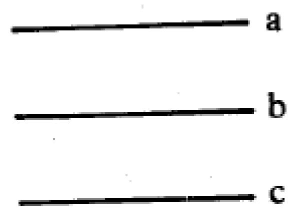
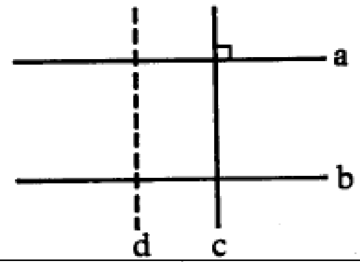
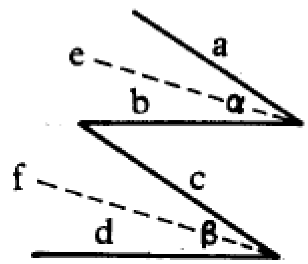
1. Given: $a \parallel b$, $b \parallel c$
Prove: $a \parallel c$
Guidance: Draw a line which intersects with all three lines.



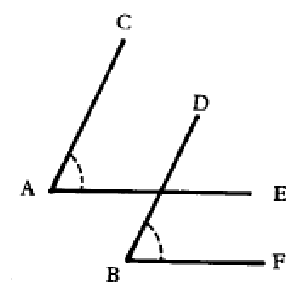
2. Given: $a \parallel b$, $c \perp a$
   a. Prove: $c \perp b$
   b. Given: $d \perp b$
      Prove: $d \parallel c$

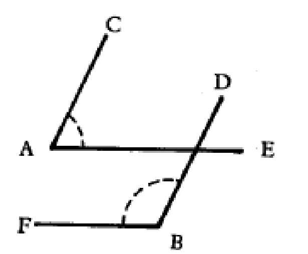


3. Given: $a \parallel c$, $b \parallel d$
   a. Prove: $\alpha = \beta$
   b. Given: e and f bisect angles α and β respectively.
      Prove: $e \parallel f$

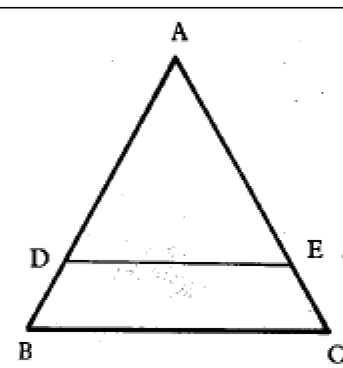


4. Prove the theorem: Angles, whose sides are parallel, respectively, are equal to each other, or their sum is 180°
Guidance:
First case: Given: $AC \parallel BD$, $AE \parallel BF$; Prove: $\measuredangle A = \measuredangle B$
Second Case: Given: $AC \parallel BD$, $AE \parallel BF$; Prove: $\measuredangle A + \measuredangle B = 180°$

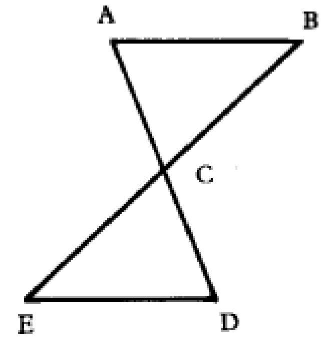




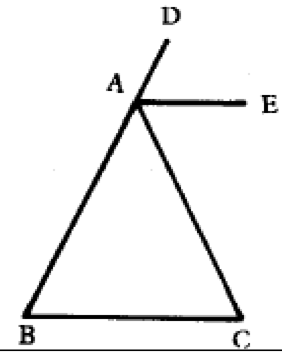
5. $\triangle ABC$ is isosceles ($AB = AC$)
Given: $DE \parallel BC$
Prove: $\triangle ADE$ is isosceles



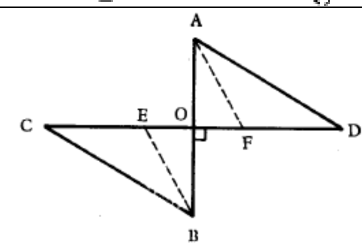
6. Given: $AB \parallel ED$, $AC = CD$
Prove: $EC = CB$



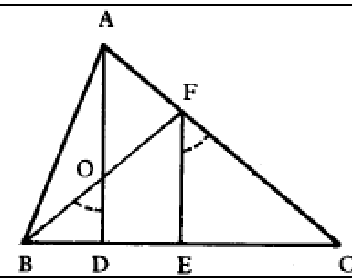
7. Given: The segment AE is parallel to BC and bisects $\measuredangle DAC$
Prove: $\triangle ABC$ is isosceles



