MEASUREMENT: SURFACE AREA

29 MAY 2014

Lesson Description

In this lesson we:

- Introduced and do questions relating to:
  - Surface Area
  - Calculations to do with Surface Areas
  - Costings

(Remember that Surface Area is linked very closely to Area and Volume and questions on surface area can involve volume.)

Summary

Circumference of a Circle

= $2 \times \pi \times radius$ OR $\pi \times diameter$

Area of a Rectangle

= length x breadth

Area of a Triangle

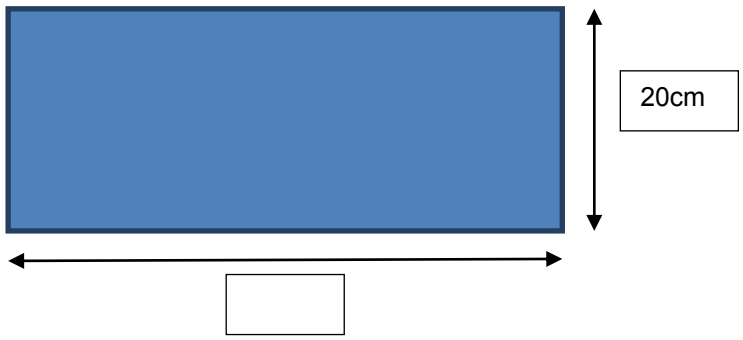
= ½ x base x perpendicular height

Area of a Circle

= $\pi \times (radius)^2$

Test Yourself

Question 1

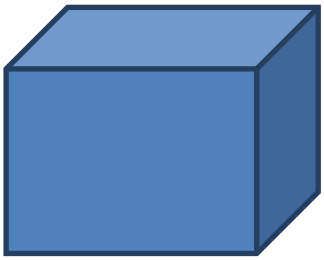


What is the area of a rectangle with dimensions 0,5m x 20cm?

A. $10m^2$
B. $10cm^2$
C. $1000\,m^2$
D. $1000\,cm^2$

Consider the diagram below when answering questions 2 – 4.

The diagram shows a square block of wood, each side being 35cm.



Question 2

Each side will have an area of:

A. $1225m^2$
B. $1225cm^2$
C. $1225\,m^3$
D. $1225\,cm^3$

Question 3

The **total** surface area of the block of wood is:

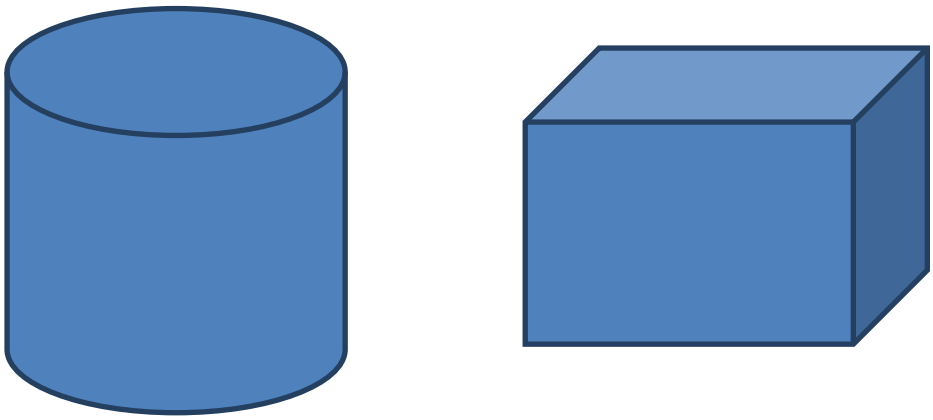
A. $4\,900\,cm^2$
B. $6\,125\,cm^2$
C. $7\,350\,cm^2$
D. None of the above

Question 4

If the length of each side were doubled, the surface area would:

A. also double
B. triple
C. half
D. none of the above

Consider the following diagram when answering questions 5 – 10



The diagrams illustrates a round tin (13cm high and 8cm in diameter) and a rectangular tin with measurements 8 cm long, 7cm wide and 6 cm high.

Question 5

The round tin has a surface area of:

A. 401,92 cm^2
B. 414,48 cm^2
C. 427,04 cm^2
D. None of the above

Question 6

The surface area of the rectangular tin is:

A. 336 cm^2
B. 292 cm^2
C. 146 cm^2
D. None of the above

Question 7

Which has the greater surface area?

A. The round tin
B. The rectangular tin
C. They are both the same
D. None of the above

Question 8

What is the volume of the round tin?

A. 653,12 cm^3
B. 2 612,48 cm^3
C. 163,28 cm^3
D. None of the above

Question 9

What is the volume of the rectangular tin?

A. 336 cm^3
B. 33,6 cm^3
C. 336 cm^2
D. None of the above

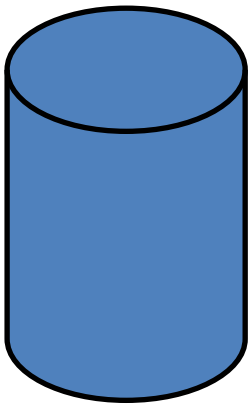
Question 10

Which has the greater volume?

A. The round tin
B. The rectangular tin
C. They are both the same
D. None of the above

Improve your Skills

Question 1



A water tank, as illustrated above, has a height of 2,75m and a diametre of 1,8m.

1.1 Due to the fact that the water tank is looking shabby, Joe decides to paint the tank a lovely blue colour.

1.1.1 What surface area needs to be painted? (Remember that there is no need to paint the bottom of the tank as it lies on the floor. However, the top and sides need painting.)

1.1.2 How many litres of paint are required if 1 litre can cover 4,5 m^2.

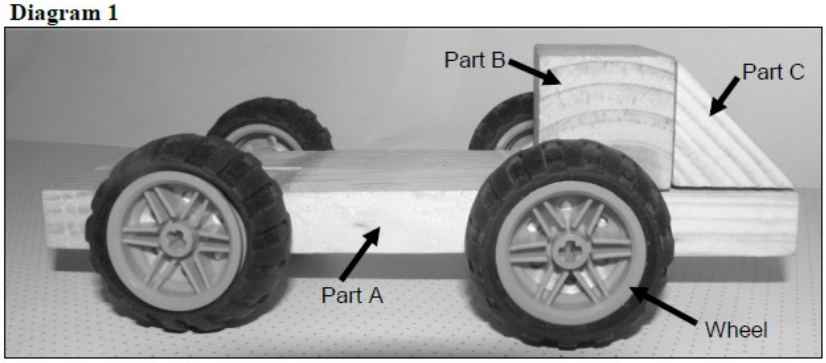
1.1.3 The local hardware store sells this specific colour of paint in 5 litre cans, each costing R439,00. What will it cost to paint the entire water tank.

1.2 If 1 litre of water can fit into a space of 1000 cm^3, then determine how many litres of water can fit into the water tank if it is 95% filled.

Question 2

(Adapted from IEB P2, 2012, Question 5)

Diagram 1



Part A – rectangular block of wood (rectangular prism)
Part B – rectangular block of wood (rectangular prism)
Part C – triangular block of wood (triangular prism)

Diagram 2

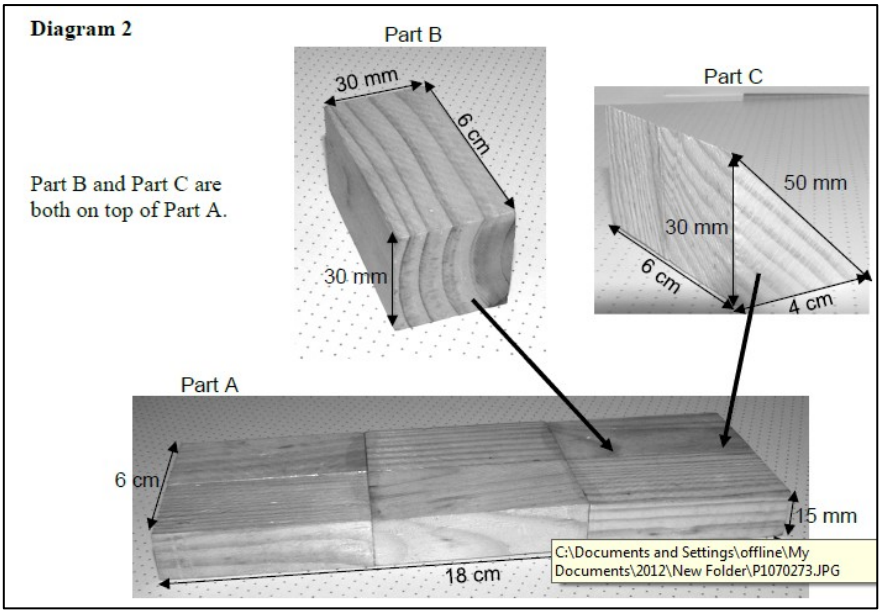
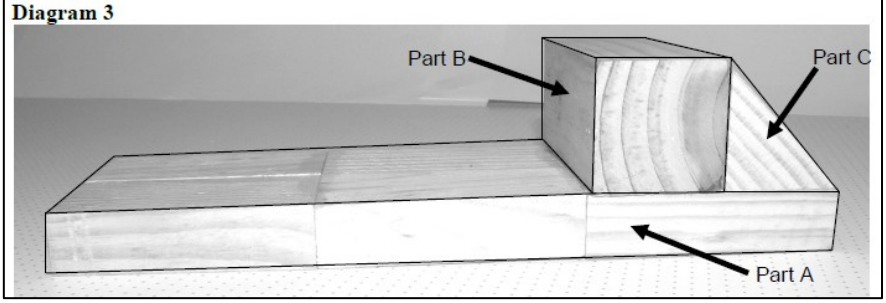


Diagram 3



Bongani and Thabiso need to raise funds for a soccer tour. They decided to make and sell wooden toy trucks to sell at a Saturday Flea Market. The truck will look as shown in Diagram 1.

Part B and Part C are glued to Part A and the wheels are not yet attached.

2.1 Calculate the surface area (in mm^2) of Part A that must be painted (after Part B and C are glued to Part A). You may need to use the following formula:

Area of a rectangle = length × breadth

(8)

2.2 Bongani says that the surface area of Part C that needs to be painted is 420 cm^2. Verify, with calculations, whether his statement is correct or not. You may need to use the following formulae:

Area of a rectangle = length × breadth Area of a triangle = $\frac{1}{2}$ × base × perpendicular height

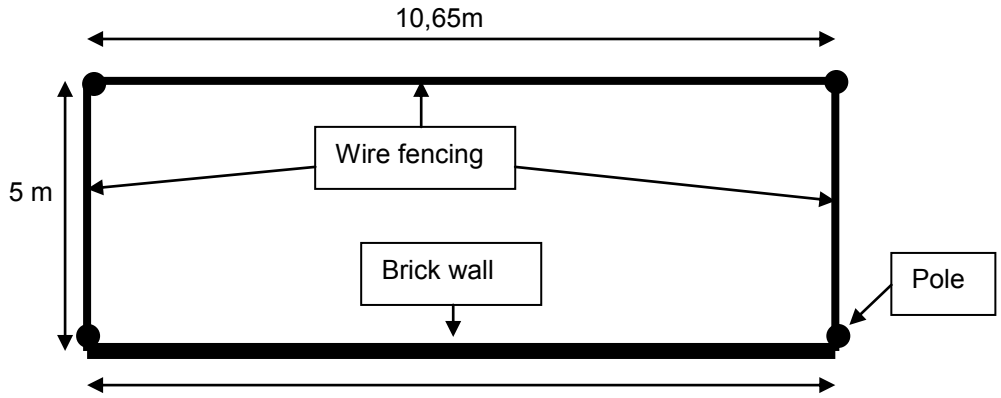
(6)

