

## UNIT 1 *Mathematical Diagrams*

## Activities

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### **Activities**

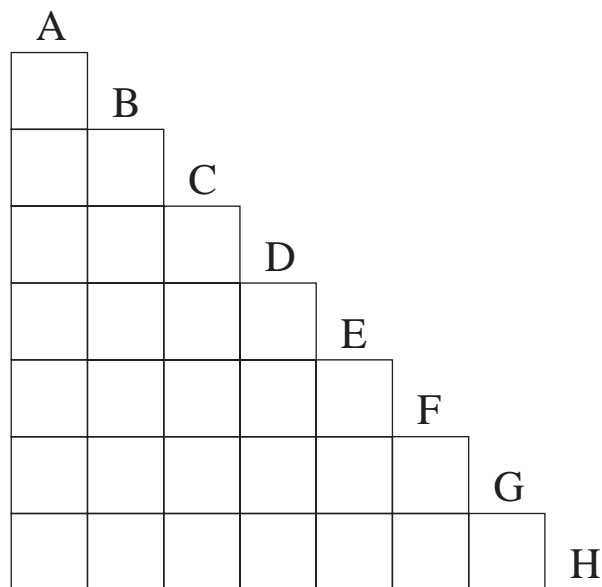
- 1.1 Your Own Mileage Chart
  - 1.2 Designing Flow Charts to Solve Problems
  - 1.3 Classification of Sports Events
  - 1.4 Getting to School
- Notes and Solutions (1 page)

# ACTIVITY 1.1

## *Your Own Mileage Chart*

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1. Make a list of 8 towns or cities, for example, the homes of 8 football teams.
2. Draw a network to show the main routes between these places.
3. Use a road map to find the distances between the places.
4. Construct a mileage chart like the one below to show the shortest distances between all 8 places.



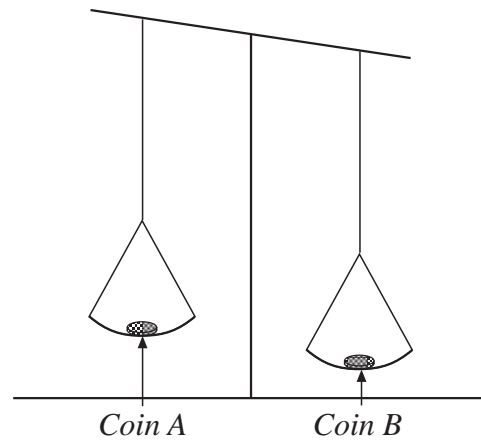
## ACTIVITY 1.2 *Designing Flow Charts to Solve Problems*

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Forged £1 coins are often lighter than genuine ones.

If you have two coins and a balance, it is easy to decide if one of the coins is forged.

If coin A weighs less than coin B, we deduce that coin A is forged.



### 1. *Four Coins*

- (a) You have four £1 coins and you know that one is lighter than the others, and is a forgery.

Design a flow chart to find out which is the forged coin.

- (b) One (inefficient) method is to compare A, say, with B, then C, and then D. This could involve 3 weighings. Design a flow chart (if you did not do so in (a) above) that gives a method requiring no more than 2 weighings.

### 2. *Six Coins*

Extend this method for use with 6 coins.

