Higher Level Maths

Area and volume

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.

Levels for Language Support	**A1 – B1** The language level of each activity is indicated in an information box.
Learning focus	Using Maths textbooks and accessing curriculum content and learning activities.
Acknowledgement	The *English Language Support Programme* acknowledges the permission of Gill and Macmillan to reproduce excerpts from *Shortcuts to Success. Maths. Junior Certificate Higher Level* by Mark Halpin.

***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
answer
arc
area
block
box
centimetres (cm)
circle
circumference
cone
container
cube
cylinder
diagram
difference
dimension
example (ex)
formula
height
hemisphere
laps
length
level
parallelogram
paving *(noun)*
paving stones
perimeter
pipe
radius
rectangle
semicircle
space
sphere
surface
tank
terms
track
triangle
values
volume (vol)
water
width

Verbs
to accompany
to add
to calculate
to curve
to empty
to fill
to fill out
to find
to let
to pack
to read
to remain
to remember
to show
to simplify
to solve
to substitute
to subtract
to submerge
to surmount
to use

Adjectives
carefully
cylindrical
different
empty
final
following
important
level
manageable
nearest
paving
perpendicular
rectangular
solid
total

Adverb
always
when

Other
hence = so = therefore
in terms of
in the following example
when we are asked

Symbols
= equals
π pi (pronounced '*pie*')
cm centimetre/centimetres
cm^3 centimetres cube/ centimetres cubed
r radius
h height

Vocabulary file 1

Word	Meaning	Note or example*
fill		
calculate		
volume		
surface		
cube		
height		
semicircle		

*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
circumference		
dimension		
sphere		
formula		
width		
curve		
radius		

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

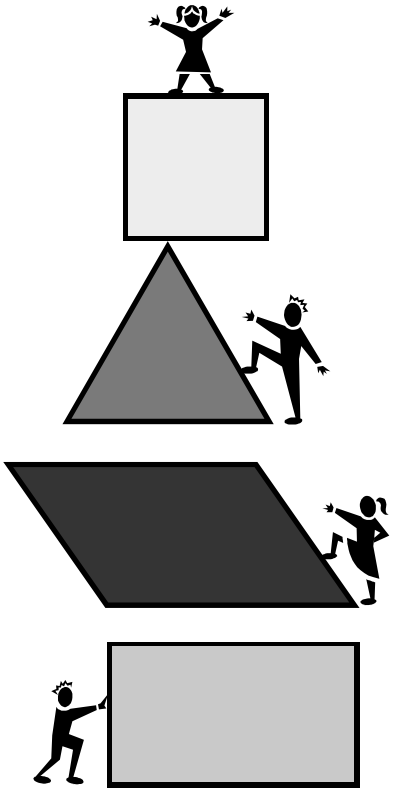
NAME: _____ DATE:_____

MATHS: Higher Level Area and volume

Language Level: A1
Type of activity: pairs or individual
Suggested time: 15 minutes

Working with words

1. **Match the shapes to the names.**



a) rectangle

b) square

c) parallelogram

d) triangle

2. Tick the best answer.
In maths, area is

a. the size of a flat surface
b. the place where you live
c. a place where there are theatres

3. Tick the best answer.
In maths perimeter is

a. the height of a place
b. the distance around the edges
c. the length of a place

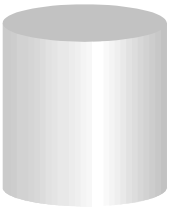
NAME: _____ DATE:_____
MATHS: Higher Level Area and volume

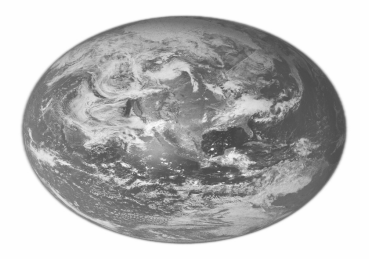
Language Level: A1/A2
Type of activity: pairs or individual
Suggested time: 30 minutes

Picture Sentences

1. Match the name to the shape.

a) sphere b) cylinder c) cube .





