

Math Challenge II-A: Algebra

Answer Key

Areteem Institute

Chapter 1. Factoring Fundamentals

Quick Reponse Questions:

1.11: B

1.16: C

1.12: C

1.17: B

1.13: 3

1.18: C

1.14: D

1.19: B

1.15: A

1.20: D

Practice Questions:

1.21(a): $5xy^2(2x - 3y + 5z)$

1.25: $(x + w)(y + z)$.

1.21(b): $6x(a - b)^3(a - b + 5)$

1.26: $(x + 2)(x^2 - x + 2)$.

1.22: $(x - 2y - z)(x^2 + 4y^2 + z^2 + 2xy + xz - 2yz)$

1.27: $(a^2 - ab + 1)(b^2 + ab + 1)$.

1.23: $(a^{16} + b^{16})(a^8 + b^8)(a^4 + b^4)(a^2 + b^2)(a + b)(a - b)$.

1.28: $(mn + m - n + 1)(mn - m + n + 1)$

1.24(a): $(2p + 3)(p - 1)$.

1.29: $(1 + x^2 + y^2)^2$.

1.24(b): $n = 1, 4, 11$.

1.30: $(a + b)^2(a - b)(a^4 - a^3b + a^2b^2 - ab^3 + b^4)$

Chapter 2. Quadratics

Quick Reponse Questions:

2.11: -4

2.16: -3

2.12: -2

2.17: 4

2.13: -39

2.18: 4

2.14: 5

2.19: 4

2.15: 24

2.20: 2

Practice Questions:

2.21(a): No real roots.

2.25: $m \leq 0$ or $4 \leq m$.

2.21(b): Two real roots.

2.26: $7, 5$.

2.21(c): One real root.

2.27: $x = 0, x_2 - x_1$.

2.22(a): 2 seconds.

2.28: $\frac{132}{289}$.

2.22(b): 67 feet.

2.29: $0 < m < 3$.

2.23: $x \leq -3/2$ or $5 \leq x$.

2.30: $a = -3$.

2.24: $-\frac{9}{2} \leq x < -4$.

Chapter 3. Prob. Solving with Quadratics

Quick Reponse Questions:

3.11: 20

3.16: 17

3.12: -100

3.17: 30

3.13: C.

3.18: 4

3.14: 9

3.19: 20

3.15: A.

3.20: 4

Practice Questions:

3.21: $n \leq -1$.

3.28: Omitted

3.22: $x^2 - 4x + 2 = 0; x = 2 \pm \sqrt{2}$.

3.29(a): $m \leq -1$ or $m \geq 1; m = \pm 1$.

3.23: $-\frac{1}{2} \leq b \leq \frac{1}{2}; a = \pm\sqrt{1+2b}$.

3.29(b): $\left(\pm\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$.

3.24: $k \leq 0, x = 2 - k - 2\sqrt{1-k}$.

3.25: 6.

3.30: $(m, n) = (0, -1), x_{1,2} = \pm 1;$
 $(m, n) = (3, 2), x_{1,2} = 1, 2; (m, n) =$
 $(-1, 0), x_{1,2} = -1, 0.$

3.26: $(-5, -3)$.

3.27: $-32, -24, -8, \text{ or } 0$.

Chapter 4. Advanced Factoring

Quick Reponse Questions:

4.11: B.

4.16: C.

4.12: -1

4.17: A.

4.13: 2

4.18: D.

4.14: 6

4.19: B.

4.15: 1.33

4.20: 2017

Practice Questions:

4.21: $(2x^2 + 5x + 12)(2x + 7)(x - 1)$

4.26: $x(x - 3)(2x + 3)(2x - 3)$.

4.22: $(x^2 + 3x + 1)(x^2 + 4x + 1)$

4.27: $(ac + bd)(bc - ad)$

4.23: $(x + 2)(x + 6)(x^2 + 8x + 10)$

4.28: $(a + 3b)(b + 3c)(c + 3d)$.

4.24: $(x^2 + y^2)(x - y)^2$.

4.29: $(a^2 + a + 1)(a^3 - a + 1)$.

4.25: $(x + 2)(x + 3)(x + 4)$

4.30: 2015

Chapter 5. Equations with Fractions

Quick Reponse Questions:

5.11: B.

