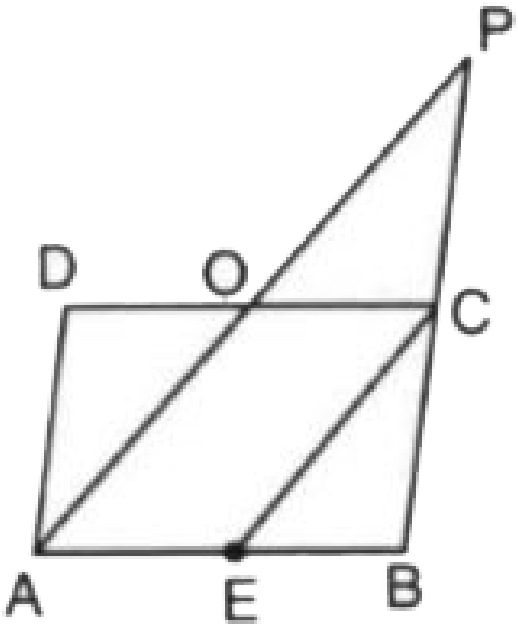
19. In parallelogram ABCD, E is the mid-point of AB and AP is parallel to EC which meets DC at point O and BC produced at P. Prove that:



PB=2AD

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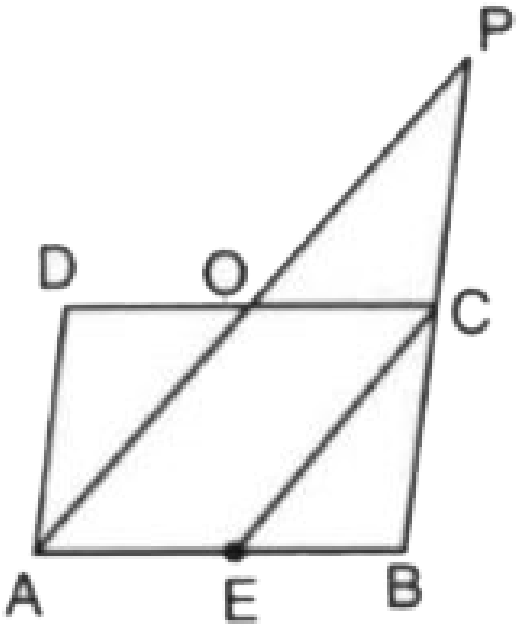
20. In parallelogram ABCD, E is the mid-point of AB and AP is parallel to EC which meets DC at point O and BC produced at P. Prove that:



O is mid-point of AP.

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21. In trapezium ABCD, sides AB and DC are parallel to each other. E is mid-point of AD and F is mid-point of BC.

Prove that : AB + DC = 2EF.

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22. In Δ ABC, AD is the median and DE is parallel to BA, where E is a point in AC. Prove

that BE is also a median.

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23. Adjacent sides of a parallelgram are equal and one of diagonls is equal to any one of the sides of this parallelgoram. Show that its diagonals are in the ratio $\sqrt{3}:1$.

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