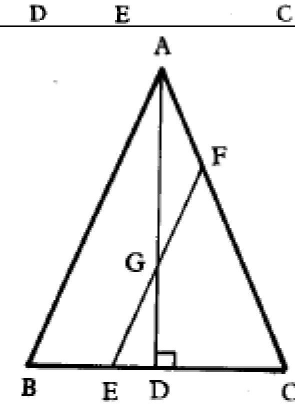
8. Given: $AB \perp CD$, $AD = CB$, $AO = OB$
   a. Prove: $AD \parallel BC$
   b. Given: AF bisects $\measuredangle A$ and $BE \parallel AF$
      Prove: BE bisects $\measuredangle B$



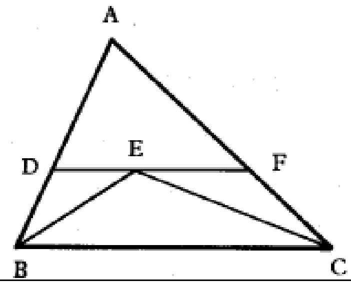
9. Given: $EF \parallel AD$, $FB = FC$, $BE = EC$
Prove:
   a. AD is an altitude to side BC in triangle ABC
   b. $\measuredangle BOD = \measuredangle EFC$



10. Given: $\triangle ABC$ is isosceles ($AB = AC$), AD is an altitude to BC, EF is parallel to AB.
Prove:
   a. $\triangle AFG$ is isosceles.
   b. $AB = AF + FE$



11. Given: BE and EC bisect $\measuredangle B$ and $\measuredangle C$, respectively, and meet at point E. Segment DF passes through E, and is parallel to BC.
Prove:
    a. $BD = DE$
    b. $DF = BD + FC$



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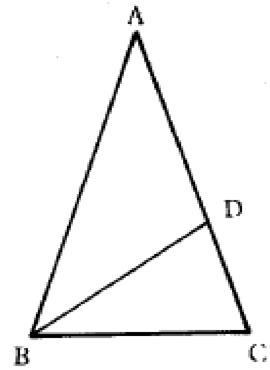
12. Given: $AD = DB = BC$, $AB = AC$
Prove that BD bisects $\measuredangle B$ and calculate $\measuredangle A$



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13. $\triangle ABC$ is isosceles ($AB = AC$). From point F on side AB, there is an altitude to AB, which intersects the base BC at point E, and intersects the continuation of side AC at point D. Given: $EC = CD$. Calculate $\measuredangle A$.

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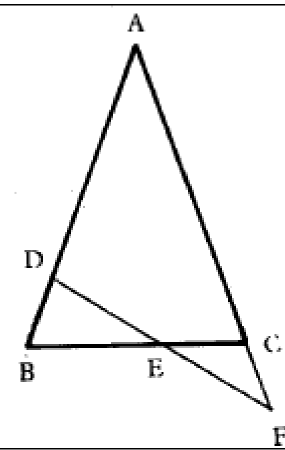
14. Given: $AB = AC$, $AD = DF$, $EC = FC$
    a. Prove: $\measuredangle ADF = 3\measuredangle F$
    b. Calculate $\measuredangle B$



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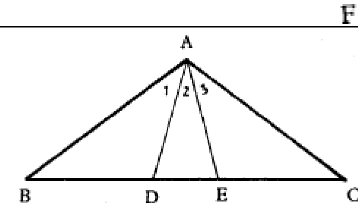
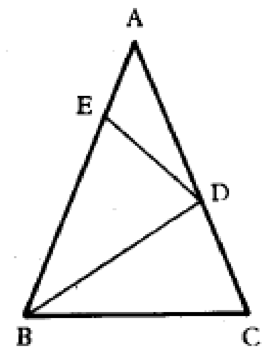
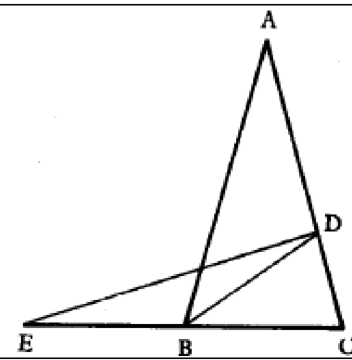
15. Given: $BD = AD = AE = EC$
    a. Prove: $\measuredangle A_1 = \measuredangle A_3$
    b. Given: $\measuredangle A_1 = \measuredangle A_2$
    Calculate $\measuredangle A$



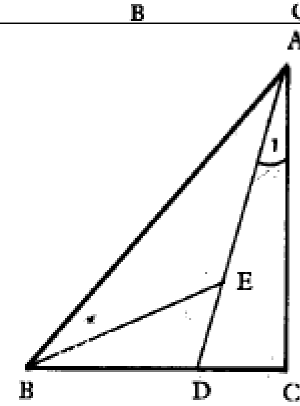
16. Given: $AB = AC$, $EB = BC$, $ED = DC$, $\measuredangle A = 40°$
Calculate $\measuredangle ADE$ and $\measuredangle DBC$



