

CHAPTER 10-1

OPERATIONS WITH POLYNOMIALS

1. 080710a, P.I. A.A.13
The sum of $8x^2 - x + 4$ and $x - 5$ is
[A] $8x^2 - 2x + 9$ [B] $8x^2 + 9$
[C] $8x^2 - 1$ [D] $8x^2 - 2x - 1$
2. 069904a, P.I. A.A.13
The sum of $3x^2 + x + 8$ and $x^2 - 9$ can be expressed as
[A] $4x^2 + x - 1$ [B] $3x^4 + x - 1$
[C] $4x^4 + x - 1$ [D] $4x^2 + x - 17$
3. 010108a, P.I. A.A.13
The sum of $3x^2 + 4x - 2$ and $x^2 - 5x + 3$ is
[A] $4x^2 + x + 1$ [B] $4x^2 - x + 1$
[C] $4x^2 + x - 1$ [D] $4x^2 - x - 1$
4. 080423a, P.I. A.A.13
The expression $(3x^2 + 2xy + 7) - (6x^2 - 4xy + 3)$ is equivalent to
[A] $3x^2 - 6xy - 4$ [B] $-3x^2 + 6xy + 4$
[C] $-3x^2 - 2xy + 4$ [D] $3x^2 - 2xy + 4$
5. 010707a, P.I. A.A.13
The expression $(2x^2 + 6x + 5) - (6x^2 + 3x + 5)$ is equivalent to
[A] $4x^2 + 3x - 10$ [B] $-4x^2 - 3x + 10$
[C] $4x^2 - 3x$ [D] $-4x^2 + 3x$
6. 060511a, P.I. A.A.13
The expression $(x^2 - 5x - 2) - (-6x^2 - 7x - 3)$ is equivalent to
[A] $7x^2 - 2x + 1$ [B] $7x^2 - 12x - 5$
[C] $7x^2 + 2x + 1$ [D] $7x^2 + 2x - 5$
7. 010019a, P.I. A.A.13
When $3a^2 - 2a + 5$ is subtracted from $a^2 + a - 1$, the result is
[A] $-2a^2 + 3a - 6$ [B] $2a^2 - 3a + 6$
[C] $2a^2 - 3a - 6$ [D] $-2a^2 + 3a + 6$
8. 060019a, P.I. A.A.13
If $2x^2 - 4x + 6$ is subtracted from $5x^2 + 8x - 2$, the difference is
[A] $3x^2 + 4x + 4$ [B] $-3x^2 + 4x + 4$
[C] $-3x^2 - 12x + 8$ [D] $3x^2 + 12x - 8$
9. 080020a, P.I. A.A.13
When $3x^2 - 2x + 1$ is subtracted from $2x^2 + 7x + 5$, the result will be
[A] $-x^2 + 5x + 6$ [B] $-x^2 + 9x + 4$
[C] $x^2 + 5x + 6$ [D] $x^2 - 9x - 4$
10. 080209a, P.I. A.A.13
When $-2x^2 + 4x + 2$ is subtracted from $x^2 + 6x - 4$, the result is
[A] $3x^2 + 2x - 6$ [B] $2x^2 - 2x - 6$
[C] $-x^2 + 10x - 2$ [D] $-3x^2 - 2x + 6$
11. 010429a, P.I. A.A.13
If $2x^2 - x + 6$ is subtracted from $x^2 + 3x - 2$, the result is
[A] $x^2 - 4x + 8$ [B] $-x^2 + 4x - 8$
[C] $-x^2 + 2x - 8$ [D] $x^2 + 2x - 8$
12. 010523a, P.I. A.A.13
When $3x^2 - 8x$ is subtracted from $2x^2 + 3x$, the difference is
[A] $x^2 - 5x$ [B] $-x^2 - 11x$
[C] $-x^2 - 5x$ [D] $-x^2 + 11x$

13. 010619a, P.I. A.A.13

When $3a^2 - 7a + 6$ is subtracted from $4a^2 - 3a + 4$, the result is

- [A] $a^2 + 4a - 2$ [B] $-a^2 - 4a + 2$
[C] $a^2 - 10a - 2$ [D] $7a^2 - 10a + 10$

14. 080123a, P.I. A.A.13

Subtract $5x^2 - 7x - 6$ from $9x^2 + 3x - 4$.