2.3 Given that the area of Part B that needs to be painted is 5 400 mm^2, calculate the total area (in mm^2) of Parts A, B and C that needs to be painted. (2)

2.4 At a hardware store, Thabiso is told that one litre of paint covers 5 m^2. He buys 5 litres of paint. Show, by means of calculations, whether he has enough paint to paint 700 trucks, (as shown in Diagram 3), each with one coat of paint. (5)

Question 3

A chicken farmer intends to build a chicken pen using fencing on three end of the pen and he intends to build a brick wall on the one side in order to protect the chickens from strong winds. The sketch below illustrates the farmer's plan (NOT drawn to scale).

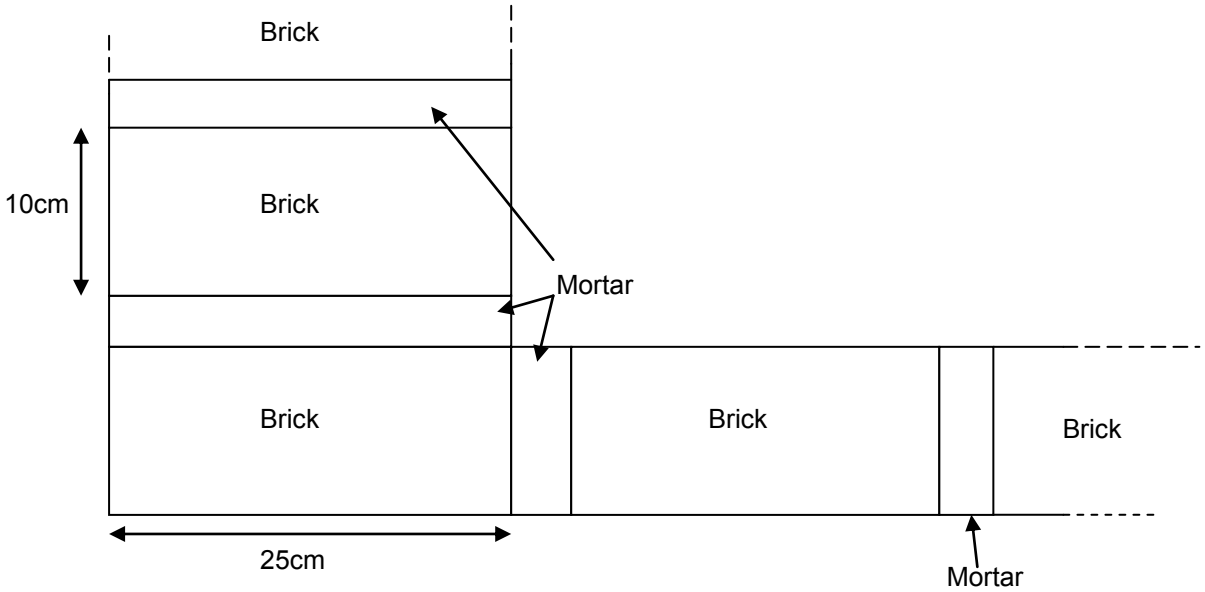


3.1 Determine the length of wiring required for the chicken run.

3.2 Determine the cost of fencing if the farmer buys 6 metres rolls of wiring for R89,94. The hardware where the farmer buys his goods from, does not sell wiring in any shorter or longer rolls.

3.3 The farmer needs to plant poles in order to hold up the fencing. Four Poles (as illustrated by●) are placed as shown in the diagram above. However, the farmer is told that the maximum length between poles must be 1,5 metres. (distance between the poles can be shorter if need be). How many poles (including the 4 shown in the diagram) does the farmer need in order to hold the fencing?

3.4 The side-view of the brick wall will look as follows: (Only the first few bricks are shown in the diagram below)



Each brick is 25 cm long and the mortar between the bricks are 1 cm wide. Determine how many bricks are needed per level if the wall is 10,65m long?