Tynecastle High School
Mathematics Department

PROBLEM SOLVING SKILLS

You cannot solve a problem by looking at it. If you cannot start the question then there are various things you MUST try:

1. **Understand the question:**
   - **Identify the topic(s) involved and establish what the question is asking you to find.**
2. **Have a plan:**
   - **Once the topic is identified think of the skills and techniques you have learned that can be applied to the problem.**
3. **Carry out the plan:**
   - **Be meticulous and check everything**
4. **Look back and answer the question:**
   - **Have you answered the question with regard to the context?**
   - **Is your answer sensible?**
5. **Make yourself familiar with this format of question:**
   - **So that next time you see the question, it'll be much easier to solve**

Some problem solving strategies to consider:

- **Introduce new variables(letters) to make working out more methodical (2 step Pythagoras)**
- **Make a diagrams or complete a table (quadratics/straight line/volume/area etc)**
- **Consider similar cases (what did you do before)**
- **Trial and error (trinomials)**
- **Work backwards**
- **Solve equations**
- **Use formulae (area, quadratics, straight line, trig etc)**
- **Use coordinates (straight line, quadratics, trig equations etc)**

Types of Problems

- May involve several steps → Break these problems down into smaller pieces and solve each piece!
- When practising write FULL solutions → present it as you would in the exam
- Do not sit with incomplete questions → bring them to Supported Study
- PLEASE REMEMBER THAT GOOGLE IS A GREAT TOOL WHICH YOU CAN USE AT HOME

Word problems:

Word problems = applied problems

- ❖ First convert the problem into maths
  - o This is the most challenging part of an applied problem
    - ▪ Do not worry if you cannot complete this part – do as much as you can because you can still pick up marks
    - ▪ You can still complete the rest of the question which will have the majority of marks
- ❖ Draw a picture and annotate it
  - o If the picture is already provided then you can annotate it
- ❖ Identify the variable x
  - o Is it a length etc…
- ❖ Clearly state the AIM of the question
- ❖ Sometimes you may need to use alternative formulae to help you
  - o Areas of shapes, Similarity formulae etc
- ❖ Solve the problem and convert final answer back to works
  - o Always have the final solution to any problem in the format that it was given to you

13. Triangles PQR and STU are mathematically similar.

The scale factor is 3 and PR corresponds to SU.

T

18 cm

Q

6 cm

P

2x cm

R

S

(x^2 + 5) cm

U
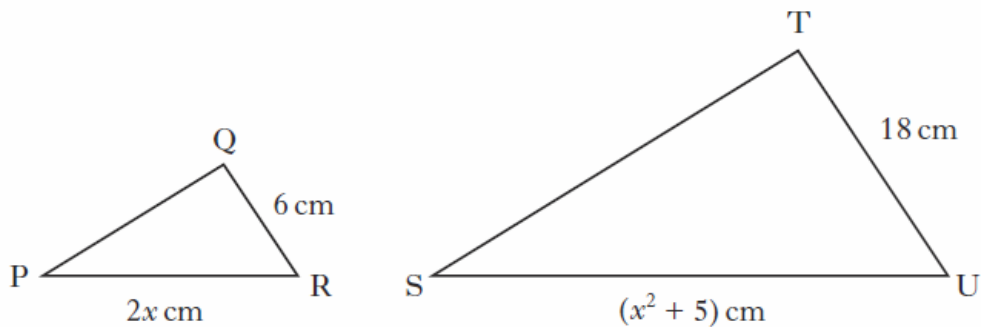
(a) Show that $x^2 - 6x + 5 = 0$.

(b) Given QR is the shortest side of triangle PQR, find the value of x.

Q

6cm

P

2x (w*) R

S

(x^2 + 5)cm (y) u

18cm

T

- Mathematically similar.
- SF 3   PR corresponds to SU → FIND x

New line = old line × SF   ← connect problem to
        y = W × 3   maths

$x^2 + 5 = 2x × 3$ ← y & w are new
$x^2 + 5 = 6x$ variable to describe
$x^2 - 6x + 5 = 0$ ♡   New & old line
$(x - 1)(x - 5) = 0$ (this is annotated on
$x - 1 = 0$ or $x - 5 = 0$ the diagram *)
   $x = 1$ or $x = 5$ ♡ identified quadratic equation
QR is shortest side,   to solve
So $2x > 6$
      $x > 3$
So $x = 5$ ← Final problem solved considering
                        extra information.

AIM
→ FIND x