DISCOVERING 3D SHAPES

TEACHING NOTES

Mª Rosa Garcia Blazquez

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UNIT: DISCOVERING 3D SHAPES
LESSON 1
SESSION 1

ACTIVITY 1

Take some different common objects (3D shapes) that we use in our daily life to the classroom or ask the students to take some objects to school.
Groups of 5. Classify the shapes according to 3 different criteria, Example: solid and hollow, shapes which roll and shapes which slide,…
Introduce the concept: flat surface and curved surface.

RESOURCES: Common containers, different objects with 3D shapes
Sentence box :Reporting

> This shape rolls because it has a (curved) surface.
> This shape slides because it has a (flat) surface.

ACTIVITY 2

VENN DIAGRAM
Groups of 2. Each student cuts out the 3D shapes then in pairs decide where they can put them in the diagram.
Review with the whole class.
Students stick them in the correct place.

RESOURCES: Worksheet 1. Shapes which roll, shapes which slide.
If necessary common objects, to check.

ADVICE

Warm up activity: every day, before starting the class, revisit the things that you have done the previous day.

Power points

When you watch the PPts. You should leave each slide for a few minutes, in order that the students think about what is going on, and can answer questions such as: What 3D shape is? How many triangles has the tetrahedron?..... Watch the PPt. before watching it with the students.

UNIT: DISCOVERING 3D SHAPES
LESSON 1
SESSION 2

ACTIVITY 1

Power Point: Discovering 3D shapes.

RESOURCES: PPt 1

ACTIVITY 2

Groups of 3. Find 3D shapes in the classroom, (table legs, boxes,lamps,), and write them down.
Plenary. Share the information with the rest of the class. Make a list on the blackboard.

ACTIVITY 3

Present the flashcards of 3D shapes and 2D shapes.
Groups of 5 students. Classify them according to 3 different criteria. They have to start using the mathematical name of the 3D shapes. Example: Flat shapes, 2D, and 3D shapes.

RESOURCES:: Teaching resources 1: Flashcards

ACTIVITY 4

Individually. Fill in the chart: Name of the shapes and their dimensions.

RESOURCES: Worksheet 2

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LESSON 1
SESSION 3

ACTIVITY 1

Cards game
In pairs the students shuffle the cards and place them in rows, picture side down. One student turns over two cards. If the shape card matches the word form card, then the student takes the two cards and takes another turn. If the two cards do not match, the next turn goes to the other student.

RESOURCES: Teaching resources 2**:** Cards game 1 (a, b)

ACTIVITY 2

Domino game
Give each student a domino card, picture side down. Don't show it to your partners. Use your card as the example and read the description: Who has the cube? Tell students to look at their card and ask them to hold up their card if they have that shape. The student with the cube should hold their card up, then read the next description. Continue the game until all the sentences have been read out and the loop finishes back with the teacher's card

RESOURCES: Teaching resources 3: Domino cards 1

ACTIVITY 3

Individually. Mach the name of the shapes with the pictures and objects. Draw lines. Write sentences to describe the shape of the objects.

RESOURCES: Worksheet 3

EXTRA RESOURCES: Visit the, web page**.:**
http://www.primaryresources.co.uk/online/logshape3d.html**.**
Take into account that in England the square based prism is called a cuboid**.**
Students can work individually, in pairs or in a plenary session.

UNIT: DISCOVERING 3D SHAPES
LESSON 1
SESSION 4

ACTIVITY 1

Construction of 3D shapes
Groups of 4. Students construct the shapes of a cube, a triangular pyramid, a square pyramid, a square prism, triangular prism, a pentagonal pyramid, a cone, a cylinder and a sphere.
Can you construct the pentagonal pyramid with these shapes? (No)
Why? (because the triangles are not big enough).
Can you construct a pentagonal pyramid without a lid?
(No, these shapes can only be joined with 4 triangles at one vertex)
Can you construct the sphere?
Why not? (because there aren't curved surfaces).

RESOURCES: "Conexion" shapes. http://www.miniland.es/.
Reference 32131.
Sheets of paper, a cone net without lid (teaching resources 4), sellotape.

