

**Show clear supporting work** on problems with several steps. Algebraic problems that display little or no supporting work will get little or no credit. You do not need to show work on one-step calculator problems. To solve numerical problems guess-and-check is legal unless you are requested to solve them “algebraically.”

1. Rewrite these with exactly three significant digits:

a) 27372

b) 0.0326644378

2. a) Let  $d = -3$ . Evaluate:  $-2^2 - d^2$ .

b) Let  $c = -2.56$ . Find, with at least three correct significant digits:

$$\frac{c + \pi}{2.4(2.9 + \sqrt{c^2 + 14})}$$

3. Short answer.

a) A point is on the vertical line through (1, 9) and the horizontal line through (4, 6). Find the point.

b) A graph on your calculator has all its points very close to the  $x$ -axis when the window is  $[-10, 10]$  by  $[-10, 10]$ . You want the points to appear five (5) times as far from the  $x$ -axis, with the  $y$ -axis still across the middle. To get this result, change your window to \_\_\_\_\_ by \_\_\_\_\_.

4. Technical terms. One word answers.

a) What is the technical term for a graph which is not misleading.

b) What is the technical term for the type of problem where the words, symbols, and basic formulas suggest operations you are not supposed to actually do – rather you are supposed to write about the operations.

c) In the notation “ $f(x)$ ”,  $f$  is the function. In that context, what is “ $f(x)$ ” called?

Problem	points	score
1	4	
2	2+4 = 6	
3	6	
4	3	
5	6	
6	16	
7	6	
8	10	
9	6	
10	6	
11	9	
12	5	
13	4	
14	5	
15	8	
total	100	

5. We want to solve these equations algebraically, if possible. Is it best to multiply out the expression on the left? Answer "Yes" or "No" [Do not solve it.]

a)  $(x - 4)(x - 7) - 2(x - 4) = 11$

b)  $(x - 4)(x - 7) - 2(x - 4)x^2 - 11 = 0$

c)  $(x - 4)(x - 7) - 2(x + 4) = 0$

6. Select, from the "Four Ways to Solve an Equation" in Section 1.6, the one of those algebraic ways best suited (for the first step) to solving the equation. [Do not solve these.] If and only if no algebraic method works, pick "Guess and Check." [This is a "multiple choice" question.]

a)  $(x - 4)(x - 7) = 1.2$

b)  $(x - 4)(x - 7)(x - 9) = 1.2$

c)  $(x - 4)(x - 7) + (x - 7)(x^2) = 0$

d)  $2x^2 + 5\sqrt{x} - 11 = 0.$

e)  $x(\log 3) + 5x = 17.$

f)  $x^3 + 2x^2 - 10x = 0$

g)  $x\sqrt{x+3} = 15$

h)  $\frac{(x-2)^2}{5} + 8 = 41$

7. Solve for  $x$ :  $x^2(x - 4) - 2x(x - 1) - 19 = 0$ . Write enough so it is clear how you did it.

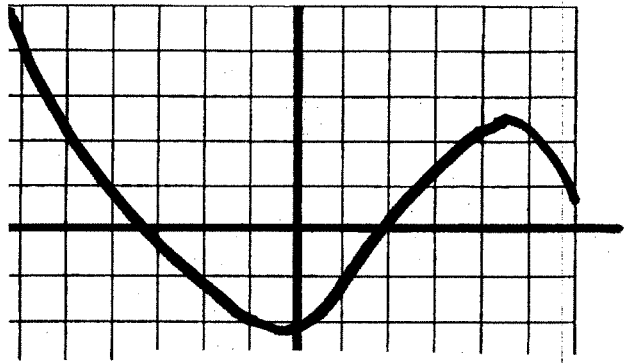
8. Here is a representative graph of  $f(x)$ .

Grid lines are one unit apart.

a) Find  $f(1)$ .

b) Solve  $f(x) = 2$ .

