

Answer Key

I. A.

- $6x^2 + 2x$; the polynomial is a binomial with a degree of 2.
- $4m^3 - 9m^2$; the polynomial is a binomial with a degree of 3.
- $-5x + 10$; the polynomial is a binomial with a degree of 1.
- $12x^2 + 7x - 3$; the polynomial is a trinomial with a degree of 2.
- $-w^3 + 4w + 15$; the polynomial is a trinomial with a degree of 3.
- $5x^2 + 20x - 15$; the polynomial is a trinomial with a degree of 2.
- $-p^4 - 1$; the polynomial is a binomial with a degree of 4.
- $3t^3 - 6t^2 + 4t$; the polynomial is a trinomial with a degree of 3.
- $-18a^3 - 22a^2 + 54a$; the polynomial is a trinomial with a degree of 3.
- $-x^5 + x^3 - x^2$; the polynomial is a trinomial with a degree of 5.

I. B.

- $12x + 2$
- $2m^2 + 9m - 6$
- $x^2 + 5x - 18$
- $4t^2 + 4t + 9$
- $10w^2 - w + 3$
- $3x^3 - 5x^2 + 8$
- $a^2 - 7a + 7$
- $14p^4 + 8p^3 + 14p^2 - p$
- $-6x^5 + 3x^4 + 9x^3 + 3x^2 - 5$
- $3m^3 - m^2 + 1$

I. C.

- $h(2) = 8$
- $h(-4) = 2$
- $h(0) = -2$
- $h(1) = 2$
- $h(-2) = -4$
- $h(-1.5) = -4.25$

II. A.

1.

·	$2x$	2
$3x$	$6x^2$	$6x$
4	$8x$	8

$$6x^2 + 14x + 8$$

2.

·	$4m$	6
$5m$	$20m^2$	$30m$
3	$12m$	18

$$20m^2 + 42m + 18$$

3.

·	$7t$	-5
$6t$	$42t^2$	$-30t$
5	$35t$	-25

$$42t^2 + 5t - 25$$

4.

·	$4x$	-2
$4x$	$16x^2$	$-8x$
2	$8x$	-4

$$16x^2 - 4$$

5.

·	$9w$	8
$10w$	$90w^2$	$80w$
-1	$-9w$	-8

$$90w^2 + 71w - 8$$

6.

·	$5y$	15
y	$5y^2$	$15y$
12	$60y$	180

$$5y^2 + 75y + 180$$

II. B.

1. $2x^2 + 12x$

3. $7x^2 - 35x$

5. $x^3 + 3x^2 - x - 3$

7. $3x^3 + 15x^2 - 3x$

9. $x^3 + 8x^2 + 11x - 2$

2. $4x^3 + 8x^2$

4. $2x^2 + 17x + 8$

6. $20x^2 - 20$

8. $27x^3 - 36x^2 + 18x$

10. $x^3 - 2x^2 - 11x + 12$

III. A.

1. $x(x + 9)$

3. $5(x^2 + 4x - 3)$

5. $y(y^2 - 7)$

7. $3w + 10$ (the greatest common factor is 1).

9. $7(m^3 - 3)$

2. $m(m - 4)$

4. $8(3w^2 - 2)$

6. $2x^2(x + 5)$

8. $4x(5x^2 + 4x + 2)$

10. $15x^3 + 4$ (the greatest common factor is 1).

III. B.

- $x = \pm 4\sqrt{3}$; the roots are $4\sqrt{3}$ and $-4\sqrt{3}$.
- $x = \pm 3\sqrt{3}$; the roots are $3\sqrt{3}$ and $-3\sqrt{3}$.
- $x = 12 \pm 2\sqrt{2}$; the roots are $12 + 2\sqrt{2}$ and $12 - 2\sqrt{2}$.

