CHAPTER 1 Mathematical Processes
1.4 Focus on Representing
Using numbers, graphs, algebra, and diagrams to represent mathematical situations

Example:

a) Myrna's father has hidden her birthday present, and given her a coded clue as to its location: TZIZTV. Myrna suspects that her father used a reflection cipher, which replaces each letter of the alphabet with its mirror image about the centre of the alphabet. Draw a diagram, and use it to decode the clue.

b) Josh graphed the points A(–1, 2) and B(3, 4). Use the graph to estimate where Josh would need to place a third point to form an equilateral triangle.

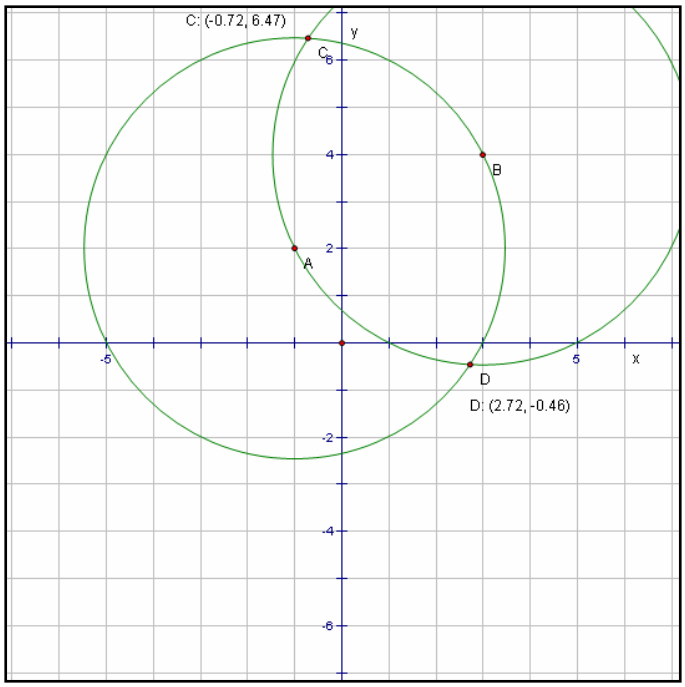
Solution:

a) Write the alphabet along a line. Draw a mirror between the letters M and N.

A B C D E F G H I J K L M | N O P Q R S T U V W X Y Z

Find the first letter in the coded word, T, and count how far it is from the mirror. It is the 7th letter from the mirror. Find the 7th letter on the other side, G. Continue to decode the message as GARAGE.

b) Use geometry software or graphing paper. Plot the given points A and B, as shown. Draw a circle with centre A and radius AB. Draw another circle with centre B and radius BA. The circles intersect at points C(–0.72, 6.47) and D(2.72, –0.46). The two possible equilateral triangles are ABC and ABD.



Practice:

1. Tim sent a text message to Julia advising her of the time he will arrive for a date UGXGPRO. Julia knows that Tim favours substitution codes, in which each letter is replaced by one a fixed distance before or after it in the alphabet. Use this fact to decode the time.

2. Eight friends are gathered for dinner at an octagonal table. Due to the design of the table, it is only convenient to speak with guests on either side, or directly across the table. How many different conversation pairs are possible?

Answers:
1. SEVENPM **2.** 12