14. Construction: (Construction of a triangle equal in area of a quadrilateral)

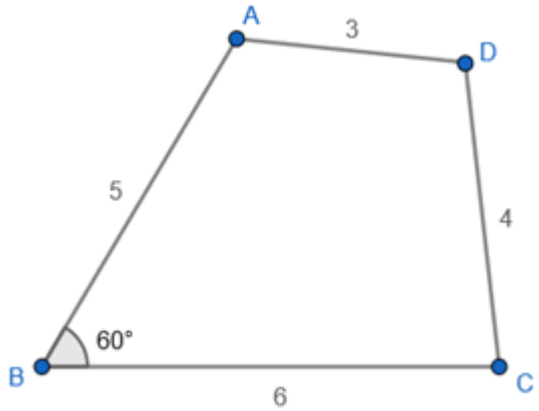
Draw and See 14

1. Question

Pritam drew a quadrilateral ABCD of which AB = 5 cm, BC = 6 cm, CD = 4 cm, DA = 3 cm and ∠ABC = 60°, I draw a triangle with equal area of that quadrilateral.

Answer

A. Draw the given quadrilateral ABCD.

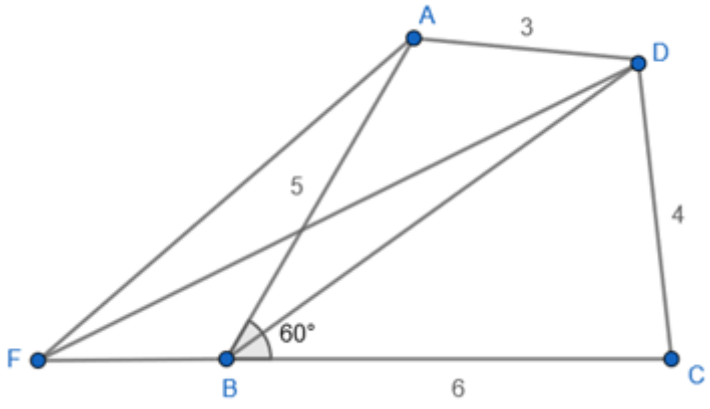


B. Draw the diagonal DB of quadrilateral ABCD.

C. Draw a parallel line through point A to diagonal DB of quadrilateral ABCD which intersects at F produced BC.

D. Join FD, AF||BD

ΔDFC is the required triangle.



Proof:

ΔABD = ΔBFD (on same base DB and between same parallels DB and AF)

∴ ΔABD = ΔBFD

ΔDBC + ΔABD = ΔBFD + ΔDBC (adding area of ΔDBC on both sides)

∴ quadrilateral ABCD = ΔDFC

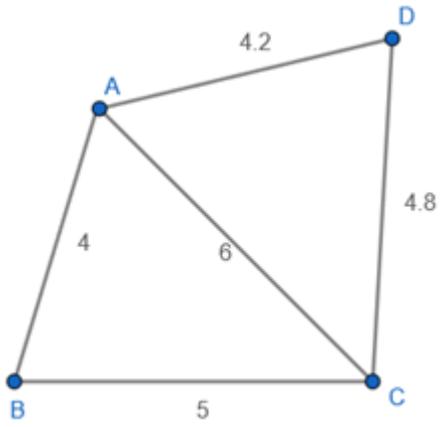
2. Question

Sahana drew a quadrilateral ABCD of which AB = 4 cm, BC = 5 cm, CD = 4.8 cm, DA = 4.2 cm and diagonal AC = 6 cm. I draw a triangle with equal area of that quadrilateral.

Answer

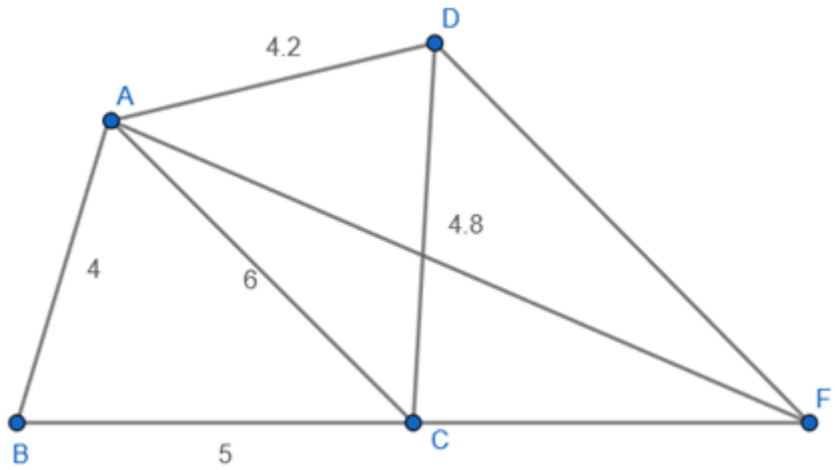
A. Draw the given quadrilateral ABCD.

