Spaces and Volumes II

Reading

Read the text opposite. Choose the best answer in each case.

1 Who is this report from?

a the Design Department
b the Technical Department
c the General Manager
d We don't know.

2 What is the purpose of the report?

a to recommend a bottle shape
b to suggest a package shape
c to suggest possible bottle shapes
d to recommend a name for the perfume

3 The report recommends using:

A a sphere.
b a cylinder.
c a pyramid.
d a cone.

4 The pyramid is not suitable because:

a it doesn't hold enough perfume,
b it holds too much perfume,
c it doesn't fit in the packaging.
d the Design Department doesn't like it.

Shapes for a new perfume bottle: A report

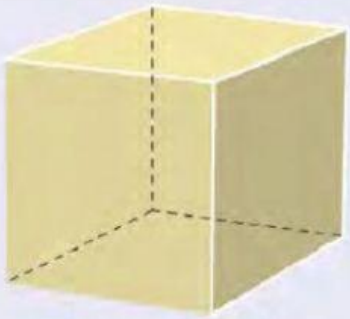


Figure 1: The packaging

Introduction

The General Manager asked the Technical Department to look at possible bottle shapes for the new perfume, *Moonlight*, and to recommend the best shape.

Terms of reference

The new bottle has to fit into the existing packaging which is a cube of 4.5 cm sides – see Figure 1. The bottle therefore has to have maximum dimensions of 4 cm in any direction. The bottle has to hold 30 cc (cm^3) of perfume. The shape has to be interesting. The Design Department suggests a pyramid, a cylinder, a sphere or a cone. These shapes can be seen in Figure 2.

LIVEWORKSHEETS

Analysis

The Technical Department looked at the four possible shapes and calculated the volume for the largest possible bottle of each shape. The results are shown in Table 1. They then wrote a report.

Table 1: Cubic capacity of each shape

Shape	Capacity
pyramid	21.3 cm^3
cylinder	50.3 cm^3
sphere	33.5 cm^3
cone	16.8 cm^3

Conclusion

The sphere is the only suitable shape for this size of packaging – see Table 1. The cylinder holds far too much while the pyramid and the cone do not hold enough.

Recommendations

We should use a spherical shape for the new bottle. We should not use a cylinder, cone or pyramid.

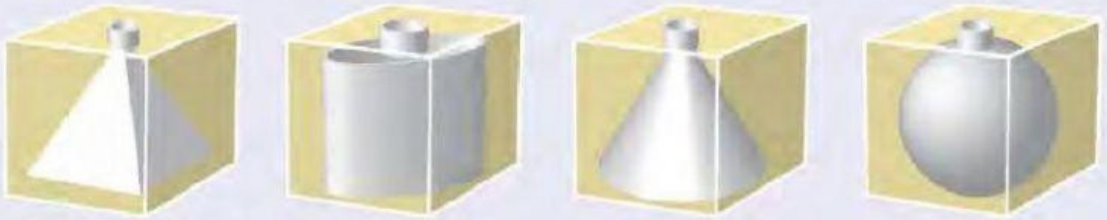


Figure 2: Possible bottle shapes inside packaging

Talking about obligation

We use ***have to*** + **infinitive** and ***should*** + **infinitive** to talk about obligation.

Examples:

*The new bottle **has to fit** into the existing packaging.*

*The shape **should be** interesting.*

We use ***does not*** or ***do not have to*** + **infinitive** and ***should not*** + **infinitive** to talk about obligation in the negative form.

Examples:

*The bottle **does not have to be** round.*

*We **should not use** a cylinder shape.*

What do you have to do to pass your exams?

How should you dress for school?

What should you eat to stay healthy?

What shapes did the Design Department suggest for the perfume bottle?

Why do you think they didn't suggest a cubic shape?

LIVEWORKSHEETS

Find and correct the mistake in each sentence.

1 The bottle has have maximum dimensions of 4 cm in any direction.
2 The bottle have to hold 50 cc of perfume.
3 The shape has being interesting.
4 We should to use a cylinder shape.
5 We should not used the cylinder, cone or pyramid.

Listening:

Listen and complete the summary of the reading text. Write one word in each space.

The report has five sections. The first section is the _____, which contains the purpose of the report. The second section is the terms of _____. This explains the problem that has to be solved. The third section is the_____: what the writer did. The fourth section is the _____: what the writer discovered. And the final section is the _____: what the writer thinks the company should do.

Reading:

Lea el siguiente extracto y responda: Se describe un problema o una forma de resolver un problema?

You can get a good estimate of the volume of a complicated shape by breaking it down into two or three simpler shapes. For example, the complicated shape in Figure 1 contains two simple shapes - a cone and a sphere. The conical part has a diameter of 4 cm and a height of 4 cm. The formula for the volume of a cone is $\pi r^2 h$ divided by 3. Therefore the volume of this cone is 3.142 times 2^2 times 4 divided by 3, which equals 16.76 cc.

The spherical part has a diameter of 4 cm. The formula for the volume of a sphere is $4 \pi r^3$ divided by 3. Therefore the volume of this sphere is 4 times 3.142 times 2^3 divided by 3, which equals 33.51 cc. The total volume is therefore 16.76 + 33.51, which equals 50.27 cc. However, this is just an estimate as the cone must be attached to the sphere.

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1 Which two shapes does Figure 1 contain?

- **a** a sphere and a cone
- **b** a sphere and a cylinder
- **c** a cylinder and a cone
- **d** a cone and a pyramid

2 Which is the correct formula for calculating the volume of a cone?

- **a** πr^2
- **b** $\pi r^2 h/3$
- **c** $\pi r^2/3$
- **d** πr^2

3 What is the total volume of the object?

- **a** 12.60 cc
- **b** 33.51 cc
- **c** 16.76 cc
- **d** 50.27 cc

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