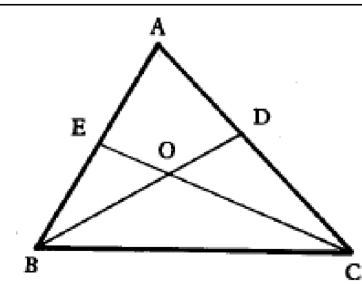
17. Given: $AB = AC$, $EB = BD$, $\measuredangle E = \measuredangle A$, BD bisects $\measuredangle ABC$
Calculate $\measuredangle A$



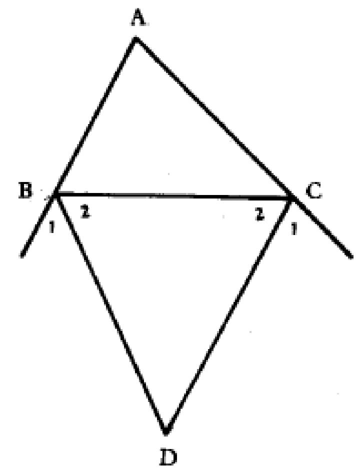
18. Given: $AE = BE$, BE bisects $\measuredangle ABC$
   a. Prove: $\measuredangle ADC = 3\measuredangle ABE$
   b. Given: $\measuredangle = 90°$, $\measuredangle A_1 = 15°$
      Calculate $\measuredangle ABD$



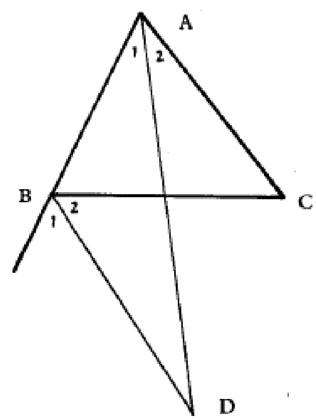
19. Given: BD and EC bisect $\measuredangle B$ and $\measuredangle C$ respectively, $\measuredangle A = 70°$
Calculate $\measuredangle BOC$
Note: the triangle is not isosceles.



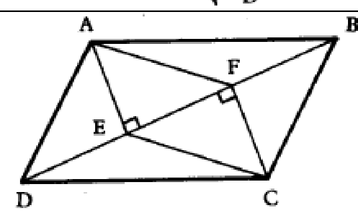
20. Given: $\measuredangle A = 80°$, DB and DC bisect the external angles to $\measuredangle B$ and $\measuredangle C$ ($\measuredangle B_1 = \measuredangle B_2$, $\measuredangle C_1 = \measuredangle C_2$)
Calculate $\measuredangle D$.



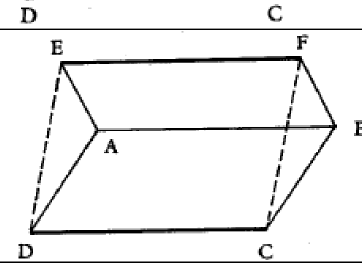
21. Given: $\measuredangle C = 50°$, $\measuredangle A_1 = \measuredangle A_2$, $\measuredangle B_1 = \measuredangle B_2$
   a. Calculate $\measuredangle D$
   b. Prove: $\measuredangle D = \frac{1}{2}\measuredangle C$ without using the given that $\measuredangle C = 50°$.



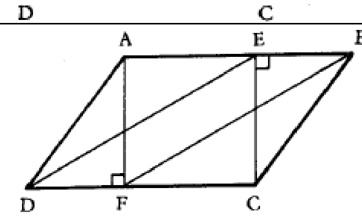
22. Given: Quadrilateral ABCD is a parallelogram, $AE \perp DB$, $CF \perp DB$
Prove: AFCE is a parallelogram.



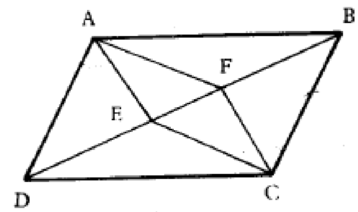
23. Given: Quadrilaterals ABCD and EFBA are parallelograms.
Prove: Quadrilateral EFCD is a parallelogram



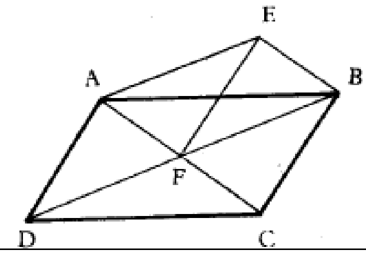
24. Given: ABCD is a parallelogram, $AF \perp DC$, $EC \perp AB$
Prove: EBFD is a parallelogram.



