S1 HOLIDAY NOTES AND EXERCISE

INSTRUCTIONS

- Working with your parents or Gaurdians read the notes and follow the steps to construct the worked example given.
-After understanding the example, attempt the practice questions given in the rectangular box in the top of each page.
- present the work on reporting day for marking.

THE VIRUS CAN NOT DEFEAT HUMANITY: WE SHALL BEAT IT SOON. Stay safe and see you again soon.

TRIANGLES

The triangle is a plane figure bounded by three straight sides.

TYPES OF TRIANGLES

1. ***A scalene triangle:*** This is a triangle with three unequal sides and three unequal angles.

2. ***An isosceles triangle:*** This is a triangle with two sides and hence two angles equal.

3. ***An equilateral triangle:*** This is a triangle with all sides, and hence all the angles, equal.

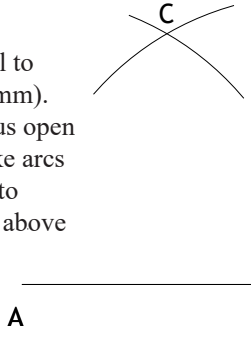
4. ***A right angled triangle:*** This is a triangle containing one right angle. The side opposite the right-angle is called the hypotenuse.

Practice Question:

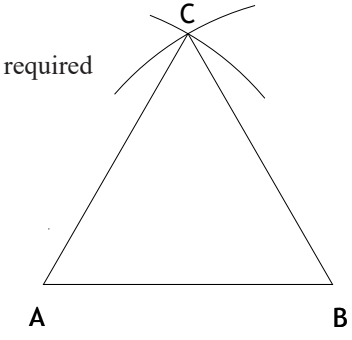
1. Construct an equilateral triangle of sides 60mm

2. Costruct a triangle of all sides 55mm

STEP 1
Draw line AB equal to length of sides (40mm). With compass radius open to distance AB make arcs from A and then B to intersect at point C above line AB.

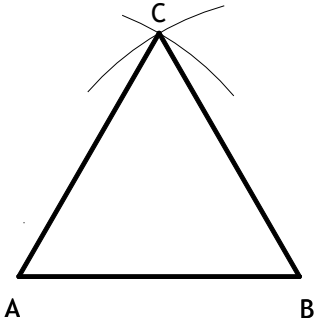


STEP 2
CAB is the required triangle



3.1 EQUILATERAL TRIANGLE GIVEN ONE SIDE

Example:
Construct an equilateral triangle of sides 40mm.



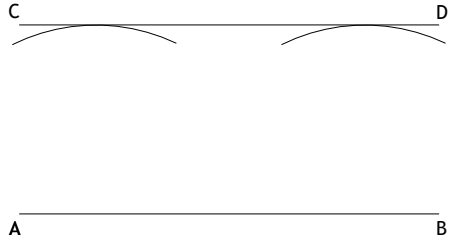
STEP 3
Make the required lines bold and print the heading below the drawing in guiding lines 5mm apart

EQUILATERAL TRIANGLE

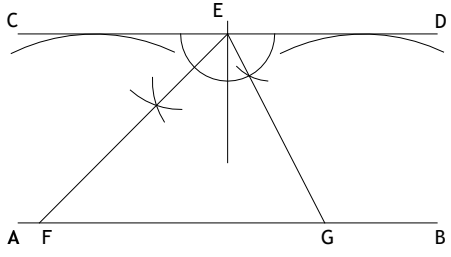
3.2 TRIANGLE GIVEN THE BASE ANGLES AND ALTITUDE

Example:
Construct a triangle of altitude 40mm and base angles 60° and 45°

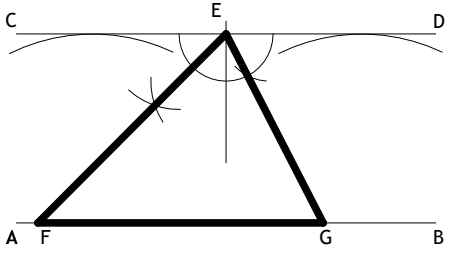
STEP 1
Draw line AB and then construct CD parallel to AB so that the distance between them is equal to the given altitude (40mm).



