

24 SEPTEMBER 2019**Study chapter 1, sections 1 – 5 of chapter 2, and appendices A & B.**

Instructions: For each problem, be certain to show your work! You may use your calculator, but you still must show your reasoning! Be sure to place a box around your answer.

1. Compute the value of $7(1 + x^2)^3$ when $x = -3$. Simplify your answer fully.

2. Solve for x : $x(x - 2) - x(2x + 1) = 5 - x^2 + 3(x - 4)$

3. Simplify fully the expression:

$$-2\{-[-(x - y)]\} + \{-2[-(x - y)]\}$$

4. Solve for x : $7x - 5[x - \{7 - 6(x - 3)\}] = 3x + 1$

5. Identify the y -intercept and the slope of the graph of the function $f(x) = 9x + 13$.

6. Let $f(x) = 1 - 3x + x^2$

(a) Find $f(3)$

(b) Find and simplify $f(2x)$

(c) Find and simplify $f(x + 3)$.

(d) Find and simplify $f(x - 2) - f(x + 2)$

7. After a rain storm, the water in a trough begins to evaporate. The amount in gallons remaining after t days is given by $V = 49 - 1.8t$

Identify the initial value and the rate of change, and explain their meanings in practical terms using units.

8. For each equation determine if it has no solution, one solution, or an infinite number of solutions:

(a) $8 = 8x + 5$

(b) $7(x - 3) = 5x - (6 - 2x)$

(c) $3(x - 9) = 2x + (x - 9) - 18$

(d) $4 = 5 + x^2$

9. Write the following in slope-intercept form: $2(1 - x) = 41 + 11(x - 10)$

10. A gram of fat contains 9 dietary calories, whereas a gram of carbohydrates contains only 4.¹

(a) Write an equation relating the amount f , in grams, of fat and the amount c , in grams, of carbohydrates that one can eat if limited to a total of 1800 calories/day.

(b) The USDA recommends that calories from fat should not exceed 30% of all calories. What does this tell you about f ?

Round your answer to the nearest integer.

An 1800-calorie diet should include no more than about grams of fat.

11. Worldwide, soda is the third most popular commercial beverage, after tea and milk. The global consumption of soda¹ rose at an approximately constant rate from 150 billion liters in 1995 to 179 billion liters in 2000.

(a) Find a linear function for the quantity of soda consumed, S , in billions of liters, t years after 1995.

Note that "S=" is already provided. Do not include this in your submitted response to this question.

(b) Give the units and practical interpretations of the slope and vertical intercept.

The slope tells us _____
and the units are in _____

The vertical intercept tells us _____
and the units are in _____

12. You want to build a patio. Builder A charges \$3 a square foot plus a \$400 flat fee, and builder B charges \$2.50 a square foot plus a \$650 flat fee. For each builder, write an expression relating the cost C to the area s square feet of the patio.

Builder A charges $C =$ _____ dollars.

Builder B charges $C =$ _____ dollars.

Which builder is cheaper for a 100 square foot patio?

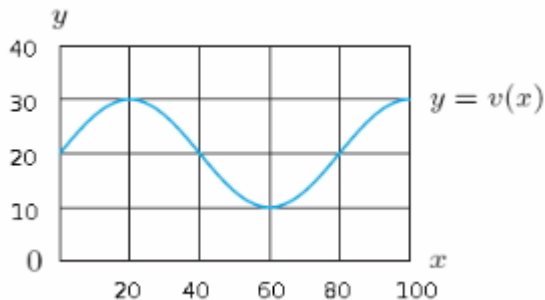
Which builder is cheaper for a 800 square foot patio?

For what size patio will both builders charge the same? $s =$ _____ square ft

(a) Write an expression for the total cost of buying 9 apples at \$ a each and 4 pears at \$ p each. Use appropriate units.

(b) Find the total cost if apples cost \$0.32 each and pears cost \$0.71 each. Use appropriate units.

13. Use the graph of $y=v(x)$ in the figure below to solve $v(x) = 30$. Give all solutions.



14. Find the average rate of change of $g(x)=2x^3 - 3x^2$ between $x=2$ and $x=4$.

The average rate of change of $g(x)$ between $x=2$ and $x=4$ is

The table below gives values of $D = f(t)$, the total US debt (in \$ billions) t years after 2005.¹

| t | D (\$ billions) |
|-----|-------------------|
| 0 | 7932.7 |
| 1 | 8507.0 |
| 2 | 9007.7 |
| 3 | 10,024.7 |
| 4 | 11,909.8 |
| 5 | 13,561.6 |
| 6 | 14,790.3 |
| 7 | 16,066.2 |
| 8 | 16,738.2 |

(a) Evaluate $\frac{f(7) - f(4)}{7 - 4}$ and $\frac{f(4) - f(0)}{4 - 0}$.

Round your answers to two decimal places.

$$\frac{f(7) - f(4)}{7 - 4} = \boxed{}$$

$$\frac{f(4) - f(0)}{4 - 0} = \boxed{}$$

(b) Compare your answers in (a). What does this tell you about the US debt? Enter a year in each box to complete the explanation.

We see that the US debt increased at a higher rate between the years

and than it did between the years and .

15. Suppose that s is directly proportional to t and that $s = 99$ when $t = 1.1$. Find s when $t = 3$.

16. The required cooling capacity, in BTUs, for a room air conditioner is proportional to the area of the room being cooled. A room of 210 square feet requires an air conditioner whose cooling capacity is 4400 BTUs.

(a) What is the constant of proportionality, and what are its units?

(b) If an air conditioner has a cooling capacity of 9,000 BTUs, how large a room can it cool?

