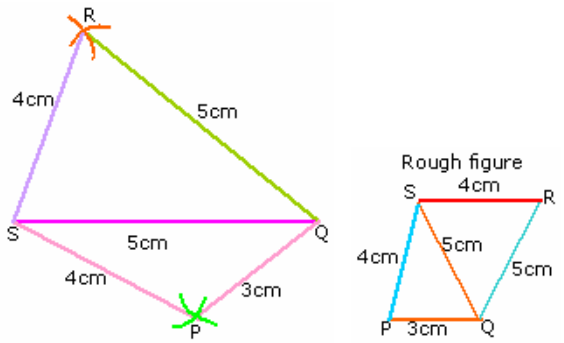
Chapter 4. Practical Geometry

Question 1

Construct a quadrilateral PQRS in which PQ = 3 cm, QR = 5 cm, QS = 5 cm, PS = 4 cm and SR = 4 cm.

Solution:



Steps of construction:

1. Draw SQ = 5cm.
2. With S as centre and SP (= 4 cm) as radius draw an arc.
3. With Q as centre and QP (= 3 cm) as radius draw another arc to cut the arc of step 2 at P.
4. With S as centre and SR (= 4 cm) as radius draw an arc.
5. With Q as centre and QR (= 5 cm) draw another arc to cut the arc of step 4 at R.
6. Join PS, PQ, RS and RQ.

PQRS is the required quadrilateral.

Question 2

Construct a parallelogram ABCD in which AB = 3.5 cm, BC = 4 cm and AC = 6.5 cm.

Solution:

Steps of construction:

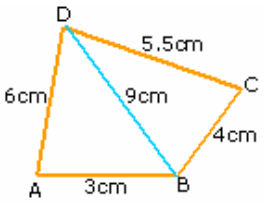
1. Draw AB = 3.5cm.
2. With A as centre and AC (= 6.5cm) as radius draw an arc above AB.
3. With B as centre and BC (= 4cm) as radius draw another arc to cut the arc of step 2 at C.
4. With A as centre and AD (= 4cm) as radius draw an arc.
5. With C as centre and CD (= 3.5cm) as radius draw another arc to cut the arc of step 4 at D.
6. Join BC, CD and DA.

ABCD is the required parallelogram.

Question 3

Is it possible to construct a quadrilateral ABCD in which AB = 3 cm, BC = 4 cm, CD = 5.5 cm, DA = 6 cm and BD = 9 cm? If not, give reason.

Solution:



The measurements must be such that the sum of any two sides of a traingle is greater than the third side.

AB = 3 cm, BD = 9 cm, and DA = 6 cm.

AB + AD = 3 cm + 6 cm = 9 cm =BD

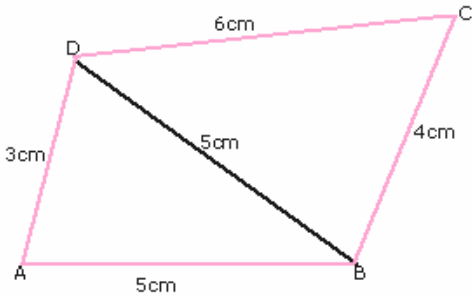
∴ Δ ABD cannot be constructed.

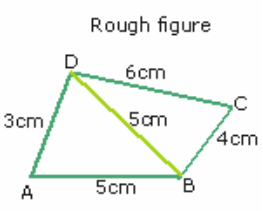
∴ The quadrilateral ABCD cannot constructed.

Question 4

Construct a quadrilateral ABCD in which AB = 5 cm, BC = 4 cm, AD = 3 cm, CD = 6 cm and BD = 5 cm.

Solution:





Steps of construction:

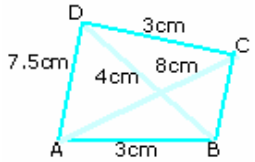
1. Draw AB = 5 cm.
2. With A as centre and AD (= 3 cm) as radius, draw an arc.
3. With B as centre and BD (= 5 cm) as radius draw another arc to cut the arc of step 2 at D.
4. With B as centre and BC (= 4 cm) as radius draw an arc.
5. With D as centre and DC (= 6 cm) as radius draw another arc to cut the arc of step 4 at C.
6. Join AD, DB, CD and BD.

ABCD is the required quadrilateral.

Question 5

Is it possible to construct a quadrilateral ABCD in which AB = 3cm, CD = 3 cm, DA = 7.5 cm, AC = 8 cm and BD = 4 cm? If not, given reason.

Solution:



The measurements must be such that the sum of any two sides of a traingle is greater than the third side.

AB = 3 cm, CD = 3 cm, and DA = 7.5 cm, AC = 8 cm and BD = 4 cm.

BD + AB = 4 cm + 3 cm = 7 cm < AD (= 7.5 cm.)

∴ Δ ABD cannot be constructed.

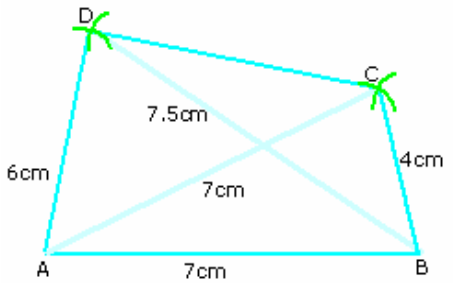
∴ The quadrilateral ABCD cannot constructed.

