IM2 Book 1 Selected Answers

IM2 Dream Team

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1. $x = -3$

2. $-$

3.   (a) $x(x+4)$
     (b) $3x(x-5)$
     (c) $-x(2x+7)$

4.   (a) $x = 0, 4$
     (b) $x = 0, 5$
     (c) $x = 0, -\frac{7}{2}$

5.

$2 \leq x$	$-$	all values that are at least 2	$-$
$-4 < x < 0$	$-$	$-$	$(-4, 0)$
$x < 1$	$-$	all values that are less than 1	$(-\infty, 1)$

6. Answers may vary. Soln: $(0,5)$. Non-soln: $(0,0)$.

7. $4a^2, 2a^2$

8.   (a) $-$
     (b) $24 \leq x$

9. $(x+4)(x+1)$. 4 and 1 add to 5 and multiply to 4.

10. $x^2 + (q+p)x + pq$. $\nabla = (q+p)$. $\Delta = pq$.

11.   (a) $-$
     (b) $37 \leq 37$
     (c) $-$
     (d) $x \geq 18$

12. $x = 1, -4, \frac{3}{2}$

13.   (a) Answers may vary.
        System soln: $(2,4)$
        Soln to one eqn but not the other: $(0,0)$
        Not a system soln: $(0,0)$

(b) –

(c) One solution.

14. Answers may vary.

$$\begin{cases} y = x \\ y = x + 1 \end{cases}$$

15. Answers may vary.

$$\begin{cases} y = x \\ 2y = 2x \end{cases}$$

16. $(3x)^2$

17. $x > -5$

18. (a) $x \leq -10$

(b) $x \leq -10$

19. (a) $x = -4$

(b) $x = 3, 5$

(c) $x = -1, 7$

20. (a) $\left(\frac{1}{2}, \frac{1}{3}\right)$

(b) $(1, -2)$

21. (a) –

(b) $y = x^2$

22. (a) $f(2) = 5$
    $f(-4) = -1$

(b) x = -1

23. (a) $2x + y = 3$

(b) No solutions

Words	Function Formula
	$f(x) = 2x$
	$f(x) = 5x - 1$
divide the input by 2 and add 5	

24.

25. (a) $f(-3) = 3$
    $f(0) = 0$
    $f(2) = 2$

(b) $x = \pm 4$

26. (a) –

    (b) 6

    (c) $x = \pm 10$

27. $(3x + 4)(x - 3)$

28. (a) $-7 \le x$

    (b) $x < 4$

29. (a) 5

    (b) 12

    (c) $|x - y|$

30. No

31. $x \ge 0$

32. $|a - b| = |b - a|$

33. $(4x + 1)(x + 5)$

34. (a) 9 and 4

    (b) 9 and -4

    (c) x and 7

    (d) x and 0

35. (a) –

    (b) $|x| > 6$

    (c) –

36.

–	all values that are 2 units away from -5	–	$x = -3, -7$
$|x| = 5|$	–	–	$x = -5, 5$
$|x + 1| = 2$	all values that are 2 units away from -1	–	$x = -3, 1$

37. (a) All values that are 5 units away from 2.

    (b) All values that are 10 units away from -4.

38. $A = (2a + b)(a + 3b)$

39. (a) $(x - 2)(x - 6)$

    (b) $(3x - 2)(2x + 3)$

    (c) $2x(3x - 1)$

40. $BC = 8$, $AC = 15$, and $AB = 17$

41. (a) $x^2 - 16$

    (b) $x^2 - 49$

(c) $9x^2 - 4$

(d) $x^2 - a^2$

42. (a) $(x - 8)(x + 8)$

  (b) $(x - c)(x + c)$

  (c) $(2x - 5)(2x + 5)$

  (d) $(ax - c)(ax + c)$

43.

−	all values that are at most 2 units away from -5	−	$-7 \le x \le -3$
$|x| \ge 6$	−	−	$x < -6$ or $x > 6$
$|x - 1| \le 4$	all values that are at most 4 units away from 1	−	−

44. (a) −

  (b) $(0, 0)$

  (c) $(-\infty, \infty)$

  (d) $y = 0$

  (e) $[0, \infty)$

45. $y = -x,\ y = x$

$$|x| = \begin{cases} -x \text{ if } x < 0 \\ x \text{ if} x \ge 0 \end{cases}$$

46. $x = 12$

47. (a) All values at most 2 units away from 7.

  (b) $x > -2$ or $x < -8$

48. $(-2, 2)$
  $(3, 7)$

49. (a) −

  (b) $|x - 52| \le 3$

50. $|x - y| = 12$. Infinite.

51. (a) $3x(x + 4)$

  (b) $(x + 5)(x + 3)$

  (c) $2(x + 1)(x - 3)$

  (d) $9(x - 2)(x + 2)$

52. 120

53.

$$|x + 2| = \begin{cases} -x + 2 \text{ if } x < -2 \\ x + 2 \text{ if } x \ge -2 \end{cases}$$

4

54. (a) $x = -5, 5$

    (b) $\text{blob} = -5, 5$

55. Yes

56. $f(x) = |x|$

57. (a) 77 blocks

    (b) 19 blocks

    (c) –

    (d) $y = |x - 91|$

58. –

59. $|l - 12| \leq 0.01$

60. (a) $(-28, 12)$

    (b) $(-\infty, 0] \cup [8, \infty)$

61. (a) $a = -1, -6$

    (b) $x = \frac{-19}{2}, \frac{9}{2}$

62. $-1 \leq a \leq 6$

63. $|x| = 3$
    $x = -3$ or $x = 3$

64. No

65. (a) –

    (b) $y = |x - 34|$

    (c) $x = 18, 50$

66. $x = -4, 4$

67. (a) –

    (b) vertex: $(4, 0)$
        domain: $(-\infty, \infty)$
        range: $[0, \infty)$
        minimum value: $y = 0$

    (c) $x = 4$

68. (a) Shift $f(x)$ left by 5

    (b) $(-5, 0)$. Shift it left by 5.

69. $x = 6, 1$

70.
$$|x - 7| = \begin{cases} x - 7 \text{ if } x \geq 7 \\ -x + 7 \text{ if } x < 7 \end{cases}$$

71. $(10, 3)$

72. $x = 4, -6$

73. $x = -1, -4$

74. Shift it right by 3

75. $g(x) = |x - h|$

76.

x	$|x|$	$|x| - 2$
-3	3	1
-2	2	0
-1	1	-1
0	0	-2
1	1	-1
2	2	0
3	3	1

Translate $f(x)$ down by 2.

77. (a) $\left(-\frac{4}{3}, \frac{4}{3}\right)$

(b) $\left(-\infty, -\frac{84}{5}\right] \cup \left[\frac{56}{5}, \infty\right)$

(c) $\left[-\frac{1}{2}, \frac{13}{2}\right]$

78. (a) $x = -5, -4$

(b) $x = -\frac{7}{2}, 3$

(c) $x = -9, 9$

(d) $x = -\frac{1}{4}, 4$

79. Left graph: $y = |x|$
Right graph: $y = |x - 3|$

80. Shift/translate the graph up by 3
Shift/translate the graph down by 5.

81. $f(x) = |x - 3|$

82. n^2