2.1 Working With Scale

Focus On . . .

- using proportional reasoning to determine the dimensions of a scale drawing or model
- drawing a scale diagram of a given object
- solving problems that involve scale
- describing when a scale representation might be used
- constructing a model of a 3-D object

a) $\frac{1}{4} = \frac{x}{8}$

$\frac{8}{4} = \frac{4x}{4}$

$2 = x$

b) $\frac{1}{8} = \frac{x}{16}$

$\frac{8x}{8} = \frac{16}{8}$

$x = 2$

g) $\frac{1}{10} = \frac{70}{x}$

$x = 700$

h) $\frac{1}{20} = \frac{40}{x}$

$x = 800$

2. Solve to create equivalent ratios.

a) $1:5 = \square:20$

b) $1:12 = \square:72$

c) $2:3 = \square:12$

d) $9:16 = \square:48$

e) $40:1 = 200:\square$

f) $8:5 = 200:\square$

$\frac{1}{5} \times \frac{x}{20} \Rightarrow \frac{5}{5}x = \frac{20}{5}$

$x = 4$

scale

- the relationship between a distance on a drawing, model, or map and the actual distance
- for example, a scale of 1 cm : 1 m means that 1 cm on the diagram, model, or map represents 1 m actual size

$$\text{Scale} = \frac{\text{Actual Size}}{\text{Model Size}}$$

scale drawing

- two-dimensional (2-D) drawing used to represent a place or object
- uses scale to show the relationship between the distance on a drawing and the distance in real life

Example: This picture is a scale of a real airplane. In this scale, the wingspan is 3 inches. If the wingspan of the actual plane is 28 feet, how much bigger is the real plane than the picture?

M_w - 3 in

P_w - 28 ft

$28\text{ft} \times \frac{12\text{ in}}{1\text{ft}}$

$= 336\text{ in.}$

Scale - for every 1 in. on model plane there are 112 in on real plane

$\text{Scale} = \frac{\text{Actual Sz.}}{\text{Model Sz.}}$

$\text{Scale} = \frac{336\text{ in}}{3\text{ in}}$

$\text{Scale} = 112\text{ in}$

$\rightarrow 1:112$

Quincy made a scale drawing of a swimming pool. The pool is 3 centimetres wide in the drawing. The actual pool is 15 metres wide. What scale did Quincy use?

1 centimetre = 100 metres

Model - Pool = 3cm

Actual Pool = 15m

$15\text{m} \times \frac{100\text{cm}}{1\text{m}}$

A.P. = 1500cm

$\text{Scale} = \frac{\text{Actual Sz.}}{\text{Model Sz.}} = \frac{1500\text{cm}}{3\text{cm}}$

Scale = 500cm

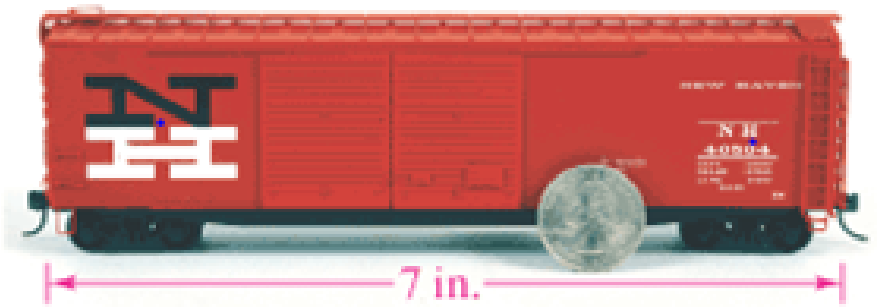
* Actual Pool is 500 times bigger than the model.

→ Ratio =

Model : Actual

1 : 500

Models Refer to the model boxcar shown at the right. The actual length of a boxcar is 609 in. What is the scale of the model?



Actual = 609 in

Model = 7 in

$$\text{Scale} = \frac{\text{Actual Sz.}}{\text{Model Sz.}}$$

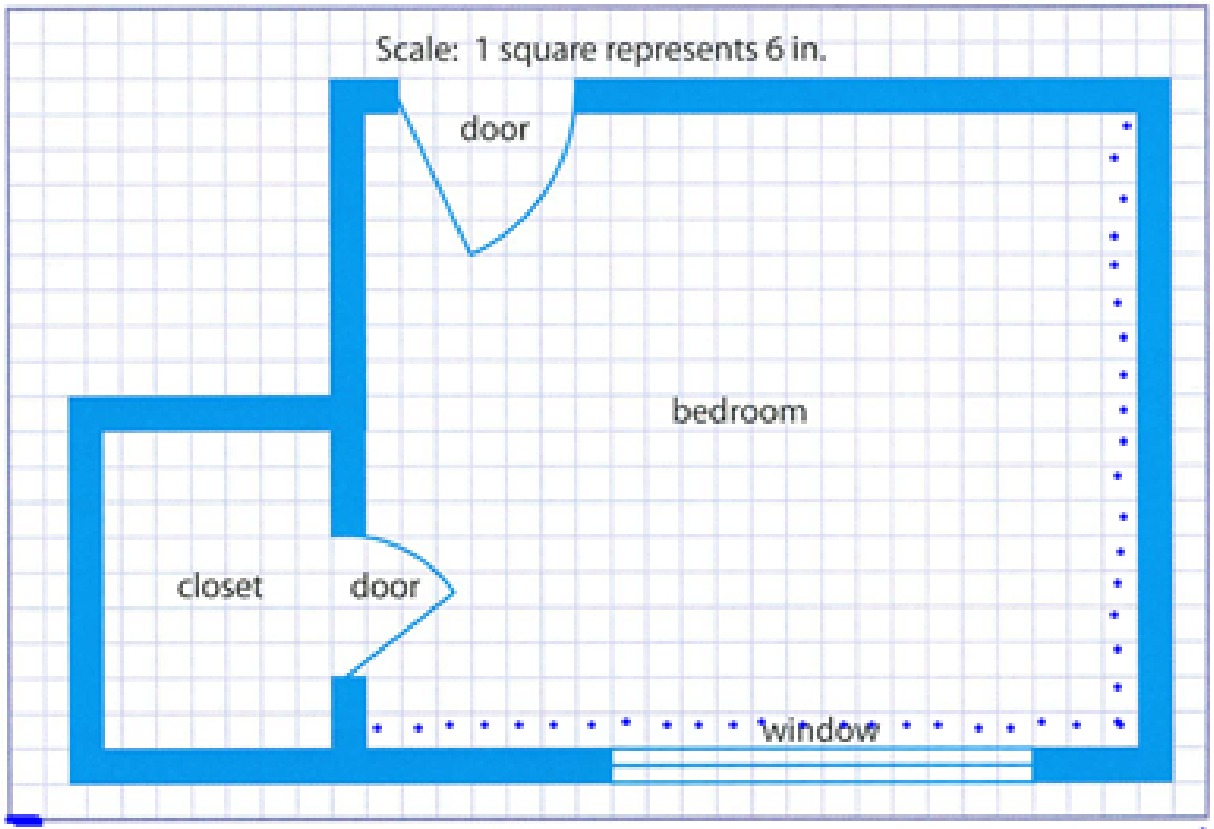
$$= \frac{609 \text{ in}}{7 \text{ in}}$$

$$\text{Scale} = 87$$

Ratio

1 : 87

This is a **scale drawing** of Fiona's bedroom done on $\frac{1}{4}$ inch grid paper.



Scale - $\frac{A}{m}$

$\frac{1}{4} = 0.25$

$= \frac{6}{0.25}$

Scale = $\frac{24}{1}$

a) Explain the scale. The drawing is 24x smaller than actual.

b) Convert the scale of the diagram to a 1 : ■ ratio. 1 : 24

c) What are the dimensions of Fiona's room, in feet?

d) How wide are the doors? Door dimensions are quoted in inches. Show your answer in inches.

e) How deep is the closet? Show your answer in feet and inches.

Dimensions of Room

Model = 18 by 22

Scale = 1:24

$$\frac{24}{1} = \frac{x}{18}$$

$$1x = (18)(24)$$

$$x = 432 \text{ in}$$

$$432 \text{ in} \times \frac{1 \text{ ft}}{12 \text{ in}} = 36 \text{ ft}$$

Actual Room

= 36 ft by 44 ft

$$\frac{24}{1} = \frac{x}{22}$$

$$x = (24)(22)$$

$$x = 528 \text{ in}$$

$$528 \text{ in} \times \frac{1 \text{ ft}}{12 \text{ in}}$$

$$= 44 \text{ ft}$$

Homework:
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