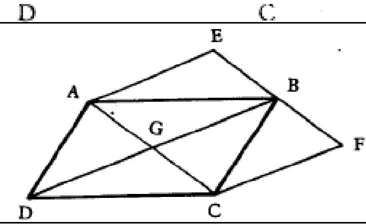
25. Given: Quadrilateral ABCD is a parallelogram, AE and FC bisect $\measuredangle A$ and $\measuredangle C$, respectively.
Prove: AFCE is a parallelogram.



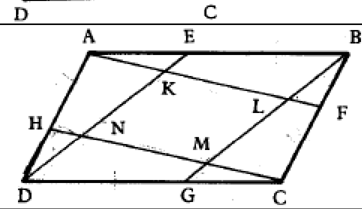
26. Given: Quadrilaterals ABCD and EBCF are parallelograms.
Prove: EBFA is a parallelogram.



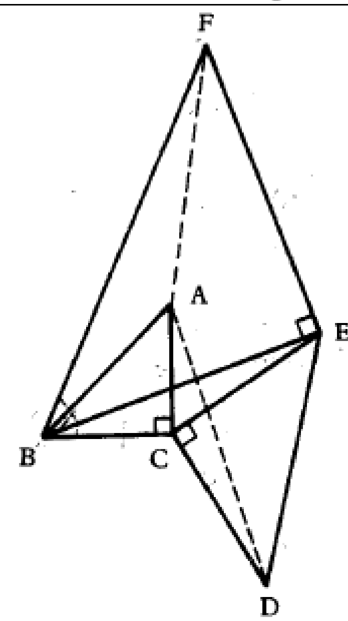
27. Given: Quadrilaterals ABCD and BFCG are parallelograms, $EB = BF$.
Prove: AEFG is a parallelogram.



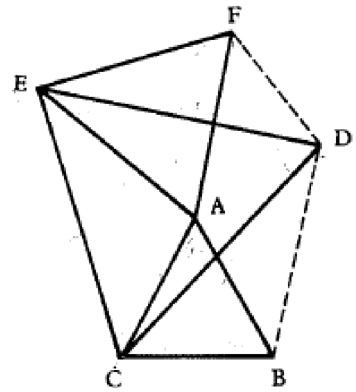
28. Given: Quadrilateral ABCD is a parallelogram, $EB = DG$, $AH = FC$
Prove: KLMN is a parallelogram.



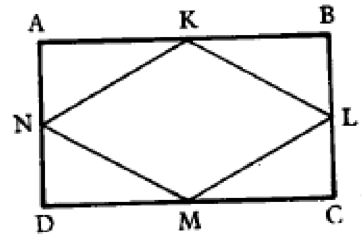
29. Given: $\triangle ABC$, $\triangle CDE$ and $\triangle BEF$ are isosceles and their head angles are right angles.
Prove:
a. $BE = AD$
b. Quadrilateral AFED is a parallelogram



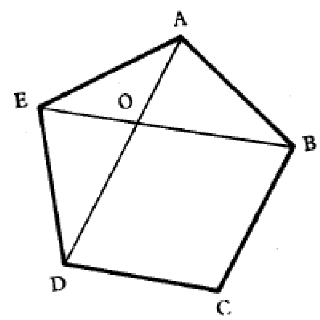
30. Given: $\triangle ABC$, $\triangle EDC$ and $\triangle EAF$ are equilateral.
Prove:
  a. $BD = AE$
  b. Quadrilateral FDBA is a parallelogram



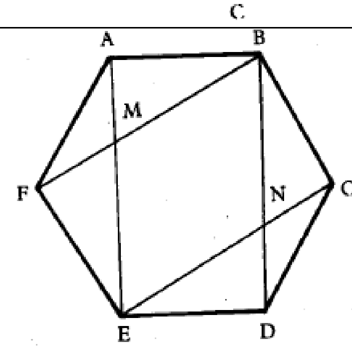
31. Given: The points K, L, M and N are the midpoints of the sides of rectangle ABCD.
Prove: KLMN is a rhombus.



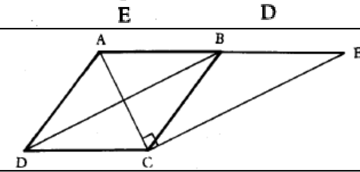
32. Given: pentagon ABCDE is a regular pentagon.
  a. Calculate $\measuredangle C$
  b. Prove: OBCD is a rhombus



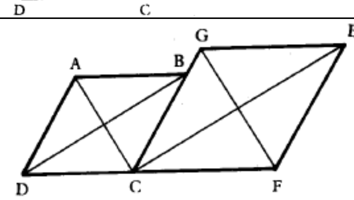
33. ABCDEF is a regular hexagon.
Prove:
  a. ABDE is a rectangle
  b. MBNE is a rhombus