B. Draw the diagonal AC of quadrilateral ABCD.



C. Draw a parallel line through point D to diagonal AC of quadrilateral ABCD which intersects at F produced BC.

D. DF||AC, ABF is the required triangle.



<u>Proof:</u>

ΔADC = ΔACF (on same base AC and between same parallels AC and DF)

∴ Δ ADC = Δ ACF

ΔABC + ΔADC = ΔACF + ΔABC (adding area of ΔABC on both sides)

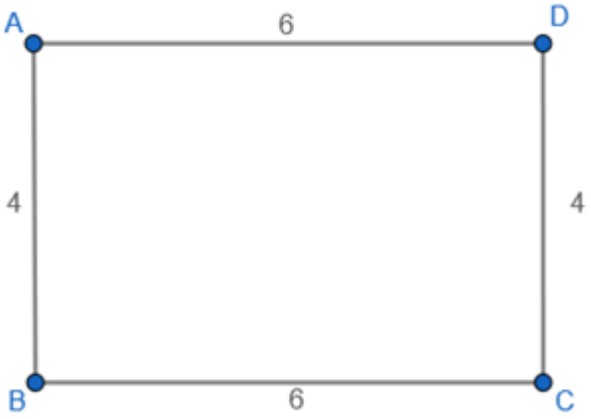
∴ quadrilateral ABCD = ΔABF

3. Question

Sahana drew a rectangle ABCD of which AB = 4 cm and BC = 6 cm. I draw a triangle with equal area of that rectangle.

Answer

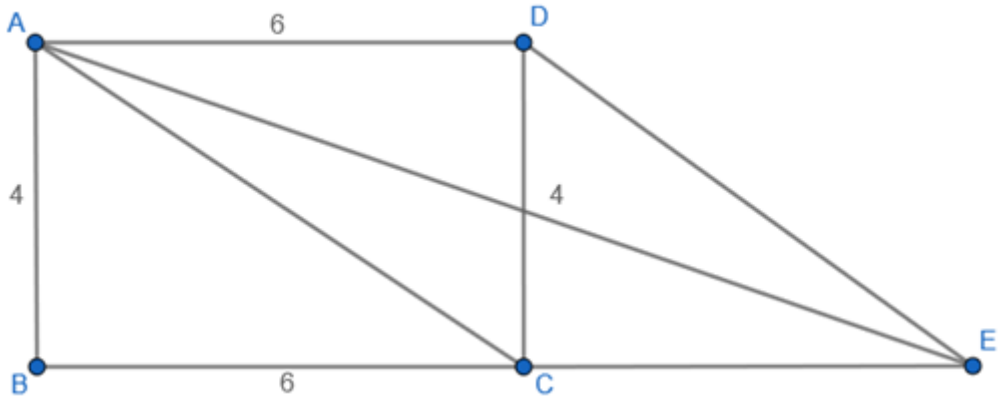
A. Draw the given rectangle ABCD.



B. Draw the diagonal AC of rectangle ABCD.

C. Draw a parallel line through point D to diagonal AC of rectangle ABCD which intersects at F produced BC.

D. DF||AC, ΔABE is the required triangle.



Proof:

ΔACE = ΔADC (on same base AC and between same parallels AC and DE)

∴ ΔACE = ΔADC

ΔABC + ΔADC = ΔACE + ΔABC (adding area of ΔABC on both sides)

