Maths

Higher Level Constructions and Transformations

It is not necessary to carry out all the activities contained in this unit. Please see *Teachers' Notes* for explanations, additional activities, and tips and suggestions.

***Note:** The categorisation of activities is indicative only and should not prevent teachers from using any activities that are considered suitable for a particular group of students.*

Making the best use of these units

Learning Record

A copy of the Learning Record should be distributed to each learning support and language support student.

Students should:

1. Write the subject and topic on the record.
2. Tick off/date the different statements as they complete activities.
3. Keep the record in their files along with the work produced for this unit.
4. Use this material to support mainstream subject learning.

Introduction of a topic or activity should ensure that students understand **what** they are doing and **why**. Many students will have some difficulty in understanding both the language in the activity and the instructions/purpose for carrying out the activity.

You can create your **personal teaching resource** by printing these units in full and filing them by subject in a large ring binder.

Encourage students to:

- Bring the relevant **subject textbooks** to learning/language support class. It does not matter if they have different textbooks as the activities in these units refer to vocabulary and other items that will be found in all subject textbooks. These units are based on curriculum materials.
- Take some **responsibility for their own learning** programmes by:

Developing a **personal dictionary** for different subjects, topics, and other categories of language, on an on-going basis. This prompt is a reminder.

Recording what they have learnt on the ***Learning Record,*** which should be distributed at the start of each unit.

Keeping their own **files** with good examples of the work produced for different subjects and topics. This file will be an invaluable **learning resource** in supporting mainstream learning.

Indicates that answers may be found at the end of the unit.

Don't forget that many of the activities in these units are also suitable as **homework** tasks or for **self-study.**

Keywords

The list of keywords for this unit is as follows:

Nouns
angle
arc
area
bisector
compass
construction
distance
image
label
line
measure
point (pt)
radius/radii
reason
rotation
side
symmetry
triangle
transformation
translation

Verbs
to be able to
to construct
to draw
to find
to follow
to investigate
to map
to measure
to outline
to prove
to shade
to swing
to transform

Adjectives
axial
both
central
clockwise
congruent
corresponding
equal
first
mean
opposite
perpendicular
same

Adverb
therefore = as a result
when

Preposition
under

Symbols
Δ triangle

Vocabulary file 1

Word	Meaning	Note or example*
angle		
distance		
measure		
point(pt)		
radius		
symmetry		
triangle		

*You may wish to write a sentence or phrase, make a note of the page in your textbook where this word appears or, if English is not your first language, provide a translation into your language.

 Get your teacher to check this and then file it in your folder so you can use it in the future.

Vocabulary file 2

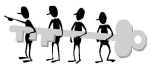
Word	Meaning	Note or example
axial		
congruent		
to construct		
to investigate		
to measure		
to outline		
to prove		

Get your teacher to check this and then file it in your folder so you can use it in the future.

NAME: _____ DATE:_____

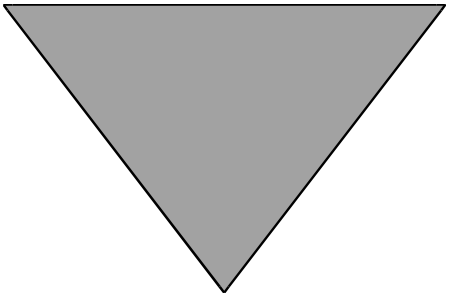
MATHS: Higher Level Constructions and transformations

Language Level: A1
Type of activity: pairs or individual
Suggested time: 20 minutes



Working with words

1. Tick the correct answer



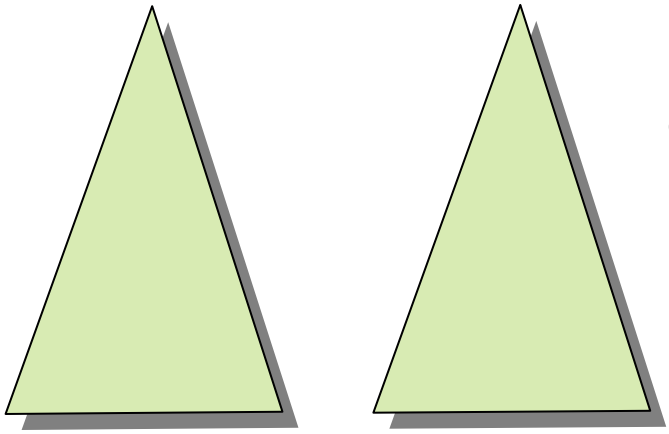
This is :

a) a triangle

b) a square

c) a rectangle

d) a circle



These two triangles are:

a) falling down

b) growing

c) pink

d) identical

2. In maths, the two triangles above are <u>congruent triangles</u>. Select the best meaning of the mathematical word, congruent

a) different

b) identical

c) normal

3. In maths, what do we call the corner of a triangle?

a) a corner

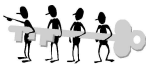
b) a side

c) an angle

NAME: _____ DATE:_____

MATHS: Higher Level Constructions and transformations

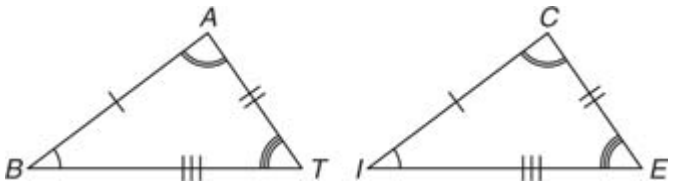
Language Level: A1/A2
Type of activity: pairs or individual
Suggested time: 10 minutes



Sentences

1. On these triangles, with a coloured pen, mark the following:

a) the angles
b) the sides
c) the area



Compare your markings with another student's.

2. Put these words in the correct order to describe different triangles. The first one is done for you.

Example: Equilateral – are of in which a triangle three sides length equal.

Equilateral – a triangle in which three sides are of equal length.

_____

Isosceles – in which a triangle are of equal length two sides

_____

Right-angled – one angle where is 90° a triangle

_____

Scalene – or sides are equal in which a triangle no two angles

_____

NAME: _____ DATE:_____
MATHS: Higher Level Constructions and transformations

Language Level: A1 / A2
Type of activity: pairs or individual
Suggested time: 30 minutes

Odd One Out

1. Circle the word which does not fit with the other words in each line.

Example: ***apple*** ***orange*** ***banana*** ***taxi***

point (pt)	angle	butter	line
triangle	hair	congruent	sides
symmetry	central	point (pt)	green
water	construct	image	translation

2. Find these words in your textbook. Then put them in short sentences in your own words. Use a dictionary if necessary.

to construct _____

to measure _____

to outline _____

to prove _____

to correspond to _____

Check that these key words are in your personal dictionary.

NAME: _____ DATE:_____
MATHS: Higher Level Constructions and transformations

Language Level: A1 / A2
Type of activity: individual
Suggested time: 10 minutes

Maths Keywords

1. Fill in the missing letters of the keywords listed below.
On the line next to the keywords, write down whether this word is a noun, an adjective or a verb.

con_ _ue_t _____

sym_ _t_y _____

inv_ _ti_ _te _____

dis_ _nce _____

2. Write as many words as possible related to **congruent triangles / this unit**. You have 3 minutes!

_____

_____

_____

_____

_____

_____

Check that these key words are in your personal dictionary.

NAME: _____ DATE:_____

MATHS: Higher Level Constructions and transformations

Language Level: A1 / A2
Type of activity: pairs or individual
Suggested time: 20 minutes

Unscramble the letters

1. A figure with three straight sides LIGATRNE

Answer _____

2. Another way of saying that you build something STOTNCRCU

Answer _____

3. When a maths figure is moved from one point in space to another NANSATTILOR

Answer _____

4. When two maths figures are exactly the same TONURCENG

Answer _____

Solve the secret code

English	A	E	G	I	L	N	P	R	S	T	Y
Code	B	X	Y	F	Z	Q	W	O	K	U	D

ex: YFOZ = GIRL

UOFBQYZXK BOX WOXUUD =

_____

NAME: _____ DATE:_____

MATHS: Higher Level Constructions and transformations

Language Level: A2/B1
Type of activity: pairs or individual
Suggested time: 30 minutes

Completing sentences

The sentences on this page are all from your textbooks. Fill in the blanks in these sentences. Use words from the Word Box below.

Angles of a triangle

A triangle has ____ sides and three angles. Each corner of the triangle is called a vertex (plural _____)

Congruent Triangles

What does it mean if two triangles are congruent?

If two triangles are _____ -

The measure of all _____ and angles in the first _____ are equal to the measure of all *corresponding* sides and _____ in the second triangle. Two sides are corresponding when they are opposite _____ angles.

Word Box:

three	equal	triangle	angles	congruent	vertices	sides

Level: A2 / B1
Type of activity: individual
Suggested time: 30 minutes

Multiple choice

We prove that two triangles are congruent therefore if we show any one of the following:
(1) SAS
(2) AAS
(3) SSS
(4) RHS
Investigate whether Δ *mon* and Δ *por* are congruent.
Please follow the three steps outlined here for all congruent triangle questions.
(1) Investigate if any side in Δ *mon* is equal to a side in Δ *por*. (You must be able to give a reason.)
(i) | mo | = | or | … both radii
(ii) | no | = | op | … both radii
(2) Investigate if any angle in Δ *mon* is equal to an angle in Δ *por*. (Again, you must be able to say why.)
| <*mon* | = | <*por* | … vertically opposite.
(3) Investigate if Δ *mon* is congruent to Δ *por*.
From the above diagram, we see that the triangles are congruent because of SAS.