STEP 2
From any point E on line CD, construct the two base angles (CEF=45° and DEG=60°) to cut Line AB at points F and G



STEP 3
EFG is the required triangle. Make the required lines bold and print the heading below the drawing in guiding lines 5mm apart



TRIANGLE

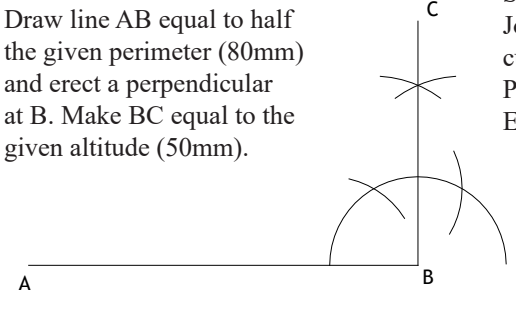
Practice Question:

1.a) Construct a triangle of of altitude 30mm and base angles 75° and 37.5°.
b) Measure and state the length of the base of the triangle above.
2. Construct an isosceles triangle that has a perimeter of 150mm and altitude 40mm

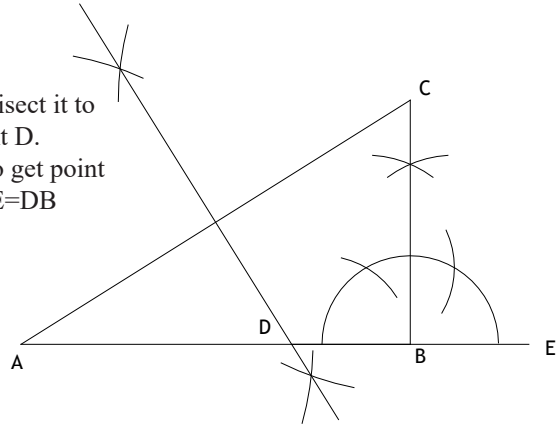
3.3 ISOSCELES TRIANGLE GIVEN THE PERIMETER AND THE ALTITUDE

Example:
Construct an isosceles triangle of perimeter 160mm and altitude 50mm.

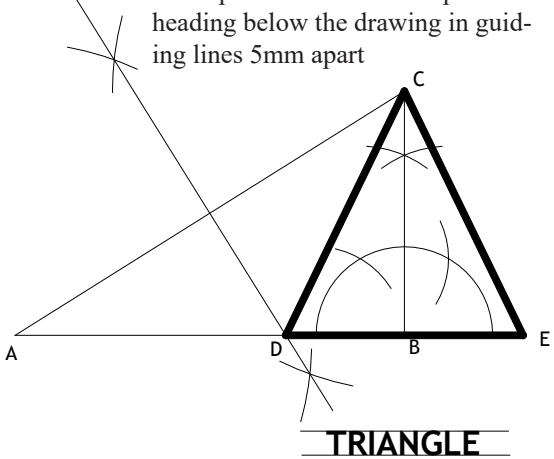
STEP 1
Draw line AB equal to half the given perimeter (80mm) and erect a perpendicular at B. Make BC equal to the given altitude (50mm).



STEP 2
Join AC and bisect it to cut AB at point D. Produce DB to get point E such that BE=DB



STEP 3
CDE is the required triangle. Make the required lines bold and print the heading below the drawing in guiding lines 5mm apart



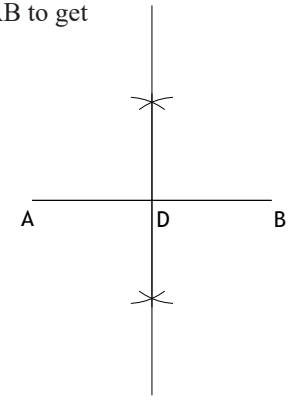
TRIANGLE

3.4 ISOSCELES TRIANGLE GIVEN THE LENGTH OF THE BASE AND PERPENDICULAR HEIGHT (ALTITUDE)

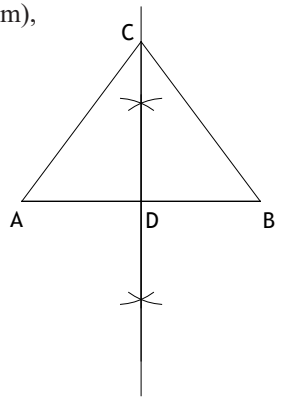
Example:

Construct a triangle of altitude 30mm and base 40mm

STEP 1
Draw line AB equal to given base length (40mm). Bisect AB to get point D



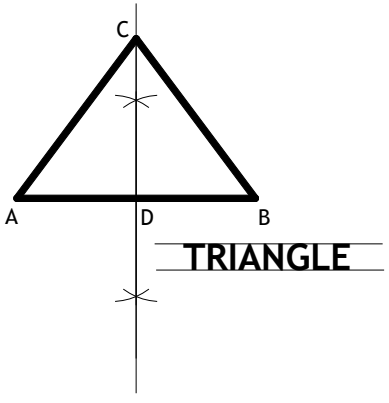
STEP 2
With the compass at D and open to distance equal to given altitude (30mm), mark off point C.



Practice Question:

1. Construct a triangle of altitude 45mm and base lenth 50mm
2. Construct a triangle of altitude 30mm and sides 45mm and 55mm.

STEP 3
CAB is the required triangle. Make the required lines bold and print the heading below the drawing in guiding lines 5mm apart

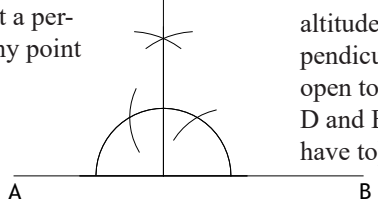


3.5 TRIANGLE GIVEN THE LENGTH OF TWO SIDES AND THE ALTITUDE

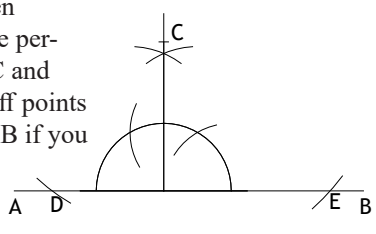
Example:

Construct a triangle of altitude 40mm and and sides 50mm and 60mm.

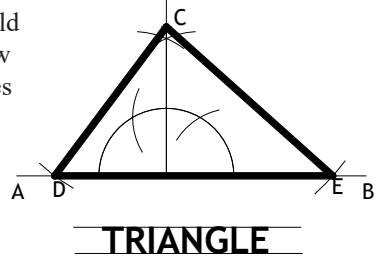
STEP 1
Draw line AB of any length and erect a perpendicular at any point on line AB



STEP 2
With the compass open to given altitude mark off point C on the perpendicular. With compass at C and open to the given sides mark off points D and E on line AB. (extend AB if you have to)



STEP 3
CDE is the required triangle. Make the required lines bold and print the heading below the drawing in guiding lines 5mm apart

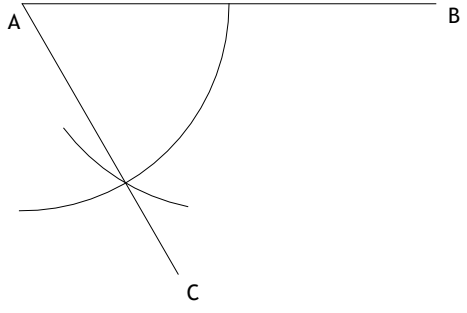


3.6 TRIANGLE GIVEN THE BASE, ALTITUDE AND THE VERTICAL ANGLE

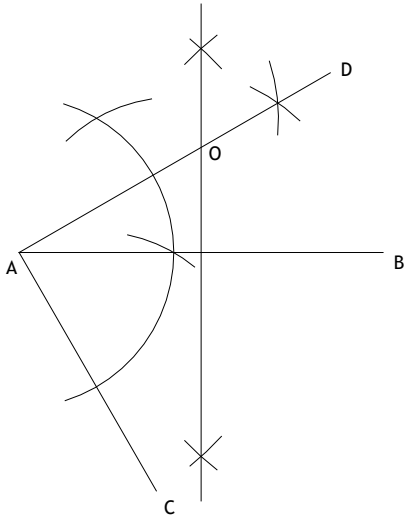
Example:

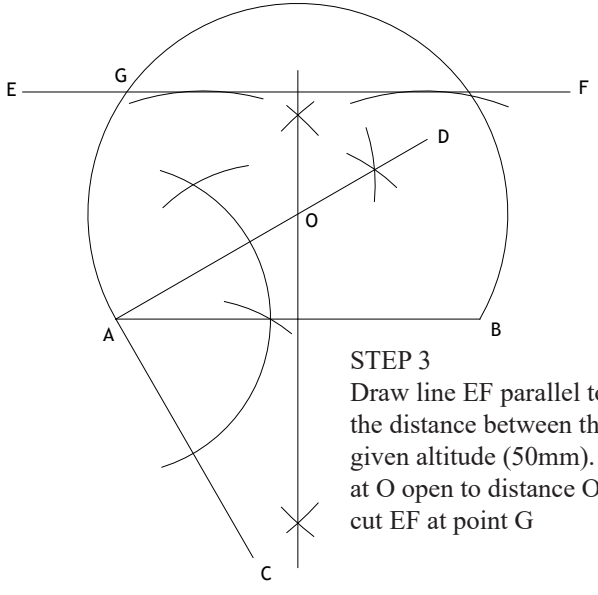
Construct a triangle of base 80mm, altitude 50mm and vertical angle 60°.

STEP 1
Draw line AB equal to given base (80mm), then construct angle BAC equal to given vertical angle (60°).



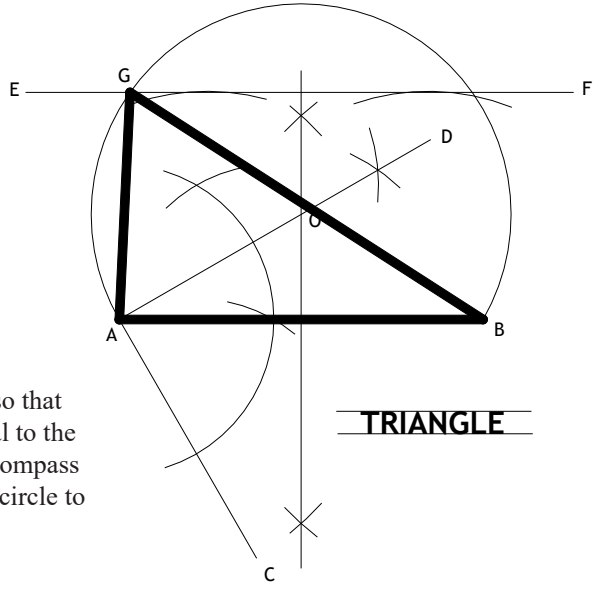
STEP 2
Erect line AD perpendicular to line AC and bisect line AB to cut AD at point O.





STEP 3
Draw line EF parallel to line AB so that the distance between them is equal to the given altitude (50mm). With the compass at O open to distance OB, draw a circle to cut EF at point G

STEP 4
GAB is the required triangle. Make the required lines bold and print the heading below the drawing in guiding lines 5mm apart



TRIANGLE

Practice Questions:

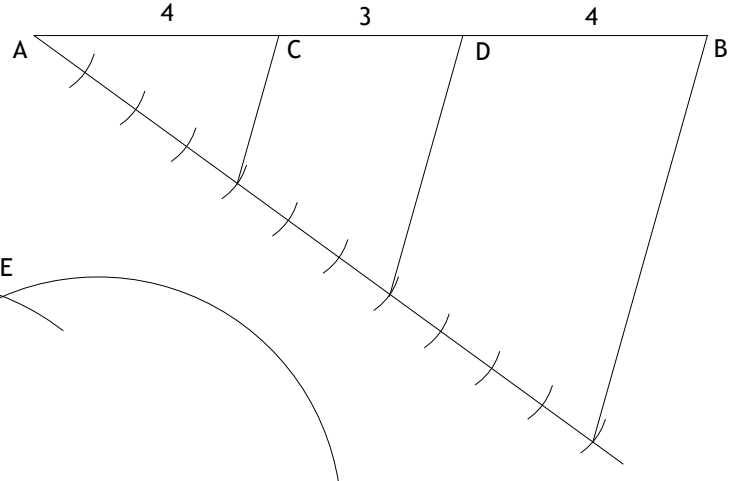
1. Construct a triangle with base of 55mm, and altitude of 62mm and a vertical angle of 37.5°
2. Construct a triangle with a base measuring 62mm, an altitude of 50mm and a vertical angle of 75°.