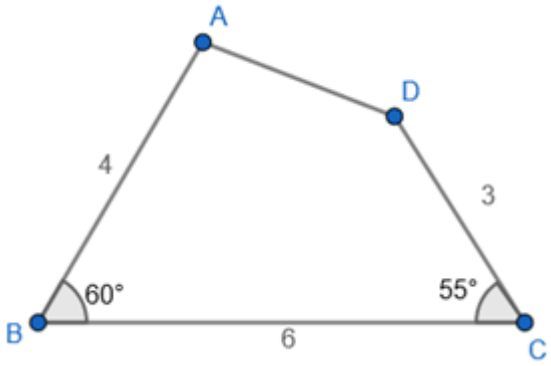
∴ rectangle ABCD = ΔABE

4. Question

I draw a quadrilateral ABCD of which BC = 6 cm, AB = 4 cm, CD = 3 cm, ∠ABC = 60°, ∠BCD = 55°, I draw a triangle with equal area of that quadrilateral of which one side is along side AB and other side is along side BC.

Answer

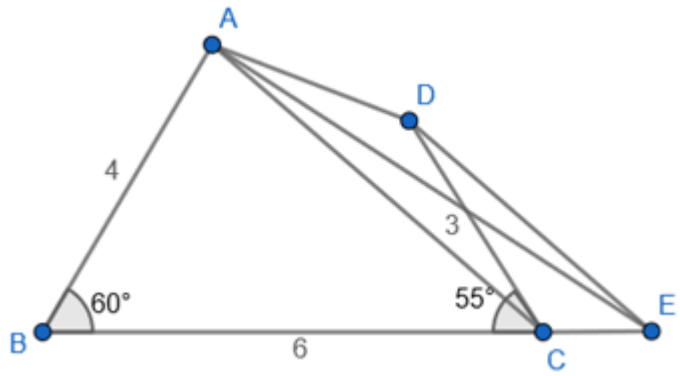
A. Draw the given quadrilateral ABCD.



B. Draw the diagonal AC of quadrilateral ABCD.

C. Draw a parallel line through point D to diagonal AC of quadrilateral ABCD which intersects at E produced BC.

D. DE||AC, ΔABE is the required triangle.



Proof:

ΔACE = ΔADC (on same base AC and between same parallels AC and DE)

∴ ΔACE = ΔADC

ΔABC + ΔADC = ΔACE + ΔABC (adding area of ΔABC on both sides)

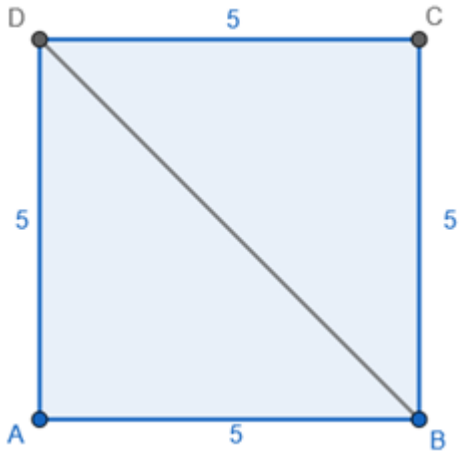
∴ quadrilateral ABCD = ΔABE

5. Question

I draw a square with side 5 cm. I draw a parallelogram with equal area of square of which one angle is 60°.

Answer

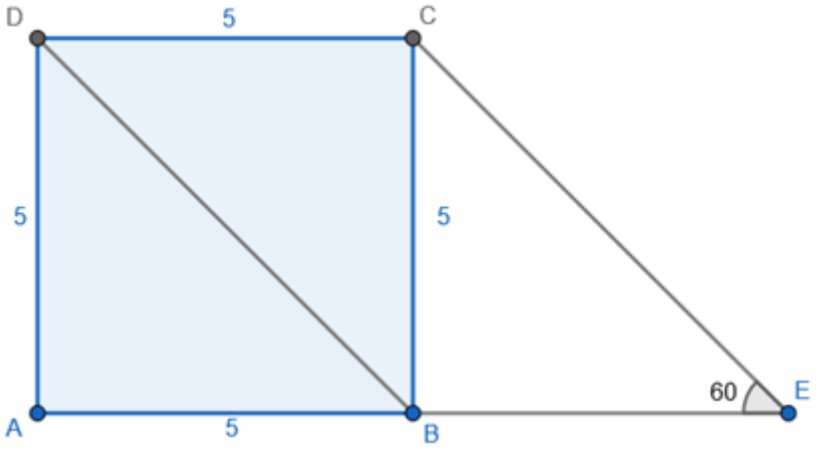
A. Draw the given square ABCD.