CHAPTER 10-2

15. 010819a, P.I. A.A.13

What is the product of $2r^2 - 5$ and $3r$?

- [A] $6r^2 - 15r$ [B] $6r^2 - 15$
[C] $6r^3 - 15r$ [D] $6r^3 - 5$

FACTORING POLYNOMIALS

16. 060506a, P.I. A.A.14

When $3x^2 - 6x$ is divided by $3x$, the result is

- [A] $x - 2$ [B] $x + 2$
[C] $2x$ [D] $-2x$

17. 010724a, P.I. A.A.14

The expression $(50x^3 - 60x^2 + 10x) \div 10x$ is equivalent to

- [A] $5x^3 - 6x^2 + x$ [B] $5x^2 - 60x^2 + 10x$
[C] $5x^2 - 6x$ [D] $5x^2 - 6x + 1$

18. 060421a, P.I. A.A.20

If $3x$ is one factor of $3x^2 - 9x$, what is the other factor?

- [A] $x^2 - 6x$ [B] $x + 3$
[C] $x - 3$ [D] $3x$

19. 060318a, P.I. A.A.20

If one factor of $56x^4y^3 - 42x^2y^6$ is $14x^2y^3$, what is the other factor?

- [A] $4x^2 - 3y^2$ [B] $4x^2y - 3xy^2$
[C] $4x^2 - 3y^3$ [D] $4x^2y - 3xy^3$

CHAPTER 10-3

OPERATIONS WITH POLYNOMIALS

20. 060708a, P.I. A.A.13

What is the product of $(c + 8)$ and $(c - 5)$?

- [A] $c^2 + 3c - 40$ [B] $c^2 + 13c - 40$
[C] $c^2 - 40$ [D] $c^2 - 3c - 40$

21. 010430a, P.I. A.A.13

The expression $(a^2 + b^2)^2$ is equivalent to

- [A] $a^4 + a^2b^2 + b^4$ [B] $a^4 + 2a^2b^2 + b^4$
[C] $a^4 + 4a^2b^2 + b^4$ [D] $a^4 + b^4$

22. 060015a, P.I. A.A.13

The expression $(x - 6)^2$ is equivalent to

- [A] $x^2 + 12x + 36$ [B] $x^2 - 36$
[C] $x^2 - 12x + 36$ [D] $x^2 + 36$

CHAPTER 10-4

FACTORING POLYNOMIALS

23. 010004a, P.I. A.A.20

Which expression is a factor of $x^2 + 2x - 15$

- [A] $(x + 3)$ [B] $(x - 3)$
[C] $(x - 5)$ [D] $(x + 15)$

24. 060206a, P.I. A.A.20

Which expression is a factor of $n^2 + 3n - 54$?