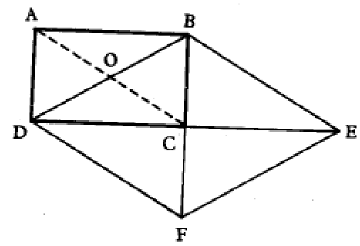
34. Given: Quadrilateral ABCD is a rhombus, $CE \perp AC$
Prove: $DB = CE$



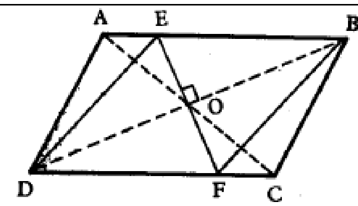
35. Given: Quadrilaterals ABCD and GEFC are rhombuses.
Prove:
  a. $DB \parallel EC$
  b. $\measuredangle ACE = 90°$



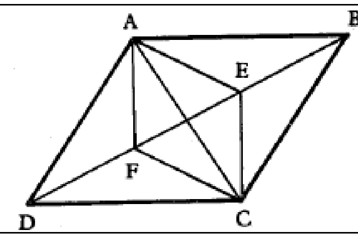
36. Given: Quadrilateral ABCD is a rectangle. Point C is the middle of both DE and BF.
Prove:
   a. BEFD is a rhombus.
   b. $AO = \frac{BE}{2}$



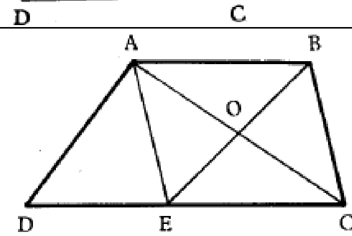
37. Given: Quadrilateral ABCD is a parallelogram, EF passes through point O and is perpendicular to BD.
Prove: EBFD is a rhombus.



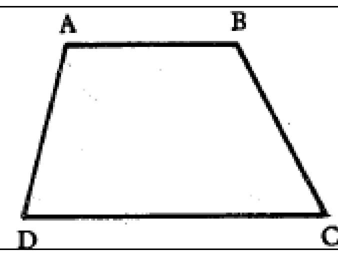
38. Given: Quadrilateral ABCD is a rhombus, AE bisects $\measuredangle CAB$, FC bisects $\measuredangle ACD$.
Prove: AECF is a rhombus.



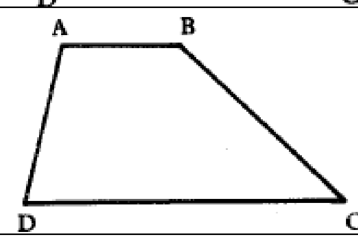
39. Given: Quadrilateral ABCD is a trapezoid, segment BE bisects diagonal AC ($AO = OC$).
Prove:
   a. Quadrilateral ABCE is a parallelogram
   b. It is impossible that one diagonal bisects another in a trapezoid.



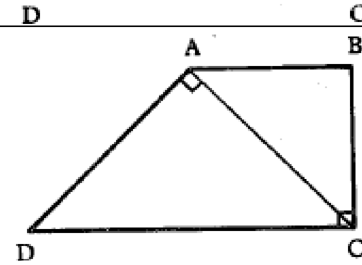
40. Given: Quadrilateral ABCD is a trapezoid, $AD < BC$
Prove: $\measuredangle C < \measuredangle D$



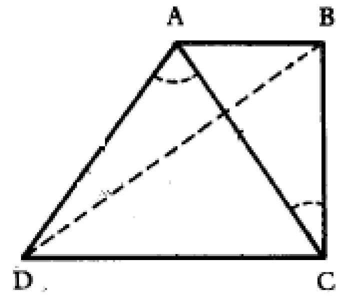
41. Given: Quadrilateral ABCD is a trapezoid
Prove: $DC - AB < AD + BC$, and express this statement in words



42. Given: Quadrilateral ABCD is a right trapezoid ($\measuredangle C = 90°$), $\measuredangle DAC = 90°$, $AB = BC$
Prove:
   a. $AD = AC$
   b. $AB = \frac{DC}{2}$



43. Given: Quadrilateral ABCD is a right trapezoid ($\measuredangle B = 90°$), $AD = AC$
Prove:
a. $\measuredangle DAC = 2\measuredangle ACB$
b. Given: $BD \perp AC$, $\measuredangle D_2 = 2\measuredangle D_1$
Calculate the angles of $\triangle ABC$.



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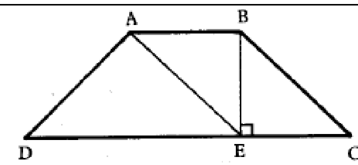
44. Given: Quadrilateral ABCD is an isosceles trapezoid, $BD = DC$, BD bisects $\measuredangle D$
a. Calculate the angles of the trapezoid.
b. Given: $DB = a$, $BC = b$
Express the perimeter of the trapezoid in terms of a and b.