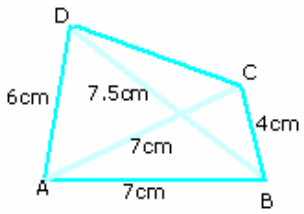
No, the quadrilateral ABCD cannot be constructed since BD + AB < AD.

Question 6

Construct a quadrilateral ABCD in which AB = 7 cm, AD = 6 cm, AC = 7 cm, BD = 7.5 cm and BC = 4cm.

Solution:





Steps of construction:

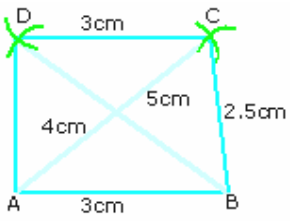
1. Draw AB = 7 cm.
2. With A as centre and AC (= 7 cm) as radius draw an arc.
3. With B as centre and BC (= 4 cm) as radius draw another arc to cut the arc of step 2 at C.
4. With A as centre and AD (= 6 cm) as radius draw an arc.
5. With B as centre and BD (= 7.5 cm) as radius draw another arc to cut the arc of step 4 at D.
6. Join AC, BC, AD and CD.

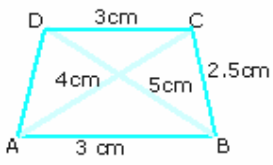
ABCD is the required quadrilateral.

Question 7

Construct a quadrilateral ABCD in which AB = CD = 3 cm, BC = 2.5 cm, AC = 4 cm and BD = 5 cm.

Solution:





Steps of construction:

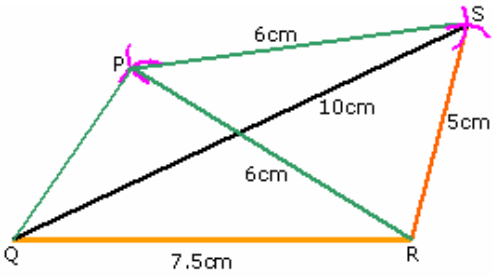
1. Draw AB = 3 cm.
2. With A as centre and AC (= 4 cm) as radius draw an arc.
3. With B as centre and BC (= 2.5 cm) draw another arc to cut the arc of step 2 at C.
4. With C as centre and radius = 3cm draw an arc
5. With B as centre and radius = 5cm draw an arc to cut the arc in step 4 at D
6. Join BC, CD and AD.

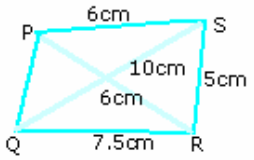
ABCD is the required quadrilateral.

Question 8

Construct a quadrilateral PQRS in which QR = 7.5 cm, RP = PS = 6 cm, RS = 5 cm and QS = 10 cm.

Solution:





Steps of construction:

1. Draw QR = 7.5 cm.
2. With Q as centre and QS (= 10 cm) as radius draw an arc.
3. With R as centre and RS (= 5 cm) as radius draw an arc to cut the arc of step 2 at S.
4. With R and S as centre and radius 6 cm draw two arcs to cut each other at P.
5. Join PQ, PS and SR.

PQRS is the required quadrilateral.

Question 9

Construct a quadrilateral ABCD in which BC = 5.5 cm, CD = 4 cm, ∠ A = 70°, ∠ B = 110° and ∠ D = 85°.

Solution:

∠ C = 360° - (∠ A + ∠ B + ∠ D)

= 360° - (70° + 110° + 85°)

= 360° - 255° = 105°

Steps of construction:

1. Draw BC = 5.5 cm.
2. At B, draw an angle BCC′ of measure 105° using a protractor.
3. With C as centre draw an arc on CC′ such that CD = 4 cm.
4. At D, draw an angle of measure 85° using a protractor.
5. At B, draw an angle BCC′ of measure 110° using a protractor to cut DD′ at A.

ABCD is the required quadrilateral.

Question 10

Is it possible to construct a quadrilateral ABCD in which AB = 5 cm, BC = 7.5 cm, ∠ A = 80°,∠ B = 140° and ∠ C = 145°? If not, give reason.

Solution:

No, it is not possible to construct a quadrilateral ABCD with the given measurements.

∠ A + ∠ B + ∠ C (= 80° + 140° + 145° = 365°) is greater than 360° .

The sum of all the four angles is 360° , quadrilateral cannot be constructed.

Question 11

Construct a quadrilateral ABCD in which AB = 4.5 cm, BC = 3.5 cm, CD = 5 cm, $\angle B = 45^0$ and $\angle C = 150^\circ$.

Solution:

Steps of construction:

1. Draw BC = 3.5 cm.
2. At B, draw BM perpendicular to BC.
3. Construct BB', the bisector of $\angle$ MBC to get $\angle$ B'BC = 45° .
4. On BB', mark a point A such that BA = 4.5cm.
5. At C, draw CC' perpendicular to BC.
6. At C, construct an angle C'DC = 60°, to get $\angle$ C = 150°.
7. Mark a point D on CD' such that CD = 5 cm.
8. Join AD.

ABCD is the required quadrilateral.