Unit 3: Review for Final Exam

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Write the prime factorization of 1386.
a. $2 \cdot 7 \cdot 11 \cdot 9$ b. $2 \cdot 7 \cdot 99$ c. $2 \cdot 3^2 \cdot 7 \cdot 11$ d. $2 \cdot 3 \cdot 7 \cdot 11$

____ 2. Determine the greatest common factor of 72 and 90.
a. 20 b. 360 c. 4 d. 18

____ 3. Determine the least common multiple of 44 and 76.
a. 836 b. 4 c. 1672 d. 3344

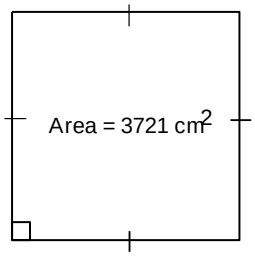
____ 4. A developer wants to subdivide a rectangular plot of land measuring 750 m by 600 m into congruent square lots. What is the side length of the largest possible square?
a. 75 m b. 30 m c. 150 m d. 50 m

____ 5. One neighbour cuts his lawn every 4 days. Another neighbour cuts her lawn every 6 days. Suppose both neighbours cut their lawns today. How many days will pass before both neighbours cut their lawns on the same day again?
a. 24 days b. 18 days c. 2 days d. 12 days

____ 6. There are 22 male students and 12 female students in a Grade 10 math class. The teacher wants to divide the class into groups with the same number of males and the same number of females in each group. What is the greatest number of groups the teacher can make?
a. 6 b. 2 c. 4 d. 8

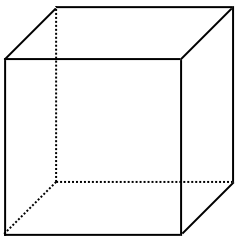
____ 7. A cube has volume 13 824 cm^3. What is the surface area of the cube?
a. 110 592 cm^2 b. 3456 cm^2 c. 24 cm^2 d. 9216 cm^2

____ 8. Determine the side length of this square.



a. 61 cm b. 15.5 cm c. 930.25 cm d. 413.44 cm

____ 9. Determine the edge length of this cube.



a. 332.55 cm b. 48 cm c. 6.93 cm d. 4096 cm

____ 10. A cube has surface area 5766 square feet. What is its volume?
a. 8649 cubic feet
b. 31 cubic feet
c. 1929 cubic feet
d. 29 791 cubic feet

____ 11. A cube with volume 343 m^3 is to be painted. Each can of paint covers 31 m^2. How many cans of paint are needed to paint the cube?
a. 10 b. 12 c. 6 d. 9

____ 12. Factor the binomial $25y^2 - 80y$.
a. $5(5y^2 - 16y)$
b. $5y(5y - 16y)$
c. $y(25y - 80)$
d. $5y(5y - 16)$

____ 13. Factor the trinomial $-21b^2 + 63b + 49$.
a. $-7(3b^2 - 9b + 7)$
b. $-21(b^2 - 3b - 7)$
c. $-7(3b^2 - 9b - 7)$
d. $21(-b^2 + 27b + 7)$

____ 14. Factor the trinomial $-28x^5y^6 - 16x^4y^5 - 36x^3y^7$.
a. $4x^4y^5(-7xy - 4 - 9y^2)$
b. $-4x^3y^5(7x^2y + 4x + 9y^2)$
c. $-2x^3y^5(14x^2y + 8x + 18y^2)$
d. $-4x^3(7x^2y^6 + 4xy^5 + 9y^7)$

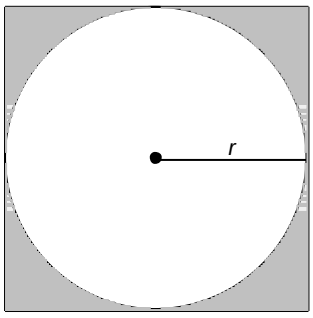
____ 15. Factor the binomial $-4m^2 - 16m^4$.
a. $-4m^2(1 + 4m^2)$
b. $-4m^2(4m^2)$
c. $-4(m^2 + 4m^4)$
d. $-2m^2(2 + 8m^2)$

____ 16. Simplify the expression $y^2 + 10y - 8 - 11y^2 - 30y - 32$, then factor.
a. $-10(y^2 - 2y - 4)$
b. $-10(y^2 + 2y + 4)$
c. $-5(2y^2 + 4y + 8)$
d. $-5(2y^2 + 4y + 1)$

____ 17. Identify the greatest common factor of the terms in the trinomial $4s^3t^4 + 8s^4t^2 - 10s^2t^3$.
a. $4s^2t^2$
b. $2s^2t^2$
c. $2s^2t^3$
d. $2s^3t^2$

____ 18. Factor the trinomial $21m^3 - 28m^2n - 42mn^2$.
a. $21m(m^2 - 7m - 2n^2)$
b. $7m(3m^2 - 4mn - 6n^2)$
c. $7mn(3m^2 - 4m - 6n)$
d. $7(3m^3 - 4m^2n - 6mn^2)$

