Grade 8 – Book C

(Revised CAPS edition)

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Chapter C1

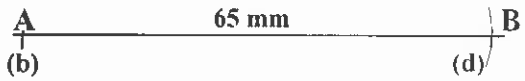
Construction and measurement

For this chapter you will need a pencil, ruler, protractor and a pair of compasses.

C1.1 Angles and lines:

C1.1.1 Line segment:

E.g.1 Construct AB = 65 mm.

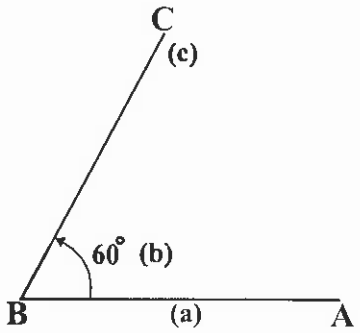


(a) Draw a long line.
(b) Mark A.
(c) Use a compass and measure 65 mm on your ruler.
(d) Place the compass on A and make a mark on B, 65 mm from .

C1.1.2 Angles:

E.g.2 Construct $A\hat{B}C = 60°$.

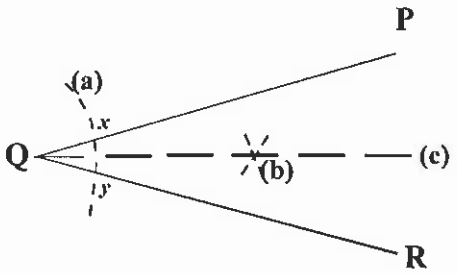
(a) Draw line AB.
(b) Place the protractor with "centre" on B.
(c) Mark C at 60°.
(d) Join B and C.



C1.1.3 Bisecting an angle:

E.g.3 Bisect $P\hat{Q}R$.

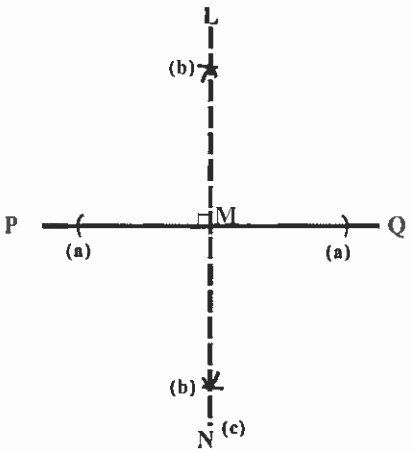
(a) Place the compass on Q and make a little arch that intersects PQ and QR.
(b) Alternately place the compass on x and y and make a crossbow.
(c) Join Q with the intersection of the crossbow.



C1.1.4 Perpendicular line:

E.g.4 Construct a perpendicular line through M.

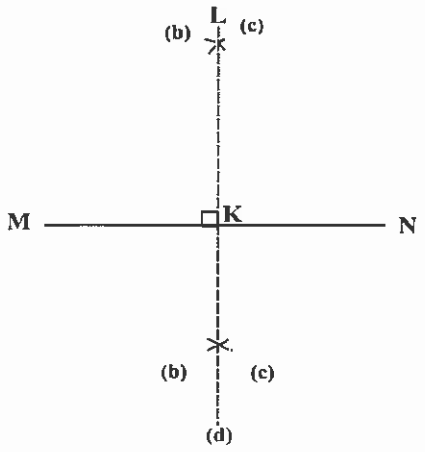
(a) Place the compass on M and make arches on both sides of M.
(b) Then place the compass on both (a)'s on both sides of M and make crossbows on either sides of PMQ so that it intersects the arches in (b).
(c) Join the intersections of the arches.
(d) $\therefore LN \perp PMQ$, which means $P\hat{M}L = 90°$.



C1.1.5 Perpendicular bisector:

E.g.5 Construct the perpendicular bisector of MN.

