

Math Challenge I-A: Number Theory

Answer Key

Areteem Institute

Chapter 1. Number Sense and Place Values

Quick Reponse Questions:

1.11: 1209

1.16: 180

1.12: 3065

1.17: 473

1.13: 890

1.18: 693

1.14: 89999

1.19: 9025

1.15: 588

1.20: 621

Practice Questions:

1.21: 112, 212, 312, 412, 512, 612, 712, 812, and 912

1.26(b): 130

1.22: 9000; 8

1.27(a): 8173

1.23: No

1.27(b): 35651

1.24: 1249

1.28(a): 93025

1.25(a): 5329

1.28(b): 664225

1.25(b): 400

1.29(a): 4221

1.26(a): 550

1.29(b): 616221

1.30: \$52.94

Chapter 2. Primes and Factors

Quick Reponse Questions:

2.11: 2

2.16: 5

2.12: 53

2.17: 31

2.13: 97

2.18: 31

2.14: 6

2.19: 30

2.15: 6

2.20: 6

Practice Questions:

2.21: Yes

2.26: $325 = 5^2 \cdot 13$, $391 = 17 \cdot 23$

2.22: Omitted

2.27: $1215 = 3^5 \cdot 5$, $1776 = 2^4 \cdot 3 \cdot 37$

2.23: 233, 239, 293

2.28: 1234765.

2.24: No

2.29: 11

2.25: 11, 101, 131, 151, 181, 191

2.30: $2 \cdot 3 \cdot 5 \cdot 7 \cdot 11 \cdot 13$

Chapter 3. Primes and Factors Continued

Quick Reponse Questions:

3.11: 7

3.16: 6

3.12: 49

3.17: 6

3.13: 91

3.18: 15

3.14: 10

3.19: 64

3.15: 81

3.20: 33

Practice Questions:

3.21: Omitted

3.26: 5000

3.22: 5

3.27: 30

3.23: 56

3.28: $2^2 = 4$

3.24: 267

3.29: 496

3.25: 4, 8, 16, 32

3.30: 6

Chapter 4. Divisibility

Quick Reponse Questions:

4.11: 171

4.16: No

4.12: 24

4.17: 444

4.13: 18

4.18: 5

4.14: No

4.19: 2

4.15: Yes

4.20: 1980

Practice Questions:

4.21(a): Look at the last (units) digit. If the last digit is 0, then the number is divisible by 10.

4.24: No, multiple examples exist, such as 5533, 3553, 3355, 5335

4.21(b): Omitted

4.25: 27636

4.22: Yes

4.26: 4257

4.23(a): If the number is divisible by 3 and by 4, then it is divisible by 12.

4.27: 4

4.23(b): Look at the last three digits. If the last three digits form a number divisible by 8, then the number is divisible by 8.

4.28: 40

4.29: 25

4.30: 105

Chapter 5. Divisibility Continued

Quick Reponse Questions:

5.11: 5

5.16: No

5.12: 24

5.17: Yes

5.13: No

5.18: No

5.14: 5

5.19: 223

5.15: Yes

5.20: 389

Practice Questions:

5.21(a): $x = 1$

5.26: 101100, 110100, 111000

5.21(b): $x = 3$

5.27: 15 or 17

5.22: Not possible

5.28: (4,9), (6,5), (10,7)

5.23: 477, 747, 774

5.29: 1012

5.24: 4824, 4428, 4320

5.30: 10

5.25: 13

Chapter 6. GCD's and LCM's

Quick Reponse Questions:

6.11: 24

6.16: 1155

6.12: 50

6.17: 35

6.13: Yes.

6.18: 6930

6.14: 35

6.19: 10

6.15: 35

6.20: 60

Practice Questions:

6.21: GCD: 2; LCM: 2400

6.26: $m = 247, n = 323$

6.22: 60060.

6.27: 5: They are 1050, 1260, 1470, 1680, 1890

6.23: $\frac{1}{9}, \frac{2}{9}, \frac{4}{9}, \frac{5}{9}, \frac{7}{9}, \frac{8}{9}$.

6.28: 18, 36, 54, 90, 108, 180, 270, 540

6.24: 52.

6.29: 13

6.25(a): $m \cdot n$

6.30: $N = 306$

6.25(b): GCD: m , LCM: n

Chapter 7. GCD's and LCM's Continued

Quick Reponse Questions:

7.11: 11

7.16: 30030

7.12: 823

7.17: 60

7.13: 36

7.18: 1400

7.14: 24

7.19: 8400

7.15: 1

7.20: 5

Practice Questions:

7.21: 10, 2310

7.26: 11

7.22: No

7.27: \$6

7.23: 1, 4, 9, 36

7.28: 21

7.24: 15

7.29: \$5

7.25: 995

7.30: $A = 81$ and $B = 15$

Chapter 8. Remainders

Quick Reponse Questions:

8.11: 3

8.16: 4

8.12: 92

8.17: 25

8.13: 87

8.18: 6

8.14: Yes

8.19: 2

8.15: 2

8.20: 101

Practice Questions:

8.21: 71

8.26: 6

8.22: $2w + 6d + 20h$

8.27: 9 is possible

8.23: Friday

8.28: 9

8.24: 3

8.29: 1

8.25: 4

8.30: $D = 13, R = 8$

Chapter 9. Modular Arithmetic

Quick Reponse Questions:

9.11: 10

9.16: 6

9.12: 300

9.17: 68

9.13: 10

9.18: No

9.14: 3

9.19: Yes

9.15: 1

9.20: Yes

Practice Questions:

9.21: 5

9.26: 1

9.22: 2

9.27: 54, 55, 56

9.23: 11

9.28: No

9.24: 51

9.29: 11, 13, 143

9.25: 4

9.30: 3