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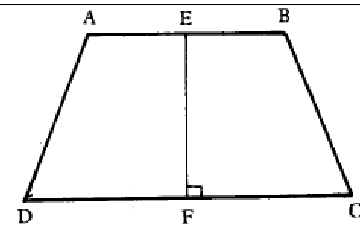
45. Given: Quadrilateral ABCD is a trapezoid, E and F are the centers of the bases AB and DC, respectively, EF is perpendicular to DC
Prove: Trapezoid ABCD is isosceles.



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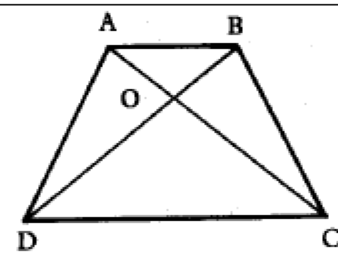
46. Given: Quadrilateral ABCD is an isosceles trapezoid.
Prove: $DO = OC$, $AO = OB$



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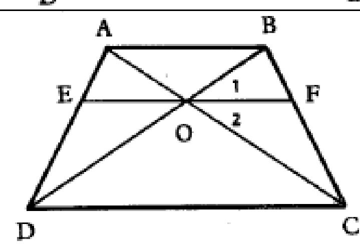
47. Given: Quadrilateral ABCD is an isosceles trapezoid. Segment EF passes through point O (the point of intersection of the two diagonals), $EF \parallel DC$
Prove:
a. $\measuredangle O_1 = \measuredangle O_2$
b. $EO = OF$



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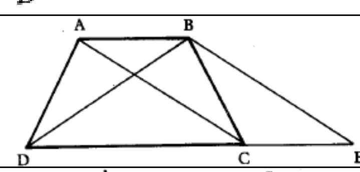
48. Given: Quadrilateral ABCD is an isosceles trapezoid, $CE = AB$ (CE is the continuation of DC)
Prove: $\triangle DBE$ is isosceles.



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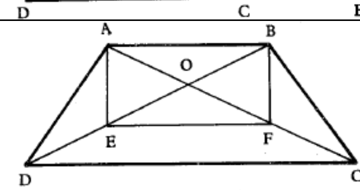
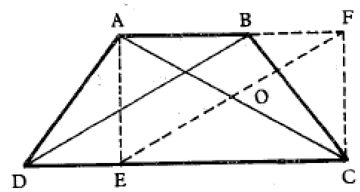
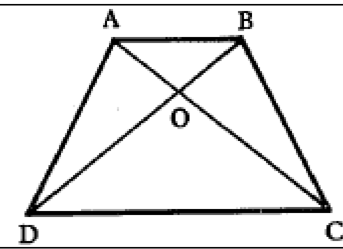
49. Given: Quadrilateral ABCD is an isosceles trapezoid, points E and F are the midpoints of segments DO and OC, respectively. $DO = 2OB$
Prove: Quadrilateral ABFE is a rectangle.



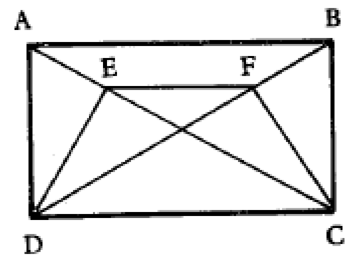
50. Given: Quadrilateral ABCD is an isosceles trapezoid, segment EF is parallel to diagonal BD and bisects diagonal AC ($AO = OC$). Segment BF is the continuation of AB.
Prove: Quadrilateral AFCE is a rectangle.



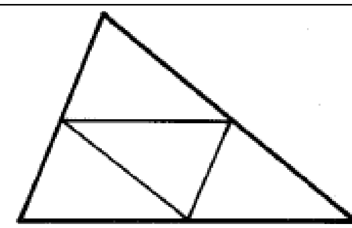
51. Given: Quadrilateral ABCD is a trapezoid, $DO = OC$
Prove: the trapezoid is isosceles.



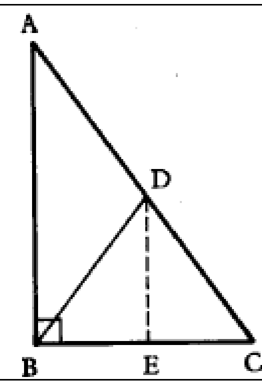
52. Given: Quadrilateral ABCD is a rectangle, $EF \parallel DC$
Prove: EFCD is an isosceles trapezoid.



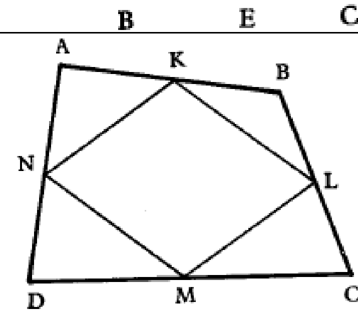
53. Prove the theorem: If we draw the three mid-segments in a triangle, we receive four congruent triangles.



