

Q1.

- a) Base area of tank $= \{(7 \times 2.5) + (2 \times 4.5)\} \text{ m}^2$
 $= (17.5 + 9) \text{ m}^2$
 $= 26.5 \text{ m}^2$
- b) Wall area of tank $= \{(7 \times 4) + (2 \times (2.5 \times 4)) + (5.5 \times 4) + (2 \times (2 \times 4)) + (4.5 \times 4)\} \text{ m}^2$
 $= (28 + 20 + 22 + 16 + 18) \text{ m}^2$
 $= 104 \text{ m}^2$
- c) Volume of tank $= (26.5 \times 4) \text{ m}^3$
 $= 106\,000 \text{ l of water}$
- d) Surface area of tank $= (104 + (2 \times 26.5)) \text{ m}^2$

Q2.

Use 225×75 as the unit length and height of brick that includes mortar.

- The wall is 40 bricks long ($9/0.225$) and 40 bricks high ($3/0.075$)
 - $= 1600$ bricks
- The door removes 4×30 bricks ($0.9/0.225$) $\times$ ($2.25/0.75$)
 - $= 120$ bricks
- The patio doors remove 8×28 bricks ($1.8/0.225$) $\times$ ($2.1/0.075$)
 - $= 224$ bricks
- Total number of bricks $= 1600 - 120 - 224$
 - $= 1256$ bricks

Q3.

The maximum bending moment for a cantilever beam with uniformly distributed load $= WL^2/2$

- Maximum bending moment $= (3.7 \times 4.1^2)/2$
 $= 31.0985 \text{ kNm}$

Q4.

The maximum bending moment for a simply supported beam with off centre point load $= Wab/L$

- Maximum bending moment $= (4.2 \times 5.8 \times 3.3)/9.1$
 $= 8.833 \text{ kNm}$

Q5.

- a) Volume of the cylinder $= \pi r^2 h$
 $= \pi \times 1.9 \times 1.9 \times 4.5$
 $= 51.042 \text{ m}^3$
- b) Surface area of a cylinder $= 2\pi r^2 + 2\pi r h$
 $= (2 \times \pi \times 1.9 \times 1.9) + (2 \times \pi \times 1.9 \times 4.5)$
 $= 22.685 + 53.728$
 $= 76.413 \text{ m}^2$
- c) No. of tins required $= 76.413 / 12.5$
 $= 6.113 \text{ litres of paint.}$
 7 tins of paint will be required.