| ***TAM*** | *Semaphore* Lesson Plan 1 | |
|---|---|---|
| ***Activity*** | | ***Notes*** |
| | | T: Teacher P: Pupil Ex.B: Exercise Book |
| **1** | **Introduction** | |
| | T: Who can tell us anything about semaphore? *(Ps give ideas)* | Interactive discussion on the problems of sending messages before the advent of modern technology. |
| | T: For this method of signalling we use two flags, one held in each hand. Each flag can be held in any of 8 positions – down, low, out, high and up, on the left or right hand side. | T shows **OS 1** on OHP or shows a drawing prepared previously on board. Even better, use real flags and get Ps to illustrate the positions (Ps could demonstrate by holding a book in each hand.) |
| | T: If the RH flag is in the up position, where can the LH flag be? *(down, low, out, high, across high, across out, across low: Ps may suggest 'up' ...)* | |
| | ... T: Can the LH flag be in the up position? If not, why not? *(Because it would be in the same position as the RH flag and would give a confusing signal)* | |
| | T: So how many positions could the LH flag be in? *(7)* | **OS 2** is shown on OHP; Ps complete the table on the OS. |
| | T: Come and put this on our grid. | |
| | T: Next – if the RH flag is in the high position, where can the LH flag be? *(down, low, out, high, up, across out, across low)* | |
| | T: Well done, but just think about the last one – that is RH high, LH up . Have we had this position before? *(Yes, LH high, RH across high would give the same signal)* | These are best illustrated by two Ps holding flags (or e.g. books) to show these positions. |
| | T: Yes, this is essentially the same signal so we will not count it again. How many different signals now? *(7 + 6 = 13)* | |
| | T: I'll give you one minute to determine the total number of available signals. | Ps work in pairs for no longer than 1 minute. T monitors their work. |
| | T: Who has the answer? Come and show us your working. | |
| | P (on board): $7 + 6 + 5 + 4 + 3 + 2 + 1 = 28$ | Volunteer P writes answer on board. Other Ps agree/disagree. Discuss errors. |
| | T: Well done. | T praises. |
| | *10 mins* | |
| **2** | **Design** | |
| | T: Work in pairs to calculate how many different signals there are with a) 6 positions b) 16 positions for each flag. | Ps work on in pairs on this activity with T monitoring and intervening as necessary. Ps have about 5 minutes to solve the problems. |
| | T: Who can show us their solutions? | |
| | $P_1$ (on board): a) $5 + 4 + 3 + 2 + 1 = 15$ | T could ask class if they know a quick way to do this calculation, i.e. using $1 + 2 + \ldots + n = \frac{n(n-1)}{2}$. |
| | $P_2$ (on board): b) $15 + 14 + 12 + 11 + 10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 120$ | |
| | T: So why do we use 8 positions? *(Easy to see from a distance, patterns for letters)* | Interactive discussion; could lead to working out angles needed for each position, e.g. (a) $120°$, (b) $22\frac{1}{2}°$ |
| | *20 mins* | |

| *TAM* | **UNIT 13** *Semaphore* Lesson Plan 1 | *Coding and Decoding* |
|---|---|---|
| ***Activity*** | | ***Notes*** |
| **3** | **Practice**<br>T: Here is the semaphore alphabet and numbers.<br>What do you notice? *(Numbers and letters are coded)*<br>T: How are signals for numbers sent?<br>*(Numerical sign is sent first)*<br>T: And then? *(Zero is K, 1 is A 2 is B, etc.)*<br>T: And when the signaller wants to go back to sending letters ..?<br>*(The signal for J indicates that letter signals will follow)*<br><br>T: Now try Exercise 1.<br><br>T: What are the problems with using this system?<br>*(Need to know the code or have it available;*<br>*receiver needs to be able to see signaller clearly,*<br>*easy to make mistakes;*<br>*messages can be easily intercepted, etc.)*<br><br>*35 mins* | T shows **OS 3** and gives each P a copy of this or the Appendix.<br><br>T should encourage discussion on the type of messages to be sent and whether numbers might be needed – yes, for directions and time, etc.<br><br>Part a) could be done individually with T monitoring Ps' work and then a review, and then part b) it could be tackled by the whole class. |
| 4 | **Extensions**<br>T: How can we extend this code for punctuation, capitals, mathematical symbols etc.<br>T: Work in pairs to find a practical workable solution and we will review your suggested solutions.<br><br>*45 mins* | Give the class sufficient time to make progress but also leave timre for interactive discusion, which should make the point that this code was designed to send simple messages and not mathematical equations! |
| **5** | **Homework**<br>Decipher the messages given on **OS 4**. (Each P is given a copy.)<br><br>Find out about historical codes (for example, Braille, Morse Code or Enigma) for discusion in the next lesson. | |
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# *Semaphore* Teaching Notes

**Key Stage:** *2/3*

**Target:** *Years 6/7*

**Teaching Notes**

This is a good introductory code to be used with KS2/3 pupils; it also brings into focus the concept of efficient design – that is, the design (which gives 28 possible patterns) is just sufficient to meet the purposes of this code to transmit messages at the time of Nelson and the Battle of Trafalgar.

In fact it was designed by the Chappe brothers in France in the late 18th century was used to carry despatches between French army units, including those commanded by Napoleon, and was soon adopted by other European states. More information is available on the website

http://www.encyclopedia4u.com/s/semaphore-communication-.html

The flags used are conventionally, each coloured red and yellow. In reality, for the purposes of this Unit, the colourings are irrelevant – plain-coloured flags would be just as effective! This would make an interesting observation/discussion point for the class. We strongly advise taking a practical approach with this topic, using real flags for pupils to show the different positions allowed.

**Solutions**

*Activity 1* a) 7 positions

b) 6 positions

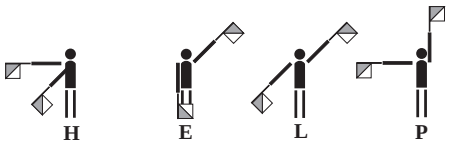
c) $7 + 6 + 5 + 4 + 3 + 2 + 1 = 28$ positions

*Activity 2* a) $5 + 4 + 3 + 2 + 1 = 15$ positions

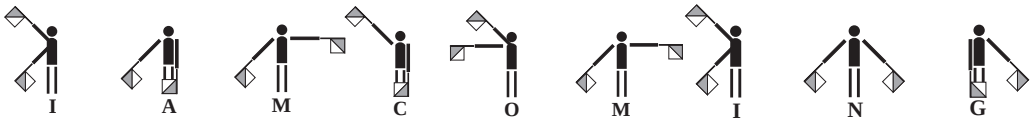
b) $15 + 14 + 13 + 12 + 11 + 10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 = 120$ positions

In the 8-position system it is easy to identify and distinguish each position (for 16 it would be more problematic); the 8-position system also gives a sufficient number of patterns to code each letter of the alphabet (for six, this is not true).

*Exercise 1* a)




b)




*Activity 3* One of the flags 'switches on' the number sign and then flags K, A, B, C, D, E, F, G, H and I become numbers 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9; J switches back to letters.

Activity 4 In theory, you could add in more options by having punctuation signs etc, but there are no more spare positions left so it would get much more complicated and not needed for the use of Semaphore in practice.

*OS 13.4* A) Hello B) We are hungry