# 3 Minutes Polygons
# For students and teachers

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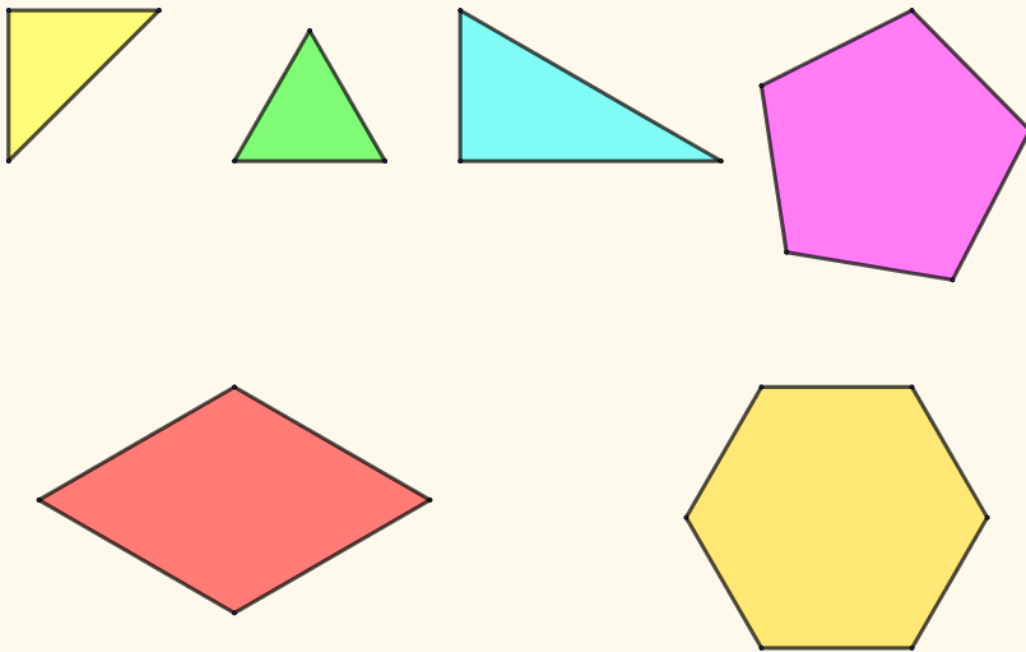
INTRODUCTION

Paper Manipulation helps students to focus and learn the mathematics concepts in an enjoyable way. For NCS students, diversity in language understanding may affect the grasping of knowledge. Non-verbal means provide a bridge for them to overcome the learning barriers.

This learning set provides an easy way for students to build geometric objects to be used in their learning process.