1. What do SAS, AAS, SSS or RHS prove?
   a) triangles are congruent b) a show
   c) nothing d) that the sun is shining

2. How many outlined steps are there to follow?
   a) none b) one
   c) three d) two

3. What must you be able to give in part **(1)**?
   a) a side b) a reason
   c) equality d) a smell

4. Are | <*mon* | and | <*por* | vertically opposite?
   a) Yes b) No

5. Are the triangles congruent because of SSS?
   a) Yes b) No

NAME: _____ DATE:_____

MATHS: Higher Level Constructions and transformations

Language Level: A2/B1
Type of activity: individual and pairs
Suggested time: 40 minutes

Grammar points

1. **Preposition Hunt**

Preposition: a word or group of words that is used before a noun or pronoun to show place, direction, time etc.

Circle the 10 prepositions in this box. Score 4 points for each correct answer. Who will score the highest? Perhaps you will. Good luck!

maths	through	at	circle	across
triangle	divide	up	along	measure
of	central	onto	equal	side
out	off	angle	distance	symmetry
image	outline	in	mean	congruent

2. Missing Prepositions. The following are six sentences from your maths textbook. Some of the prepositions are missing. Decide which ones.

- When a circle contains a four-sided figure the opposite angles add ____ to 180°.
- Under a translation, the object moves ____ a given straight line.
- Mark the five main points on M and find the image ____ each point.
- Under axial symmetry, the object is reflected _____ a line.
- From point c draw a perpendicular line ____ A.
- Under central symmetry, the object is reflected _____ a fixed point.

3. Now it's your turn! Go to your maths textbook and the unit on congruent triangle. Rewrite some of the sentences, leaving out the prepositions. Swap your sentences with another student, fill them in and correct them for one another.

Alphaboxes

Using your textbook, find **one** word beginning with each of the letters of the alphabet. Write the word in the relevant box. You could also write the word in your own language.

a	b	c
d	e	f
g	h	i
j	k	l
m	n	o
p	q	r
s	t	u
v	w	xyz

NAME: _____ DATE:_____

MATHS: Higher Level Constructions and transformations

Maths Word Search

Find the words in the box below.

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

ANGLE	DISTANCE	TRIANGLE	EQUAL
AXIAL	FIND	TRIANGLES	LINE
CENTRAL	POINT	IMAGE	MEAN
CONGRUENT	TRANSLATION	SYMMETRY	
CONSTRUCT	SIDE	INVESTIGATE	

Play Snap

Make Snap cards with 2 sets of the same keywords. See *Notes for teachers* for ideas about how to use the cards.

translation	**translation**
distance	**distance**
under	**under**

find	find
same	same
construct	construct

symmetry	symmetry
angles	angles
pt (point)	pt (point)

central	central
congruent	congruent
line	line

Answer key

Working with words, page 6
1. a,d
2. b
3. c

Sentences, page 7
2. Isosceles – a triangle in which two sides are of equal length.
Right-angled – a triangle where one angle is 90º.
Scalene – a triangle in which no two angles or sides are equal.

Odd One Out, page 8
Butter, hair, green, water

Maths key words, page 9
congruent (adjective), symmetry (noun), investigate (verb), distance (noun)

Unscramble the letters, page 10
Triangle, construct, translation, congruent
Secret Code: triangles are pretty

Completing Sentences, page 11

Angles of a triangle
A triangle has **three** sides and three angles. Each corner of the triangle is called a vertex (plural **vertices**).
Congruent Triangles
What does it mean if two triangles are congruent?
If two triangles are **congruent** - .
The measure of all **sides** and angles in the first **triangle** are equal to the measure of all *corresponding* sides and **angles** in the second triangle. Two sides are corresponding when they are opposite **equal** angles.

Multiple Choice, page 12

1a, 2c, 3b, 4a, 5b.

Grammar points, page 13

1. Preposition Hunt: through, at, across, up, along, onto, of, out, off, in

2. Missing prepositions:

- When a circle contains a four-sided figure the opposite angles add **up** to 180°.
- Under a translation, the object moves **along** a given straight line.
- Mark the five main points on M and find the image **of** each point.
- Under axial symmetry, the object is reflected **across** a line.
- From point c draw a perpendicular line **onto** A.
- Under central symmetry, the object is reflected **through** a fixed point.

Word Search, page 15