

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
- $(x+3)(x+1)$
 - $(x+5)(x+3)$
 - $(x+2)(x+2)$
 - $(x+6)(x+1)$
- 2 Which expression is equivalent to $(x+2)^2 - 5(x+2) + 6$?
- $x(x-1)$
 - $(x-3)(x-2)$
 - $(x-4)(x+3)$
 - $(x-6)(x+1)$
- 3 Which expression is equivalent to $(x+3)^2 + 4(x+3) - 5$?
- $(x+5)(x-1)$
 - $(x+8)(x+2)$
 - $(x-2)(x+4)$
 - $x^2 + 4x + 16$
- 4 The expression $(x+a)^2 + 5(x+a) + 4$ is equivalent to
- $(a+1)(a+4)$
 - $(x+1)(x+4)$
 - $(x+a+1)(x+a+4)$
 - $x^2 + a^2 + 5x + 5a + 4$
- 5 Which expression is equivalent to $(x-2)^2 + 27(x-2) - 90$?
- $(x+30)(x-3)$
 - $(x+28)(x-5)$
 - $(x-30)(x+3)$
 - $(x-2)(x+25)(x-90)$
- 6 The expression $(x^2 + 3)^2 - 2(x^2 + 3) - 24$ is equivalent to
- $(x^2 + 9)(x^2 - 1)$
 - $(x^2 - 3)(x^2 + 7)$
 - $x^4 - 2x^2 - 21$
 - $x^4 + 4x^2 - 9$
- 7 If $(a^3 + 27) = (a+3)(a^2 + ma + 9)$, then m equals
- 9
 - 3
 - 3
 - 6
- 8 When factored completely, $m^5 + m^3 - 6m$ is equivalent to
- $(m+3)(m-2)$
 - $(m^2 + 3m)(m^2 - 2)$
 - $m(m^4 + m^2 - 6)$
 - $m(m^2 + 3)(m^2 - 2)$
- 9 Which expression is equivalent to $x^6y^4(x^4 - 16) - 9(x^4 - 16)$?
- $x^{10}y^4 - 16x^6y^4 - 9x^4 - 144$
 - $(x^6y^4 - 9)(x+2)^3(x-2)$
 - $(x^3y^2 + 3)(x^3y^2 - 3)(x+2)^2(x-2)^2$
 - $(x^3y^2 + 3)(x^3y^2 - 3)(x^2 + 4)(x^2 - 4)$
- 10 Which expression is *not* equivalent to $36x^6 - 25y^4$?
- $6^2(x^3)^2 - 5^2(y^2)^2$
 - $(6x^3 - 5y^2)(6x^3 + 5y^2)$
 - $(6x^6 - 5y^4)(6x^6 + 5y^4)$
 - $(3 \bullet 2x^3 - 5y^2)(3 \bullet 2x^3 + 5y^2)$

11 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) $(x+y)^4(x-y)^4$

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

13 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) $2d(d-3)^2(d+3)$

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

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

16 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) $t^3 + 5t^2 + 6t + t^2 + 5t + 6 = (t+1)(t+2)(t+3)$

17 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) $(x^2 - 4)^2 - 5(x^2 - 4) - 6 = (x^2 - 7)(x^2 - 6)$

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

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

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

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

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

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

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

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

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

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

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Answer Section

1 ANS: 2

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

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

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

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

REF: 081901aii

2 ANS: 1

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

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

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

$$(x - 1)x$$

REF: 012301aii

3 ANS: 2

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

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

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

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

REF: 062401aii

4 ANS: 3

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

$$u^2 + 5u + 4$$

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

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

REF: 012006aii

5 ANS: 2

$$u = x - 2 \quad u^2 + 27u - 90$$

$$(u + 30)(u - 3)$$

$$(x - 2 + 30)(x - 2 - 3)$$

$$(x + 28)(x - 5)$$

REF: 012503aii

6 ANS: 2

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

$$u^2 - 2u - 24$$

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

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

REF: 062310aii

7 ANS: 2 REF: 081904aii

8 ANS: 4

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

REF: 011703aii

9 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

10 ANS: 3 REF: 062302aii

11 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

12 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

13 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

14 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

15 ANS: 2

$$n^2(n^2 - 9) + 4n(n^2 - 9) - 12(n^2 - 9)$$

$$(n^2 + 4n - 12)(n^2 - 9)$$

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

REF: 061911aii

16 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

17 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

18 ANS:

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

REF: 081825aii

19 ANS:

$$x^4 - 5x^2 + 4$$

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

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

REF: 012331aii

20 ANS:

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

REF: 082226aii

21 ANS:

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

REF: 012425aii

22 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

23 ANS:

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

REF: 061727aii

24 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

25 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

26 ANS:

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

REF: 011828aii

27 ANS:

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

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

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

REF: fall1512aii