- [A] $n - 9$ [B] $n + 6$
[C] $n + 9$ [D] $n^2 + 9$

25. 010814a, P.I. A.A.20
What are the factors of $x^2 - 5x + 6$?
[A] $(x - 2)$ and $(x - 3)$
[B] $(x + 6)$ and $(x - 1)$
[C] $(x + 2)$ and $(x + 3)$
[D] $(x - 6)$ and $(x + 1)$
26. 010318a, P.I. A.A.20
What are the factors of $x^2 - 10x - 24$?
[A] $(x - 12)(x + 2)$ [B] $(x + 12)(x - 2)$
[C] $(x - 4)(x - 6)$ [D] $(x - 4)(x + 6)$
27. 060623a, P.I. A.A.20
Factored completely, the expression $2y^2 + 12y - 54$ is equivalent to
[A] $(y + 6)(2y - 9)$ [B] $2(y - 3)(y - 9)$
[C] $2(y + 9)(y - 3)$ [D] $(2y + 6)(y - 9)$
28. 060535a, P.I. A.A.20
Factor completely: $3x^2 + 15x - 42$
31. 010201a, P.I. A.A.19
Expressed in factored form, the binomial $4a^2 - 9b^2$ is equivalent to
[A] $(2a + 3b)(2a - 3b)$
[B] $(4a - 3b)(a + 3b)$
[C] $(2a - 3b)(2a - 3b)$
[D] $(2a - 9b)(2a + b)$
32. 010105a, P.I. A.A.19
One of the factors of $4x^2 - 9$ is
[A] $(2x + 3)$ [B] $(x + 3)$
[C] $(4x - 3)$ [D] $(x - 3)$
33. 080711a, P.I. A.A.19
One factor of the expression $x^2y^2 - 16$ is
[A] $x^2 - 4$ [B] $x^2 + 8$
[C] $xy - 4$ [D] $xy - 8$
34. 060109a, P.I. A2.A.7
Factor completely: $3x^2 - 27$
[A] $3(x^2 - 27)$ [B] $(3x + 3)(x - 9)$
[C] $3(x + 3)(x - 3)$ [D] $3(x - 3)^2$

CHAPTER 10-5

29. fall0706ia, P.I. A.A.19
The expression $x^2 - 16$ is equivalent to
[A] $(x - 2)(x + 8)$ [B] $(x + 2)(x - 8)$
[C] $(x + 8)(x - 8)$ [D] $(x + 4)(x - 4)$
30. 010414a, P.I. A.A.19
What is a common factor of $x^2 - 9$ and $x^2 - 5x + 6$?
[A] x^2 [B] $x + 3$
[C] $x - 2$ [D] $x - 3$
35. 080103a, P.I. A2.A.7
Written in simplest factored form, the binomial $2x^2 - 50$ can be expressed as
[A] $(x - 5)(x + 5)$ [B] $2x(x - 50)$
[C] $2(x - 5)(x - 5)$ [D] $2(x - 5)(x + 5)$
36. 080533a, P.I. A2.A.7
Factor completely: $5n^2 - 80$
37. 080434a, P.I. A2.A.7
Factor completely: $3ax^2 - 27a$

CHAPTER 10-6

SOLVING QUADRATICS

38. 069909a, P.I. A.A.28
The larger root of the equation $(x + 4)(x - 3) = 0$ is
[A] 3 [B] -3 [C] 4 [D] -4
39. 080622a, P.I. A.A.27
One of the roots of the equation $x^2 + 3x - 18 = 0$ is 3. What is the other root?
[A] -6 [B] 15 [C] -21 [D] 6
40. 010727a, P.I. A.A.27
What is the solution set of the equation $x^2 - 5x = 0$?
[A] {0,5} [B] {0,-5} [C] {5} [D] {0}
41. 080012a, P.I. A.A.27
The solution set for the equation $x^2 - 2x - 15 = 0$ is
[A] {-5,-3} [B] {5,3}
[C] {-5,3} [D] {5,-3}
42. 060725a, P.I. A.A.27
The solution set of the equation $x^2 - 4x - 12 = 0$ is
[A] {-2,6} [B] {-6,2}
[C] {-4,3} [D] {-3,4}
43. 080118a, P.I. A.A.27
What is the solution set of $m^2 - 3m - 10 = 0$?
[A] {3,10} [B] {3,-10}
[C] {5,-2} [D] {2,-5}
44. 060313a, P.I. A.A.27
What is the solution set of the equation $x^2 - 5x - 24 = 0$?
[A] {-3,-8} [B] {3,-8}
[C] {3,8} [D] {-3,8}
45. 010520a, P.I. A.A.27
What is the solution set for the equation $x^2 - 5x + 6 = 0$?
[A] {-6,1} [B] {2,3}
[C] {-2,-3} [D] {6,-1}
46. 060514a, P.I. A.A.27
What is the solution set of the equation $x^2 + 11x + 28 = 0$?
[A] {-3,-4} [B] {-7,4}
[C] {-7,-4} [D] {3,4}
47. 089926a, P.I. A.A.27
Solve for x : $x^2 + 3x - 40 = 0$
48. 060229a, P.I. A.A.27
Solve for x : $x^2 + 3x - 28 = 0$
49. 010637a, P.I. A.A.27
Solve for x : $x^2 + 2x - 24 = 0$
50. 080525a, P.I. A.A.27
The solution set for the equation $x^2 - 5x = 6$ is
[A] {-2,3} [B] {2,-3}
[C] {1,-6} [D] {-1,6}
51. 060430a, P.I. A.A.28
If $(x - 4)$ is a factor of $x^2 - x - w = 0$, then the value of w is
[A] -12 [B] 12 [C] 3 [D] -3
52. 060606b, P.I. A.A.8
If the equation $x^2 - kx - 36 = 0$ has $x = 12$ as one root, what is the value of k ?
[A] -3 [B] 3 [C] 9 [D] -9

WRITING QUADRATICS

53. 080627a, P.I. A.A.8

When Albert flips open his mathematics textbook, he notices that the product of the page numbers of the two facing pages that he sees is 156. Which equation could be used to find the page numbers that Albert is looking at?

[A] $(x+1)(x+3) = 156$

[B] $x + (x+1) = 156$ [C] $x(x+1) = 156$

[D] $(x+1) + (x+2) = 156$

54. 060608a

What is the length of one side of the square whose perimeter has the same numerical value as its area?

[A] 4 [B] 3 [C] 5 [D] 6

55. 060425a, P.I. A.A.5

A farmer has a rectangular field that measures 100 feet by 150 feet. He plans to increase the area of the field by 20%. He will do this by increasing the length and width by the same amount, x . Which equation represents the area of the new field?

[A] $(100 + 2x)(150 + x) = 18,000$

[B] $(100 + x)(150 + x) = 18,000$

[C] $(100 + x)(150 + x) = 15,000$

[D] $2(100 + x) + 2(150 + x) = 15,000$

56. fall0726ia, P.I. A.A.8

The length of a rectangular window is 5 feet more than its width, w . The area of the window is 36 square feet. Which equation could be used to find the dimensions of the window?

[A] $w^2 - 5w - 36 = 0$ [B] $w^2 + 5w + 36 = 0$

[C] $w^2 - 5w + 36 = 0$ [D] $w^2 + 5w - 36 = 0$

57. 080035a, P.I. A.A.8

Jack is building a rectangular dog pen that he wishes to enclose. The width of the pen is 2 yards less than the length. If the area of the dog pen is 15 square yards, how many yards of fencing would he need to completely enclose the pen?

58. 060035a, P.I. A.A.8

The area of the rectangular playground enclosure at South School is 500 square meters. The length of the playground is 5 meters longer than the width. Find the dimensions of the playground, in meters. *[Only an algebraic solution will be accepted.]*

59. 010233a, P.I. A.A.8

Javon's homework is to determine the dimensions of his rectangular backyard. He knows that the length is 10 feet more than the width, and the total area is 144 square feet. Write an equation that Javon could use to solve this problem. Then find the dimensions, in feet, of his backyard.

60. 080232a, P.I. A.A.8

A rectangular park is three blocks longer than it is wide. The area of the park is 40 square blocks. If w represents the width, write an equation in terms of w for the area of the park. Find the length and the width of the park.

61. 080431b, P.I. A.A.8

A rectangular piece of cardboard is to be formed into an uncovered box. The piece of cardboard is 2 centimeters longer than it is wide. A square that measures 3 centimeters on a side is cut from each corner. When the sides are turned up to form the box, its volume is 765 cubic centimeters. Find the dimensions, in centimeters, of the original piece of cardboard.