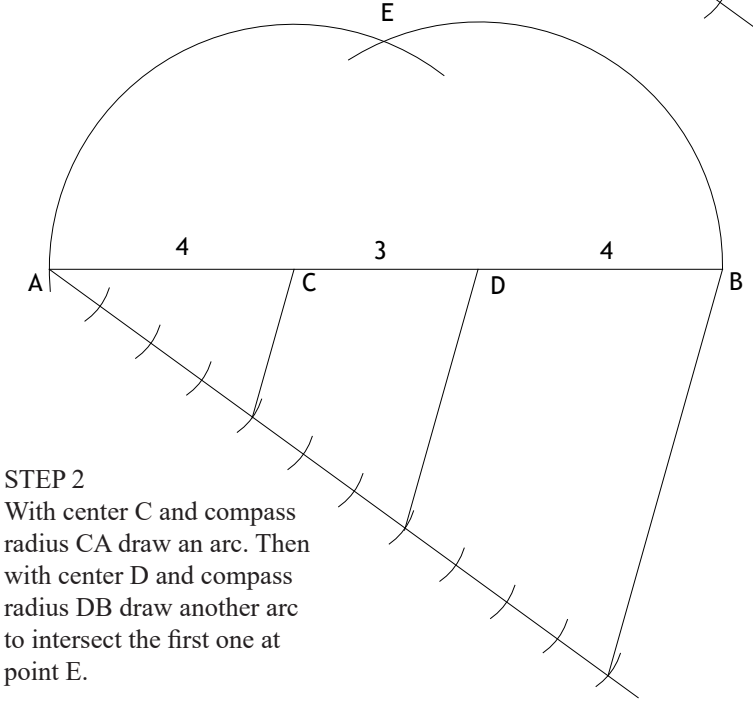
3.7 TRIANGLE GIVEN THE PERIMETER AND THE RATIO OF THE SIDES

Example:

Construct a triangle of perimeter 150mm and sides in the ratio of 4:3:4

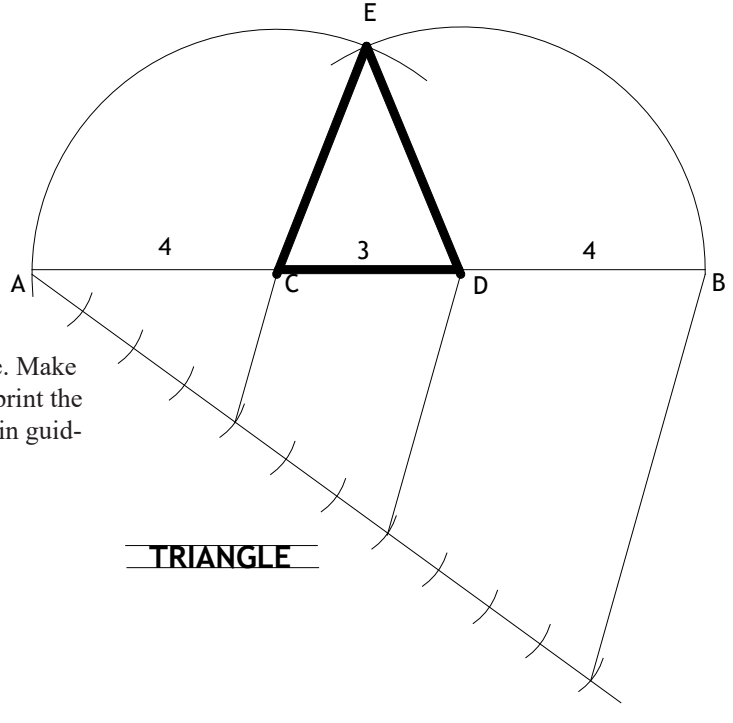
STEP 1
Draw line AB equal to given perimeter (150mm) and divide it into the given ratio (4:3:4). **see Ex. 2.8** on how to divide a line into a given ratio. This gives you points C and D on line AB.





STEP 2
With center C and compass radius CA draw an arc. Then with center D and compass radius DB draw another arc to intersect the first one at point E.

STEP 3
ECD is the required triangle. Make the required lines bold and print the heading below the drawing in guiding lines 5mm apart



Practice Questions:

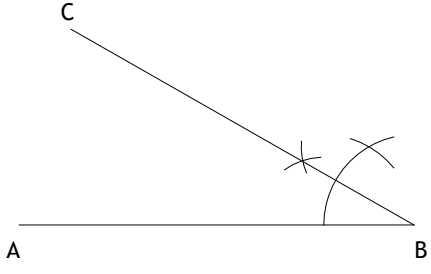
1. Construct a triangle with a perimeter measuring 160mm and sides in the ratio 3:5:6.
2. Construct a triangle with a perimeter of 125mm whose sides are in the ratio 2:4:5.

3.8 TRIANGLE GIVEN THE PERIMETER, THE ALTITUDE AND THE VERTICAL ANGLE

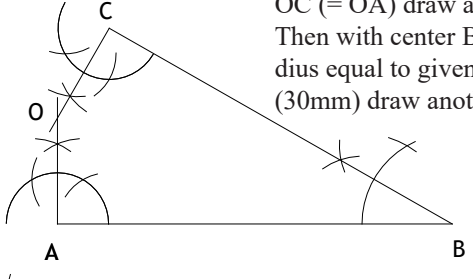
Example:

Construct a triangle of perimeter 140mm, altitude 30mm and vertical angle 30°

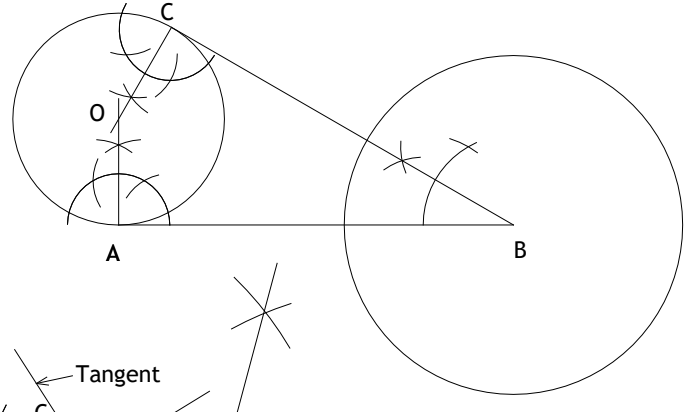
STEP 1
Construct angle CBA equal to the given vertical angle (30°) and make the length of CB and AB equal to half the perimeter (70mm)



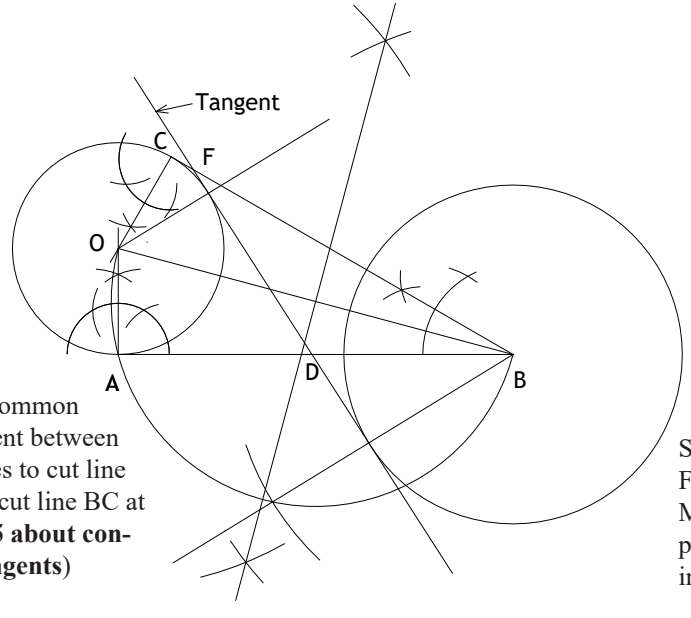
STEP 2
Erect perpendiculars at C and A to meet at point O



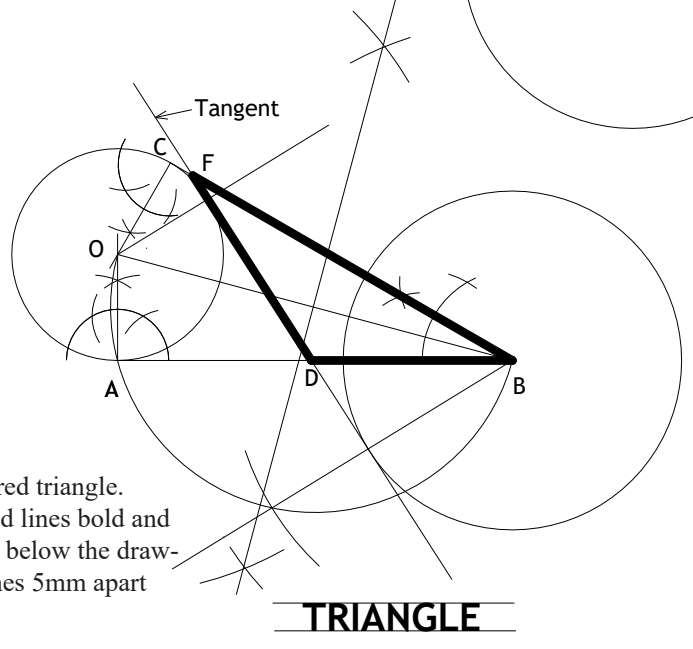
STEP 3
With center O and radius OC (= OA) draw a circle. Then with center B radius equal to given altitude (30mm) draw another circle



STEP 4
Construct a common internal tangent between the two circles to cut line AB at D and cut line BC at F. (**see Ex 7.5 about constructing tangents**)



STEP 5
FDB is the required triangle. Make the required lines bold and print the heading below the drawing in guiding lines 5mm apart



TRIANGLE

Practice Questions:

1. Construct a triangle with a perimeter measuring 115mm altitude 40mm and the vertical angle is 45°

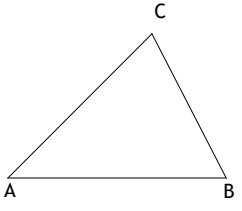
2. Construct a triangle with a perimeter of 130mm, vertical angle 75° and altitude 45mm.

3.9 TRIANGLE SIMILAR TO ANOTHER TRIANGLE BUT WITH A DIFFERENT PERIMETER

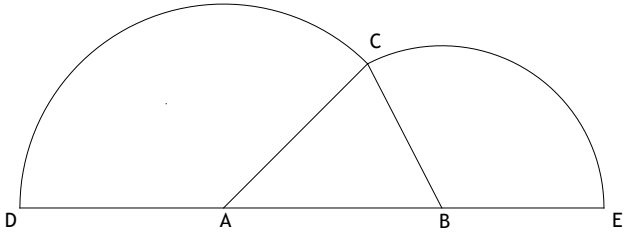
Example:

Construct a triangle of altitude 40mm and base angles 60° and 45° and then draw a similar triangle with a perimeter of 140mm