____ 19. Which expression represents the area of the shaded region?



a. $2r(2r-\pi)$ b. $r^2(1-\pi)$ c. $r^2(4-\pi)$ d. $r(r-2\pi)$

____ 20. Which of the following trinomials can be represented by a rectangle? Use algebra tiles to check.

a. $y^2+2y+16$ c. $y^2+16y+55$

b. $y^2+11y+5$ d. $y^2+10y+2$

____ 21. Which of the following trinomials can be represented by a rectangle? Use algebra tiles to check.

a. $2a^2+32a+11$ c. $2a^2+14a+55$

b. $2a^2+25a+12$ d. $2a^2+17a+4$

____ 22. Expand and simplify: $(p+3)(p-8)$

a. $p^2-5p-24$ c. $p^2+11p-24$

b. $p^2-11p-24$ d. $p^2+5p-24$

____ 23. Expand and simplify: $(3-r)(6-r)$

a. $18-9r+r^2$ c. $18+3r+r^2$

b. $18-3r+r^2$ d. $18+9r+r^2$

____ 24. Factor: $-14-5x+x^2$

a. $(7+x)(-2+x)$ c. $(-14+x)(1+x)$

b. $(14+x)(-1+x)$ d. $(-7+x)(2+x)$

____ 25. Factor: $-4b^2+24b+160$

a. $-4(b-8)(b+5)$ c. $-4(b-4)(b+10)$

b. $-4(b+8)(b-5)$ d. $-4(b+4)(b-10)$

____ 26. Factor: $-2d^2-8d+192$

a. $-2(d+6)(d-16)$ c. $-2(d-6)(d+16)$

b. $-2(d+8)(d-12)$ d. $-2(d-8)(d+12)$

____ 27. Complete: $(a+7)(a-\square)=a^2+\square a-21$

a. $(a+7)(a-4)=a^2+4a-21$ c. $(a+7)(a-3)=a^2+3a-21$

b. $(a+7)(a-3)=a^2+4a-21$ d. $(a+7)(a-4)=a^2+3a-21$

____ 28. Factor: $c^2-9c-52$

a. $(c-4)(c+13)$
b. $(c-2)(c+26)$
c. $(c+4)(c-13)$
d. $(c+2)(c-26)$

____ 29. Expand and simplify: $(h-8)(h+12)$

a. $h^2-4h-96$
b. $h^2+4h-96$
c. $h^2+20h-96$
d. $h^2-20h-96$

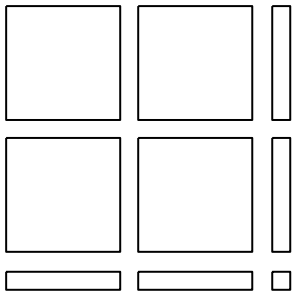
____ 30. Complete. $(k-\square)(k-6)=k^2-\square k+66$

a. $(k-11)(k-5)=k^2-6k+66$
b. $(k-11)(k-6)=k^2-17k+66$
c. $(k-11)(k-17)=k^2-6k+66$
d. $(k-11)(k-6)=k^2-5k+66$

____ 31. Factor: $-4m^2+28m+120$

a. $-4(m+3)(m-10)$
b. $-4(m-3)(m+10)$
c. $-4(m-2)(m+15)$
d. $-4(m+2)(m-15)$

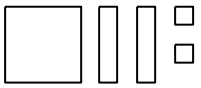
____ 32. Which multiplication sentence does this set of algebra tiles represent?



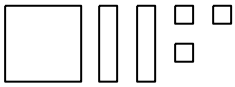
a. $(2x-1)(2x-1)$
b. $(2x^2+1)(2x^2+1)$
c. $(2x^2+x)(2x^2+x)$
d. $(2x+1)(2x+1)$

____ 33. Which set of algebra tiles represents x^2+2x+3?

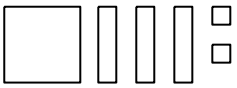
a.



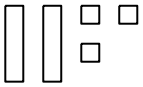
b.



c.



d.



____ 34. Expand and simplify: $(8p+3)(7p-4)$

a. $56p^2+11p-12$
b. $56p^2-11p-12$
c. $56p^2+53p-12$
d. $56p^2-53p-12$

____ 35. Expand and simplify: $(-5m-3)(7+8m)$

a. $-40m^2-59m-21$
c. $-40m^2+11m-21$

b. $40m^2 - 59m - 21$
d. $-40m^2 - 11m - 21$

____ 36. Factor: $9x^2 + 26x + 16$
a. $(9x + 4)(x + 4)$
b. $(9x + 8)(x + 2)$
c. $(3x + 4)(3x + 4)$
d. $(3x + 8)(3x + 2)$

____ 37. Factor: $4s^2 - 29s - 63$
a. $(2s - 7)(2s + 9)$
b. $(2s + 7)(2s - 9)$
c. $(4s + 7)(s - 9)$
d. $(4s - 7)(s + 9)$

____ 38. Factor: $12b^2 + 64b - 10$
a. $2(2b - 1)(6b + 5)$
b. $2(2b + 5)(6b + 1)$
c. $2(2b - 5)(6b + 1)$
d. $2(2b + 1)(6b - 5)$

____ 39. Expand and simplify: $2(1 - 4t)(9 + 8t)$
a. $-64t^2 + 56t + 18$
b. $-64t^2 + 88t + 18$
c. $-192t^2 - 168t + 54$
d. $-64t^2 - 56t + 18$

____ 40. Factor: $5n^2 + 44n - 9$
a. $(5n - 1)(n + 9)$
b. $(5n + 1)(n - 9)$
c. $(5n + 9)(n - 1)$
d. $(5n - 9)(n + 1)$

____ 41. Factor: $4 - 15z - 19z^2$
a. $(2 - 19z)(2 + z)$
b. $(4 - 19z)(1 + z)$
c. $(2 + 19z)(2 - z)$
d. $(4 + 19z)(1 - z)$

____ 42. Factor: $72w^2 + 54w - 45$
a. $3(6w + 3)(4w - 5)$
b. $3(6w + 5)(4w - 3)$
c. $3(6w - 5)(4w + 3)$
d. $3(6w - 3)(4w + 5)$