62. 010326a, P.I. A.A.8
Three brothers have ages that are consecutive even integers. The product of the first and third boys' ages is 20 more than twice the second boy's age. Find the age of *each* of the three boys.
63. 060131a, P.I. A.A.8
Find three consecutive odd integers such that the product of the first and the second exceeds the third by 8.
64. 060636a, P.I. A.A.8
Tamara has two sisters. One of the sisters is 7 years older than Tamara. The other sister is 3 years younger than Tamara. The product of Tamara's sisters' ages is 24. How old is Tamara?
65. 010830b, P.I. A2.A.21
Write a quadratic equation such that the sum of its roots is -5 and the product of its roots is 6. What are the roots of this equation?

[1] C

[2] A

[3] B

[4] B

[5] D

[6] C

[7] A

[8] D

[9] B

[10] A

[11] B

[12] D

[13] A

[2] $4x^2 + 10x + 2$, and appropriate work is shown, such as $(9x^2 + 3x - 4) - (5x^2 - 7x - 6)$.

[1] The setup is correct, but the distribution of the negative sign is incorrect.

or [1] $14x^2 - 4x - 10$, but appropriate work is shown.

or [1] $4x^2 + 10x + 2$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct

response that was obtained by an obviously

[14] incorrect procedure.

[15] C

[16] A

[17] D

[18] C

[19] C

[20] A

[21] B

[22] C

[23] B

[24] C

[25] A

[26] A

[27] C

[2] $3(x + 7)(x - 2)$, and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made.

or [1] A conceptual error is made, such as incomplete factoring.

or [1] $3(x + 7)(x - 2)$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct

response that was obtained by an obviously

[28] incorrect procedure.

[29] D

[30] D

[31] A

[32] A

[33] C

[34] C

[35] D

[2] $5(n + 4)(n - 4)$, and appropriate work is shown.

[1] Appropriate work is shown, but one factoring error is made or the expression is not simplified completely.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct

response that was obtained by an obviously

[36] incorrect procedure.

[2] $3a(x - 3)(x + 3)$, and appropriate work is shown.

[1] Appropriate work is shown, but one factoring error is made, or the expression is not factored completely.

or [1] $3a(x - 3)(x + 3)$, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[37] incorrect procedure.

[38] A

[39] A

[40] A

[41] D

[42] A

[43] C

[44] D

[45] B

[46] C

[3] -8 and 5 and appropriate work is shown, such as factoring or trial and error.

[2] The student shows correct factoring into $(x + 8)(x - 5)$ or correct use of the quadratic formula but finds only one correct value for x .

[1] Correct factoring is shown, but no values are found.

or

[1] Incorrect factoring is shown, but two appropriate values are found.

or

[1] Either -8 or 5 is arrived at by trial and error.

or

[1] -8 and 5 and no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[47] incorrect procedure.

[3] -7 and 4 , and appropriate work is shown, such as factoring.

[2] Correct factoring $(x + 7)(x - 4)$ is shown, but only one correct value of x is found.

or [2] Correct factoring is shown, but the negative value of x is rejected.

[1] Correct factoring is shown, but the values of x are not found.

or [1] Incorrect factoring is shown, but appropriate values are found.

or [1] Only one value is found by trial and error.

or [1] -7 and 4 , but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[48] incorrect procedure.

[3] -6 and 4 , and appropriate work is shown, such as factoring or trial and error with at least three trials and appropriate checks.

[2] Appropriate work is shown, but one computational error is made.

or [2] Appropriate work is shown, but only one correct value for x is found.

or [2] The trial-and-error method is used to find the correct solutions, but only two trials and appropriate checks are shown.

[1] Appropriate work is shown, but two or more computational errors are made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] The equation is factored correctly, but no values are found.

or [1] The equation is factored incorrectly, but two appropriate values are found.

or [1] -6 and 4 , but no work or only one trial with an appropriate check is shown.