Triangle: Right-angled Isosceles Triangle
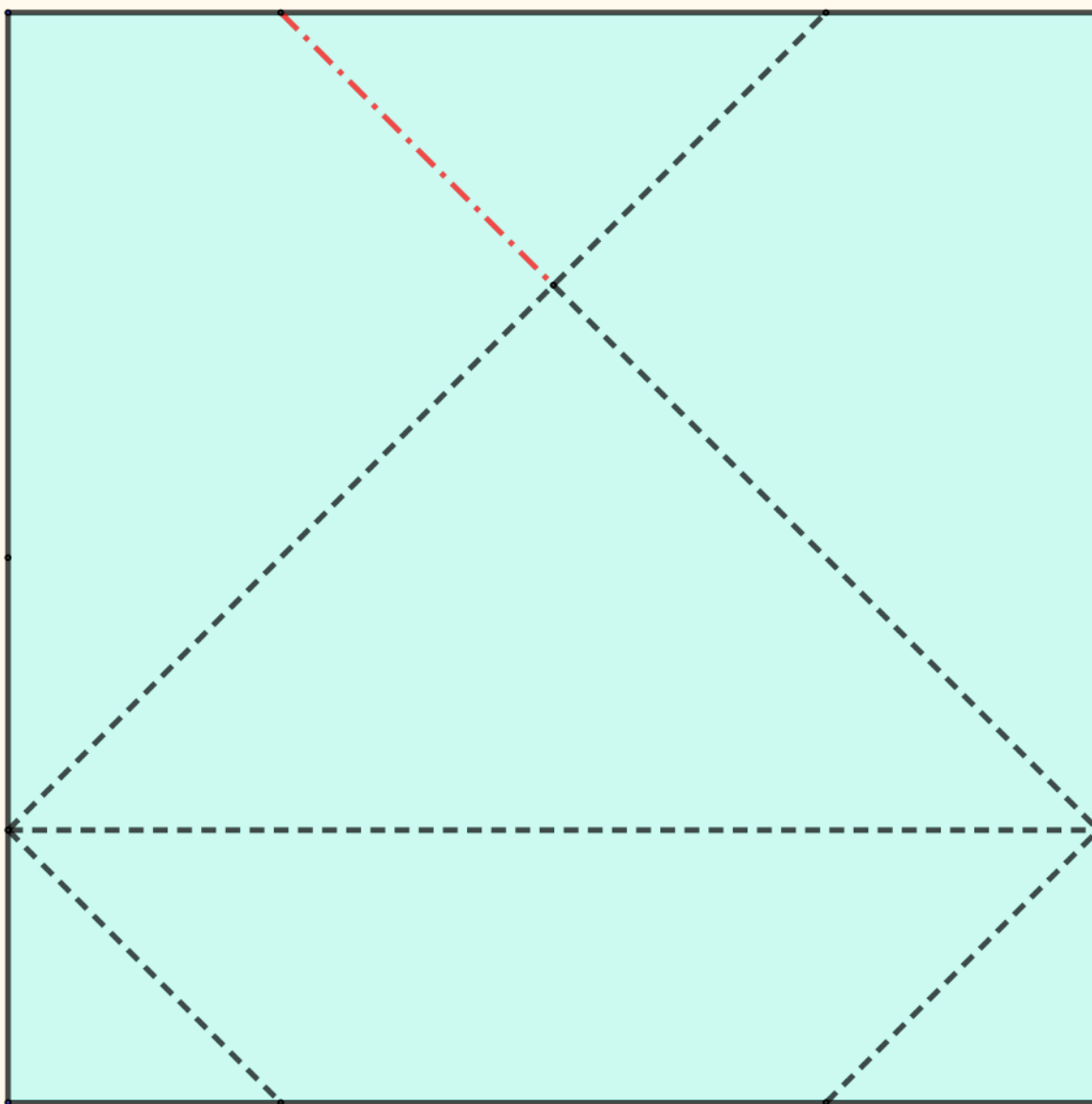
Cut out the template to make a right-angled triangle by folding along the crease lines. You may also make it directly from a piece of square paper.
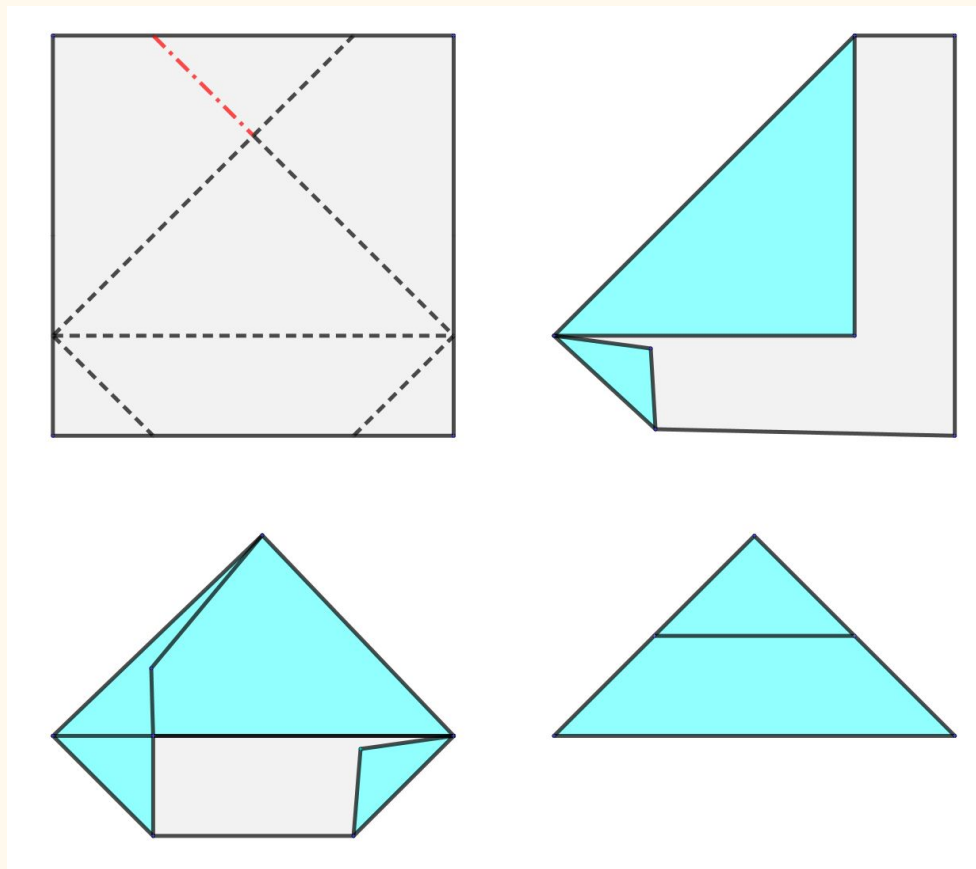

