

AFM: Study Guide Unit 2

Key

1. The average lifespan of American women has been tracked, and the model for the data is

$= 0.2t + 73$ , where  $t = 0$  corresponds to 1960. Explain the meaning of the slope and y-intercept.

slope - The avg lifespan of Am. women is increasing by 0.2 yrs for every year after 1960.

yint - The avg lifespan of Am women in 1960 was 73 yrs old.

What is the average lifespan of an American woman in 2010?  $t = 50$

83 yrs old

2. The equation for the speed (not the height) of a ball that is thrown straight up in the air is given by  $v = 128 - 32t$ , where  $v$  is the velocity (in feet per second) and  $t$  is the number of seconds after the ball is thrown.

What is the slope and its meaning in context? The velocity of ball is decreasing by 32 ft/sec every sec.

What is the vertical intercept and its meaning in context? The ball was thrown with initial velocity of 128 ft/sec

What is the x-intercept and its meaning in context? The velocity is 0 ft/sec at  $t = 4$  sec.

3. Find the equation of a line that passes through (1, 2) and has a slope of  $-\frac{2}{3}$

$y - 2 = -\frac{2}{3}(x - 1)$   
 $y = -\frac{2}{3}x + \frac{8}{3}$

4. Find the equation of a line that passes through (-3, -1) and (2, 4).

$m = \frac{5}{5} = 1$      $y - 4 = 1(x - 2)$      $y = x + 2$

5. Find the equation of a line with an x-intercept of -2 and a y-intercept of 4.

$(-2, 0)$      $(0, 4)$   
 $m = 2$   
 $y = 2x + 4$

6. The table below shows the cost, C, in dollars, of selling x cups of coffee per day from a cart.

X	0	5	10	50	100	200
C	50.00	51.25	52.50	62.50	75.00	100.00

(a) Using the table, give the equation relating the cost to the cups of coffee.

$C = .25x + 50$

(b) Find the slope of the line. Explain what this means in the context of the problem.

$\$0.25/\text{cup}$ ; The cost of selling coffee from a cart increases by  $\$0.25$  for every cup sold.

(c) Find the y-intercept. IN regards to the context of the given information, explain what the y-intercept tells us and why it is that amount.

$\$50$ ; The cost of selling 0 cups coffee is still  $\$50$ .

7. A theatre manager graphed weekly profits as a function of the number of patrons and found that the relationship was linear. One week of profit was \$11,328 when 1324 patrons attended. Another week 1529 patrons produced a profit of \$13,275.50.

- Find a formula for weekly profit, y, as a function of the number of patrons, x.  $y = 9.5x - 1250$
- Interpret the slope, using complete sentences. Profits increase by  $\$9.50$  per patron.
- Interpret the y-intercept, using complete sentences. When 0 patrons, profit is  $\$-1250$  so losing money.
- What is the break-even point (the number of patrons for which there is zero profit)? 131 patrons
- If the weekly profit was \$17,759.50, how many patrons attended the theatre?

1737 patrons

8. The height in feet,  $h(t)$ ,  $t$  seconds after a ball is thrown upward is given by  $h(t) = -16t^2 + 56t + 72$ .

- a. Find the maximum height attained by the ball.  $121 \text{ ft}$
- b. When is the ball at its maximum height?  $1.75 \text{ sec}$
- c. When is the ball at 85 feet above the ground?  $3.25 \text{ sec}$  and  $0.25 \text{ sec}$
- d. When does the ball hit the ground?  $4.5 \text{ sec}$

9. Find two numbers whose sum is 11 and product is 24.

$$\begin{aligned} x+y &= 11 & 3 \text{ \& } 8 \\ xy &= 24 \end{aligned}$$

10. The sum of the squares of 2 consecutive odd integers is 290. Find the integers.

$$x^2 + (x+2)^2 = 290 \quad 11 \text{ \& } 13$$

11. The height of a triangle is 2 cm less than twice its base. The area is  $112 \text{ cm}^2$ . Find the height and base.



$$\frac{1}{2}x(2x-2) = 112$$

$$\begin{aligned} \text{base} &= 11.09 \text{ cm} \\ \text{height} &= 20.19 \text{ cm} \end{aligned}$$

12. The amount of water wasted varies directly with the amount of time the faucet drops. If a dripping faucet wastes one cup of water if it drips for four minutes, then how long must the faucet drip to waste 6.5 cups of water?

$$\begin{aligned} A &= kt & A &= \frac{1}{4}t & 6.5 &= \frac{1}{4}t \\ 1 &= k(4) & & & & \\ k &= \frac{1}{4} & & & & \\ & & & & & \boxed{26 = t} \\ & & & & & \text{min} \end{aligned}$$

13. According to Hooke's Law, the force,  $F$ , needed to stretch a spring varies directly to the amount the spring is stretched,  $x$ . Write the formula for Hooke's Law. If fifty pounds stretches a spring five inches, by how much will the spring be stretched by a force of 120 pounds?

$$\begin{aligned} F &= kx & F &= 10x \\ 50 &= k(5) & 120 &= 10x \\ k &= 10 & x &= 12 \text{ inches} \end{aligned}$$

14. To balance a seesaw, the distance,  $d$  (in feet), a person is from the fulcrum is inversely proportional to his or her weight,  $w$  (in pounds). Roger, who weighs 120 pounds, is sitting 6 feet away from the fulcrum. Ellen weighs 108 pounds. Write an equation relating the distance from the fulcrum and weight. How far from the fulcrum must she sit to balance the seesaw?

$$\begin{aligned} d &= \frac{k}{w} & 6 &= \frac{k}{120} & k &= 720 & d &= \frac{720}{w} \\ & & & & & & d &= 6.6 \text{ ft away} \end{aligned}$$

15. Boyle's Law states that for a constant temperature the pressure,  $P$ , of a gas varies inversely with its volume,  $V$ . A sample of hydrogen gas has a volume of 8.56 liters at a pressure of 1.5 atmospheres. Write an equation relating pressure and volume. Find the volume of the hydrogen gas if the pressure changes to 1.2 atmospheres.

$$P = \frac{k}{V} \quad 1.5 = \frac{k}{8.56} \quad k = 12.84 \quad P = \frac{12.84}{V} \quad V = \frac{12.84}{1.2} = 10.7 \text{ liters}$$

16. Sketch and be able to describe the graphs (domain, range, symmetry, behavior) of  $y = 1/x$ ,  $y = 1/x^2$ ,  $y = x^4$ ,  $y = x^5$ ,  $y = x^{1/3}$ ,  $y = x^{1/4}$  or any similar power functions.