III. C.

- $(x + 5)(x - 5)$
- $(x + 12)(x - 12)$
- $(5x + 4)(5x - 4)$
- $(2a + 7)(2a - 7)$

- $x = \pm 2\sqrt{13}$; the roots are $2\sqrt{13}$ and $-2\sqrt{13}$.
- $x = \pm 5\sqrt{7}$; the roots are $5\sqrt{7}$ and $-5\sqrt{7}$.
- $x = -20 \pm 4\sqrt{5}$; the roots are $-20 + 4\sqrt{5}$ and $-20 - 4\sqrt{5}$.

III. D.

- The roots are -10 and 10 .
- The roots are -15 and 15 .
- The roots are $-\frac{5}{2}$ and $\frac{5}{2}$.

- The roots are $-\frac{3}{2}$ and $\frac{3}{2}$.
- The roots are $-\frac{1}{3}$ and $\frac{1}{3}$.
- The roots are $-\frac{5}{4}$ and $\frac{5}{4}$.

IV. A.

1.

1	x	1
x	x^2	x
	x	1

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

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

3.

6	$6x$	36
x	x^2	$6x$
	x	6

$$x^2 + 12x + 36 = (x + 6)^2$$

$$x^2 + 12x = (x + 6)^2 - 36$$

2.

2	$2x$	4
x	x^2	$2x$
	x	2

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

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

4.

$\frac{9}{2}$	$\frac{9}{2}x$	$\frac{81}{4}$
x	x^2	$\frac{9}{2}x$
	x	$\frac{9}{2}$

$$x^2 + 9x + \frac{81}{4} = \left(x + \frac{9}{2}\right)^2$$

$$x^2 + 9x = \left(x + \frac{9}{2}\right)^2 - \frac{81}{4}$$

5.

$\frac{11}{2}$	$\frac{11}{2}x$	$\frac{121}{4}$
x	x^2	$\frac{11}{2}x$
	x	$\frac{11}{2}$

$$x^2 + 11x + \frac{121}{4} = \left(x + \frac{11}{2}\right)^2$$

$$x^2 + 11x = \left(x + \frac{11}{2}\right)^2 - \frac{121}{4}$$

6.

14	$14x$	196
x	x^2	$14x$
	x	14

$$x^2 + 28x + 196 = (x + 14)^2$$

$$x^2 + 28x = (x + 14)^2 - 196$$

IV. B.

1. 25
3. 6
5. $\frac{49}{4}$
7. 26

2. 49
4. 18
6. $\frac{225}{4}$
8. 3

IV. C.

1. The roots are approximately 1.16 and -5.16 .
Check:
 $(1.16)^2 + 4(1.16) - 6 \approx 0$
 $(-5.16)^2 + 4(-5.16) - 6 \approx 0$
3. The roots are approximately -0.20 and -9.80 .
Check:
 $(-0.20)^2 + 10(-0.20) + 2 \approx 0$
 $(-9.80)^2 + 10(-9.80) + 2 \approx 0$
5. The roots are approximately 0.30 and -3.30 .
Check:
 $(0.30)^2 + 3(0.30) - 1 \approx 0$
 $(-3.30)^2 + 3(-3.30) - 1 \approx 0$

2. The roots are approximately 3.24 and -1.24 .
Check:
 $(3.24)^2 - 2(3.24) - 4 \approx 0$
 $(-1.24)^2 - 2(1.24) - 4 \approx 0$
4. The roots are approximately 9.32 and 2.68.
Check:
 $(9.32)^2 - 12(9.32) + 25 \approx 0$
 $(2.68)^2 - 12(2.68) + 25 \approx 0$
6. The roots are approximately 2.70 and -3.70 .
Check:
 $(2.70)^2 + (2.70) - 10 \approx 0$
 $(-3.70)^2 + (-3.70) - 10 \approx 0$

V. A.

1. $(x - 4)(x + 2)$
3. $(m + 7)(m - 1)$
5. $4(w + 5)(w - 2)$
2. $(y + 6)(y + 7)$
4. $(x - 3)(x - 6)$
6. $2t(t - 3)(t - 4)$

7. $3m(m + 10)(m + 2)$

9. $(x + 1)(x + 10)$

11. $(m + 7)(m - 5)$

13. $3(n - 5)(n - 4)$

8. $2(x + 3)(x - 7)$

10. $(w + 8)(w - 2)$

12. $(x + 6)(x - 2)$

14. $2(x + 5)(x + 6)$

V. B.1. The roots are -3 and -2 .3. The roots are -7 and 5 .5. The roots are 0 and -8 .7. The roots are 4 and 8 .9. The roots are $-\frac{3}{2}$ and 1 .2. The roots are 4 and -1 .4. The roots are 2 and -6 .6. The roots are -10 and -5 .

