

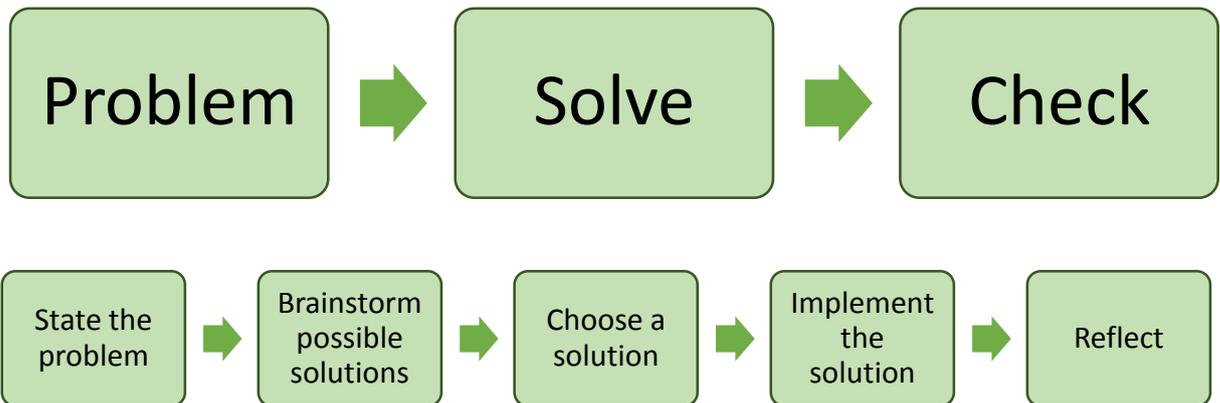
Module 5 - Teaching competences and values

Guidance material	5.4.2 Teaching Problem Solving Grade 7-9
What is the purpose of this material?	<ul style="list-style-type: none"> This is a selection of teaching strategies and teaching templates to support the teaching of problem solving
When to use this material?	<ul style="list-style-type: none"> When introducing the competences to teachers to support them in implementing this competence in their class programme.
With whom to use this material?	<ul style="list-style-type: none"> Teachers
Have you considered these materials first?	<ul style="list-style-type: none"> Introduce teachers to the SCF through: <ul style="list-style-type: none"> 1.1 What is the SCF? 1.2 Structure of the SCF 1.3 Definitions matching activity 1.4 Prior knowledge brainstorm activity 1.5 Close reading – Executive summary 1.6 Close reading – Framework Requirements and Exemplifications 4.1 What are competences? Introduce teachers to this competence through: <ul style="list-style-type: none"> 4.1.4 What is Problem Solving?
How to use this material?	<ul style="list-style-type: none"> This resource can be used in a range of ways, for example: <ul style="list-style-type: none"> Share with teachers and discuss it in staff meetings or team meetings. Encourage teachers to plan using the ideas in this resource. Encourage teachers to adapt the teaching strategies and templates below to meet their grade level, curriculum area and student's needs. Discuss the ideas and then ask teachers to share their own ideas for teaching this competence. For more information on each competence read the <i>Framework Requirements & Exemplifications</i> section of the <i>Abu Dhabi Education Council Student Competence Framework (SCF) for Private Schools - Competences for Abu Dhabi's 21st Century Learners (2014)</i>. Note: All websites were checked at the time this guidance material was created. Any website used in an educational context should be checked for accuracy and appropriate content. Links to other websites from this material should not be taken as endorsement of those sites or of content/products offered on those sites
What resources or equipment are needed?	<ul style="list-style-type: none"> Copies of the <i>Framework Requirements & Exemplifications</i> section of the <i>ADEC SCF for Private Schools (2014)</i>.

Teaching Problem Solving Grade 7-9

Here are some strategies and teaching approaches to try in your classroom to promote problem solving:

- Students are increasingly expected to work independently and collaboratively in groups to solve problems using the problem solving process. Here are three different problem solving processes:



Pólya's four stages of problem solving:

Step 1: Understand and explore the problem

- What do you already know?
- What do you not understand?
- What are the causes of this problem?
- What are the effects of these causes?
- What are the obstacles?

Step 2: Devise a plan

- Have you seen a similar problem before?
- Which strategy will you use to solve this problem?
- What steps will you take to solve the problem?

Step 3: Carry out the plan

- Carry out your plan to get to a solution

Step 4: Look back and reflect on the solution.

- Can you check your solution?
- Did you select the best strategy?
- What would you do differently next time?

Although Pólya's four stages of problem solving are listed in order, for difficult problems it may not be possible to simply move through them consecutively to produce an answer. You might need to move backwards and forwards between and across the steps.
(Pólya, George (1957). "How to Solve It". Garden City, NY: Doubleday)

- Provide opportunities for interactive problem-solving such as participation in Citizen Science projects e.g. organising environmental group to identifying, counting, and reporting the number of butterflies seen in the school grounds
- Students make and use models to solve problems and demonstrate principles for themselves or a younger age group.

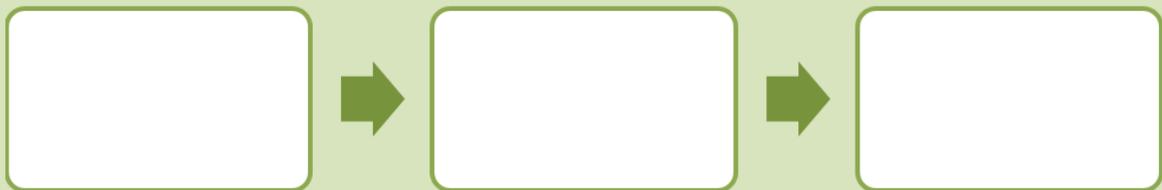
- Teach students how to solve problems in different ways. Support them to reflect on which way they chose and why.

