Answer on Question #85660 – Math – Algebra

Question

7. John decides to walk down a set of steps. He also made the following observations

• At 1/4 way down, his eye-level was one step below the top

• At 3/7 way down, he was twice his eye-level down from the top

• At 1/2 way down, he eye-level was 0.4m above 1/3 the way down

How high was

• John

• Each step

The set of stairs

Solution

The height of John=x

The height of the stairs = y

The height of the step =z

Make a system of equations

$$(1)\ \left(y-\frac{1}{4}y\right)+x+z=y$$

$$(2)\ \left(y-\frac{3}{7}y\right)+2x=y$$

$$(3)\ \left(y-\frac{1}{2}y\right)+x+\frac{1}{3}y-0.4=y$$

Solve the system of two equations

$$(2)\left(y-\frac{3}{7}y\right)+2x=y\Rightarrow 2x=y-\frac{4}{7}y\Rightarrow x=\frac{3}{14}y$$

$$(3)\left(y-\frac{1}{2}y\right)+x+\frac{1}{3}y-0.4=y\Rightarrow\frac{1}{2}y+\frac{3}{14}y+\frac{1}{3}y-0.4=y\Rightarrow\frac{21+9+14}{42}-y=0.4$$

$$\frac{1}{21}y=0.4\Rightarrow y=8.4m$$

$$x=\frac{3}{14}y\Rightarrow x=1.8m$$

Find the height of the step

$$(1)\ \left(y-\frac{1}{4}y\right)+x+z=y\Rightarrow z=\frac{1}{4}y-x\Rightarrow z=0.3m$$

Answer: $\text{The height of John}=1.8m;\ \text{The height of the stairs}=8.4m;\text{The height of the step}=0.3m.$