[0] -6 or 4 , but no work or only one trial with an appropriate check is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[49] obviously incorrect procedure.

[50] D

[51] B

[52] C

[53] C

[54] A

[55] B

[56] D

[4] 16 and appropriate work is shown, such as $W(W + 2) = 15$.

[3] Appropriate work is shown, but one computational error is made.

or [3] $L = 5$, $W = 3$, and the perimeter = 16, but no work is shown.

[2] Appropriate work is shown, but more than one computational error is made.

or [2] $L = 5$, $W = 3$, and appropriate work is shown, but the perimeter is not found.

or [2] The length and width are incorrect, but the perimeter is computed appropriately.

[1] Length and width are appropriately defined in terms of a single variable.

or [1] 16 but no work is shown.

[0] $L = 5$ and $W = 3$ but no work is shown, and the perimeter is not found.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[57] obviously incorrect procedure.

[4] Width = 20 and length = 25 and an appropriate algebraic equation is shown, such as $x^2 + 5x - 500 = 0$.

[3] A correct quadratic equation is shown, but one error is made.

or [3] A correct quadratic equation is shown, but solved for only one dimension.

[2] An appropriate solution is shown, but the student fails to reject the negative root and finds two sets of dimensions.

or [2] The quadratic equation $(5x)(x) = 500$ is solved appropriately for both dimensions, $x = 10$ and $5x = 50$.

[1] The student writes only the correct quadratic equation or only the equation $x(x + 5) = 500$ or fails to solve the equation correctly.

or [1] The student writes a linear equation from $x(x + 5) = 500$, such as $2x + 5x = 500$, but solves that equation appropriately.

or [1] A correct equation is shown for the perimeter and solved appropriately.

or [1] $(5x)(x) = 500$ is solved correctly for only one dimension.

or [1] 20 and 25 but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

[58] incorrect procedure.

- [4] $x(x + 10) = 144$ or an equivalent equation and $8 = \text{width}$ and $18 = \text{length}$, and appropriate work is shown.
- [3] Appropriate work is shown, but one computational error is made.
- or [3] A correct equation is used and a correct solution is found, but only one dimension is identified.
- [2] An appropriate solution is found to an incorrect equation of equal difficulty.
- or [2] A correct equation set equal to zero is shown, with no further work or incorrect work.
- [1] A conceptual error is made, such as writing the equation $2x + 2(x + 10) = 144$, but the dimensions are found appropriately.
- or [1] $x(x + 10) = 144$ and $8 = \text{width}$ and $18 = \text{length}$, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [59] incorrect procedure.

- [4] $w(w + 3) = 40$, $\text{width} = 5$, and $\text{length} = 8$, and appropriate work is shown.
- [3] $w(w + 3) = 40$ and appropriate work is shown, but one computational error is made in finding the length and width.
- or [3] $w(w + 3) = 40$ and appropriate work is shown, but only the width is found.
- [2] $w(w + 3) = 40$ and appropriate work is shown, but the length and width are not identified.
- or [2] $w(w + 3) = 40$ and appropriate work is shown, but more than one computational error is made in finding the length and width.
- or [2] An incorrect equation of equal difficulty is solved appropriately for the length and width.
- [1] $w(w + 3) = 40$, but no further correct work is shown.
- or [1] Appropriate work is shown, but one conceptual error is made, such as solving the equation $2w + 2w + 6 = 40$.
- or [1] $w(w + 3) = 40$, $\text{width} = 5$, and $\text{length} = 8$, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [60] incorrect procedure.

[4] 21 by 23, and appropriate work is shown, such as solving the equation $765 = 3(x - 4)(x - 6)$.

[3] Appropriate work is shown, but one computational error is made.

or [3] Appropriate work is shown, but only one dimension is found.