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### Extension

#### (A) *Eight Coins*

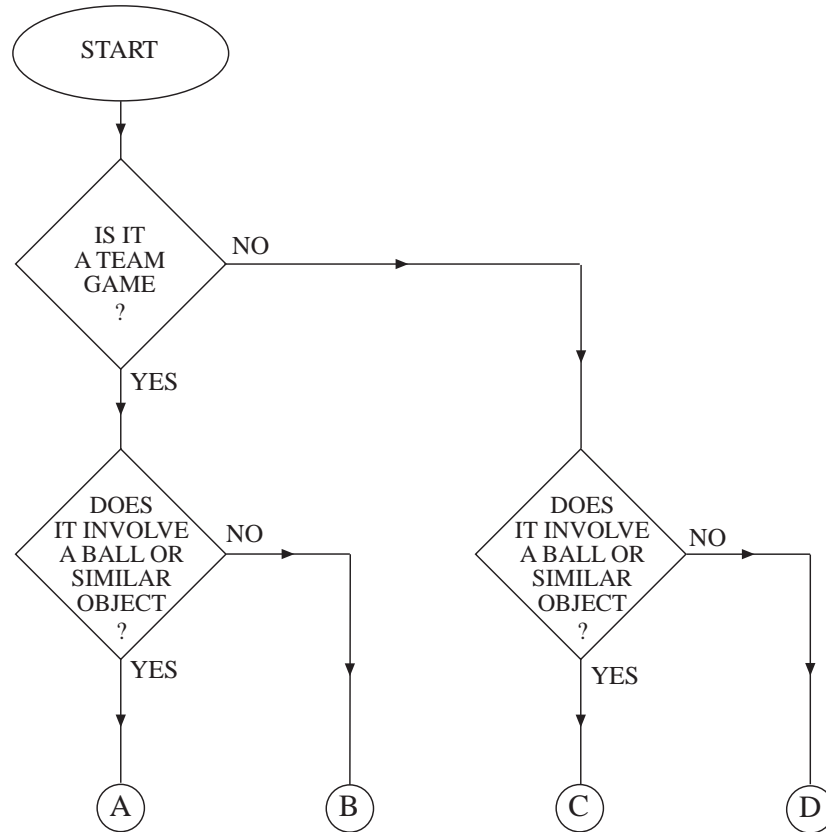
You now have 8 coins, and you know that one is a forgery and is either lighter or heavier than the others. Design a flow chart to illustrate a method of finding out which is different, using only 3 weighings, at most.

- (B) Design a flow chart to show someone how to play noughts and crosses using a method that ensures that they *never lose*.

## ACTIVITY 1.3

## Classification of Sports Events

Here is a method of classifying sports events:



- In which group (A, B, C or D) is each of these sports classified:
  - football,
  - hockey,
  - marathon running,
  - synchronised swimming,
  - long jump,
  - tennis,
  - darts,
  - discus throwing ?
- Name one more sport in each of the four groups.

### Extension

Design a method of classifying TV programmes.

## ACTIVITY 1.4

## *Getting to School*

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1. Make a list of all the tasks that you do each day from when you wake up until you get to school.
2. Decide how long each task takes to complete and what other tasks must be done before it can take place.
3. Carry out a critical path analysis to work out the shortest possible time in which you can do all the tasks.
4. If you oversleep and don't have time to do all the tasks, which could you leave out?  
What is the shortest time now between waking up and getting to school?

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### **Alternative**

Undertake a similar analysis for one of these activities:

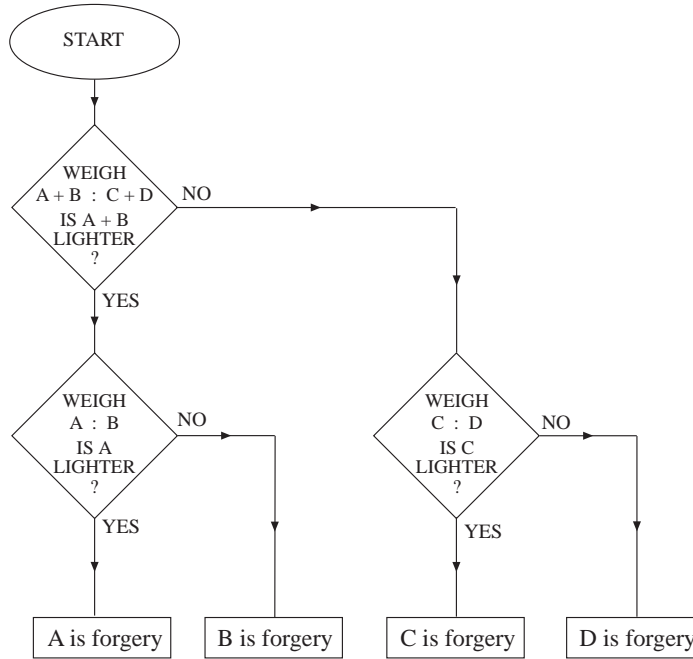
- (a) another everyday activity,
- (b) planning a summer holiday,
- (c) going to a party,
- (d) planning a wedding.

# ACTIVITIES 1.2 and 1.3

# Notes for Solutions

Notes and solutions given only where appropriate.

1.2 1. (b)



2. Similar to above, but start with weighing  $A + B + C$  against  $D + E + F$ .

- 1.3 1. (a) A                      (b) A                      (c) D                      (d) B  
           (e) D                      (f) C                      (g) C                      (h) C