# FOM 11 - Unit 1 Test - Rates and Scale Factor - Version C

First Name: Key Last Name: Key Block:

| **Learning Outcomes** | Can Start | | Can Partially | | Can Do | |
|---|---|---|---|---|---|---|
| 1. Can solve ratio and unit rate questions | | | | | | |
| 2. Can interpret, solve, and draw functions on a graph | | | | | | |
| 3. Can solve linear scale factor problems | | | | | | |
| 4. Can solve polygon application problems of perimeter, area, and volume | | | | | | |
| TEST SCORE | 0 | 1 | 2 | 3 | 4 | 5 |

| **PART 1:** | Can Start | | Can Partially | | Can Do | |
|---|---|---|---|---|---|---|
| 1. Can solve ratio and unit rate questions | | | | | | |

**Show all work. Answers should have correct units**

1) Paige carries 51g every 6 minutes

a) Express as a rate (as a fraction in lowest terms)

$\frac{51g}{6min} = \boxed{\frac{17g}{2min}}$

b) Express as a unit rate:

$\frac{17g}{2min} = \boxed{8.5g/min}$

c) Convert the unit rate to kilgrams per hour

g → kg
m → hr

$\frac{8.5g}{min}\left(\frac{1kg}{1000g}\right)\left(\frac{60min}{1hr}\right) = \boxed{\frac{0.51kg}{hr}}$

d) How long will it take Paige to carry 145kg?

$145kg\left(\frac{1hr}{0.51kg}\right) = \boxed{284.3 hrs}$

2) Convert 56 miles per hour to kilometres per minute

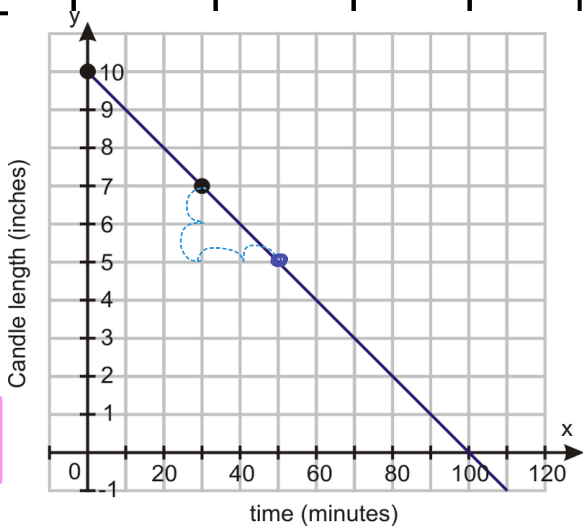
miles → km
hrs → min

$\frac{56mi}{hr}\left(\frac{1.6km}{1mi}\right)\left(\frac{1hr}{60min}\right)$

$= \boxed{\frac{1.49km}{min}}$

| PART 2: | Can Start | Can Partially | Can Do |
|---|---|---|---|
| 2. Can interpret, solve, and draw functions on a graph | | | |

3) Calculate the rate of change (2 marks):




① look on graph $\frac{\downarrow 2}{\rightarrow 20} = \frac{-2}{+20}$

$= \frac{-1 \text{ in}}{10 \text{ min}}$

or

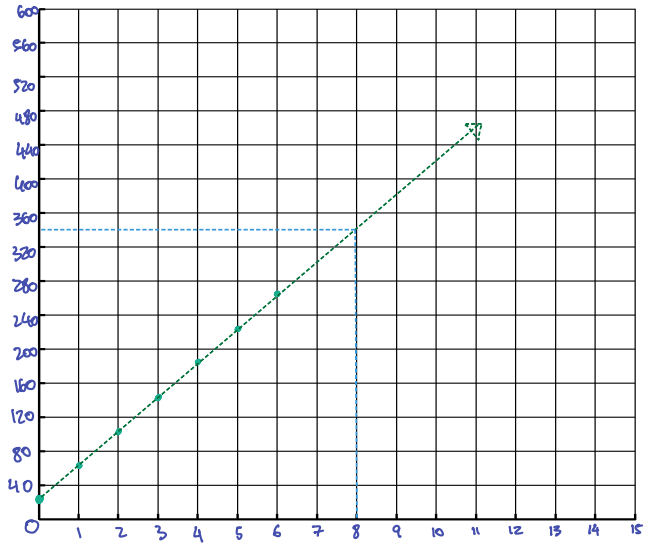
② calculate with slope formula

$\frac{y_2 - y_1}{x_2 - x_1} = \frac{5-7}{50-30} = \frac{-2}{20} = \frac{-1 \text{ in}}{10 \text{ min}}$

