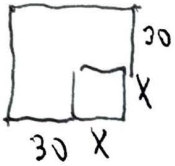


Algebra 1: Semester 2 Written Final Review 2019

Name KEY Period 1 Date 5/14/19

1. A contractor adds a wrap-around porch to a square house on two sides. The area of the house after the addition is represented by  $A = (30 + x)^2$ . Use this expression to answer the following questions.



$A = lw \rightarrow A = (x+30)(x+30)$   
 $x^2 + 30x + 30x + 900$

- a. What is the area of the house after the expansion? (2 pts)

$A = x^2 + 60x + 900$

- b. Find the area of the house and porch when  $x = 10$ . (1 pt)

$A = (10)^2 + 60(10) + 900$   
 $100 + 600 + 900$

$A = 1600$  SQUARE FEET

- c. What is the area of the extension, without the area of the house? (1 pt)

$A = 1600 - \text{AREA OF HOUSE}$   
 $1600 - (10 \times 10) \rightarrow 1600 - 100 = 1500$  SQUARE FEET

2. At a Civil War reenactment, a cannonball is fired into the air. The release point is 6 feet above the ground. The function  $h = -16t^2 + 128t + 6$  represents the height  $h$  (in feet) of the cannonball after  $t$  seconds.



$y = -16x^2 + 128x + 6$

- a. What is the maximum height of the cannonball? When will it reach that height? (2 pts)

$x = \frac{-b}{2a} = \frac{-128}{2(-16)} = \frac{-128}{-32} = 4$   
 $x = 4$

$y = -16(4)^2 + 128(4) + 6$   
 $-256 + 512 + 6$   
 $y = 262$  FEET

- b. After how many seconds will the cannonball reach the ground? Round to the nearest tenth if necessary. (2 pts)

$0 = -16x^2 + 128x + 6$   
 $0 = -8x^2 + 64x + 3$   
 $a = -8$   
 $b = 64$   
 $c = 3$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$   
 $= \frac{-64 \pm \sqrt{64^2 - 4(-8)(3)}}{2(-8)}$   
 $= \frac{-64 \pm \sqrt{4096 + 96}}{-16}$   
 $= \frac{-64 \pm \sqrt{4192}}{-16}$   
 $= \frac{-64 - 64.7}{-16} = 8.0$

3. Write a function that represents each situation; use the function to solve for the value after 5 years have passed. Round to the nearest cent if necessary.

- a. A house purchased for \$175,000 increases in value by 3% every year. (2 pts)

Function:  $f(x) = A(1+r)^t$

Value of house after 5 years:

$f(x) = 175,000(1+.03)^5 \rightarrow \$202,872.96$

- b. A used care purchased for \$6599 decreases in value by 12% every year. (2 pts)

Function:  $f(x) = A(1-r)^t$

Value of car after 5 years:

$f(x) = 6599(1-.12)^5 \rightarrow f(x) = 3,482.50$

4. The polynomial  $A = x^2 - 22x + 121$  represents the area (in square feet) of a square playground.

a. Find the area when  $x = 30$  feet. (1 pt)

$$A = (30)^2 - 22(30) + 121$$

$$900 - 660 + 121$$

$$\boxed{361 \text{ sq ft}}$$

b. Given  $A = s^2$ , write a polynomial that represents the side length of the playground. (1 pt)

$$\frac{x^2 - 22x + 121}{(x-11)(x-11)} \rightarrow S = x - 11$$

c. Write an expression for the perimeter of the playground. (1 pt)

$$P = 4S$$

$$P = 4(x - 11)$$

d. Find the perimeter when  $x = 30$  feet. (1 pt)

$$P = 4(30 - 11)$$

$$4(19)$$

$$\underline{\text{PERIMETER}} = \boxed{76 \text{ ft}}$$

5. Use the provided data set to answer the following questions.

Height of 18-year old adults (in.): ~~60, 61, 63, 65, 69, 71, 73~~

60, 63, 65, 67, 69, 71, 73

a. Find the mean, median, mode, and range of the data set. (2 pts)

Mean: 66.9

Median: 67

Mode: NONE

Range: 13

| Standard Deviation |           |               |                   |
|--------------------|-----------|---------------|-------------------|
| x                  | $\bar{x}$ | $x - \bar{x}$ | $(x - \bar{x})^2$ |
| 60                 | 66.9      | -6.9          | 47.61             |
| 63                 | 66.9      | -3.9          | 15.21             |
| 65                 | 66.9      | -1.9          | 3.61              |
| 67                 | 66.9      | .1            | .01               |
| 69                 | 66.9      | 2.1           | 4.41              |
| 71                 | 66.9      | 4.1           | 16.81             |
| 73                 | 66.9      | 6.1           | 37.21             |

b. Find the standard deviation of the data set. Round to the nearest thousandths place. (2pts)

$$= \frac{47.61 + 15.21 + 3.61 + .01 + 4.41 + 16.81 + 37.21}{7}$$

$$= \sqrt{\frac{124.87}{7}} = \sqrt{17.8386} = \boxed{4.224}$$

S.D. =  $\boxed{4.224}$