8. The equation has no real roots.

10. The roots are -7 and 4 .**V. C.**1. The zeros are 0 and 5 .3. The zeros are -6 and -5 .5. The zeros are $-\frac{5}{2}$ and -2 .7. The zeros are -2 and 1 .2. The zeros are 0 and -2 .4. The zeros are 12 and -3 .

6. The function has no real zeros.

8. The zeros are 0 and $\frac{3}{2}$.**VI. A.**

1. $x = \frac{-3 + \sqrt{29}}{2}$ or $x = \frac{-3 - \sqrt{29}}{2}$

3. $x = \frac{-3 + 3\sqrt{3}}{2}$ or $x = \frac{-3 - 3\sqrt{3}}{2}$

5. $x = -0.25$ or $x = 0.5$

7. $x = -2 - \frac{3}{2}\sqrt{2}$ or $x = -2 + \frac{3}{2}\sqrt{2}$

9. $x = 1 - \frac{\sqrt{30}}{3}$ or $x = 1 + \frac{\sqrt{30}}{3}$

11. $x = \frac{5 - \sqrt{17}}{4}$ or $x = \frac{5 + \sqrt{17}}{4}$

13. $x = -1$ or $x = 7$

15. The function has no real zeros.

17. $x = -1$

2. $x = \frac{-1 + \sqrt{85}}{6}$ or $x = \frac{-1 - \sqrt{85}}{6}$

4. $x = \frac{1 + \sqrt{97}}{8}$ or $x = \frac{1 - \sqrt{97}}{8}$

6. $x = \frac{2}{3}$ or $x = -1$

8. $x = \frac{2}{5}$ or $x = -2$

10. $x = -1$ or $x = -5$

12. $x = \frac{4 + 2\sqrt{7}}{3}$ or $x = \frac{4 - 2\sqrt{7}}{3}$

14. $x = -2$

16. $x = \frac{-3 + \sqrt{177}}{12}$ or $x = \frac{-3 - \sqrt{177}}{12}$

18. The function has no real zeros.

VII. A.

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|---------------------------|----------------------------|
| 1. $3i$ | 2. $6i$ |
| 3. $2\sqrt{5}i$ | 4. $3 + 3\sqrt{2}i$ |
| 5. $9 - 8i$ | 6. $5 + \sqrt{3}i$ |
| 7. $2 - \sqrt{2}i$ | 8. $8 + 2\sqrt{3}i$ |

VII. B.

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|--|--|
| 1. The real part is 24. The imaginary part is $0i$. | 2. The real part is 0. The imaginary part is $8i$. |
| 3. The real part is 7. The imaginary part is $3i$. | 4. The real part is 8. The imaginary part is $0i$. |
| 5. The real part is 0. The imaginary part is $-35i$. | 6. The real part is 14. The imaginary part is $\sqrt{5}i$. |
| 7. The real part is 52. The imaginary part is $0i$. | 8. The real part is 2.5. The imaginary part is $3\sqrt{2}i$. |

VII. C.

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|---|--|
| 1. integer, rational number, real number, complex number | 2. irrational number, real number, complex number |
| 3. natural number, whole number, integer, rational number, real number, complex number | 4. imaginary number, complex number |
| 5. rational number, real number, complex number | 6. imaginary number, complex number |
| 7. rational number, real number, complex number | 8. imaginary number, complex number |

VII. D.

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|---|---|
| 1. The equation has two imaginary roots. | 2. The equation has two real roots. |
| 3. The equation has one real root. | 4. The equation has two imaginary roots. |
| 5. The equation has two imaginary roots. | 6. The equation has two real roots. |