B. Draw the diagonal DB of square ABCD.

C. Draw a parallel line through point C to diagonal DB of square ABCD which intersects at E produced AB.

D. CE||DB.



Proof:

Since sides of square are equal and parallel, AB||DC and thus, DC||AE.

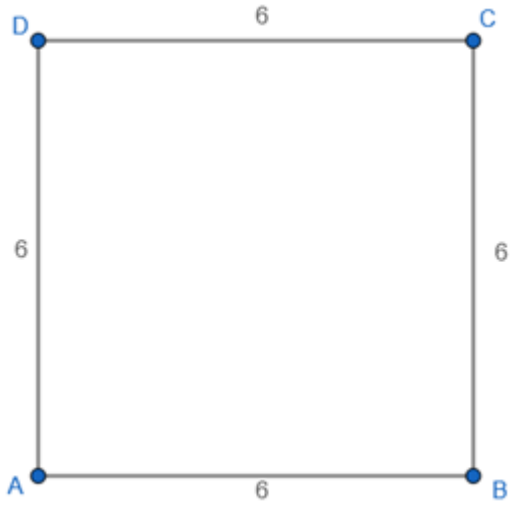
∴ square ABCD = ΔABE (on same base DC and between same parallels DC and AE)

6. Question

I draw a square with side 6 cm. and I draw a triangle with equal area of that square.

Answer

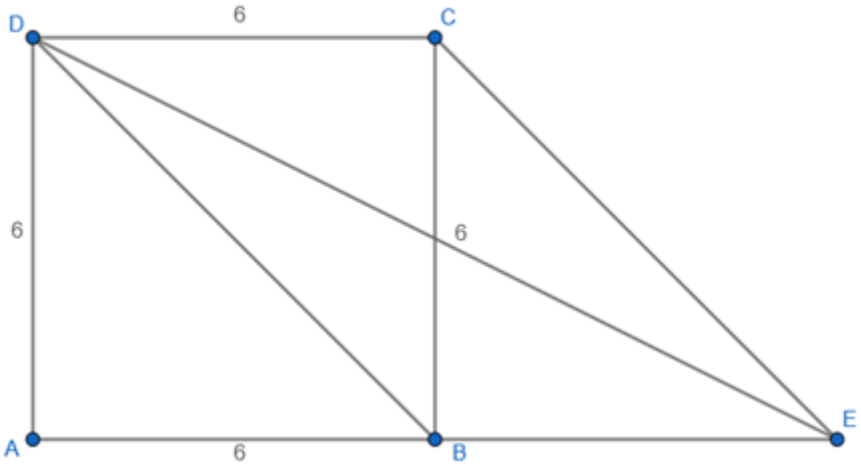
A. Draw the given square ABCD.



B. Draw the diagonal DB of square ABCD.

C. Draw a parallel line through point C to diagonal DB of square ABCD which intersects at E produced AB.

D. CE||DB. ΔADE is the required triangle.



Proof:

ΔDCB = ΔDBE (on same base DB and between same parallels DB and CE)

∴ ΔDCB = ΔDBE

ΔABD + ΔDCB = ΔDBE + ΔABD (adding area of ΔABD on both sides)

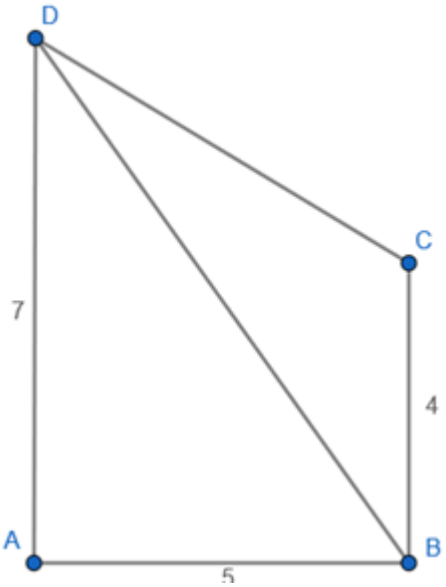
∴ square ABCD = ΔADE

7. Question

I draw a quadrilateral ABCD of which AD and BC are perpendicular on side AB and AB = 5 cm, AD = 7 cm and BC = 4 cm. I draw a triangle with equal area of that quadrilateral of which one angle is 30°.