5.16: -1

5.12: 3

5.17: B.

5.13: 0

5.18: 0.5

5.14: 1

5.19: 2.2

5.15: 1

5.20: 2

Practice Questions:

5.21: $\pm \frac{1}{2}$

5.26: 0.

5.22: $-\frac{3}{2} \pm \frac{\sqrt{5}}{2}$

5.27: No solutions exist.

5.23: $x = -2$.

5.28: $\frac{3}{2} \pm \frac{\sqrt{5}}{2}$.

5.24: $\frac{1}{3}(1 \pm \sqrt{10})$.

5.29: $-2, 1$

5.25: $x = 0$ and $x = -3$.

5.30: $x = 1, 6$

Chapter 6. Equations with Absolute Values

Quick Reponse Questions:

6.11: C

6.16: 7

6.12: C

6.17: 2

6.13: 8

6.18: 1

6.14: 3

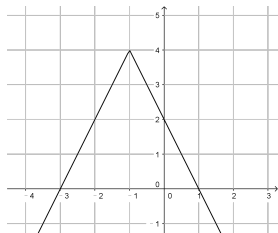
6.19: 6

6.15: -1.5

6.20: 6

Practice Questions:

6.21:



6.25: $-\frac{1}{4}$.

6.26: $x = 1$.

6.27: $y = -2, 1$

6.28: $a = 1, b = -1/2$.

6.29: $x = -9, -3, 3$

6.22: $x = -4, 0$

6.23: $-1, 0, 2$.

6.30: Domain: All real numbers, Range: All $y \geq -1$, Zeros: $-6, -4, 0, 2$

6.24: $x = 0, -4$

Chapter 7. Equations with Radicals

Quick Reponse Questions:

7.11: 4

7.16: 32

7.12: C

7.17: -71

7.13: 2

7.18: -26

7.14: 4

7.19: A

7.15: 1

7.20: -3

Practice Questions:

7.21: Domain: $-3 \leq x \leq 3$. Range:
 $0 \leq y \leq 6$.

7.26: No solutions.

7.22: $x = 8$.

7.27: $x = -4, \pm 2$.

7.23: $\frac{3}{4}$.

7.28: $a = \frac{-1}{\sqrt[3]{2}} = \frac{-\sqrt[3]{2}^2}{2}$.

7.24: $x = 4$ and $x = -1$

7.29: 0.

7.25: $x = \frac{\sqrt{21} - 1}{2}$.

7.30: $k > -1/16$ and $k \neq 0$.

Chapter 8. Polynomials

Quick Reponse Questions:

8.11: No.

8.16: 1

8.12: 6

8.17: B

8.13: 5

8.18: 8

8.14: C

8.19: 4

8.15: -4

8.20: 1

Practice Questions:

8.21(a): True.

8.25: $x = 1, x = \pm 2$.

8.21(b): False.

8.26: Omitted

8.22(a): 7.

8.27: $x = \pm 1, x = 2 \pm \sqrt{2}$.

8.22(b): 9.

8.28: -8128 .

8.23: -9 .

8.29: 128.

8.24: Quotient: $x^2 + 8$, Remainder:
 $3x + 34$.

8.30: $2, 1, -1/2$.

Chapter 9. Prob. Solving with Polynomials

Quick Reponse Questions:

9.11: D

9.16: 5

9.12: B

9.17: -2 .

9.13: 3

9.18: 5

9.14: -1

9.19: 2

9.15: 30

9.20: 0

Practice Questions:

9.21: $\sqrt{5}$

9.27(a): $P(z) = 1 \cdot z^3 + 0 \cdot z^2 + (-3xy) \cdot z + (x^3 + y^3)$.

9.22: $\frac{2}{5}$.

9.27(b): Omitted

9.23: 17.

9.27(c): $(x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$.

9.24: 5.

9.28: 5.

9.25: -2 .

9.29: $\frac{16}{51}$.

9.26: $\left(\frac{3 + \sqrt{5}}{2}, \frac{3 - \sqrt{5}}{2} \right),$
 $\left(\frac{3 - \sqrt{5}}{2}, \frac{3 + \sqrt{5}}{2} \right).$

9.30: $(x, y) = (-5, -3), (0, 2), (3, -1).$