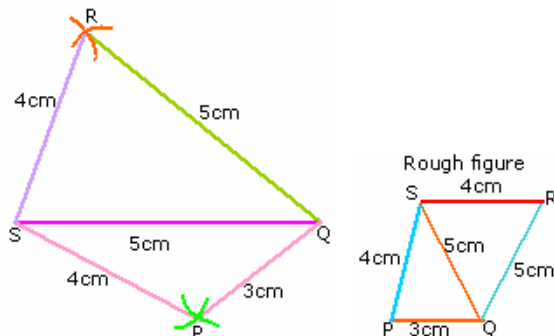


# Chapter 4. Practical Geometry

## Question 1

Construct a quadrilateral PQRS in which  $PQ = 3\text{ cm}$ ,  $QR = 5\text{ cm}$ ,  $QS = 5\text{ cm}$ ,  $PS = 4\text{ cm}$  and  $SR = 4\text{ cm}$ .

**Solution:**



Steps of construction:

1. Draw  $SQ = 5\text{ cm}$ .
  2. With S as centre and  $SP (= 4\text{ cm})$  as radius draw an arc.
  3. With Q as centre and  $QP (= 3\text{ cm})$  as radius draw another arc to cut the arc of step 2 at P.
  4. With S as centre and  $SR (= 4\text{ cm})$  as radius draw an arc.
  5. With Q as centre and  $QR (= 5\text{ cm})$  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  $AB = 3.5\text{ cm}$ ,  $BC = 4\text{ cm}$  and  $AC = 6.5\text{ cm}$ .

**Solution:**

Steps of construction:

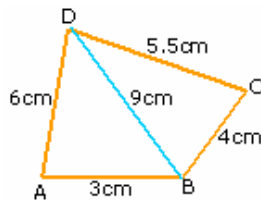
1. Draw  $AB = 3.5\text{ cm}$ .
2. With A as centre and  $AC (= 6.5\text{ cm})$  as radius draw an arc above AB.
3. With B as centre and  $BC (= 4\text{ cm})$  as radius draw another arc to cut the arc of step 2 at C.
4. With A as centre and  $AD (= 4\text{ cm})$  as radius draw an arc.
5. With C as centre and  $CD (= 3.5\text{ cm})$  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  $AB = 3\text{ cm}$ ,  $BC = 4\text{ cm}$ ,  $CD = 5.5\text{ cm}$ ,  $DA = 6\text{ cm}$  and  $BD = 9\text{ cm}$ ? If not, give reason.

**Solution:**



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

$AB = 3\text{ cm}$ ,  $BD = 9\text{ cm}$ , and  $DA = 6\text{ cm}$ .

$AB + AD = 3\text{ cm} + 6\text{ cm} = 9\text{ cm} = BD$

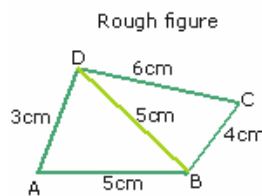
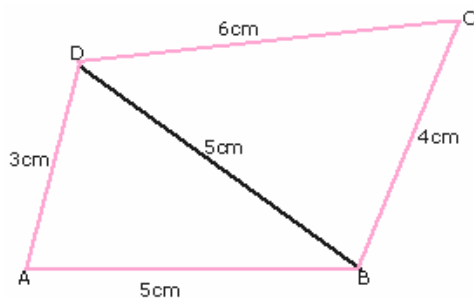
$\therefore \triangle ABD$  cannot be constructed.

$\therefore$  The quadrilateral ABCD cannot be constructed.

### Question 4

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

**Solution:**



**Steps of construction:**

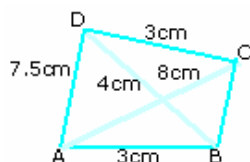
1. Draw  $AB = 5\text{ cm}$ .
2. With A as centre and  $AD (= 3\text{ cm})$  as radius, draw an arc.
3. With B as centre and  $BD (= 5\text{ cm})$  as radius draw another arc to cut the arc of step 2 at D.
4. With B as centre and  $BC (= 4\text{ cm})$  as radius draw an arc.
5. With D as centre and  $DC (= 6\text{ cm})$  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  $AB = 3\text{ cm}$ ,  $CD = 3\text{ cm}$ ,  $DA = 7.5\text{ cm}$ ,  $AC = 8\text{ cm}$  and  $BD = 4\text{ cm}$ ? If not, given reason.

**Solution:**



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

$AB = 3\text{ cm}$ ,  $CD = 3\text{ cm}$ , and  $DA = 7.5\text{ cm}$ ,  $AC = 8\text{ cm}$  and  $BD = 4\text{ cm}$ .

$BD + AB = 4\text{ cm} + 3\text{ cm} = 7\text{ cm} < AD (= 7.5\text{ cm})$

$\therefore \triangle ABD$  cannot be constructed.