ACTIVITY 2

Watch PPt 1 slides 9, 10,11.Revisit: edge, face, vertex
Hand students the two parts of worksheet nº 4. Complete the charts and answer the questions using the constructions from the previous activity.
The pyramids have the same number of surfaces as the vertex.
The number of faces + number .of vertex = number of edges+2 Euler's theorem.

RESOURCES: PPt. 1 slides 9, 10,11., worksheets 4 (a, b), constructions activity 1

ACTIVITY 3

Revisit together the characteristics of the 3D shapes.

RESOURCES: Worksheets 4 (a,b), constructions activity 1
Sentence box

A
- square pyramid
- triangular pyramid
- cylinder
- cone
- sphere
- triangular prism
- square prism
- cube

is a 3D shape with

- 1
- 2
- 3
- 4
- 6

- flat surface/s
- curved surface/s

UNIT: DISCOVERING 3D SHAPES
LESSON 1
SESSION 5

ACTIVITY 1

In pairs. On the table there are cards, face down with drawings of 3D shapes, pieces of the game “CONEXION”, sheets of paper.
A student picks up a card and gives instructions to his partner who has to construct the shape. Swap roles.

RESOURCES: Teaching resources 5: cards 2, teaching resources 4, “Conexion” game, sheets of paper,.

ACTIVITY 2

Some students report to the class how they made the shapes, and compare the shapes.
It is possible to construct the sphere?
Why? Why not?
Think about how to construct a sphere.
Answer: with water, soap and straws.
Make spheres.

RESOURCES: Teaching resources 6: Language frames. Cups, soap, and straws.

ACTIVITY 3

Assessment. Depending of the student’s level hand them worksheets 5 (a and b), (or a” and b). (differentiating language). Label the shapes, the parts of the shapes, and answer the questions.

RESOURCES: Worksheets 5 (a, a” and b)

UNIT: DISCOVERING 3D SHAPES
LESSON 2 A BIT DEEPER.
SESSION 1

ACTIVITY 1

Domino game
Give each student a domino card, picture side down. Don't show your partners. The teacher starts the game asking a question: Who has a 3D shape with 6 square surfaces? The student that has the cube should hold up their domino card and asks their question.

RESOURCES: Teaching resources 7: Domino cards 2

ACTIVITY 2

Make a cube, a triangular pyramid, a square pyramid, a square prism with the game "Conexion" Undo it, put it flat on the table At any moment you can separate one piece from the others completely. This is a net. Look at them carefully.
Fold the nets and construct the shapes.

RESOURCES: " Conexion game"

ACTIVITY 3

Write the name of the shapes under their nets. There are extra shapes

RESOURCES: Worksheet 6.

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LESSON 2
SESSION 2

ACTIVITY 1

Hand the students nets of different 3 D shapes (one for each). Look at them carefully.
Ask some students what shape they can construct with their net.
Cut out the nets, and construct the shapes.
Make a creative display with the shapes. Students label the shapes.

RESOURCES: Teaching resources 8 : Nets (print them in coloured paper)

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LESSON 2
SESSION 3

ACTIVIY 1

Look carefully at the 3D shapes (realia): sphere, square pyramid, square prism, cone, and cylinder from above, below and in front.
What can you see?
A circle, a square, a triangle, a rectangle.

RESOURCES: 3D shapes (realia)
Sphere, square pyramid, square prism, cone, cylinder.

From in front, from above, from below.

If I look at the_____from_____I can see a_____.

ACTIVITY 2

Complete the chart.
If you see a rectangle, it could be a prism or a cylinder….

RESOURCES: Worksheet 7.

ACTIVITY 3

"In the hot seat".
One of the students picks up a card from teaching resources 2a. The student is a 3D shape". The others have to ask questions trying to guess what shape the student is .
Do you have flat/curved surfaces?
Do you have triangles?
How many faces do you have?

RESOURCES: Teaching resources 2a, and teaching resources 9: Language frame.

EXTRA RESOURCES: Visit the web page:
http://www.harcourtschool.com/activity/solid_figures/
Students can work individually, in pairs o in a plenary session.

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LESSON 2
SESSION 4

ACTIVITY 1

Look at the display (lesson 2 session 2)
Which of the 3D shapes is made with identical faces?
(The cube, and the triangular pyramid)
Groups of 3: Construct 3D shapes with the game "Conexion" using only identical faces: triangles, squares, pentagons.