[2] Appropriate work is shown, but two or more computational errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] An incorrect equation of equal difficulty is solved appropriately, and appropriate dimensions are found.

or [2] A correct quadratic equation is written in standard form, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational error are made.

or [1] An incorrect equation of equal difficulty is written, and one computational error is made, but appropriate dimensions are found.

or [1] An incorrect equation of equal difficulty is solved appropriately, but one computational error is made when finding the length.

or [1] 21 by 23, but no work is shown.

[0] 21 or 23, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[61] obviously incorrect procedure.

[3] 4, 6, and 8, and appropriate work is shown, such as the correct quadratic equation or trial and error with at least three trials and appropriate checks.

[2] The correct quadratic equation is solved, but one computational error is made, but three appropriate ages are listed.

or [2] The correct quadratic equation is solved, but the negative root is not rejected, but three appropriate ages are listed.

or [2] The correct quadratic equation is solved, but only one age is found.

or [2] The trial-and-error method is used to find a correct solution, but only two trials and appropriate checks are shown.

[1] An incorrect equation of lesser difficulty is solved appropriately, and the three ages are listed.

or [1] An incorrect quadratic equation of equal difficulty is solved appropriately, and the three ages are listed.

or [1] The correct quadratic equation is shown, but more than one computational error is made.

or [1] The correct quadratic equation is shown, but no further correct work is shown.

or [1] 4, 6, and 8, but no work or only one trial with an appropriate check is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[62] incorrect procedure.

[4] 3, 5, and 7, and appropriate work is shown, such as an appropriate quadratic equation or trial-and-error method.

[3] An appropriate equation is written and solved, but one computational error is made.

or [3] An appropriate equation is written and solved, but the even solutions are also listed.

[2] An incorrect quadratic equation is shown, but it is solved appropriately.

or [2] Integers are misrepresented, but the subsequent quadratic equation is solved appropriately.

or [2] An appropriate equation is written and solved, but more than one computational error is made.

or [2] The correct solution is given, but only one trial is shown with appropriate checks when a trial-and-error method is used.

[1] A linear equation is solved appropriately.

or [1] 3, 5, and 7, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[63] incorrect procedure.

[3] 5, and appropriate work is shown, such as the quadratic equation $(x + 7)(x - 3) = 24$ or trial and error with at least three trials and appropriate checks.

[2] A correct quadratic equation is written, but one computational error is made in finding Tamara's age.

or [2] 12 and 2 are found as the sisters' ages, but Tamara's age is not found.

or [2] The trial-and-error method is used to find the correct solution, but only two trials and appropriate checks are shown.

[1] Appropriate work is shown, but two or more computational errors are made.

or [1] Appropriate work is shown, but one conceptual error is made.

or [1] A correct quadratic equation is written, but no further correct work is shown.

or [1] An incorrect equation of equal difficulty is solved appropriately for Tamara's age.

or [1] The trial-and-error method is attempted and at least six systematic trials and appropriate checks are shown, but no solution is found.

or [1] 5, but no work or only one trial with an appropriate check is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[64] incorrect procedure.

[4] $x^2 + 5x + 6 = 0$ or an equivalent equation and -3 and -2, and appropriate work is shown, such as using the sum and product formulas or factoring the equation.

[3] Appropriate work is shown, but one computational or factoring error is made.

or [3] The expression $x^2 + 5x + 6 = 0$ is written and -3 and -2, and appropriate work is shown.

[2] Appropriate work is shown, but two or more computational or factoring errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] A correct quadratic equation is written, and appropriate work is shown, but the roots are not found.

or [2] Appropriate work is shown to find -3 and -2, but no quadratic equation is written.

[1] Appropriate work is shown, but one conceptual error and one computational or factoring error are made.

or [1] $x^2 + 5x + 6 = 0$ or an equivalent equation and -3 and -2, but no work is shown.

[0] A correct quadratic equation or -3 and -2, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[65] obviously incorrect procedure.