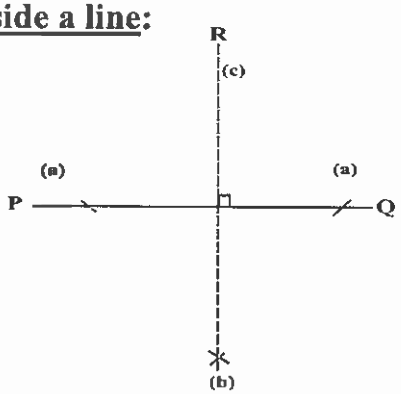
(a) Open the compass on more than half the length of MN.
(b) Place the compass on M and make arches on both sides of MN.
(c) Then place the compass on N and make cross-bows on either sides of MN so that it intersects the arches in (b).
(d) Join the intersections of the arches.
(e) $\therefore$ MK = KN and KL $\perp$ MN, which means $M\hat{K}L = 90°$.



C1.1.6 Draw a perpendicular line from a point outside a line:

E.g.6 Draw the perpendicular line from R on PQ.

(a) Place the compass on R and make arches on PQ on either sides of R.
(b) Place the compass alternately on the arches made in (a) and make a crossbow on the other side of PQ.
(c) Join R with (b).



Exercise 1:

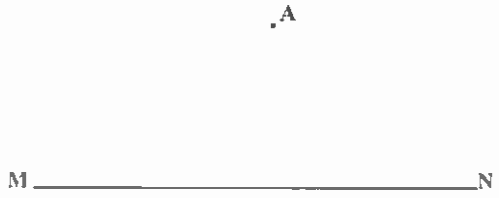
Date:_____

(1) (a) Construct a line AB = 45 mm.
(b) Then construct $A\hat{B}C = 45°$.

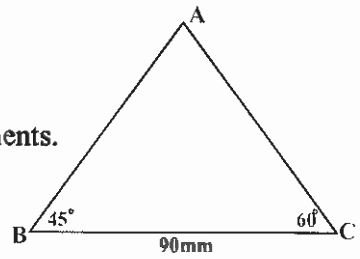
(2) (a) Construct a line MN = 60 mm.
(b) Construct the perpendicular bisector of MN.

(3) (a) Construct a line PQ = 72 mm.
(b) Construct $R\hat{Q}P = 60°$.
(c) Bisect $R\hat{Q}P$.

(4) Construct a perpendicular line on MN from point A.



(5) Construct the following triangle according to the given measurements.
(This triangle is not drawn to scale!)

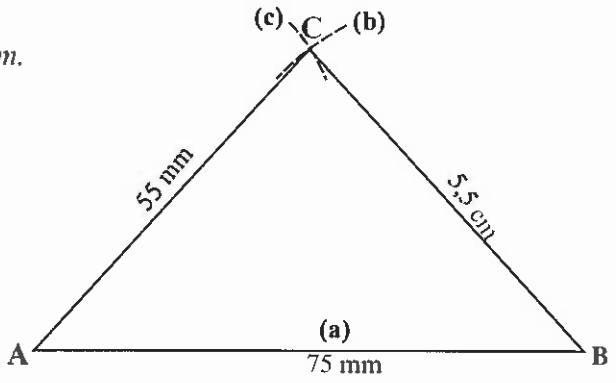


☺ **Construct RS // PQ with RS ⊥ AB and PQ ⊥ AB.**

C1.2 Triangles:

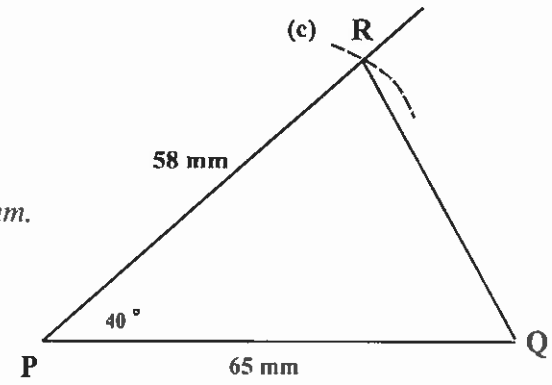
E.g.7 Construct ΔABC with: $AB = 75\ mm$; $BC = 5{,}5\ cm$ and $AC = 55\ mm$.

(a) Draw line $AB = 75\ mm$.
(b) Use a compass, measure $5{,}5\ cm = 55\ mm$. on a ruler and place compass on B. Make an arch.
(c) With compass, measure 55 mm on ruler and place compass on A. Make an arch which intersects the arch in (b).
(d) Point C is where (b) intersects (c).



