Math Challenge I-A: Counting and Probability

Answer Key

Areteem Institute

Chapter 1. The Sum Rule: Intro to Counting

Quick Reponse Questions:

1.11: 3

1.12: 6

1.13: 6

1.14: 5

1.15: 15

1.16: 27

1.17: 4

1.18: 12

1.19: 36

1.20: 26

Practice Questions:

1.21: 48

1.22: 8

1.23(a): 9

1.23(b): 11

1.23(c): 4

1.23(d): 10

1.24: 5

1.25(a): 9

1.25(b): 29

1.26: 8

1.27: 7 or eight

1.28: 20

1.29: 9

1.30: 6

Chapter 2. The Product Rule

Quick Reponse Questions:

2.11: 20

2.12: 75

2.13: 6

2.14: 100

2.15: 50

2.16: 13

2.17: 15

2.18: 1984

2.19: 1024

2.20: 2048

Practice Questions:

2.21: 392

2.22(a): 0

2.22(b): 9765625

2.23: 70

2.24: 2652

2.25: 72

2.26: 4100

2.27: 512

2.28: 112896

2.29: 900

2.30: 2940

Chapter 3. Does Order Matter?

Quick Reponse Questions:

3.11: 5040

3.12: C

3.13: 504

3.14: 44

3.15: 5

3.16: 15

3.17: 35

3.18: 720

3.19: 1296

3.20: 840

Practice Questions:

3.21: 3628800

3.22: 70

3.23: 28

3.24: 5040

3.25: 30

3.26: 15600

3.27: 10156250

3.28: 18009460

3.29: 108056760

3.30: They are equal.

Chapter 4. Grouping and Spacing

Quick Reponse Questions:

4.11: 336

4.12: 24

4.13: 3360

4.14: 5

4.15: C

4.16: 720

4.17: 4320

4.18: 845000

4.19: 48

4.20: 40560000

Practice Questions:

4.21: 34650

4.22: 40500

4.23: 1152

4.24: 270141900

4.25: 576

4.26: 1693440

4.27: 30240

4.28: 240

4.29: 7140

4.30: $2! \cdot 2! \cdot 5!$.

Chapter 5. Stars and Bars

Quick Reponse Questions:

5.11: C

5.12: B

5.13: C

5.14: 4

5.15: 2

5.16: 21

5.17: 2401

5.18: 210

5.19: 35

5.20: 840

Practice Questions:

5.21(a): 56.

5.21(b): 16.

5.22(a): 21

5.22(b): 21

5.23(a): 120

5.23(b): 220

5.24(a): 2002

5.24(b): $\binom{10}{5} = 252.$

5.24(c): 360

5.25(a): 45.

5.25(b): 24310.

5.26: 6.

5.27(a): 900

5.27(b): 6

5.28: 15

5.29: 3.

5.30: 24.

Chapter 6. Venn Diagrams and Sets

Quick Reponse Questions:

Practice Questions:

Chapter 7. Patterns and Sequences

Quick Reponse Questions:

7.11: 125

7.12: 14

7.13: 43

7.14: C

7.15: B

7.16: 200

7.17: 81

7.18: 50

7.19: 76

7.20: 2500

Practice Questions:

7.21: $0, 2, 5, 9$

7.22: $900/7, 135, 140, 144$

7.23: $a_0 = -2, a_{n+1} = a_n + 12$; $a_n = -2 + 12n$

7.24: $a_0 = 8, a_{n+1} = 1.5 \cdot a_n$; $a_n = 8 \cdot (1.5)^n$

7.25(a): $1, 2, 4, 7, 12$

7.25(b): $S_n = F_{n+2} - 1$

7.26(a): 672

7.26(b): $\dfrac{243}{4}$

7.27: 25850

7.28(a): $a_0 = 100, a_{n+1} = a_n + 12$

7.28(b): $a_n = 100 + 12n$

7.29: 55

7.30(a): 8

7.30(b): $a_n = 2^n$

Chapter 8. What is the Chance?

Quick Reponse Questions:

8.11: 7

8.12: 3

8.13: 10

8.14: 4

8.15: 1

8.16: 3

8.17: 11

8.18: .3

8.19: 3

8.20: .4

Practice Questions:

8.21: $\dfrac{4}{19}$

8.22: $\dfrac{1}{2}$

8.23(a): $\dfrac{1}{4}$

8.23(b): 0

8.24: $\dfrac{1}{80}$

8.25(a): $\dfrac{1}{3}$

8.25(b): $\dfrac{1}{2}$

8.25(c): Omitted

8.26: $\dfrac{1}{6}$

8.27(a): $\dfrac{3}{91}$

8.27(b): $\dfrac{6}{91}$

8.28: $P(A \cap B^c) = .4$, $P(A \cap B) = .3$, $P(A^c \cap B) = .2$, $P(A^c \cap B^c) = .1$

8.29: $\dfrac{1}{8}$

8.30: $\dfrac{1}{2}$

Chapter 9. Probability and Statistics

Quick Reponse Questions:

9.11: 42

9.12: 62.8

9.13: 39

9.14: 11

9.15: 6

9.16: 3.02

9.17: D

9.18: 11

9.19: 6

9.20: 19

Practice Questions:

9.21: 60

9.22: 6

9.23: 19

9.24: $\dfrac{80}{9}$

9.25: Median is greater and a better statistic

9.26: 21

9.27(a): True

9.27(b): False

9.28: $\dfrac{10}{16807}$

9.29: 5

9.30: 64