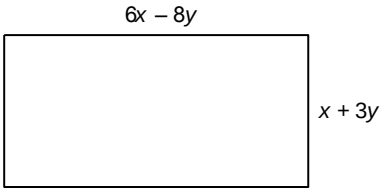
____ 43. Expand and simplify: $(8h + 1)(3h^2 - 6h + 1)$
a. $24h^3 - 51h^2 - 14h + 1$
b. $24h^3 + 45h^2 - 6h + 1$
c. $24h^3 - 45h^2 + 2h + 1$
d. $24h^3 - 48h^2 + 8h + 1$

____ 44. Expand and simplify: $(3m - 5n)^2$
a. $9m^2 - 25n^2$
b. $9m^2 - 15mn + 25n^2$
c. $9m^2 - 30mn + 25n^2$
d. $9m^2 + 25n^2$

____ 45. Expand and simplify: $(11v - 7w)(11v + 7w)$
a. $121v^2 + 154vw + 49w^2$
b. $121v^2 + 49w^2$
c. $121v^2 - 49w^2$
d. $121v^2 - 154vw + 49w^2$

____ 46. Expand and simplify: $(4d - 1)(7d^2 + 16d - 4)$
a. $28d^3 + 71d^2 + 4$
b. $28d^3 + 64d^2 - 16d + 4$
c. $28d^3 + 57d^2 - 32d + 4$
d. $28d^3 + 57d^2 + 4$

____ 47. Which polynomial, written in simplified form, represents the area of this rectangle?



a. $6x^2 - 10xy - 24y^2$
c. $12x^2 + 20xy - 48y^2$
b. $6x^2 + 13xy - 24y^2$
d. $6x^2 + 10xy - 24y^2$

____ 48. Expand and simplify: $(2x^2 + 3x - 8)(9x^2 - 2x + 7)$

a. $18x^4 + 23x^3 - 64x^2 + 37x - 56$
c. $18x^4 + 23x^3 - 58x^2 + 37x + 56$
b. $18x^4 + 23x^3 - 64x^2 - 5x + 56$
d. $18x^4 - 31x^3 - 64x^2 + 37x - 56$

____ 49. Expand and simplify: $(n^2 - 2n + 3)(-4n^2 + 3n + 6)$

a. $-4n^4 + 11n^3 - 12n^2 - 3n + 18$
c. $-4n^4 - 5n^3 + 21n + 18$
b. $-4n^4 + 11n^3 + 21n + 18$
d. $-4n^4 - 5n^3 - 12n^2 + 3n + 18$

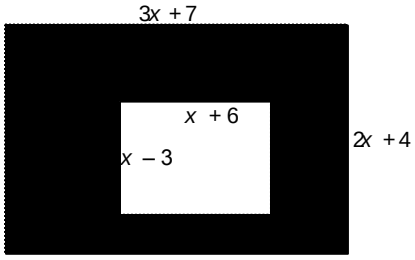
____ 50. Expand and simplify: $(6p + 5)(6p - 7) - (7p - 4)(p - 2)$

a. $29p^2 - 30p - 27$
c. $29p^2 + 6p - 43$
b. $29p^2 + 6p - 27$
d. $29p^2 - 30p - 43$

____ 51. Expand and simplify: $(5x - y)(2x + 8y) - (2x - 3y)^2$

a. $6x^2 + 44xy - 17y^2$
c. $6x^2 + 50xy + 1y^2$
b. $6x^2 + 26xy + 1y^2$
d. $6x^2 + 50xy - 17y^2$

____ 52. Each shape is a rectangle. Write a polynomial, in simplified form, to represent the area of the shaded region.



a. $5x^2 + 23x + 46$
c. $5x^2 + 23x + 10$
b. $5x^2 + 29x + 10$
d. $5x^2 + 29x + 46$

____ 53. Factor: $49a^2 + 28a + 4$

a. $(7a + 2)(7a - 2)$
c. $(7a - 2)^2$
b. $(49a + 2)(a + 2)$
d. $(7a + 2)^2$

____ 54. Factor: $144 - 168r + 49r^2$

a. $(36 - 7r)(4a - 7r)$
c. $(12 + 7r)^2$
b. $(12 - 7r)(12 + 7r)$
d. $(12 - 7r)^2$

____ 55. Factor: $16p^2 - 81q^2$

a. $(4p - 9q)^2$
c. $(16p - 9q)(p - 9q)$
b. $(4p + 9q)^2$
d. $(4p + 9q)(4p - 9q)$

____ 56. Find an integer to replace □ so that this trinomial is a perfect square.

$\square x^2 + 56xy + 16y^2$

a. 7
c. 49
b. 14
d. 196

____ 57. Find an integer to replace □ so that this trinomial is a perfect square.

$64v^2 - \square vw + 49w^2$

a. 112
c. 56
b. 392
d. 14

____ 58. Factor: $121s^2 - 132st + 36t^2$

a. $(11s - 6t)^2$
c. $(11s - t)(11s - 36t)$
b. $(11s + 6t)^2$
d. $(11s - 6t)(11s + 6t)$

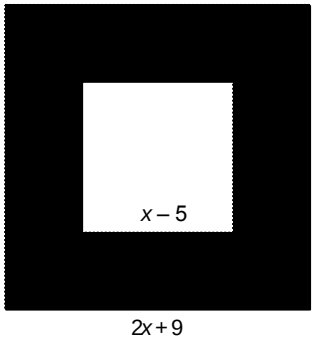
____ 59. Factor: $9c^2 - 24c + 16$

a. $(3c - 4)^2$
c. $(6c - 8)^2$
b. $(3c - 4)(3c + 4)$
d. $(6c - 8)(6c + 8)$

____ 60. Factor: $512 - 2w^4$

a. $(16 - w^2)(32 - w^2)$
c. $2(16 - w^2)^2$
b. $2(16 + w^2)(4 + w)(4 - w)$
d. $2(16 + w^2)^2$