2. Put these words in the correct order to form sentences.

a rule mathematical is formula a

_____

x = length area width

_____

area rectangle the of each find

_____

each the of square perimeter find

_____

each triangles find the of of the following area

_____

NAME: _____ DATE:_____

MATHS: Higher Level Area and volume

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

Odd One Out

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

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

centimetres	cylinder	fire	volume
length	blue	height	width
car	parallelogram	rectangle	triangle
hemisphere	circle	sphere	rain

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

to substitute _____

to subtract _____

to show _____

to measure _____

to remain _____

Check that these key words are in your personal dictionary.

NAME: _____ DATE:_____

MATHS: Higher Level Area and volume

Language Level: A2 / B1
Type of activity: individual
Suggested time: 20 minutes

Maths Keywords

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

fo_ _ula _____

rec_ _ng_ _ar _____

sem_ _ir_le _____

rem_ _ni_g _____

2. Write as many words as possible related to **area and volume / this unit**. You have 3 minutes!

_____

_____

_____

_____

_____

_____

_____

_____

NAME: _____ DATE:_____

MATHS: Higher Level Area and volume

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

Unscramble the letters

1). A shape with four straight sides, two longer than the others CARELNGET

Answer _____

1). The outside part or top layer of something ACSREUF

Answer _____

1). A straight line from the centre to the edge of a circle DIRSUA

Answer _____

1). Work something out mathematically TECLACUAL

Answer _____

Solve the secret code

English=	A	C	D	E	I	L	N	R	S	U	V	Y
Code=	B	X	Y	F	G	Q	K	O	P	H	M	W

example: (code) YOGMF = DRIVE (English)

XWQGKYFOP BOF XHOMFY =

_____

NAME: _____ DATE:_____
MATHS: Higher Level Area and volume

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

Completing sentences

1. Fill in the blanks in these sentences. Use words from the Word Box below.

When we are asked to calculate the _____ or area of an object 'in terms of π':

(1) _____ out the formula for all values except π. Do not substitute 3.14 or 22/7 for π.

(2) Your final answer will therefore include π.

Example

A cylinder has a _____ of 8 cm and a height of 12 cm. _____:

(i) The volume of the cylinder in terms of π.

(ii) The total surface _____ in terms of π.

radius	calculate	fill	volume	area

2. Fill in the blanks in these instructions. Use words from the word box below.

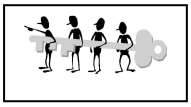
- Find, in metres, the length of the _____ of the field.
- Find, in m^2, the _____ of the field.
- Calculate, in cm, the _____ of the radius of the wheel.
- _____ the length of the arc.
- _____ a diagram, and let b= the breadth.

area	draw	calculate	perimeter	length

NAME: _____ DATE:_____

MATHS: Higher Level Area and volume

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



Multiple Choice

Read the text below and choose the best answers.

In the following example, the diagram is very important. Read the notes which accompany the question carefully and this type of question will be very manageable.

Example 1

Three spheres of radius 6 cm are packed into a cylinder. Calculate:

(i) The volume of the cylinder.

(ii) The volume of empty space in the cylinder. (let $\pi = 3.14$)

Dimensions of the cylinder

*Please remember that the radius of each sphere is 6 cm, so diameter is 12 cm.

*Radius of cylinder = radius of sphere

(i) Volume of cylinder = $\pi r^2 h$

= 3.14 x 6 x 6 x 36

= 4069.44 cm^3

(ii) Volume of sphere = $4/3\ \pi r^3$

= (4/3) x 3.14 x 6 x 6 x 6

= 904.32 cm^3

—> Volume of 3 spheres = 904.32 x 3

= 2712.96 cm^3

Volume of empty space = Volume of cylinder - Volume of spheres

Vol. of empty space = 4069.44 - 2712.96

= 1356.48cm^3

1. What accompanies the question in this text?

a) spheres b) money
c) nothing d) notes

2. What are the three spheres packed into?

a) a cylinder b) empty space
c) a radius d) dimensions

3. What is the diameter of each sphere?

a) three b) π
c) 12 cm d) 6 cm

4. Should the radius of a cylinder be the same as the radius of a sphere?

a) Yes b) No

5). Should you subtract the volume of spheres from the volume of cylinder?

a) Yes b) No

NAME: _____ DATE:_____

MATHS: Higher Level Area and volume

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

Vocabulary building

1. Adjectives to nouns

a) Notice the changes to the adjective when it becomes a noun:

How wide is the garden?
What is the width of the garden?

b) Write out the nouns for the following adjectives. Check the spellings in a dictionary.

wide → long →

high → broad →

c) Read these sentences from your text book and decide which of the words from b) would fit in the blanks.