4) It costs $25 to get into the art show, and $40 per painting

a) Graph data from 0 painting purchases to 8 purchases.

b) Calculate how many paintings you'll have by spending a total of $1225




$y = mx + b$

total of 1225 — move by 40 — begin at 25

$1225 = 40(x) + 25$

$1225 = 40x + 25$

$-25 \quad -25$

$\frac{1200}{40} = \frac{40x}{40}$

$30 = x$

It takes 30 paintings to spend $1225.

| | | | | | | |
|---|---|---|---|---|---|---|
| 3. Can solve linear scale factor problems | | | | | | |

5) Complete the table:

| Object Length | Image Length | Scale Factor | Enlargement/ Reduction |
|---|---|---|---|
| 81 cm | 27 cm | $\frac{I}{O} = \frac{27}{81} = \frac{1}{3}$ | Reduction |
| 5 m | 40 m | $\frac{I}{O} = \frac{40}{5} = 8$ | Enlargement |
| 18 ft | 63m | 3.5 | Enlargement |
| 22.5 | 9 in | 0.4 | Reduction |

$18 \times (3.5) = \left(\frac{I}{18}\right) \times 18$

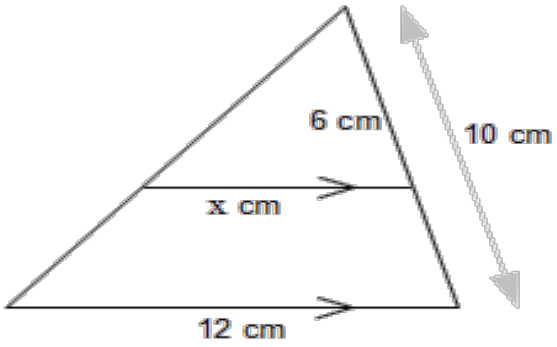
$63 = I$

$0.4 = \frac{9}{A}$

$A = \frac{9}{0.4}$

$A = 22.5$

6) The shapes triangles are similar. Find ***x***:




$\times 12 \left(\frac{6}{10}\right) = \left(\frac{x}{12}\right) \times 12$

$\frac{72}{10} = x$

$7.2 = x$

7) The scale factor for a billboard is $\frac{10}{3}$. If the human head is 40cm long, what is the length of the head on the billboard?

let B= the size of the head on the billboard

$\frac{10}{3} = \frac{I}{A} = \frac{B}{40}$

$\Rightarrow \times 40 \left(\frac{10}{3}\right) = \left(\frac{B}{40}\right) \times 40$

$\Rightarrow \frac{400}{3} = B$

$B = 133.3\text{cm}$

| | | | | | | |
|---|---|---|---|---|---|---|
| 4. Can solve polygon application problems of perimeter, area, and volume. | | | | | | |

8) One triangular prism has a height of 4m, and another, similar to it, a height of 14m. In lowest terms, find the ratio of their:

object ↙ 4m, Image ↙ 14m

Scale factor $= \frac{14}{4} = \frac{7}{2}$

a) perimeters.

a:b

$\boxed{7/2}$

b) areas.

$a^2 : b^2$ $\quad \frac{7^2}{2^2} = \boxed{\frac{49}{4}}$

c) volume.

$a^3 : b^3$ $\quad \frac{7^3}{2^3} = \boxed{\frac{343}{8}}$

9) A scale model of a car is 2:9. If 28L of paint is needed to paint the real car, how much paint is needed for the scale model (to the nearest tenth).

object ↙

Scale factor $= \frac{2}{9}$

↓

Area ratio $= \frac{2^2}{9^2} = \frac{4}{81}$

$28 \times \left(\frac{4}{81}\right) = \left(\frac{\text{Scale}}{28}\right) \times 28$

$\frac{28 \times 4}{81} =$ Scale model

$\boxed{1.38L = \text{Scale model}}$

10) What will happen to the volume of a cylinder if the radius is doubled and the height is quadrupled?

$\pi r^2 h$ ← original

Image ↙

$\pi(2r)^2(4h)$

$= \pi(4r^2)(4h)$

$= \boxed{16\pi r^2 h}$

$\therefore \quad \frac{16\pi r^2 h}{\pi r^2 h}$

$\therefore$ The volume would increase by 16 times the original value.