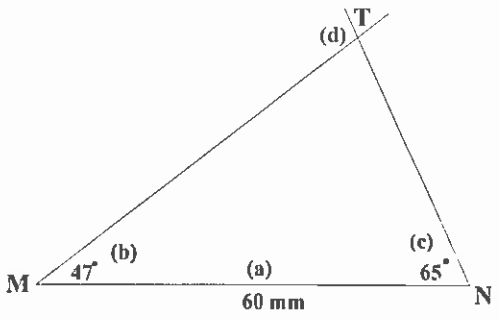
E.g.8 Construct ΔPQR with: $PQ = 6{,}5\ cm$; $PR = 5{,}8\ cm$ and $\hat{P} = 40°$.

(a) Draw a line $PQ = 65\ mm$.
(b) Construct $\hat{P} = 40°$ with your protractor.
(c) Use a compass and a ruler and measure 58 mm. Place compass on P, tick 58 mm on new line.
(d) R is where (c) intersects the new line. Join RQ.



E.g.9 Construct ΔMNT with: $\hat{M} = 47°$; $\hat{N} = 65°$ and $MN = 0{,}06\ m$.

(a) Draw line $MN = 0{,}06\ m = 6\ cm = 60\ mm$.
(b) Construct $M = 47°$ by using a protractor.
(c) Construct $N = 65°$ by using a protractor.
(d) T is where (b) intersects (c).



Exercise 2: Date: _____

(1) (a) Construct ΔABC with $AB = 80\ mm$; $BC = 66\ mm$ and $AC = 4\ cm$.
(b) Construct the perpendicular bisector of AB.

(2) (a) Construct ΔABC with $\hat{A} = 90°$, $AB = 60$ mm and $AC = 44$ mm.
(b) Bisect $A\hat{B}C$.

(3) (a) Construct Δ PQR with $\hat{P} = 35°$, $\hat{R} = 70°$ and $PR = 7$ cm.
(b) Construct the perpendicular line from R on PQ.

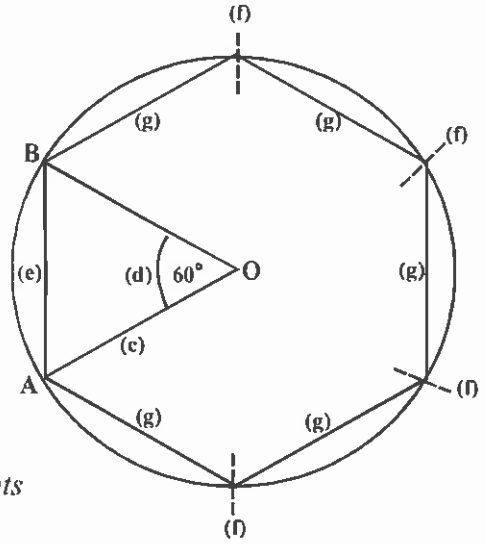
☺ **(a) Construct triangle ABC with AB = AC = 60 mm and BC = 80 mm.**

(b) Construct the altitude from triangle ABC passing through point A.

(c) Which type of triangle is ΔABC? _____

C1.3 Regular polygons:

E.g.10 Construct a regular hexagon.



(a) Determine the size of each segment:
$\frac{360°}{6} = 60°$

(b) Draw any circle.

(c) Mark the midpoint with an O and draw OA.

(d) From OA, at O, construct $A\hat{O}B = 60°$.

(e) Join AB. Use a compass and measure the length of AB.

(f) Use the length of AB, measured in (e) on a compass, and from B, mark another five line segments of the same size on the perimeter of the circle.

(g) Join the points in (f).

Exercise 3: Date:_____

(1) Construct a regular octagon.

(2) Construct a regular pentagon.

☺ **With a regular polygon, the size of the angle at centre of each segment is 30°.**

How many sides does the polygon have? _____

_____

C1.4 Constructions without protractors:

Exercise 4: Date:_____

(1) (a) Construct $P\hat{Q}R = 90°$.

(b) Use (a) and construct $P\hat{Q}S = 45°$, without using a protractor.

(2) (a) Construct $\triangle ABC$ with $AB = BC = AC = 7$ cm.

(b) Measure the size of $\hat{A}$, $\hat{B}$ and $\hat{C}$ in $\triangle ABC$.