54. Prove, using the properties of the mid-segment of a triangle, the theorem: the median to the hypotenuse of a right triangle is equal to half of the hypotenuse.
Guidance: Draw mid-segment DE and prove that $\triangle BDC$ is isosceles.



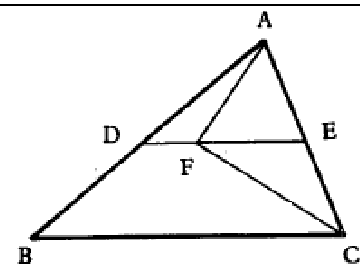
55. Given: ABCD is a quadrilateral, and points K, L, M and N are the midpoints of its edges.
Prove: Quadrilateral KLMN is a parallelogram
Guidance: Draw diagonal AC.



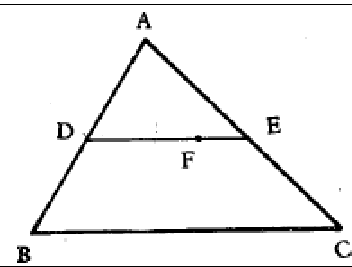
56. Prove: If we connect the midpoints, one after another, of the edges of a quadrilateral whose diagonals are equal, we receive a rhombus.

57. Prove: If we connect the midpoints, one after another, of the edges of a quadrilateral whose diagonals are perpendicular to one another, we receive a rectangle.

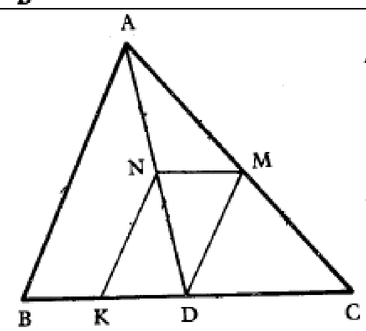
58. Given: DE is a mid-segment in $\triangle ABC$, CF bisects $\measuredangle C$
Prove: $\measuredangle AFC = 90°$



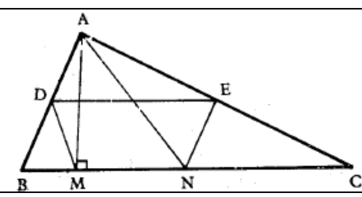
59. Given: DE is a mid-segment in $\triangle ABC$, $DB = DF$
Prove: $FE < EC$



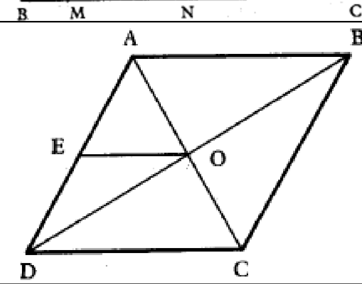
60. Given: segment AD is a median to side BC in $\triangle ABC$. K, M and N are the midpoints of segments BD, AC and AD, respectively.
   a. Prove: NMDK is a parallelogram
   b. What condition must $\triangle ABC$ fulfill so that NMDK will be a rectangle? Explain your answer.
   c. What condition must $\triangle ABC$ fulfill so that NMDK will be a rhombus? Explain your answer.



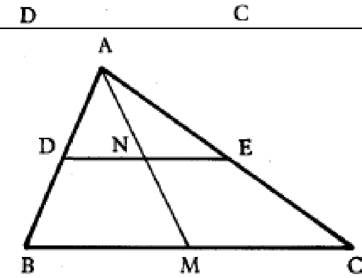
61. Given: DE is a mid-segment in $\triangle ABC$, AN is a median to BC, AM is an altitude to BC.
Prove: DENM is an isosceles trapezoid.



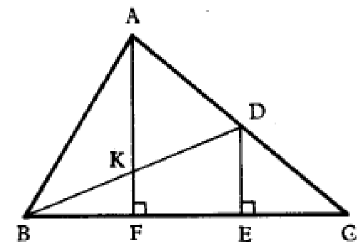
62. Given: Quadrilateral ABCD is a rhombus and quadrilateral EOCD is an isosceles trapezoid.
   a. Prove: $AE = ED$
   b. Calculate the angles of the rhombus.
   c. Given: the perimeter of the rhombus is 24. Calculate the perimeter of the trapezoid.



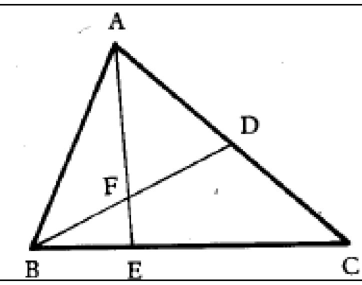
63. Given: AM is a median to edge BC in $\triangle ABC$, DE is a mid-segment in $\triangle ABC$.
Prove: AN is a median to edge DE in $\triangle ADE$.