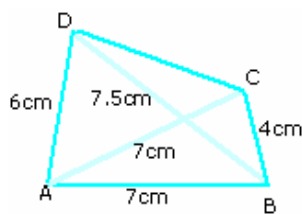
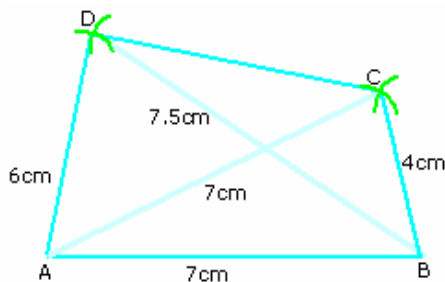
$\therefore$  The quadrilateral ABCD cannot be constructed.

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

### Question 6

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

**Solution:**



Steps of construction:

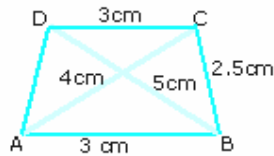
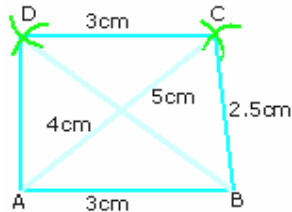
1. Draw  $AB = 7\text{ cm}$ .
2. With A as centre and  $AC (= 7\text{ cm})$  as radius draw an arc.
3. With B as centre and  $BC (= 4\text{ cm})$  as radius draw another arc to cut the arc of step 2 at C.
4. With A as centre and  $AD (= 6\text{ cm})$  as radius draw an arc.
5. With B as centre and  $BD (= 7.5\text{ cm})$  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  $AB = CD = 3\text{ cm}$ ,  $BC = 2.5\text{ cm}$ ,  $AC = 4\text{ cm}$  and  $BD = 5\text{ cm}$ .

**Solution:**



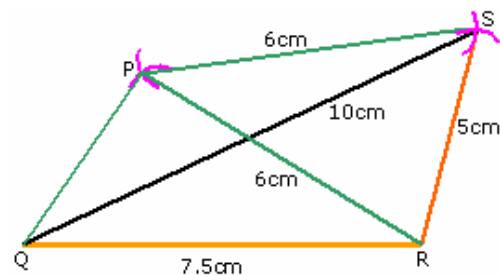
Steps of construction:

1. Draw  $AB = 3\text{ cm}$ .
  2. With A as centre and  $AC (= 4\text{ cm})$  as radius draw an arc.
  3. With B as centre and  $BC (= 2.5\text{ cm})$  draw another arc to cut the arc of step 2 at C.
  4. With C as centre and radius  $= 3\text{ cm}$  draw an arc
  5. With B as centre and radius  $= 5\text{ cm}$  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  $QR = 7.5\text{ cm}$ ,  $RP = PS = 6\text{ cm}$ ,  $RS = 5\text{ cm}$  and  $QS = 10\text{ cm}$ .

**Solution:**



Steps of construction:

1. Draw  $QR = 7.5\text{ cm}$ .
  2. With Q as centre and  $QS (= 10\text{ cm})$  as radius draw an arc.
  3. With R as centre and  $RS (= 5\text{ cm})$  as radius draw an arc to cut the arc of step 2 at S.
  4. With R and S as centre and radius  $6\text{ cm}$  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  $BC = 5.5 \text{ cm}$ ,  $CD = 4 \text{ cm}$ ,  $\angle A = 70^\circ$ ,  $\angle B = 110^\circ$  and  $\angle D = 85^\circ$ .

**Solution:**

$$\begin{aligned}\angle C &= 360^\circ - (\angle A + \angle B + \angle D) \\ &= 360^\circ - (70^\circ + 110^\circ + 85^\circ) \\ &= 360^\circ - 255^\circ = 105^\circ\end{aligned}$$

Steps of construction:

1. Draw  $BC = 5.5 \text{ cm}$ .
  2. At B, draw an angle  $BCC'$  of measure  $105^\circ$  using a protractor.
  3. With C as centre draw an arc on  $CC'$  such that  $CD = 4 \text{ cm}$ .
  4. At D, draw an angle of measure  $85^\circ$  using a protractor.
  5. At B, draw an angle  $BCC'$  of measure  $110^\circ$  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  $AB = 5 \text{ cm}$ ,  $BC = 7.5 \text{ cm}$ ,  $\angle A = 80^\circ$ ,  $\angle B = 140^\circ$  and  $\angle C = 145^\circ$ ? If not, give reason.

**Solution:**

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

$\angle A + \angle B + \angle C (= 80^\circ + 140^\circ + 145^\circ = 365^\circ)$  is greater than  $360^\circ$ .

The sum of all the four angles is  $360^\circ$ , quadrilateral cannot be constructed.

### Question 11

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

#### Solution:

Steps of construction:

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

ABCD is the required quadrilateral.