You may also make one from rectangular paper by following the YouTube video:

https://youtu.be/wbt5osjwHf4

Further Learning Activities

1. Measure the lengths of sides and angles of the triangle using protractor and ruler. Students may have a real taste of the meaning of ***isosceles*** and ***right-angled***.
2. Use the right-angled triangle as a tool to investigate objects around us.
    a. Identify objects with acute angles, obtuse angles and right angles
    b. Let students discover that there are only one right angle while many acute and obtuse angles
    c. To have a taste of STEM education, may ask students to think why there are such angles.
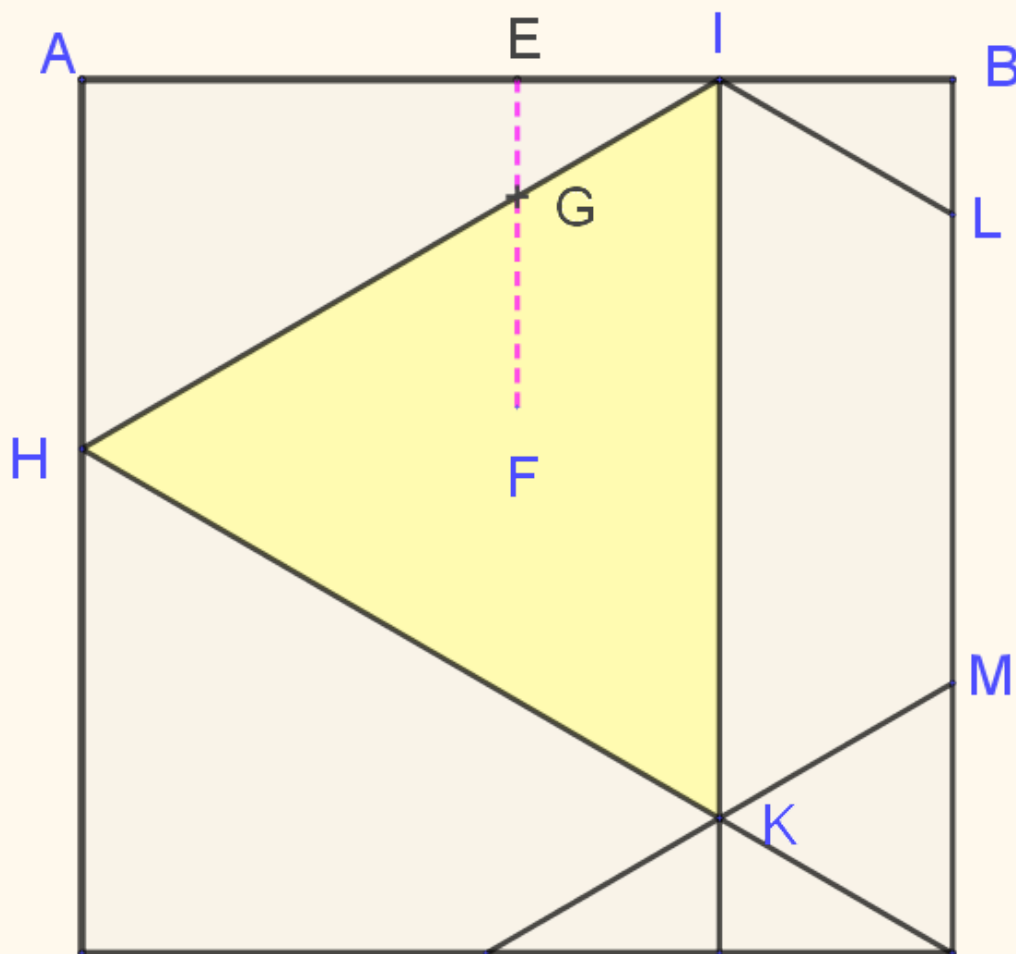
Triangle: Right-angled Triangle (30° - 60° - 90°)
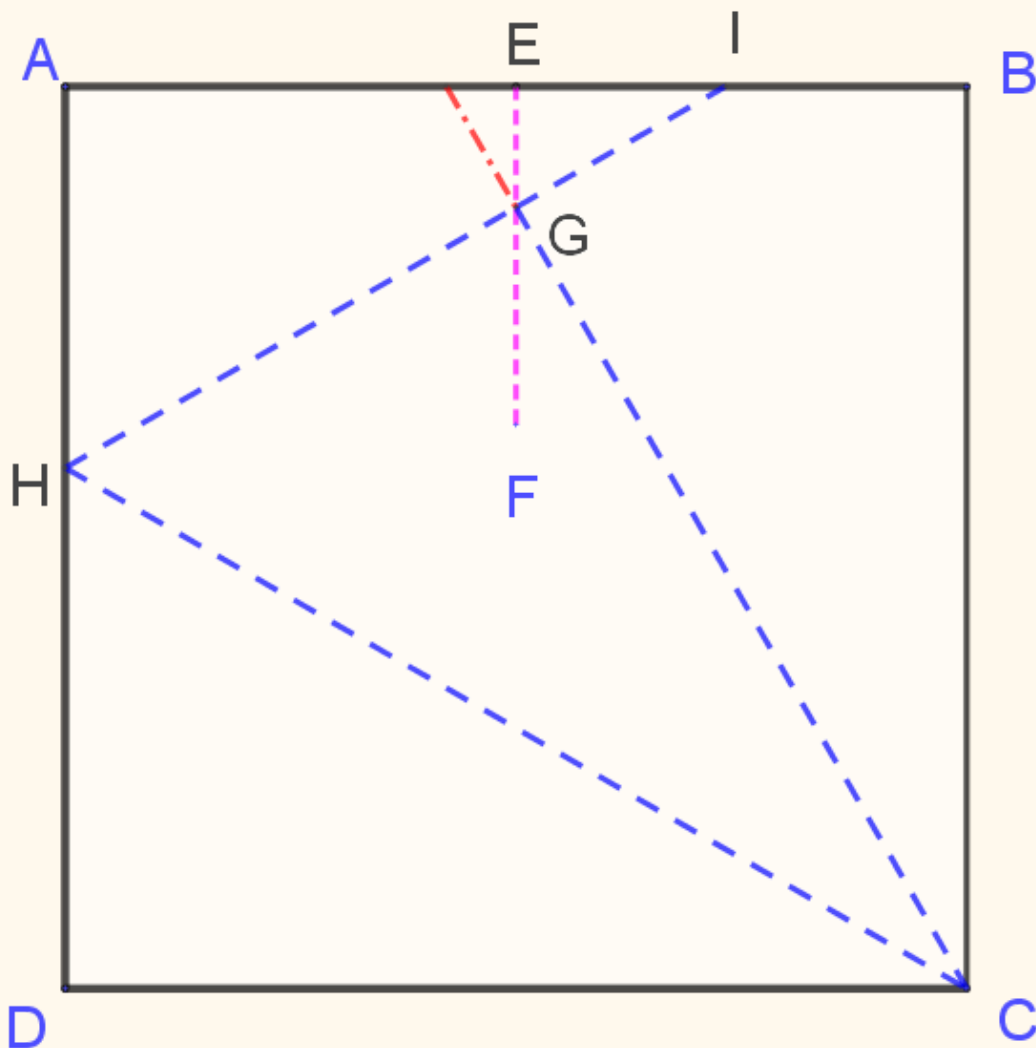
Folding Steps: Starting from a piece of square paper ABCD

1. Fold EF such that EF is parallel to AD and BC while AE = EB. (*fold and open*)
2. Fold CH to overlap point D to point G on EF. (*fold and not open*)
3. Fold HI along GH. (*fold and not open*)
4. Fold GC to complete the right-angled triangle.
5. Refer to YouTube Video for a better looking version:https://youtu.be/Gh3Kxi2ZI60

Allow students to use it to explore. Measuring the lengths, angles and use it as a measuring tool for perpendicular and comparative tool to identify acute and obtuse angles.

