Model Boats

When a scale model is made, all the lengths are reduced by a particular scale factor.
This means the surface area and the volume are both reduced, but not by the same scale factor…

Full size

Scale model

A 1: 4 scale model of a canoe is built. It is 120cm long. The full size boat has a width of 60cm.

1.

Write down the **length scale factor** from the model to the full-sized canoe: $LSF =$_____

Work out the **area scale factor** from the model to the full-sized canoe: $ASF =$_____

Work out the **volume scale factor** from the model to the full-sized canoe: $VSF =$_____

2.

a) Find the length of the full size boat.

b) Find the width of the scale model.

_____*cm*

_____*cm*

c) A full size boat uses £100 worth of plywood. How much does the plywood used to build the model cost?

d) When a Canadian canoe capsizes, it can be very hard to right it because of the weight of water inside. If the model can hold 25 litres of water, how much would the real thing hold?
And how much would this weigh?

_____*litres*

£_____

_____*kg*

Model Boats SOLUTIONS

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A $1:4$ *scale model of a canoe is built. It is* $120cm$ *long. The full size boat has a width of* $60cm$.

1.

Write down the **length scale factor** from the model to the full-sized canoe: $LSF =$**4**

Work out the **area scale factor** from the model to the full-sized canoe: $ASF =$**16**

Work out the **volume scale factor** from the model to the full-sized canoe: $VSF =$**64**

2.

a) Find the length of the full size boat.

Model has length $120cm$, length scale factor 4:
$$120 \times 4 = 480$$

480cm

b) Find the width of the scale model.

Boat has width $60cm$, length scale factor 4:
$$60 \div 4 = 15$$

15cm

c) A full size boat uses £100 worth of plywood. How much does the plywood used to build the model cost?

Cost of plywood relates directly to area, so using the area scale factor of 16:
$$100 \div 16 = 6.25$$

£6.25

d) When a Canadian canoe capsizes, it can be very hard to right it because of the weight of water inside. If the model can hold 25 litres of water, how much would the real thing hold?
And how much would this weigh?

Amount of water it can hold relates directly to volume, so using the volume scale factor of 64:
$$25 \times 64 = 1600$$

And note that 1 litre of water weighs 1kg

1600 $litres$

1600 kg