____ 61. Determine the area of the shaded region in factored form.



a. $4(x + 14)$
c. $(3x + 14)(x + 4)$
b. $(3x + 4)(x + 14)$
d. $(3x - 4)(x - 14)$

Short Answer

62. Expand and simplify: $(7t + 4)(4t - 5)$

63. Factor: $34n^2 + n - 8$

64. Factor: $10z^2 - 35z + 25$

65. Find and correct the error(s) in this solution of factoring by decomposition.
$$\begin{aligned} 50y^2 + 45y - 26 &= 50y^2 + 65y - 20y - 26 \\ &= 5y(10y + 13) + 2(10y + 13) \\ &= (10y + 13)(5y + 2) \end{aligned}$$

66. Expand and simplify: $(7x - 8y)(9x + 4y - 6)$

67. Find and correct the errors in this solution.
$(11a + b)(2a - 13b + 8)$
$= 13a^2 - 143ab + 88a - 2ab - 13b^2 + 8b$
$= 13a^2 - 145ab - 13b^2 - 88a + 8b$

68. Factor: $36a^2 + 84ab + 49b^2$

69. Factor: $25s^2 - 16t^2$

Problem

70. Chris completes one lap of a go-cart track every 45 s. D'Arcy completes one lap of the same track every 60 s. Suppose Chris and D'Arcy cross the starting line at the same time. How many seconds will pass before they cross the starting line at the same time again? How many laps will Chris have completed in that time? How many laps will D'Arcy have completed in that time?

71. A cube has surface area 1734 m^2. What is its volume?

72. A square has area 46.0 cm^2. Determine the perimeter of the square to the nearest tenth of a centimetre.

73. Germaine wants to paint a cube with volume 6859 m^3. Each tub of paint covers 55 m^2. How many tubs of paint does Germaine need to paint the cube?

74. Calculate the volume of the largest possible sphere that can fit in a cube with volume 4096.0 cm^3. Give the volume to the nearest tenth of a cubic centimetre. Explain your steps.

75. a) Here are a student's solutions for factoring polynomials. Identify the errors in each solution. Write a correct solution.
    i) Factor: $15s^2 - 35s^3 + 5s$
    Solution: $15s^2 - 35s^3 + 5s = 5s(3s - 7s^2)$
    ii) Factor: $-22h - 32h^2 + 16h^3$
    Solution: $-22h - 32h^2 + 16h^3 = -2h(11 + 16h + 8h^2)$
    b) What should the student have done to check her work?

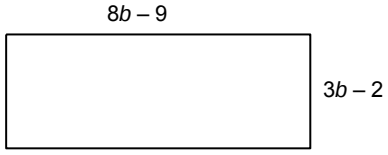
76. Multiply this pair of binomials. Sketch and label a rectangle to illustrate the product.
$(x + 8)(x - 5)$

77. A student is asked to find an integer to replace □ so that $x^2 - x + \square$ can be factored. The student said the only possible integer is -56. Is the student correct? Explain.

78. Find an integer to replace □ so that $x^2 + \square x - 24$ can be factored.
How many integers can you find?

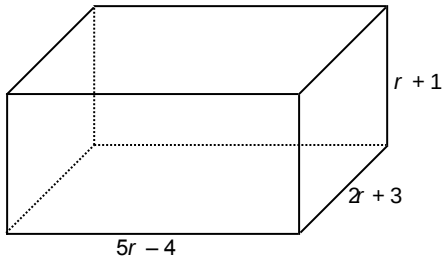
79. Factor. Check by expanding.
$7z^2 - 42z + 35$

80. Find the area of the rectangle.



81. Use decomposition to factor $25y^2 + 20y + 4$. Explain your steps.

82. A student says that the expression $10r^3 - 5r^2 - 27r - 12$ represents the volume of this right rectangular prism. Is the student correct? How do you know?



