A.SSE.A.2: Factoring Polynomials 4

1 When the expression $(x+2)^2+4(x+2)+3$ is rewritten as the product of two binomials, the result is
1) $(x+3)(x+1)$
2) $(x+5)(x+3)$
3) $(x+2)(x+2)$
4) $(x+6)(x+1)$

2 Which expression is equivalent to $(x+2)^2-5(x+2)+6$?
1) $x(x-1)$
2) $(x-3)(x-2)$
3) $(x-4)(x+3)$
4) $(x-6)(x+1)$

3 Which expression is equivalent to $(x+3)^2+4(x+3)-5$?
1) $(x+5)(x-1)$
2) $(x+8)(x+2)$
3) $(x-2)(x+4)$
4) $x^2+4x+16$

4 The expression $(x+a)^2+5(x+a)+4$ is equivalent to
1) $(a+1)(a+4)$
2) $(x+1)(x+4)$
3) $(x+a+1)(x+a+4)$
4) $x^2+a^2+5x+5a+4$

5 The expression $(x^2+3)^2-2(x^2+3)-24$ is equivalent to
1) $(x^2+9)(x^2-1)$
2) $(x^2-3)(x^2+7)$
3) x^4-2x^2-21
4) x^4+4x^2-9

6 If $\left(a^3+27\right)=(a+3)\left(a^2+ma+9\right)$, then m equals
1) –9
2) –3
3) 3
4) 6

7 When factored completely, m^5+m^3-6m is equivalent to
1) $(m+3)(m-2)$
2) $(m^2+3m)(m^2-2)$
3) $m(m^4+m^2-6)$
4) $m(m^2+3)(m^2-2)$

8 Which expression is equivalent to $x^6y^4(x^4-16)-9(x^4-16)$?
1) $x^{10}y^4-16x^6y^4-9x^4-144$
2) $(x^6y^4-9)(x+2)^3(x-2)$
3) $(x^3y^2+3)(x^3y^2-3)(x+2)^2(x-2)^2$
4) $(x^3y^2+3)(x^3y^2-3)(x^2+4)(x^2-4)$

9 Which expression is *not* equivalent to $36x^6-25y^4$?
1) $6^2(x^3)^2-5^2(y^2)^2$
2) $(6x^3-5y^2)(6x^3+5y^2)$
3) $(6x^6-5y^4)(6x^6+5y^4)$
4) $(3\bullet 2x^3-5y^2)(3\bullet 2x^3+5y^2)$

10 Which expression is equivalent to x^8-y^8?
1) $(x-y)^8$
2) $(x^2+y^2)^2(x^2-y^2)^2$
3) $(x^4+y^4)(x^2+y^2)(x+y)(x-y)$
4) $(x+y)^4(x-y)^4$

11 Factored completely, $x^4 + 4x^3 - 9x^2 - 36x$ is equivalent to
1) $x(x+9)(x-9)(x+4)$
2) $x(x+3)(x-3)(x+4)$
3) $(x^3 - 9x)(x+4)$
4) $x(x^2 - 9)(x+4)(x+4)$

12 The completely factored form of $2d^4 + 6d^3 - 18d^2 - 54d$ is
1) $2d(d^2 - 9)(d+3)$
2) $2d(d^2 + 9)(d+3)$
3) $2d(d+3)^2(d-3)$
4) $2d(d-3)^2(d+3)$

13 What is the completely factored form of $k^4 - 4k^2 + 8k^3 - 32k + 12k^2 - 48$?
1) $(k-2)(k-2)(k+3)(k+4)$
2) $(k-2)(k-2)(k+6)(k+2)$
3) $(k+2)(k-2)(k+3)(k+4)$
4) $(k+2)(k-2)(k+6)(k+2)$

14 The completely factored form of $n^4 - 9n^2 + 4n^3 - 36n - 12n^2 + 108$ is
1) $(n^2 - 9)(n+6)(n-2)$
2) $(n+3)(n-3)(n+6)(n-2)$
3) $(n-3)(n-3)(n+6)(n-2)$
4) $(n+3)(n-3)(n-6)(n+2)$

15 Which factorization is *incorrect*?
1) $4k^2 - 49 = (2k+7)(2k-7)$
2) $a^3 - 8b^3 = (a-2b)(a^2 + 2ab + 4b^2)$
3) $m^3 + 3m^2 - 4m + 12 = (m-2)^2(m+3)$
4) $t^3 + 5t^2 + 6t + t^2 + 5t + 6 = (t+1)(t+2)(t+3)$

16 Which expression has been rewritten correctly to form a true statement?
1) $(x+2)^2 + 2(x+2) - 8 = (x+6)x$
2) $x^4 + 4x^2 + 9x^2y^2 - 36y^2 = (x+3y)^2(x-2)^2$
3) $x^3 + 3x^2 - 4xy^2 - 12y^2 = (x-2y)(x+3)^2$
4) $(x^2 - 4)^2 - 5(x^2 - 4) - 6 = (x^2 - 7)(x^2 - 6)$