ACTIVITY 2

Watch the PPt 2: Regular polyhedrons.
Groups of 3. Construct the regular polyhedrons that you didn't make before.

RESOURCES: display, lesson 2 session 2, game connexion, PPt 2
Sentence box

A (cube or hexahedron) has (6) squares.
A(triangular pyramid or tetrahedron) has (4) triangles.
An (octahedron) has (8) triangles.
A (dodecahedron) has (12) pentagons.
An (icosahedron) has (20) triangles.

ACTIVITY 3

Complete the tree Diagram.

RESOURCES: Worksheet 8

EXTRA RESOURCES: Visit these web pages:
http://www.learner.org/interactives/geometry/platonic.html

http://www.mathsnet.net/geometry/solid/nets.html

Students can work individually, in pairs o in a plenary session.

UNIT: DISCOVERING 3D SHAPES
LESSON 2
SESSION 5

ACTIVITY 1

Construction of 3D shapes with straws and plasticine.
Show a model. One slide of PPt 3
Give each student a worksheet number 9.
First individually, later in pairs. Students predict how many straws and balls of plasticine they need.

RESOURCES: PPt 3, worksheet 9.

ACTIVITY 2

Students prepare the balls of plasticine and cut the straws in 9, 5, and 3 cm.
Students construct the 3D shapes with straws and plasticine
They check if their predictions are correct, and answer the question.
The cube and the rectangular prism have the same number of edges and the same number of vertices, because the rectangular prism is like if we stretch the cube a little.
Watch the PPt 3

RESOURCES: Worksheet 9. Enough straws so each student has about 25 straws of 9 cm, 30 straws of 5 cm and 15 straws of 3 cm, and 40 small balls of plasticine. PPt 3

ACTIVITY 3

Guessing game
Pair work. Student A tell student B how many straws and plasticine balls they need to construct one shape from worksheet 9. Student B guesses the shape

RESOURCES: Worksheet 9.
Sentence box:

To construct this shape you need_____ straws and _____plasticine balls.
It has_____ edges, and _____vertices.
The edges can have equal length. (triangular prism, square pyramid, triangular pyramid
The edges must have equal length (cube)
The edges don't have to be of equal length (rectangular prism)

UNIT:DISCOVERING 3D SHAPES
LESSON 2
SESSION 6

ACTIVITY 1

Until now we have constructed 3 D shapes with nets, or with the game Conexion,.
This activity shows how to construct a cube with a square piece of paper.
During the task, stop at two or three stages. Ask students to turn to a partner and compare the progress they are making with the construction.
Once the cube is completed ask small groups to think of some ideas about what the cube could be used for.
Pre-teaching: Origami, fold, unfold, press, flat, flap, pocket, tuck, expand, blow.

RESOURCES: PPt 4: Origami cube. Coloured square pieces of paper. Dictionary (teaching resources 10)
Word bank: Origami, fold, unfold, diagonal, press, flat, flap, pocket, tuck, expand, blow.

ACTIVITY 2

Nets of a cube. Discover which nets can construct a cube.
Individually. Students make their predictions.
Students compare their ideas with a partner.
Ask different groups of children to make different nets (so the whole class can check their predictions) (drawing, cutting out and constructing) or make the nets with the game Conexion.

RESOURCES: Worksheet 10. Game Conexion.
The nets of a cube are: 2,3,5,6,7.

UNIT: DISCOVERING 3D SHAPES
LESSON 3 3D SHAPES IN THE CITY
SESSION 1

ACTIVITY 1

Practise the drawing of 3D shapes with worksheet 11.

