

5. Total distance bus travels in the 3 minutes is the length of the bus plus the length of the tunnel. Let x be the length of the tunnel in m. Then distance traveled = $(8 + x)$ m = $\frac{8+x}{1,000}$ km. 3 minutes = $\frac{3}{60} = \frac{1}{20}$ h
- Distance = Speed \times Time
- $$\frac{8+x}{1,000} = 30 \left(\frac{1}{20} \right)$$
- $$\frac{8+x}{1,000} = \frac{1,500}{1,000}$$
- $$8+x = 1,500$$
- $$x = 1,492$$
- The tunnel is 1,492 m long.
6. Amount increase = $\$627 - \550
 $= \$77$
- Percentage increase = $\frac{77}{550} \times 100\%$
 $= 14\%$
- (b) New cost = 95% original cost
- $$95\% \text{ of } 78\text{¢} = \frac{95}{100} \times 78$$
- $$= 74.1$$
- New cost = 74¢ per kg
7. Let s be the speed of the car. Then $16s$ is the speed of the plane.
- distance of car = s km/h \times 1 h = s km
 distance for plane = $16s$ km/h \times 1 h = $16s$ km
 Total distance = 850 km
- $$s + 16s = 850$$
- $$17s = 850$$
- $$s = 50$$
- Speed of car is 50 km/hr. Since it traveled 1 h, it went 50 km.
8. Let y = the number of years ago that Mary's mother's age was 4 times Mary's age. Mary's age then was $12 - y$ and her mother's age then was $42 - y$. Her mother's age then was 4 times Mary's age:
- $$42 - y = 4(12 - y)$$
- $$42 - y = 48 - 4y$$
- $$3y = 6$$
- $$y = 2$$
- 2 years ago Mary was 10.
9. Total mass of boys = 24×35.5 kg = 852 kg
 Total mass of girls = 15×29 kg = 435 kg
 Total mass of class = 852 kg + 435 kg = 1,287 kg
- Average mass of class = $\frac{1,287\text{kg}}{39} = 33$ kg
- Mass of new boy = 33 kg + 1.4 kg = 34.4 kg
 New total mass of class = $1,287$ kg + 34.4 kg = 1,321.4 kg
- New average mass of class = $\frac{1,321.4}{40} = 33.035$ kg

5. Surface area S_W of each inside wall is area of the rectangle.

$$S_W = 2 \text{ m} \times 8 \text{ m} = 16 \text{ m}^2$$

Surface area S_A of internal face of arch is half the internal curved surface of a cylinder.

$$S_A = \frac{1}{2}(2\pi rh)$$

$$= \pi rh$$

$$= (3.14)(1.75)(8) \text{ m}^2$$

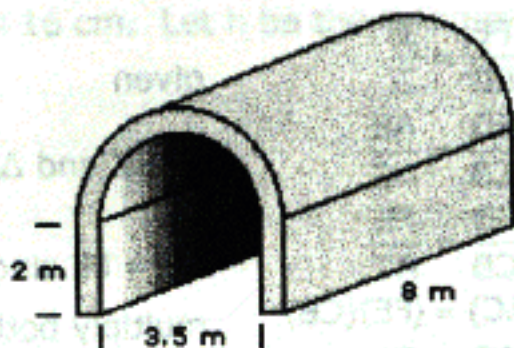
$$= 43.96 \text{ m}^2$$

Total surface area S :

$$S = 2(S_W) + S_A$$

$$= 2(16) + 43.96 \text{ m}^2$$

$$= 75.96 \text{ m}^2$$



6. (a) 1 cm : 20 cm
30 cm : 30 x 20 cm
30 cm : 600 cm
30 cm : 6 m
The boat is 6 m long.

Let h be the length of the mast of the model in meters.

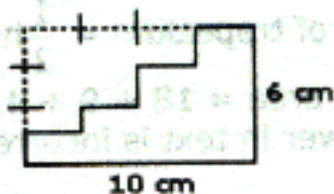
$$\frac{1 \text{ m}}{20 \text{ m}} = \frac{h \text{ m}}{7 \text{ m}}$$

$$20h = 7$$

$$h = 0.35$$

The length of the model's mast is 0.35 m = 35 cm.

7. The "steps" can be moved to form a rectangle. So the perimeter is the same as that of the rectangle.
Perimeter = $2(10 \text{ cm} + 6 \text{ cm})$
 $= 32 \text{ cm}$



8. Area of 4 walls = $4(470 \text{ cm})(210 \text{ cm}) = 394,800 \text{ cm}^2$
 $1 \text{ m}^3 = 10,000 \text{ cm}^3$
 $2.7 \text{ m}^2 = 2.7 \times 10,000 \text{ cm}^2 = 27,000 \text{ cm}^2$
Area that needs to be painted = $394,800 \text{ cm}^2 - 27,000 \text{ cm}^2 = 367,800 \text{ cm}^2$
Let c be the cost in dollars

$$\frac{c}{0.50} = \frac{367,800}{500}$$

$$500c = 183,900$$

$$c = 367.80$$

The cost of painting the walls is \$367.80

9. A tessellating octagon can be derived from a square.
Example:

