Exercises

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Triangle exercise

1. ABC and AMP are two right triangles, right angled at B and M respectively. M lies on AC and AB is extended to meet P. Prove that:
   1.1 $\triangle ABC \sim \triangle AMP$
   1.2 $\frac{CA}{PA} = \frac{BC}{MP}$

Solution:

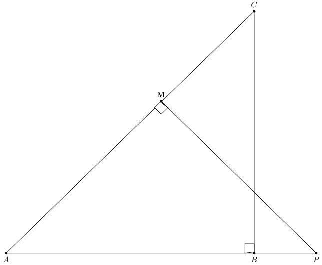

Figure 0-1: right angled triangles

From the above figure

$$\angle CAB = \angle MAP \tag{1}$$

$$\angle ABC = \angle AMP \tag{2}$$

From 1 and 2

$$\triangle ABC \sim \triangle AMP \tag{3}$$

- As correspondinng sides are proportional $\frac{CA}{PA} = \frac{BC}{MP} = \frac{AB}{AM}$
  $$\frac{CA}{PA} = \frac{BC}{MP}$$

Triangle construction

2. In $\triangle ABC$,a=8,$\angle B = 45^\circ$ and c-b=3.5. Sketch $\triangle ABC$

Solution:

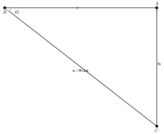

Figure 0-2: Triangle

Given a=8cm, c-b=k (k=3.5cm) Apply cosine rule

$$\cos(B) = \frac{a^2 + c^2 - b^2}{2ac}$$
$$b = \frac{2ak\cos B - a^2 - k^2}{2k + \cos B}$$

Python code for Figure 0-2: https://github.com/d-DP/Codes

3. Two circles intersect at two points B and C. Through B, two line segments ABD and PBQ are drawn to intersect the circles at A, D and P, Q respectively. Prove that $\angle ACP = \angle QCD$

Solution:

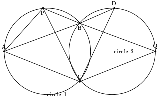

Figure 0-3: Circle

Solution:

From the above figure

$$\angle PBA = \angle ACP \tag{4}$$
$$\angle DBQ = \angle QCD \tag{5}$$
$$\angle PBA = \angle DBQ \tag{6}$$

4. Draw a circle with centre B and radius 6. If C be a point 10 units away from its centre,construct the pair of tangents AC and CD to the circle.

Solution:

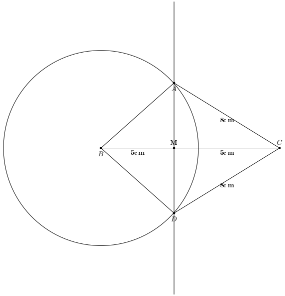

Figure 0-4: Circle

python code : https://github.com/d-DP/Codes

5. The lengths of two parallel chords of a circle are 6 cm and 8 cm. If the smaller chord is at distance 4 cm from the centre, what is the distance of the other chord from the centre?

Solution:

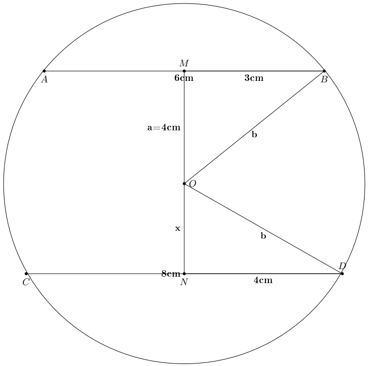

Figure 0-5: Circle

Apply Baudhayana theorem for $\triangle MOB$ and $\triangle NOD$

$$a^2 + b^2 = (3)^2$$
$$x^2 + b^2 = (4)^2$$