STEP 1
Construct the triangle. see Ex.3.2 on how to construct the triangle



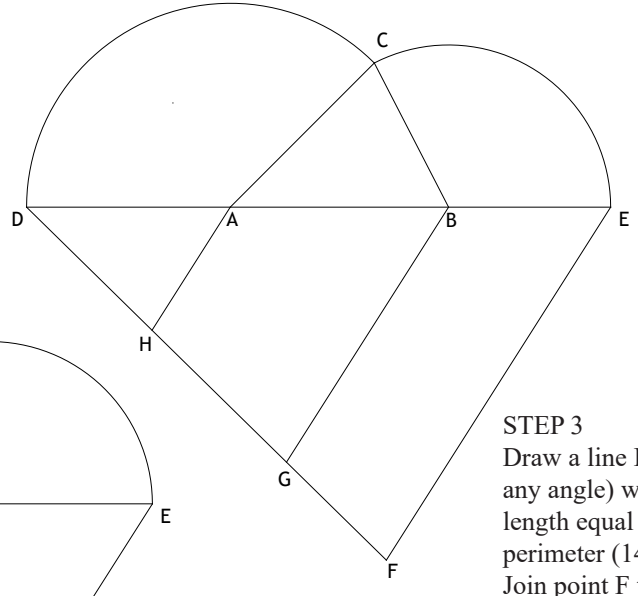
STEP 2
With the compas at A radius AC, draw an arc to cut AB extended at D. With the compas at B radius BC, draw an arc to cut AB extended at E.



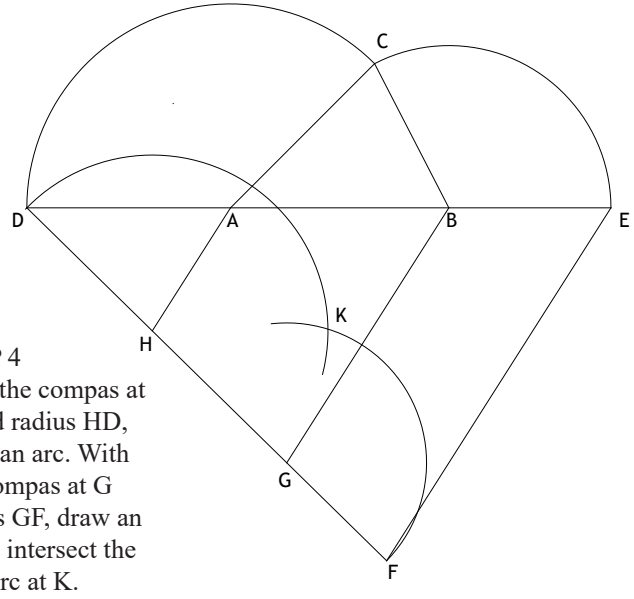
Practice Questions:

1.a) Construct a triangle with a base measuring 62mm, altitude of 50mm and a vertical angle of 60°.
b) Draw a triangle similar that in 1(a) but with a perimeter 250mm.

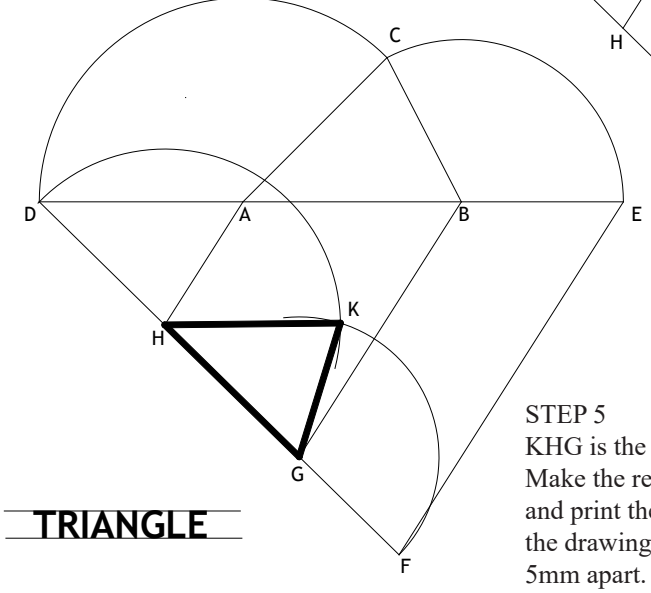
2. Construct a triangle with a perimeter of 130mm, and sides in a ratio 2:3:4 and draw a similar one with a perimeter of 150mm.



STEP 3
Draw a line DF (at any angle) with length equal to new perimeter (140mm). Join point F to E. Draw lines from A and B parallel to FE to cut line DF at H and G



STEP 4
With the compas at H and radius HD, draw an arc. With the compas at G radius GF, draw an arc to intersect the first arc at K.



TRIANGLE

STEP 5
KHG is the required triangle. Make the required lines bold and print the heading below the drawing in guiding lines 5mm apart.