Triangle: Equilateral Triangle

Folding Steps: Starting from a piece of square paper ABCD

1. Fold EF such that EF is parallel to AD and BC while AE = EB. (*fold and open*)
2. Fold CH to overlap point D to point G on EF. (*fold and not open*)
3. Fold HI along HG. Open every previous folds
4. Fold IJ perpendicular to CD. (*fold and open*)
5. Folding up and make the equilateral triangle.
6. Video for more detail folds: https://youtu.be/2NIZo3D7Eq0

Allow students to measure, angles and lengths of sides to figure out the properties.

Pentagon (almost regular) & Hexagon (Regular):

The following videos show how to fold pentagon and hexagon. It is recommended that observation and measurement should be made after making the figures. NCS students could be benefited by understanding the concepts with different approaches, Teachers' explanation together with hand-on activities.
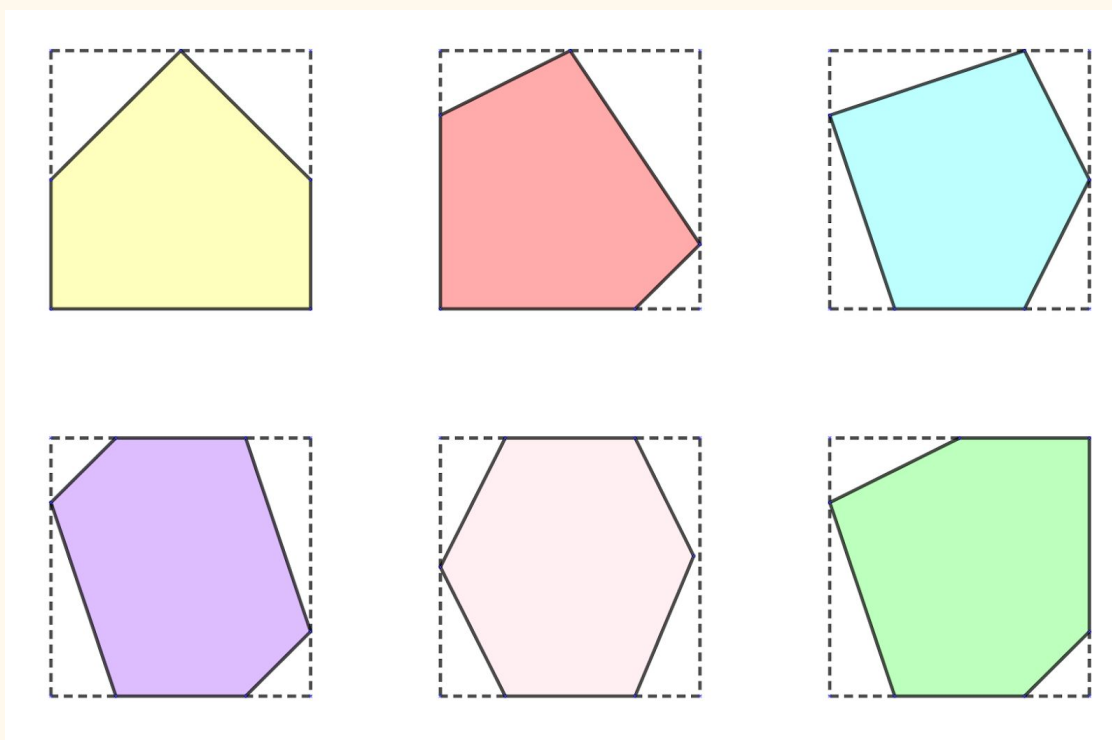
Pentagon folded from square paper:
https://youtu.be/O433UnWojq4

Pentagon folded from A-size paper:
https://youtu.be/cNTeoGKhjHM

Hexagon folded from 14cm x 15 cm rectangle: https://youtu.be/Ha26b805Psw

Before or after the above folding activities, teachers may ask students to make some non-regular pentagons and hexagons.

It is good for students to identify that being non-regular some properties may not be found.
(*may not have lines of symmetry, may not have sides of equal lengths*)