RESOURCES: Worksheet 11

ACTIVITY 2

Go for a walk around your local area looking for 3D shapes.
Groups of 4. Each group is in charge of looking for 2 kinds of 3D shapes, writing them down on the worksheet 12. Each student finds a building or a piece of street furniture and draws it. The members of the group help each other to make the drawings. If possible each group has a camera. If not, the teacher takes photos of the shapes: Buildings, sculptures, lights, litter bins, buses,…,

RESOURCES: Preparation for the walk: make sure you find different shapes during your walk. Worksheet 12, digital camera,

ACTIVITY 3

Reporting
Each group prepares a report of their drawings and tells the rest of the class about one of them. Make a display with the drawings.
Sentences box

My building is in (number and street)

It is made up of

1
2
3
4

sphere/s
cone/s
cylinder/s
prism/s
cube/s
pyramid/s
……

and

1
2
3
4

sphere/s
cone/s
cylinder/s
prism/s
cube/s
pyramid/s
…

The most common 3D shape during our walk was_____

UNIT: DISCOVERING 3D SHAPES
LESSON 3
SESSION 2

ACTIVITY 1

Students look at photos they took the previous day and classify them.
They make a display with the photos.
Each group reports to the others the number of shapes they found.
Make a bar chart showing the different shapes that they discovered. They colour the squares in the bar chart.

RESOURCES: Photos from activity 2 previous day, worksheets 12 and 13
Sentences box

We found (1,2,3,4…) (cylinder/s, cube/s prism/s..)

ACTIVITY 2

Pre-teach: hemi-sphere (1/2 sphere), hemi-cylinder (1/2 cylinder)
Watch PPt 5 about London.
Students look at each slide for a few minutes They put their hands up when they recognize a 3D shape The student tells the name of the 3D shape. They colour a square in the bar chart.

RESOURCES: PPt 5:London (project each slide for a few minutes), worksheet 13

ACTIVITY 3

Compare the shapes you saw in London with those in your local area and answer the questions.
Pre-teaching: A cylindrical shape has a shape of a cylinder.
A conical shape has a shape of a cone.

RESOURCES: Worksheet 13. Expect some L1. Possible answer for the last question: easier to construct/ more function (space saving) /cheaper.

OPTION: When watching the PPt of London encourage the students to make links with buildings in their own countries.
Tell students to think of some buildings which are similar to those in your local area or country.

UNIT: DISCOVERING 3D SHAPES
LESSON 3
SESSION 3

ACTIVITY 1

Watch PPt 6: 3D shapes in daily life. The students tell which 3D shapes the objects are.

RESOURCES: PPt 6. Shapes in daily life.

ACTIVITY 2

Creativity.
Students "invent" a 3D object, and explain what is it used for.
Design it making a drawing, or making a 3D shape with different materials (include recycled materials). They could do it at home or in the classroom.
Students describe their design.

RESOURCES: Worksheet 14. Different materials (include recycled materials)
Sentences box

I designed a_____
It is used for_____
With this object you can_____
I think it can be made of (plastic, paper, stone, clay,…)

ACTIVITY 3

Students think about the best place to put their design objects.
Students make a drawing of the best place, and some of them report their ideas to the rest of the class.

RESOURCES: Worksheet 15
Sentence box

I'd like my object to go | inside / outside | in a modern/ancient building

OPTION: Personalising content

While watching the PPt encourage students to think about different shapes the objects can be made of. E.g A candle can be the shape of a rectangular prism.

UNIT: DISCOVERING 3D SHAPES
LESSON 3 REVISITING
SESSION 4

ACTIVITY 1

Peer assessment
In pairs. Give them worksheets 16 (a and b). Student A asks student B the questions on worksheet A: (Question 2:_____.) Student B writes the answer in rectangle 2.
Students change roles and check their answers.

RESOURCES: Worksheets 16 (a and b)

ACTIVITY 2

Column dictation
Plenary. Depending on the student's level hand them worksheet 17 (a or a") Give some students a piece of paper with the name of a part of a shape, or a name of a regular polyhedron ,,,
Each student reads their piece of paper, and the whole class writes down the name in the appropriate column.
Students can ask the student who is reading the word how to spell it.

RESOURCES: Worksheet 17 (a or a"), Teaching resources 11

ACTIVITY 3

There are two different revisiting worksheets: a, an a". Some of the questions are the same, some have content differentiation, some have language differentiation and some both.
Depending on the student's level give them worksheets 17 (b and c) or (b" and c").
Students answer the questions.

RESOURCES: Worksheets 17 (b and c) Worksheets 17 (b" and c")

ACTIVITY4

Self assessment. Give the students Worksheet 18. Students answer the questions.

RESOURCES: Worksheet 18