Math 9 – Unit 4: Measurement

Name: Anne Sers

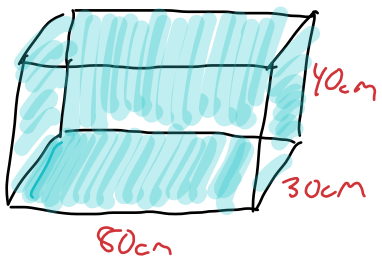
4.5 Measurement Applications

Date: _____

1. An aquarium is in the form of a rectangular prism whose external measures are 80 cm × 30 cm × 40 cm. The base, side faces and back face are to be covered with a coloured paper. Find the area of the paper needed.

l w h

not top or front.



Sides: $2 \times 40 \times 30 = 2400\,cm^2$

Back = $40 \times 80 = 3200\,cm^2$

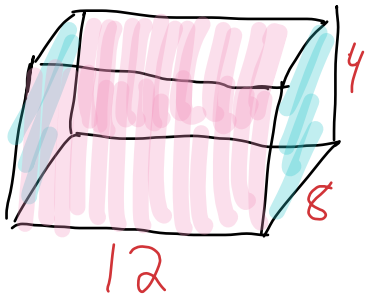
Bottom = $80 \times 30 = 2400\,cm^2$

$8000\,cm^2$

∴ You would need $8000\,cm^2$ of paper.

2. The internal measures of a cuboidal room are 12 m × 8 m × 4 m. Find the total cost of painting all four walls of a room if the cost of painting is \$5 per m^2. What will be the cost of painting if the ceiling of the room is also to be painted?

l w h



Side walls = $2 \times 4 \times 8 = 64\,m^2$

Front and Back walls = $2 \times 12 \times 4 = 96\,m^2$

Total = $160\,m^2$

Cost: \$5 per m^2

$= 5 \times 160$

$= \$800$

The ceiling is $12 \times 8 = 96\,m^2$

and $\$5 \times 96 = \$480$

3. In a building there are 24 cylindrical pillars. The radius of each pillar is 28 cm and height is 4 m. Find the total cost of painting the curved surface area of all the pillars at the rate of \$8 per m^2.

$SA = 2\pi r^2 + 2\pi rh$

$r = 28cm = 0.28m$

$h = 4m$

$SA = 2(3.14)(0.28)(4)$

$SA = 7.0336 m^2$ for one.

24 cylinders

$= 24 \times 7.0336$

$= 168.8 m^2$

$Cost = \$8 \times 168.8$

$= \$1350.48$

4. Find the volume of a cylinder whose radius is 7 cm, and the total surface area is 968 cm^2.

$SA = 2\pi r^2 + 2\pi rh$

$968 = 2(3.14)(7)^2 + 2(3.14)(7)h$

$968 = 307.72 + 43.96h$

$-307.72 \quad -307.72$

$\frac{660.28}{43.96} = \frac{43.96h}{43.96}$

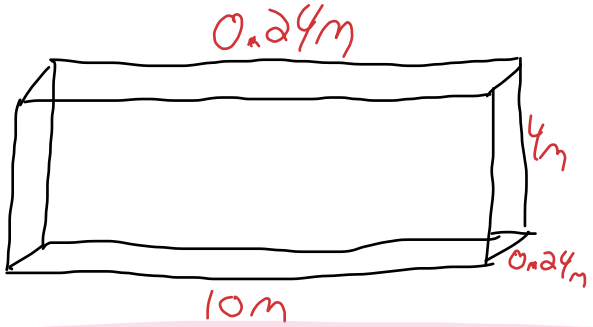
$15_{cm} = h$

$V = \pi r^2 h$

$V = (3.14)(7)^2(15)$

$V = 2307.9 cm^3$

5. A wall of length 10 m was to be built across an open ground. The height of the wall is 4m and thickness of the wall is 24 cm. If this wall is to be built up with bricks whose dimensions are 24 cm × 12 cm × 8 cm, how many bricks would be required?



l w h

① Volume of one brick in meters

$V = lwh$

$V = (0.24)(0.12)(0.08)$

$V = 0.002304 m^3$

② Volume of wall

$V = (10)(4)(0.24)$

$V = 9.6 m^3$

③ How many bricks fill up the wall?

$9.6 \div 0.002304 = 4166.67$

Or do it all in cm. Same final answer

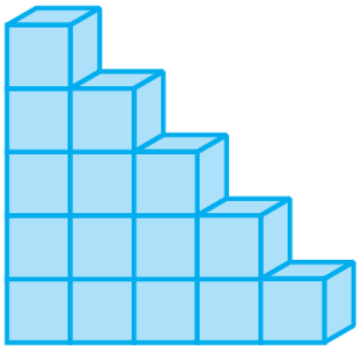
6. A child playing with building blocks, which are of the shape of cubes, has built a structure as shown. If the edge of each cube is 3 cm, find the volume of the structure built by the child.

V of cube $= 3^3 = 27$

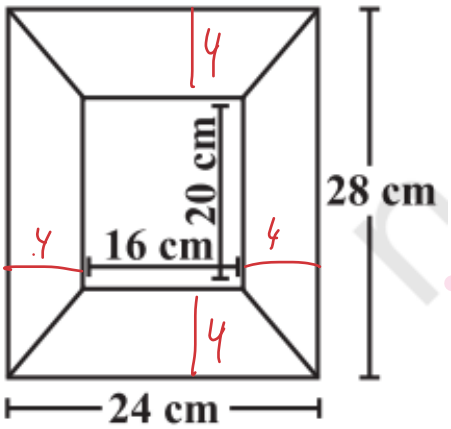
15 cubes $\therefore$

$$\begin{array}{r} 27 \\ \times\ 15 \\ \hline 135 \\ 270 \\ \hline 405 \end{array}$$

$405 cm^3$



7. Diagram of the picture frame below has outer dimensions = 24 cm × 28 cm and inner dimensions 16 cm × 20 cm. Find the area of each section of the frame, if the width of each section is the same.



Top + Bottom

$A = \frac{(a+b)h}{2} \times 2$

$A = (16+24)(4) = 160\,cm^2$ → $80\,cm^2$ each

Sides:

$A = \frac{(a+b)h}{2} \times 2$

$A = (20+28)(4) = 192\,cm^2$ → $96\,cm^2$ each

Total $= 352\,cm^2$

8. David and Ben decided to set up a lemonade stand on a hot summer day. They took a large cylindrical vessel of base radius 15 cm and filled up to a height of 32 cm with lemonade they had prepared using freshly squeezed lemons. The lemonade is filled in small cylindrical glasses of radius 3 cm up to a height of 8 cm and sold for $5 each. How much money do they make by selling the prepared lemonade completely?

(1) Total Lemonade:

$V = \pi r^2 h$

$V = (3.14)(15)^2(32)$ (225×2)

$V = 22608\,cm^3$

(2) Volume of one cup:

$V = (3.14)(3)^2(8)$

$V = 226.08\,cm^2$

(3) How many cups?

$22608 \div 226.08$

$= 100$ cups.

(4) Revenue:

$100 \times \$5$

$= \$500$