- The area of a rectangle is 250cm². If it length is 40cm, calculate its _____
- The area of a triangle is 150cm². If its base is 25cm, calculate its perpendicular _____.
- Area of a lawn = _____ x _____ .

2. Nouns to adjectives. 

How would you describe the shape above?

It is a triangle, but the shape is triangular. Change the following nouns to adjectives.

circle → rectangle →

cylinder → square →

Vocabulary building (continued)

3. Circle the 10 nouns in these columns. Score 4 points for each correct answer. Who will score the highest? Perhaps you will. Good luck!

remaining	space
circle	rectangle
packed	triangle
perpendicular	radius
centimetres	let
arc	rectangular
empty	emptied
sphere	surface
width	fill
cylindrical	so
calculate	

Score: _____ points

4. Now it's your turn. Go to your maths textbook and the unit on area and volume. Rewrite six instructions, leaving out either nouns or adjectives. Leave a blank space where these words should be. Give these sentences to another student to fill in, and then correct one another's work.

_____

_____

_____

_____

_____

_____

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 Area and volume

Word Search

Find the words in the box below.

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

ARC	CYLINDER	RADIUS	TRACK
AREA	FORMULA	RECTANGLE	VOLUME
CENTIMETRES	HEIGHT	SEMICIRCLE	WIDTH
CIRCLE	HEMISPHERE	SPHERE	
CIRCUMFERENCE	LENGTH	SURFACE	
CUBE	PARALLELOGRAM	TANK	

Play Snap

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

✂

empty	**empty**
formula	**formula**
surface	**surface**

NAME: _____ DATE:_____

MATHS: Higher Level Area and volume

volume	volume
area	area
calculate	calculate

sphere	sphere
width	width
parallelogram	parallelogram

radius	radius
circle	circle
curved	curved

Answer key

Working with words, page 6
1. Square, triangle, parallelogram
circle, rectangle
2. Area is the size of a flat surface.
Perimeter is the distance around the edges.

Picture Sentences, page 7
Cylinder, cube, sphere
A formula is a mathematical rule.
Find the area of each rectangle.
Find the perimeter of each square.
Find the area of each of the following triangles.

Odd one out, page 8
Fire, blue, car, rain

Key words, page 9
Formula (noun), rectangular (adjective), semicircle (noun), remaining (verb or adjective)

Unscramble the letters, page 10
Rectangle, surface, radius, calculate
Secret code: cylinders are curved

Completing Sentences, page 11
1. When we are asked to calculate the **volume** or area of an object 'in terms of π':
(1) **Fill** out the formula for all values except π. Do not substitute 3.14 or 22/7 for π.
(2) Your final answer will therefore include π.
Example
A cylinder has a **radius** of 8 cm and a height of 12 cm.
Calculate:
(i) The volume of the cylinder in terms of π.
(ii) The total surface **area** in terms of π.

2.

- Find, in metres, the length of the **perimeter** of the field.

- Find, in m^2, the **area** of the field.
- Calculate, in cm, the **length** of the radius of the wheel.
- **Calculate** the length of the arc.
- **Draw** a diagram, and let b= the breadth.

Multiple choice, page 12

1d, 2a, 3c ,4a ,5a

Vocabulary building, page 13

1. b) Wide – width, long – length, high – height, broad – breadth

1. c)

- The area of a rectangle is $250cm^2$. If it length is 40cm, calculate its **breadth**.
- The area of a triangle is $150cm^2$. If its base is 25cm, calculate its perpendicular **height**.
- Area of a lawn = **length** x **width**.

2. circle – circular, rectangle – rectangular, cylinder – cylindrical, square – square

Vocabulary building, page 14

2. Nouns: circle, centimetres, arc, sphere, width, space, rectangle, triagle, radius, surface.

NAME: _____ DATE:_____

MATHS: Higher Level Area and volume

Word Search: