

# CHAPTER 4

## Systems of Linear Equations

### 4.1 Slope and Rate of Change

Note: In this section,  $m$  will always refer to slope and  $b$  will refer to the constant term (or initial value).

1) All represent linear relationships.

3)

a) Answers will vary.  
(0, 1000) and (1, 1000.2) lie on the line.

b) 
$$m = \frac{1000.2 - 1000}{1 - 0} = \frac{0.2}{1} = 0.2$$

c) Answers will vary.

1. (4, 1000.8) and (10, 1002) lie on the line.

$$m = \frac{1002 - 1000.8}{10 - 4} = \frac{1.2}{6} = 0.2$$

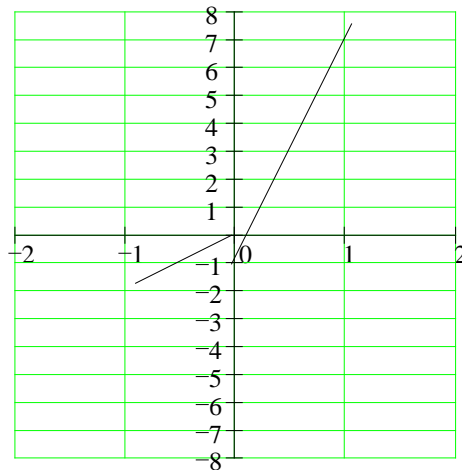
2. (350, 1070) and (500, 1100) lie on the line.

$$m = \frac{1100 - 1070}{500 - 350} = \frac{30}{150} = 0.2$$

d) The slopes between all these points are equal. We can infer that the rate of incline (slope) of the hill is constant and equals 0.2.

5) (-1, -3), (0, -1), (1, 7)

a)



b)

c)

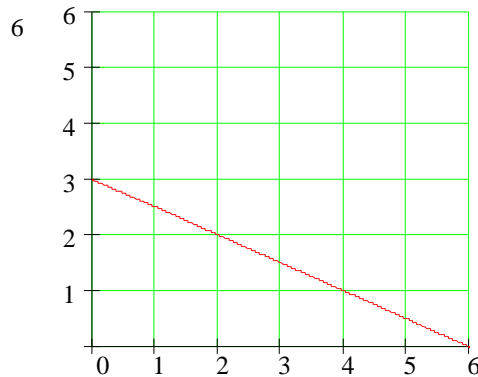
$$1. \quad m = \frac{(-1) - (-3)}{0 - (-1)} = \frac{(-1) + 3}{0 + 1} = \frac{2}{1} = 2$$

$$2. \quad m = \frac{7 - (-1)}{1 - 0} = \frac{7 + 1}{1} = \frac{8}{1} = 8$$

d) Yes. The slopes are not the same.

7)

a)



b)  $(0+2, 3+1) = (2, 4)$

c)  $(0+2, 3+1) = (2, 4)$

d) Yes. The slopes are equal.

9)

a)  $m = \frac{7}{11} \approx 0.64$

b)  $m = \frac{\text{Rise}}{\text{Run}} \quad 0.75 = \frac{\text{Rise}}{12 \text{ in}} \quad \text{Rise} = (0.75)(12 \text{ in}) = 9 \text{ in}$

c)  $m = \frac{\text{Rise}}{\text{Run}} \quad 0.60 = \frac{7.5 \text{ in}}{\text{Run}} \quad \text{Run} = \frac{7.5 \text{ in}}{0.60} = 12.5 \text{ in}$

11)

a) \$1000

b) No. In the first year, the investment's worth increased by  $\$1100 - \$1000 = \$100$ . In the second year, it increased by  $\$1210 - \$1100 = \$110$ . Since the investment's worth did not increase by the same amount every year, the graph of its value vs. time does *not* have a constant rate of change (slope).

c) No. Since the graph does not have a constant slope, it does not represent a linear relationship.

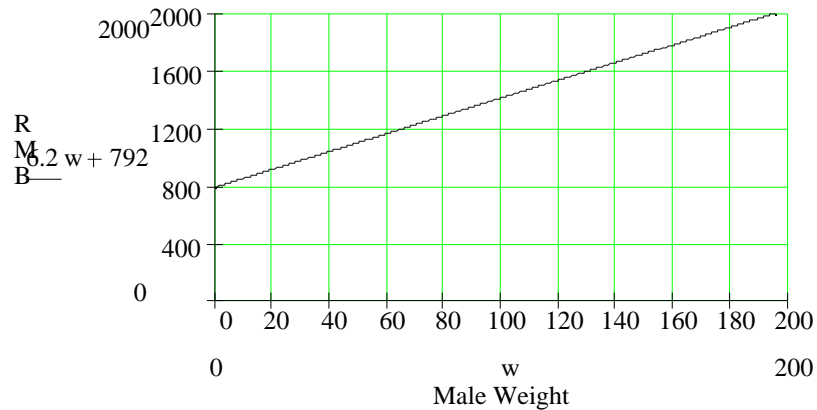
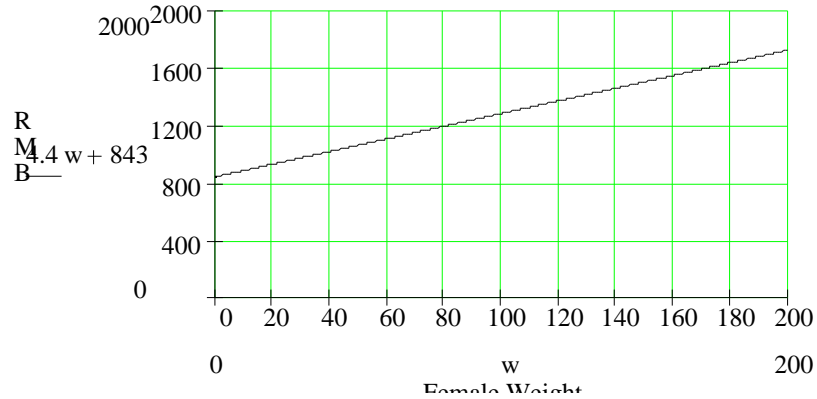
d) This investment would be *much better* to own because *it's value increases by a greater amount every year*. In the first year the increase was \$100. In the 2<sup>nd</sup> year, it increased by \$110. In the 3<sup>rd</sup> yr, it increased by \$121. The previous investment only increased by \$100 each year.

13)

- a) Density of Superlight =  $m = \frac{104.5 - 50}{50 - 0} = \frac{54.5}{50} = 1.09$
- b)  $1.09 > 1.00$  the company lied.

15)

a)



- b) Female BMR =  $m = \frac{1571 - 1283}{120 - 100} = \frac{288}{20} = 14.4$
- Male BMR =  $m = \frac{1536 - 1412}{120 - 100} = \frac{124}{20} = 6.2$

- c) A female needs 4.4 more calories per day for every 1 lb increase in weight. A male needs 6.2 more calories per day for every 1 lb increase in weight.

### Skill and Review

17)  $\frac{(11) + 2}{3 - 4} + (-3)^4$   
 $= \frac{(11) + 2}{3 - 4} + 81$

$$\begin{aligned} &= \frac{13}{-1} + 81 \\ &= (-13) + 81 \\ &= 68 \end{aligned}$$

$$19) \quad C = \frac{11}{6}\pi \text{ cm} = \frac{11\pi}{6} \text{ cm}$$

Since  $C = 2\pi r$ , we have  $\frac{11\pi}{6} \text{ cm} = 2\pi r$ .

$$r = \frac{1}{2\pi} \cdot \frac{11\pi}{6} \text{ cm}$$

$$r = \frac{11}{12} \text{ cm}$$