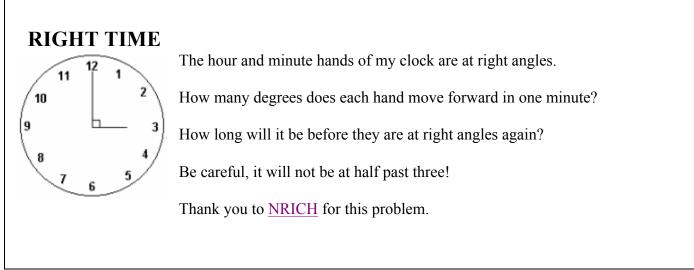


#### AFRICAN INSTITUTE FOR MATHEMATICAL SCIENCES SCHOOLS ENRICHMENT CENTRE TEACHER NETWORK

# **Title: Right Time Grades 9 to 11**



# Solution

The minute hand moves faster than the hour hand so, at 3 o'clock the angle between them is decreasing. In one minute the minute hand moves forward 360/60 = 6 degrees as there are 60 minutes in an hour. The hour hand moves forward 30 degrees in 1 hour so it moves  $30/60 = \frac{1}{2}$  degree in one minute.

The angle between the hands changes by  $5\frac{1}{2}$  degrees in each minute so for example after 1 minute and 2 minutes the angle between the two hands is  $84\frac{1}{2}^{O}$  and  $79^{\circ}$  and so on.

The hands coincide after 90/5.5 minutes and after that the minute hand is ahead of the hour hand.

The hands are at right angles after 180/5.5 = 32 8/11 minutes (between 3.30 and 3.35).

Alternatively, if the hands are at right angles after x minutes then  $5\frac{1}{2} x = 180$  so x = 32 8/11

# Notes for teachers

## Why do this activity?

This problem solving activity relates to time and it gives practice in mathematical reasoning but it only requires knowledge about angles and time learned in primary school.

## **Possible approach**

Take a clock into the classroom. Set the hands at 3 o'clock. Ask 'what is the angle between the hands?" Then ask the learners to watch the hands as you move the time on the clock forward. Stop at about 3.15. Ask "What do you notice?" The hands will have moved very close together. Continue moving time on the clock and ask the learners to tell you when the hands are at right angles again? This will be between 3.30 and 3.35.

Now ask the learners to work in pairs and to find out the EXACT time when the hands will be at right angles again. When several pairs have worked it out get them to come to the board in pairs and to explain to the class how they found the answer.

Then, to give everyone the opportunity to work successfully with these ideas, ask them to work out when the hands will next be at right angles to each other and give them time to do this. Ask different pairs of learners to explain this to the class.

#### **Key questions**

Does the angle between the hands of the clock stay the same as time changes? How many degrees does the minute hand move forward in one minute? How many degrees does the hour hand move forward in one hour? In one minute? What will the angle between the hands be after 1 minute, 2 minutes, 3 minutes...?

#### **Possible extension**

Very able learners may be able to find the answer algebraically. More challenges: How many times in a day will the hands be at right angles? How many times will they coincide?

### **Possible support**

Learners could continue the sequence listing the angle between the hands at intervals of 1 minute  $84\frac{1}{2}^{0}$ ,  $79^{\circ}$ ,  $73\frac{1}{2}^{\circ}$ ,  $67^{\circ}$ ,  $61\frac{1}{2}^{\circ}$ ,  $56^{\circ}$ , ...

Ask them how long it will take to get to 2°. Answer 16 minutes. Then what happens?