83. Factor. Explain your steps.
$75x^2 - 147y^2$

Unit 3: Review for Final Exam
Answer Section

MULTIPLE CHOICE

1. ANS: C PTS: 1 DIF: Easy
   REF: 3.1 Factors and Multiples of Whole Numbers LOC: 10.AN1
   TOP: Algebra and Number KEY: Procedural Knowledge
2. ANS: D PTS: 1 DIF: Easy
   REF: 3.1 Factors and Multiples of Whole Numbers LOC: 10.AN1
   TOP: Algebra and Number KEY: Procedural Knowledge
3. ANS: A PTS: 1 DIF: Easy
   REF: 3.1 Factors and Multiples of Whole Numbers LOC: 10.AN1
   TOP: Algebra and Number KEY: Procedural Knowledge
4. ANS: C PTS: 1 DIF: Moderate
   REF: 3.1 Factors and Multiples of Whole Numbers LOC: 10.AN1
   TOP: Algebra and Number KEY: Procedural Knowledge
5. ANS: D PTS: 1 DIF: Moderate
   REF: 3.1 Factors and Multiples of Whole Numbers LOC: 10.AN1
   TOP: Algebra and Number KEY: Procedural Knowledge
6. ANS: B PTS: 1 DIF: Moderate
   REF: 3.1 Factors and Multiples of Whole Numbers LOC: 10.AN1
   TOP: Algebra and Number KEY: Procedural Knowledge
7. ANS: B PTS: 1 DIF: Moderate
   REF: 3.2 Perfect Squares, Perfect Cubes, and Their Roots LOC: 10.AN1
   TOP: Algebra and Number KEY: Procedural Knowledge
8. ANS: A PTS: 1 DIF: Easy
   REF: 3.2 Perfect Squares, Perfect Cubes, and Their Roots LOC: 10.AN1
   TOP: Algebra and Number KEY: Procedural Knowledge
9. ANS: B PTS: 1 DIF: Easy
   REF: 3.2 Perfect Squares, Perfect Cubes, and Their Roots LOC: 10.AN1
   TOP: Algebra and Number KEY: Procedural Knowledge
10. ANS: D PTS: 1 DIF: Moderate
    REF: 3.2 Perfect Squares, Perfect Cubes, and Their Roots LOC: 10.AN1
    TOP: Algebra and Number KEY: Procedural Knowledge
11. ANS: A PTS: 1 DIF: Moderate
    REF: 3.2 Perfect Squares, Perfect Cubes, and Their Roots LOC: 10.AN1
    TOP: Algebra and Number KEY: Procedural Knowledge
12. ANS: D PTS: 1 DIF: Easy
    REF: 3.3 Common Factors of a Polynomial LOC: 10.AN5
    TOP: Algebra and Number KEY: Procedural Knowledge
13. ANS: C PTS: 1 DIF: Easy
    REF: 3.3 Common Factors of a Polynomial LOC: 10.AN5
    TOP: Algebra and Number KEY: Procedural Knowledge
14. ANS: B PTS: 1 DIF: Moderate
    REF: 3.3 Common Factors of a Polynomial LOC: 10.AN5
    TOP: Algebra and Number KEY: Procedural Knowledge
15. ANS: A PTS: 1 DIF: Easy

REF: 3.3 Common Factors of a Polynomial LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

16. ANS: B PTS: 1 DIF: Moderate
REF: 3.3 Common Factors of a Polynomial LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

17. ANS: B PTS: 1 DIF: Easy
REF: 3.3 Common Factors of a Polynomial LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

18. ANS: B PTS: 1 DIF: Moderate
REF: 3.3 Common Factors of a Polynomial LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

19. ANS: C PTS: 1 DIF: Moderate
REF: 3.3 Common Factors of a Polynomial LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

20. ANS: C PTS: 1 DIF: Easy
REF: 3.4 Modelling Trinomials as Binomial Products LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

21. ANS: B PTS: 1 DIF: Easy
REF: 3.4 Modelling Trinomials as Binomial Products LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

22. ANS: A PTS: 1 DIF: Easy
REF: 3.5 Polynomials of the Form x^2 + bx + c LOC: 10.AN4
TOP: Algebra and Number KEY: Procedural Knowledge

23. ANS: A PTS: 1 DIF: Easy
REF: 3.5 Polynomials of the Form x^2 + bx + c LOC: 10.AN4
TOP: Algebra and Number KEY: Procedural Knowledge

24. ANS: D PTS: 1 DIF: Moderate
REF: 3.5 Polynomials of the Form x^2 + bx + c LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

25. ANS: D PTS: 1 DIF: Moderate
REF: 3.5 Polynomials of the Form x^2 + bx + c LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

26. ANS: D PTS: 1 DIF: Moderate
REF: 3.5 Polynomials of the Form x^2 + bx + c LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

27. ANS: B PTS: 1 DIF: Moderate
REF: 3.5 Polynomials of the Form x^2 + bx + c LOC: 10.AN4
TOP: Algebra and Number KEY: Procedural Knowledge

28. ANS: C PTS: 1 DIF: Easy
REF: 3.5 Polynomials of the Form x^2 + bx + c LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

29. ANS: B PTS: 1 DIF: Easy
REF: 3.5 Polynomials of the Form x^2 + bx + c LOC: 10.AN4
TOP: Algebra and Number KEY: Procedural Knowledge

30. ANS: B PTS: 1 DIF: Moderate
REF: 3.5 Polynomials of the Form x^2 + bx + c LOC: 10.AN4
TOP: Algebra and Number KEY: Procedural Knowledge

31. ANS: A PTS: 1 DIF: Moderate
REF: 3.5 Polynomials of the Form x^2 + bx + c LOC: 10.AN5

TOP: Algebra and Number KEY: Procedural Knowledge

32. ANS: D PTS: 1 DIF: Easy
REF: 3.6 Polynomials of the Form ax^2 + bx + c LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

33. ANS: B PTS: 1 DIF: Easy
REF: 3.6 Polynomials of the Form ax^2 + bx + c LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

34. ANS: B PTS: 1 DIF: Easy
REF: 3.6 Polynomials of the Form ax^2 + bx + c LOC: 10.AN4
TOP: Algebra and Number KEY: Procedural Knowledge

35. ANS: A PTS: 1 DIF: Easy
REF: 3.6 Polynomials of the Form ax^2 + bx + c LOC: 10.AN4
TOP: Algebra and Number KEY: Procedural Knowledge

36. ANS: B PTS: 1 DIF: Easy
REF: 3.6 Polynomials of the Form ax^2 + bx + c LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

37. ANS: C PTS: 1 DIF: Easy
REF: 3.6 Polynomials of the Form ax^2 + bx + c LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

38. ANS: A PTS: 1 DIF: Moderate
REF: 3.6 Polynomials of the Form ax^2 + bx + c LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

39. ANS: D PTS: 1 DIF: Moderate
REF: 3.6 Polynomials of the Form ax^2 + bx + c LOC: 10.AN4
TOP: Algebra and Number KEY: Procedural Knowledge

40. ANS: A PTS: 1 DIF: Easy
REF: 3.6 Polynomials of the Form ax^2 + bx + c LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

41. ANS: B PTS: 1 DIF: Moderate
REF: 3.6 Polynomials of the Form ax^2 + bx + c LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

42. ANS: D PTS: 1 DIF: Moderate
REF: 3.6 Polynomials of the Form ax^2 + bx + c LOC: 10.AN5
TOP: Algebra and Number KEY: Procedural Knowledge

43. ANS: C PTS: 1 DIF: Easy REF: 3.7 Multiplying Polynomials
LOC: 10.AN4 TOP: Algebra and Number KEY: Procedural Knowledge

44. ANS: C PTS: 1 DIF: Easy REF: 3.7 Multiplying Polynomials
LOC: 10.AN4 TOP: Algebra and Number KEY: Procedural Knowledge

45. ANS: C PTS: 1 DIF: Easy REF: 3.7 Multiplying Polynomials
LOC: 10.AN4 TOP: Algebra and Number KEY: Procedural Knowledge

46. ANS: C PTS: 1 DIF: Easy REF: 3.7 Multiplying Polynomials
LOC: 10.AN4 TOP: Algebra and Number KEY: Procedural Knowledge

47. ANS: D PTS: 1 DIF: Moderate REF: 3.7 Multiplying Polynomials
LOC: 10.AN4 TOP: Algebra and Number KEY: Procedural Knowledge

48. ANS: A PTS: 1 DIF: Moderate REF: 3.7 Multiplying Polynomials
LOC: 10.AN4 TOP: Algebra and Number KEY: Procedural Knowledge

49. ANS: A PTS: 1 DIF: Moderate REF: 3.7 Multiplying Polynomials
LOC: 10.AN4 TOP: Algebra and Number KEY: Procedural Knowledge

50. ANS: C PTS: 1 DIF: Moderate REF: 3.7 Multiplying Polynomials

LOC: 10.AN4 TOP: Algebra and Number KEY: Procedural Knowledge

51. ANS: D PTS: 1 DIF: Moderate REF: 3.7 Multiplying Polynomials
LOC: 10.AN4 TOP: Algebra and Number KEY: Procedural Knowledge

52. ANS: A PTS: 1 DIF: Moderate REF: 3.7 Multiplying Polynomials
LOC: 10.AN4 TOP: Algebra and Number KEY: Procedural Knowledge

53. ANS: D PTS: 1 DIF: Easy REF: 3.8 Factoring Special Polynomials
LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

54. ANS: D PTS: 1 DIF: Easy REF: 3.8 Factoring Special Polynomials
LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

55. ANS: D PTS: 1 DIF: Easy REF: 3.8 Factoring Special Polynomials
LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

56. ANS: C PTS: 1 DIF: Easy REF: 3.8 Factoring Special Polynomials
LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

57. ANS: A PTS: 1 DIF: Easy REF: 3.8 Factoring Special Polynomials
LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

58. ANS: A PTS: 1 DIF: Easy REF: 3.8 Factoring Special Polynomials
LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

59. ANS: A PTS: 1 DIF: Easy REF: 3.8 Factoring Special Polynomials
LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

60. ANS: B PTS: 1 DIF: Moderate REF: 3.8 Factoring Special Polynomials
LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

61. ANS: B PTS: 1 DIF: Difficult REF: 3.8 Factoring Special Polynomials
LOC: 10.AN4 | 10.AN5 TOP: Algebra and Number
KEY: Procedural Knowledge

SHORT ANSWER

62. ANS:
$28t^2 - 19t - 20$

PTS: 1 DIF: Easy REF: 3.6 Polynomials of the Form ax^2 + bx + c
LOC: 10.AN4 TOP: Algebra and Number KEY: Procedural Knowledge

63. ANS:
$(17n - 8)(2n + 1)$

PTS: 1 DIF: Easy REF: 3.6 Polynomials of the Form ax^2 + bx + c
LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

64. ANS:
$5(2z - 5)(z - 1)$

PTS: 1 DIF: Moderate REF: 3.6 Polynomials of the Form ax^2 + bx + c
LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

65. ANS:

$$\begin{aligned} 50y^2 + 45y - 26 &= 50y^2 + 65y - 20y - 26 \\ &= 5y(10y + 13) - 2(10y + 13) \\ &= (10y + 13)(5y - 2) \end{aligned}$$

PTS: 1 DIF: Moderate REF: 3.6 Polynomials of the Form ax^2 + bx + c

LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

66. ANS:

$63x^2 - 44xy - 32y^2 - 42x + 48y$

PTS: 1 DIF: Moderate REF: 3.7 Multiplying Polynomials
LOC: 10.AN4 TOP: Algebra and Number KEY: Procedural Knowledge

67. ANS:

$(11a + b)(2a - 13b + 8)$
$= 22a^2 - 143ab + 88a + 2ab - 13b^2 + 8b$
$= 22a^2 - 141ab + 88a - 13b^2 + 8b$

PTS: 1 DIF: Moderate REF: 3.7 Multiplying Polynomials
LOC: 10.AN4 TOP: Algebra and Number KEY: Procedural Knowledge

68. ANS:

$(6a + 7b)^2$

PTS: 1 DIF: Easy REF: 3.8 Factoring Special Polynomials
LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

69. ANS:

$(5s + 4t)(5s - 4t)$

PTS: 1 DIF: Easy REF: 3.8 Factoring Special Polynomials
LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

PROBLEM

70. ANS:

The time, in seconds, that will pass is the least common multiple of 40 and 50.
List the multiples of each number until the same multiple appears in both lists.