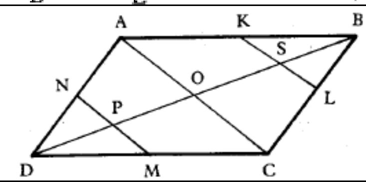
64. Given: segment AF is an altitude to edge BC in $\triangle ABC$, BD is a median to AC in the same triangle, and $ED \perp BC$
   a. Prove: $FE = EC$
   b. Given: $BF = FE$, $AF = 10cm$
      Calculate the length of AK



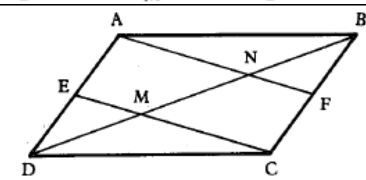
65. Given: BD is a median to edge AC in $\triangle ABC$, segment AE bisects the median BD ($BF = FD$)
Prove: $BE = \frac{BC}{3}$
Guidance: Draw through D a line parallel to AE.



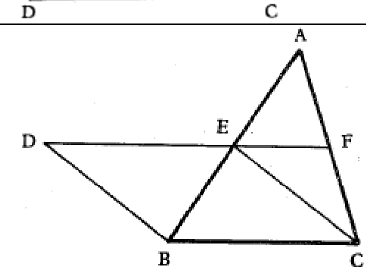
66. Given: Quadrilateral ABCD is a parallelogram. Points K, L, M and N are the midpoints of the edges of the parallelogram.
Prove: $DP = PO = OS = SB$



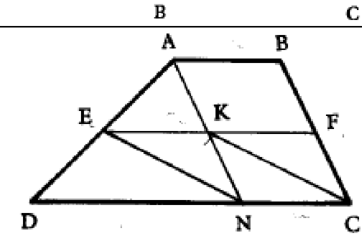
67. Given: E and F are the midpoints of edges AD and BC in parallelogram ABCD.
Prove: $DM = MN = BN$



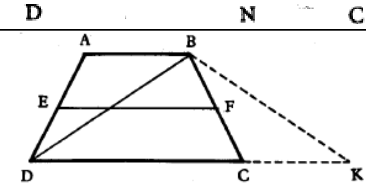
68. Given: Quadrilateral DECB is a parallelogram, $EF = \frac{DE}{2}$ (EF is the continuation of DE)
Prove: EC is a median in $\triangle ABC$



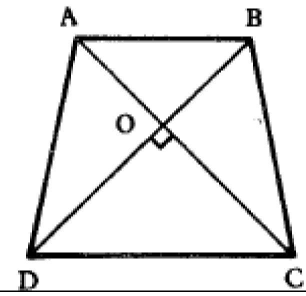
69. Given: EF is the mid-segment in trapezoid ABCD, the quadrilaterals ABCN and EKCN are parallelograms
Prove: $DC = 3AB$



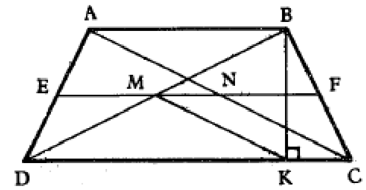
70. Prove the theorem: The diagonal of an isosceles trapezoid is longer than the mid-segment.
Guidance: Prove: $EF < BD$ (EF is the mid-segment). Lengthen the base DC by the length of the base AB ($AB = CK$), and use $\triangle DBK$



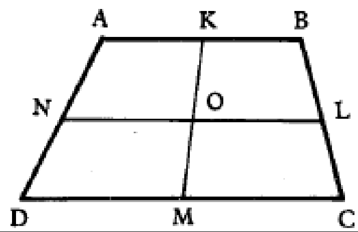
71. Given: In the isosceles trapezoid ABCD, the diagonals are perpendicular to one another ($AC \perp BD$).
Prove: the height of the trapezoid is equal to the mid-segment.
Guidance: draw the height through the point O.



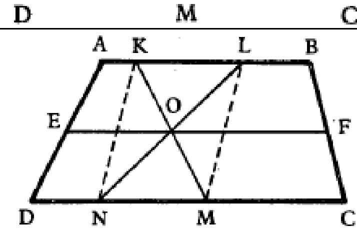
72. Given: EF is the mid-segment of the isosceles trapezoid ABCD, BK is an altitude.
Prove: MNCK is a parallelogram.



73. Given: the points K, L, M and N are the midpoints of the edges of the trapezoid ABCD.
Prove: $NO = OL$



74. Given: EF is the mid-segment in trapezoid ABCD. O is a point on EF, segments KM and NL pass through O
Prove: KLMN is a parallelogram



75. Given: ABCD is an isosceles trapezoid, KMND is a parallelogram, and segment BN is an altitude in the trapezoid.
Prove: KM is a mid-segment in trapezoid ABCD.