Answer

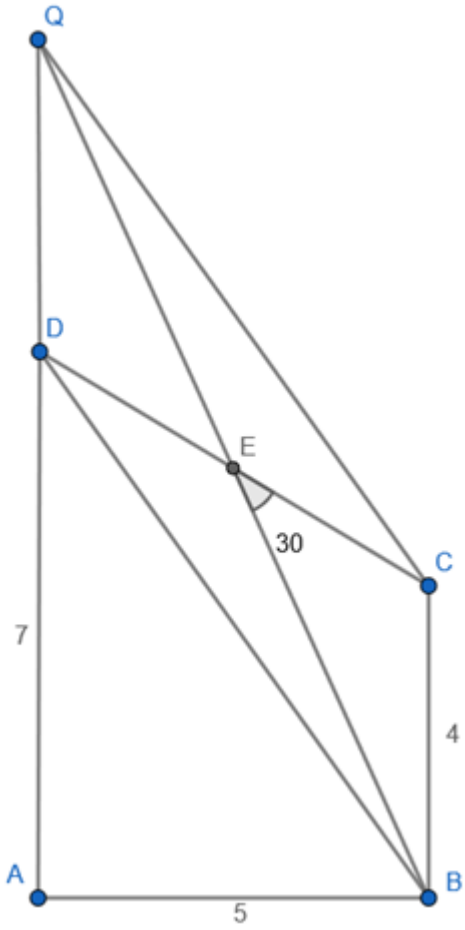
A. Draw the given quadrilateral ABCD.



B. Draw the diagonal DB of quadrilateral ABCD.

C. Draw a parallel line through point C to diagonal DB of quadrilateral ABCD which intersects at Q produced AD.

D. CQ||DB, ΔABQ is the required triangle.



Proof:

ΔDCB = ΔDBQ (on same base DB and between same parallels DB and CQ)

∴ ΔDCB = ΔDBQ

ΔABD + ΔDCB = ΔDBQ + ΔABD (adding area of ΔABD on both sides)

∴ quadrilateral ABCD = ΔABQ

Taking BQ as a base, we draw another ΔBCE with one angle 30^0 and between the parallels DQ and BC.

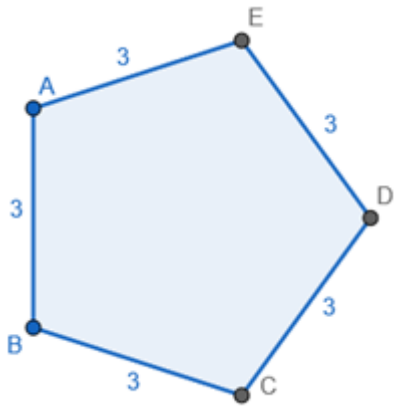
∴ ΔBCE = quadrilateral ABCD

8. Question

I draw any pentagon ABCDE and draw a triangle with equal area of it of which one vertex is C.

Answer

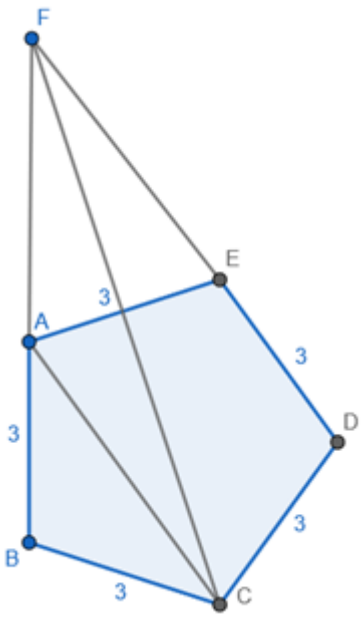
A. Draw the given pentagon ABCDE.



B. Draw the diagonal AC of pentagon ABCDE.

C. Draw a parallel line through point E to diagonal AC of pentagon ABCDE which intersects at F produced AB.

D. AC||FD, ΔABC is the required triangle.



Proof:

ΔACF = quadrilateral ACED (on same base AC and between same parallels AC and FD)

∴ ΔACF = quadrilateral ACED

ΔABC + ΔACF = quadrilateral ACED + ΔABC (adding area of ΔABC on both sides)

∴ ΔABC = pentagon ABCDE