Multiples of 45 are: 45, 90, 135, 180, . . .
Multiples of 60 are: 60, 120, 180, . . .

The least common multiple of 45 and 60 is 180.
So, 180 s will pass before Chris and D'Arcy cross the starting line at the same time again.

It takes 45 s for Chris to complete one lap. So, in 180 s, Chris will complete $\frac{180}{45} = 4$ laps.

It takes 60 s for D'Arcy to complete one lap. So, in 180 s, D'Arcy will complete $\frac{180}{60} = 3$ laps.

PTS: 1 DIF: Moderate REF: 3.1 Factors and Multiples of Whole Numbers
LOC: 10.AN1 TOP: Algebra and Number KEY: Problem-Solving Skills

71. ANS:

To calculate the volume, first determine the edge length of the cube.

The surface area of a cube is the sum of the areas of its 6 congruent square faces.
So, the area, *A*, of one face is:

$A = \frac{1734}{6}$

$A = 289$

The edge length, *e*, of the cube is the square root of the area of one square face.

$e = \sqrt{289}$

$e = 17$

So, the volume, *V*, of the cube is the cube of its edge length.

$V = 17^3$

$V = 4913$

The volume of the cube is 4913 m^3.

PTS: 1 DIF: Easy REF: 3.2 Perfect Squares, Perfect Cubes, and Their Roots
LOC: 10.AN1 TOP: Algebra and Number KEY: Problem-Solving Skills

72. ANS:

To calculate the perimeter, first determine the side length of the square.

The side length, *s*, of a square is equal to the square root of its area.

$s = \sqrt{46.0}$

$s = 6.7823...$

The perimeter, *P*, of a square is 4 times its side length.

$P = 4s$

$P = 4(6.7823...)$

$P = 27.1293...$

The perimeter of the square is approximately 27.1 cm.

PTS: 1 DIF: Moderate REF: 3.2 Perfect Squares, Perfect Cubes, and Their Roots
LOC: 10.AN1 TOP: Algebra and Number KEY: Problem-Solving Skills

73. ANS:

To calculate how many tubs of paint are needed, first determine the surface area of the cube.

The edge length, *e*, of a cube is equal to the cube root of its volume.

$e = \sqrt[3]{6859}$

$e = 19$

The surface area, *SA*, of a cube is the sum of the areas of its 6 congruent square faces.

$SA = 6(19 \cdot 19)$

$SA = 6(361)$

$SA = 2166$

Calculate how many tubs of paint are needed:

$\frac{2166}{55} = 39.3818...$

Germaine needs 40 tubs of paint to paint the cube.

PTS: 1 DIF: Moderate REF: 3.2 Perfect Squares, Perfect Cubes, and Their Roots
LOC: 10.AN1 TOP: Algebra and Number KEY: Problem-Solving Skills

74. ANS:
To determine the volume of the sphere, first determine the edge length of the cube.

The edge length, *e*, of a cube is equal to the cube root of its volume.

$e = \sqrt[3]{4096.0}$

$e = 16$

The radius, *r*, of the largest sphere that will fit in the cube is one-half of the edge length of the cube.

$r = \frac{1}{2}(16)$

$r = 8.0$

Use the formula for the volume of a sphere.

$V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}\pi(8.0)^3$

$V = 2144.6605...$

The volume of the largest possible sphere that can fit in the cube is approximately 2144.7 cm^3.

PTS: 1 DIF: Difficult REF: 3.2 Perfect Squares, Perfect Cubes, and Their Roots
LOC: 10.AN1 TOP: Algebra and Number
KEY: Communication | Problem-Solving Skills

75. ANS:
a) i) Correction:

$5s(3s - 7s^2 + 1)$

The student did not remove the common factor from the third term correctly. When the common factor is the same as the term, a factor of 1 remains. This must be written as a term in the factored polynomial.

ii) Correction:

$-2h(11 + 16h - 8h^2)$

When the student removed the common factor from the third term, she made a sign error. The sign should be negative, not positive.

b) The student should have expanded her solutions to check that the trinomial was the same as the original trinomial each time.

PTS: 1 DIF: Moderate REF: 3.3 Common Factors of a Polynomial
LOC: 10.AN5 TOP: Algebra and Number
KEY: Communication | Problem-Solving Skills

76. ANS:

	x	8
x	$(x)(x) = x^2$	$(8)(x) = 8x$
-5	$(-5)(x) = -5x$	$(-5)(8) = -40$

$$(x+8)(x-5) = x^2 + (-5x) + 8x + (-40)$$
$$= (x^2 + 3x - 40)$$

PTS: 1 DIF: Moderate REF: 3.5 Polynomials of the Form x^2 + bx + c
LOC: 10.AN4 TOP: Algebra and Number KEY: Problem-Solving Skills

77. ANS:
Replace □ with -56:
Find two integers whose product is -56 and whose sum is -1.
The integers are 7 and -8.
So, $x^2 - x - 56 = (x+7)(x-8)$

The student is not correct because -56 is not the only possible integer.
The product of any pair of integers whose sum is -1 will allow $x^2 - x + \square$ to be factored.