17 Over the set of integers, factor the expression $x^4 - 4x^2 - 12$.

18 Over the set of integers, completely factor $x^4 - 5x^2 + 4$.

19 Factor the expression $x^3 - 2x^2 - 9x + 18$ completely.

20 Factor $x^3 + 4x^2 - 9x - 36$ completely.

21 Factor the expression $2x^3 - 3x^2 - 18x + 27$ completely.

22 Over the set of integers, factor the expression $4x^3 - x^2 + 16x - 4$ completely.

23 Over the set of integers, factor the expression $2x^4 - 10x^3 + 3x^2 - 15x$ completely.

24 Factor completely over the set of integers: $-2x^4 + x^3 + 18x^2 - 9x$

25 Completely factor the following expression: $x^2 + 3xy + 3x^3 + y$

26 Rewrite the expression $\left(4x^2 + 5x\right)^2 - 5\left(4x^2 + 5x\right) - 6$ as a product of four linear factors.

A.SSE.A.2: Factoring Polynomials 4
Answer Section

1 ANS: 2

$u = x + 2 \qquad u^2 + 4u + 3$

$(u + 3)(u + 1)$

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

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

REF: 081901aii

2 ANS: 1

$u = x + 2 \qquad u^2 - 5u + 6$

$(u - 3)(u - 2)$

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

$(x - 1)x$

REF: 012301aii

3 ANS: 2

$u = x + 3 \qquad u^2 + 4u - 5$

$(u + 5)(u - 1)$

$(x + 3 + 5)(x + 3 - 1)$

$(x + 8)(x + 2)$

REF: 062401aii

4 ANS: 3

$(x + a)^2 + 5(x + a) + 4 \quad \text{let } u = x + a$

$u^2 + 5u + 4$

$(u + 4)(u + 1)$

$(x + a + 4)(x + a + 1)$

REF: 012006aii

5 ANS: 2

$(x^2 + 3)^2 - 2(x^2 + 3) - 24 \quad \text{let } u = x^2 + 3$

$u^2 - 2u - 24$

$(u - 6)(u + 4)$

$(x^2 + 3 - 6)(x^2 + 3 + 4)$

REF: 062310aii

6 ANS: 2 REF: 081904aii

7 ANS: 4

$m^5 + m^3 - 6m = m(m^4 + m^2 - 6) = m(m^2 + 3)(m^2 - 2)$

REF: 011703aii

8 ANS: 4

$(x^6y^4 - 9)(x^4 - 16)$

$(x^3y^2 + 3)(x^3y^2 - 3)(x^2 + 4)(x^2 - 4)$

REF: 081814aii

9 ANS: 3 REF: 062302aii

10 ANS: 3

$x^8 - y^8 = (x^4 + y^4)(x^4 - y^4) = (x^4 + y^4)(x^2 + y^2)(x^2 - y^2) = (x^4 + y^4)(x^2 + y^2)(x + y)(x - y)$

REF: 082423aii

11 ANS: 2

$x(x^3 + 4x^2 - 9x - 36)$

$x(x^2(x + 4) - 9(x + 4))$

$x(x^2 - 9)(x + 4)$

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

REF: 062407aii

12 ANS: 3

$2d(d^3 + 3d^2 - 9d - 27)$

$2d(d^2(d + 3) - 9(d + 3))$

$2d(d^2 - 9)(d + 3)$

$2d(d + 3)(d - 3)(d + 3)$

$2d(d + 3)^2(d - 3)$

REF: 081615aii

13 ANS: 4

$k^4 - 4k^2 + 8k^3 - 32k + 12k^2 - 48$

$k^2(k^2 - 4) + 8k(k^2 - 4) + 12(k^2 - 4)$

$(k^2 - 4)(k^2 + 8k + 12)$

$(k + 2)(k - 2)(k + 6)(k + 2)$

REF: fall1505aii

14 ANS: 2

$n^2\left(n^2-9\right)+4n\left(n^2-9\right)-12\left(n^2-9\right)$

$\left(n^2+4n-12\right)\left(n^2-9\right)$

$(n+6)(n-2)(n+3)(n-3)$

REF: 061911aii

15 ANS: 3

$(m-2)^2(m+3)=(m^2-4m+4)(m+3)=m^3+3m^2-4m^2-12m+4m+12=m^3-m^2-8m+12$

REF: 081605aii

16 ANS: 1

1) let $y=x+2$, then y^2+2y-8

$(y+4)(y-2)$

$(x+2+4)(x+2-2)$

$(x+6)x$

REF: 081715aii

17 ANS:

$\left(x^2-6\right)\left(x^2+2\right)$

REF: 081825aii

18 ANS:

x^4-5x^2+4

$(x^2-4)(x^2-1)$

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

REF: 012331aii

19 ANS:

$x^3-2x^2-9x+18=x^2(x-2)-9(x-2)=\left(x^2-9\right)(x-2)=(x+3)(x-3)(x-2)$

REF: 082226aii

20 ANS:

$x^3+4x^2-9x-36=x^2(x+4)-9(x+4)=\left(x^2-9\right)(x+4)=(x+3)(x-3)(x+4)$

REF: 012425aii

21 ANS:

$2x^3 - 3x^2 - 18x + 27$

$x^2(2x - 3) - 9(2x - 3)$

$(x^2 - 9)(2x - 3)$

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

REF: 082325aii

22 ANS:

$x^2(4x - 1) + 4(4x - 1) = (x^2 + 4)(4x - 1)$

REF: 061727aii

23 ANS:

$2x^4 - 10x^3 + 3x^2 - 15x = x(2x^3 - 10x^2 + 3x - 15) = x(2x^2(x - 5) + 3(x - 5)) = x(2x^2 + 3)(x - 5)$

REF: 082427aii

24 ANS:

$-x(2x^3 - x^2 - 18x + 9)$

$-x(x^2(2x - 1) - 9(2x - 1))$

$-x(x^2 - 9)(2x - 1)$

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

REF: 062228aii

25 ANS:

$3x^3 + x^2 + 3xy + y = x^2(3x + 1) + y(3x + 1) = \left(x^2 + y\right)(3x + 1)$

REF: 011828aii

26 ANS:

The expression is of the form $y^2 - 5y - 6$ or $(y - 6)(y + 1)$. Let $y = 4x^2 + 5x$:

$\left(4x^2 + 5x - 6\right)\left(4x^2 + 5x + 1\right)$

$(4x - 3)(x + 2)(4x + 1)(x + 1)$

REF: fall1512aii