Draw a picture	Draw a picture that shows the solution. The picture does not need to be detailed, it should only contain enough detail to solve the problem
Draw a diagram	Draw a diagram that shows the solution. A diagram is different from a picture. It might include images, text and numbers. A diagram often shows the relationship between things, for example a Venn diagram shows differences and similarities.
Guess and check	Guess the solution and check it. You might check your solutions against the correct solution, other people's solutions or an example from your teacher.
Act it out	Role play the solution. Act out the people, events or actions within the problem.
Use equipment	Use equipment to help you work out the solutions. This is works really well with mathematics problems.
Make a list	Think about all the parts of the problem and your solution, out them in an order that makes sense. There are lots of ways to order your list, for example: What happened first → What happened last Most important → Least important Similar things → Different things
Research it	Find out more about the problem and other solutions that have been tried.

- Teach students how to use diagrams when solving problems.

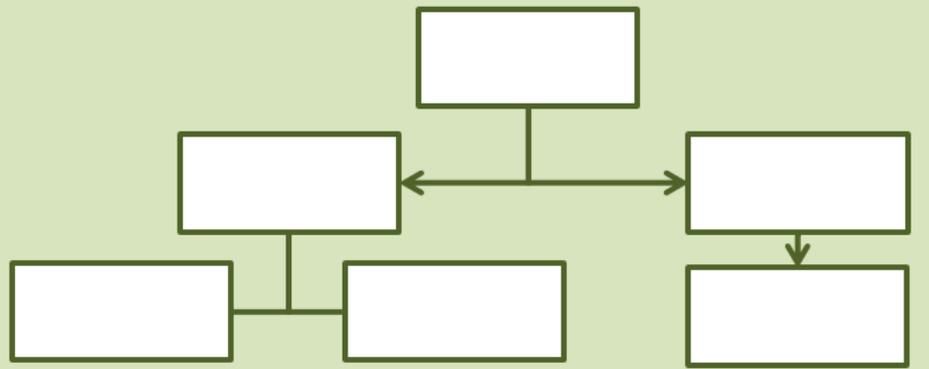
Chain diagram

Chain diagrams usually represent a *sequence* of events needed for a solution. The elements of the problem are set out in words, usually placed in boxes, and positioned in different places on a sheet of paper, using lines to represent the relationship between them.



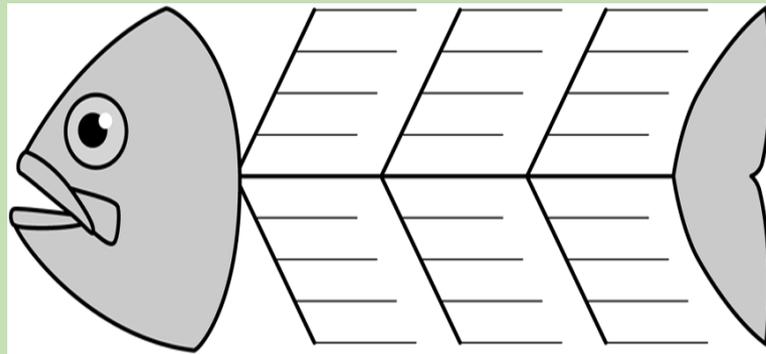
Flow charts

Flow charts allow for inclusion of branches, folds, loops, decision points and many other relationships between the elements. In practice, flow charts can be quite complicated and there are many conventions as to how they are drawn but, generally, simple diagrams are easier to understand and aid in 'seeing' the problem more readily.



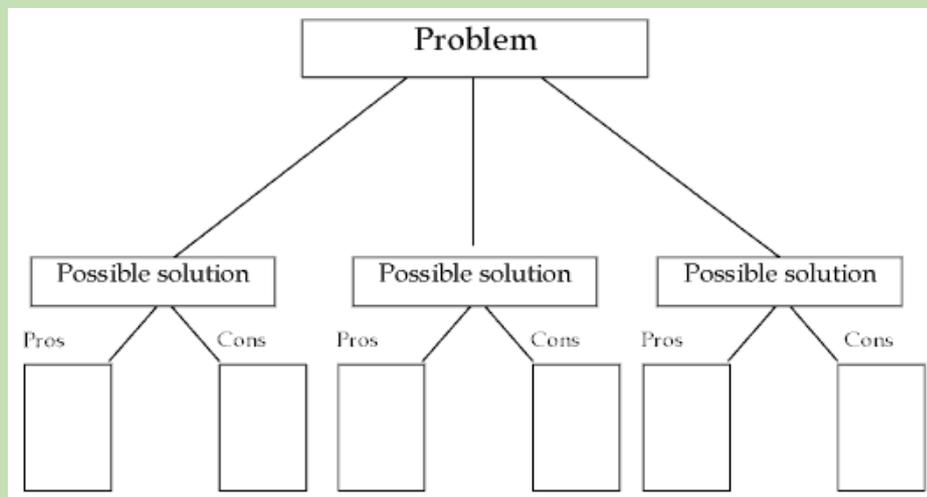
Fish bone, cause and effect

Write the problem in the fish head. Beside each long diagonal bone write the causes of the problem. Beside each small horizontal bone write the effects of the causes.



Consequence diagram

A consequence diagram helps you see the pros and cons with each solution.



- Use graphic organisers to support students through the problem solving process.

What do you already know?	Brainstorm ways to solve this problem
<i>What is the problem?</i>	
Try it here	What did you learn by solving this problem?