(c) Which type of triangle is ABC? _____

(d) Use (a) and construct $A\hat{B}D = 30°$, without using a protractor.

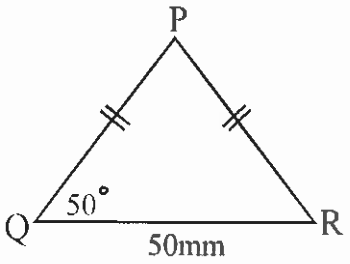
(3) (a) Construct $T\hat{R}S = 90°$.

(b) Use (a) and construct $P\hat{R}S = 135°$, without using a protractor.

C1.5 REVISION EXERCISE:

Date:_____

(1) Construct the following figure according to the given scale.



(2) (a) Construct ΔMNS as follows:
MN = 7 cm , NS = 8 cm and MS = 70 mm.

(b) Construct the perpendicular bisector of NS with B as midpoint, on NS.
Extend the perpendicular bisector. This should pass through M!

(c) What will the estimated length of MB be?

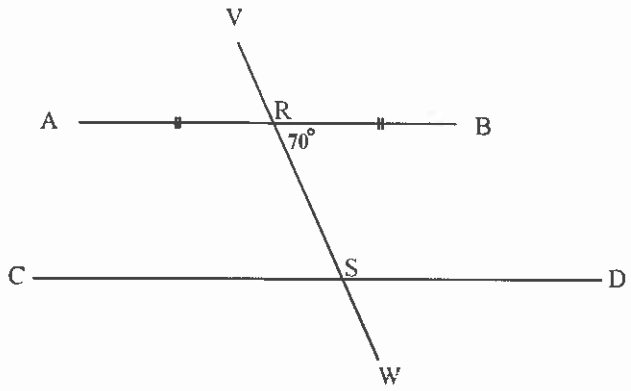
(d) Check your answer in (c) by:
(i) using the theorem of Pythagoras.
(ii) measuring the line in the construction with a ruler.

(3) (a) Construct a circle with radius 4 cm.
(b) Construct a regular quadrilateral.
(c) What type of quadrilateral is this?

---

(4) Construct the following figure according to the given measurements:

AB = 80 mm
AR = RB
RS = 35 mm
CD = 0,12 m
$D\hat{S}W = B\hat{R}S = 70°$
VR = SW = 1 cm
CS = 2 SD



(5) (a) Construct equilateral Δ KLT.
(b) Use (a) and construct $K\hat{T}S = 120°$, without using a protractor.

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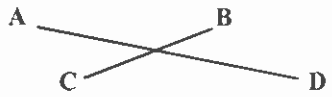
Chapter C2

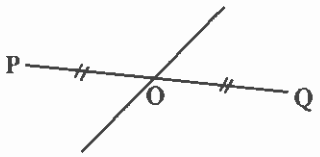
Lines and angles

C2.1 Lines:

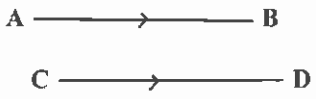
(1) Secants: Two lines intersecting
∴ AD intersects BC.



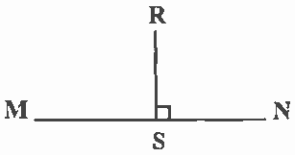
(2) Bisector: One line intersects another exactly in the middle.
∴ PO = OQ.



(3) Parallel lines: Two or more lines which are always the same distance apart and will never cross each other.
∴ AB // CD.

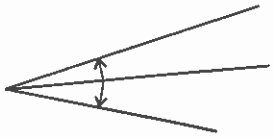


(4) Perpendicular lines: A line is perpendicular to another line if it makes a 90° angle with the other line.
∴ RS ⊥ MN.



C2.2 Angles:

(1) Types of angles:

Name of angle:	Example:	Size of angle:
Acute angle		Greater than 0° but smaller than 90°.
Right angle		Equal to 90°.
Obtuse angle		Greater than 90° but smaller than 180°.
Straight angle		Equal to 180°.
Reflex angle		Greater than 180° but smaller than 360°.
Revolution		Equal to 360°.

(2) Adjacent angles:
Two angles with a common vertex and a common arm and the two angles lie on either side of the common arm.