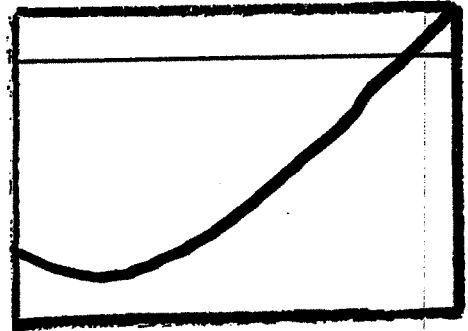
c) Solve  $f(x) = x$



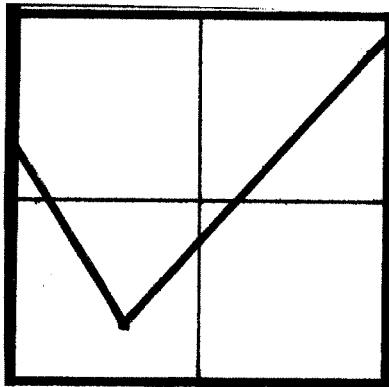
9. Here is the graph of  $y = (x - 40)(x - 20)(30 - x)$  in a certain window. Find the window.

The  $x$ -interval is  $x_{\min} =$                        $x_{\max} =$

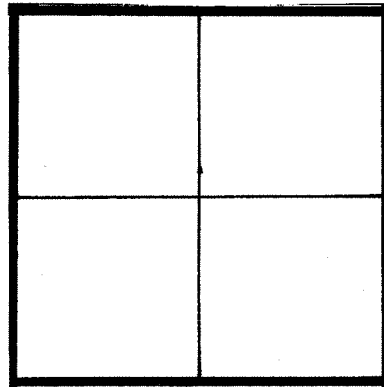
The  $y$ -interval is  $y_{\min} =$                        $y_{\max} =$



10. Here is a representative graph in the standard window,  $[-10, 10]$  by  $[-10, 10]$ . Use the blank window to mark where it would appear in the window  $[-20, 20]$  by  $[-5, 5]$ .

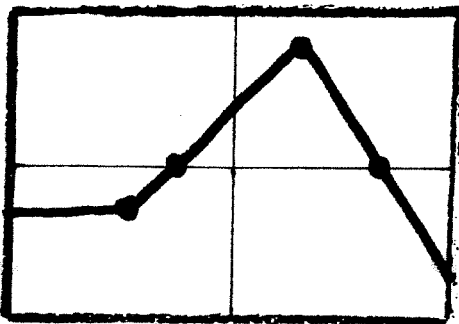


$[-10, 10]$  by  $[-10, 10]$

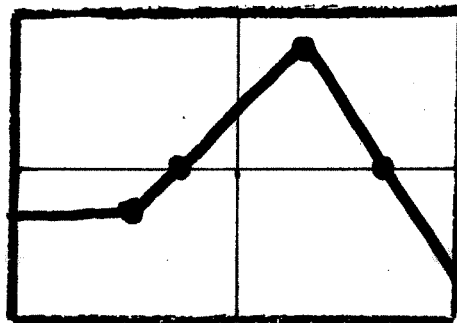


$[-20, 20]$  by  $[-5, 5]$ .

11. Here is a representative graph of  $y = f(x)$  in the standard window  $[-10, 10]$  by  $[-10, 10]$  (three times). Sketch in the same window the requested graphs. [Four points are emphasized. Get those right and sketch in the rest.]



a)  $f(x - 3)$



b)  $f(-x)$



c)  $f(x)/2$

12. True (T) or False (F)?

- a) T F The sentences " $3x = 15$ " and " $3z = 15$ " have the same meaning.
- b) T F The sentences " $5x = 3x + 2x$ " and " $5z = 3z + 2z$ " have the same meaning.
- c) T F  $x = 2$  iff  $x^2 = 4$ .
- d) T F In the sentence "Let  $f(x) = 5x - 2$ " the letter  $x$  is a placeholder.
- e) T F The sentence " $5(x + 2) = 5x + 10$ " is about numbers.

13. Theorem:  $1 + 2 + 3 + \dots + n = n(n+1)/2$ .

Use the theorem to find  $1 + 2 + 3 + 4 + \dots + k + (k+1) =$

14. Section 1.4, "Reading and Writing Mathematics," discussed how methods are written as facts. State, symbolically, as a fact, **the method** for turning all expressions similar to these into a single fraction (single number expressed as a quotient):  $(3/5) + 2$  and  $11/7 + 5$  and  $(x/y) + h$ .

15. Here is a definition, just for this problem. Read it and use it to do the three parts.

Definition: Let  $x \S y = 3x + y$  if  $x \geq 0$  and  $x \S y = 2y - x$  if  $x < 0$ .

- a) Find  $(-3) \S 4$ .
- b) Find  $2 \S x$ .
- c) Solve for  $x$ :  $x \S 5 = 35$ .