For example, replace □ with -72:
Find two integers whose product is -72 and whose sum is -1.
The integers are 8 and -9.
So, $x^2 - x - 72 = (x+8)(x-9)$

There are an infinite number of integers that could replace □ so that $x^2 - x + \square$ can be factored:
$-2, -6, -12, -20, -30, -42, -56, -72, \ldots$

PTS: 1 DIF: Difficult REF: 3.5 Polynomials of the Form x^2 + bx + c
LOC: 10.AN4 | 10.AN5 TOP: Algebra and Number
KEY: Communication | Problem-Solving Skills

78. ANS:
Find two integers whose product is -24.
Calculate the sum of each pair.

a	***b***	**Product** ***ab***	**Sum** ***a + b***
6	-4	-24	2
-6	4	-24	-2
8	-3	-24	5
-8	3	-24	-5
12	-2	-24	10

-12	2	-24	-10
24	-1	-24	23
-24	1	-24	-23

From the table, the trinomials and their factors are:

$x^2 + 2x - 24 = (x + 6)(x - 4)$

$x^2 - 2x - 24 = (x - 6)(x + 4)$

$x^2 + 5x - 24 = (x + 8)(x - 3)$

$x^2 - 5x - 24 = (x - 8)(x + 3)$

$x^2 + 10x - 24 = (x + 12)(x - 2)$

$x^2 - 10x - 24 = (x - 12)(x + 2)$

$x^2 + 23x - 24 = (x + 24)(x - 1)$

$x^2 - 23x - 24 = (x - 24)(x + 1)$

The integers that can replace □ so that $x^2 + \square x - 24$ can be factored are: $2, -2, 5, -5, 10, -10, 23,$ and -23

PTS: 1 DIF: Difficult REF: 3.5 Polynomials of the Form x^2 + bx + c
LOC: 10.AN5 TOP: Algebra and Number KEY: Problem-Solving Skills

79. ANS:

$7z^2 - 42z + 35$

The greatest common factor is 7.

$7z^2 - 42z + 35 = 7(z^2 - 6z + 5)$

Two numbers with a sum of -6 and a product of 5 are -1 and -5.

So, $z^2 - 6z + 5 = (z - 1)(z - 5)$

And, $7z^2 - 42z + 35 = 7(z - 1)(z - 5)$

Check that the factors are correct. Multiply the factors.

$7(z - 1)(z - 5) = 7(z^2 - 6z + 5)$

$= 7z^2 - 42z + 35$

The trinomial is the same as the original trinomial, so the factors are correct.

PTS: 1 DIF: Difficult REF: 3.5 Polynomials of the Form x^2 + bx + c
LOC: 10.AN5 TOP: Algebra and Number KEY: Procedural Knowledge

80. ANS:

Use the formula for the area, *A*, of a rectangle.

$A = l \times w$

$A = (8b - 9)(3b - 2)$

Use the distributive property.

$A = 8b(3b - 2) + (-9)(3b - 2)$

$A = 24b^2 - 16b - 27b + 18$

$A = 24b^2 - 43b + 18$

The area of the rectangle is $24b^2 - 43b + 18$ square units.

PTS: 1 DIF: Moderate REF: 3.6 Polynomials of the Form ax^2 + bx + c
LOC: 10.AN5 TOP: Algebra and Number KEY: Problem-Solving Skills

81. ANS:

$25y^2 + 20y + 4$

Check for common factors; there are none.

The product of the coefficient of y^2 and the constant term is: $25(4) = 100$

Write $20y$ as the sum of two terms whose coefficients have a product of 100.

Factors of 100	Sum of Factors
1, 100	1 + 100 = 101
2, 50	2 + 50 = 52
4, 25	4 + 25 = 29
5, 20	5 + 20 = 25
10, 10	10 + 10 = 20

The two coefficients are 10 and 10, so write the trinomial $25y^2 + 20y + 4$ as $25y^2 + 10y + 10y + 4$.

Remove a common factor from the 1st pair of terms, and from the 2nd pair of terms.

$25y^2 + 10y + 10y + 4 = 5y(5y + 2) + 2(5y + 2)$

Each product has a common binomial factor.

$25y^2 + 10y + 10y + 4 = (5y + 2)(5y + 2)$

So, $25y^2 + 20y + 4 = (5y + 2)(5y + 2)$

PTS: 1 DIF: Difficult REF: 3.6 Polynomials of the Form ax^2 + bx + c
LOC: 10.AN5 TOP: Algebra and Number
KEY: Communication | Problem-Solving Skills

82. ANS:

Use the formula for the volume, *V*, of a right rectangular prism:

$V = lwh$

$V = (5r - 4)(2r + 3)(r + 1)$

$V = (10r^2 + 15r - 8r - 12)(r + 1)$

$V = (10r^2 + 7r - 12)(r + 1)$

$V = 10r^2(r) + 10r^2(1) + 7r(r) + 7r(1) - 12(r) - 12(1)$

$V = 10r^3 + 17r^2 + -5r - 12$

Since this expression does not match the student's expression, the student is incorrect.
The expression $10r^3 + 17r^2 + -5r - 12$ represents the volume of the right rectangular prism.

PTS: 1 DIF: Moderate REF: 3.7 Multiplying Polynomials
LOC: 10.AN4 TOP: Algebra and Number
KEY: Communication | Problem-Solving Skills

83. ANS:
$75x^2 - 147y^2$

As written, each term of the binomial is not a perfect square. But the terms have a common factor 3. Remove this common factor.

$75x^2 - 147y^2$

$= 3(25x^2 - 49y^2)$

Write each term in the binomial as a perfect square.

$3(25x^2 - 49y^2) = 3\left[(5x)^2 - (7y)^2\right]$ Write these terms in binomial factors.

$= 3(5x - 7y)(5x + 7y)$

PTS: 1 DIF: Moderate REF: 3.8 Factoring Special Polynomials
LOC: 10.AN5 TOP: Algebra and Number
KEY: Communication | Problem-Solving Skills