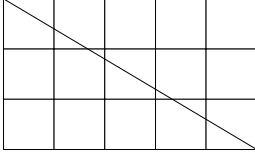


Answer Key

1. $2 \left(= \frac{1}{2}\% \times 400 = \frac{1}{2} \times 4 \right)$
2. $10\frac{5}{12}$
3. .0008
4. .006
5. .16
6. 8
7. $10 \div .01 = 1000$
8. $\frac{1}{4}$
9. $3\frac{5}{8}$
10. 560000
11. 32
12. 12
13. 8
14. 800
15. .06
16. 31
17. 1495
18. 102.8
19. 16,000
20. 12.12

$$\begin{array}{r} 2 \overline{) 120} \\ \underline{24} \\ 23 \\ \underline{31} \\ 5 \end{array}$$
21. $120 = 2 \times 2 \times 2 \times 3 \times 5 = 2^3 \times 3 \times 5$
22. $\Delta = 3$
23. 25%
24. $82\% \times 300 = 0.82 \times 300 = 246$
25. $2.5\% \times 40 = 0.025 \times 40 = 1$
26. $\frac{3}{15} = \frac{1}{5} = 20\%$
27. 30
28. $\frac{1}{2}\% \times 400 = \frac{1}{2} \times 4 = 2$
29. $\frac{375}{3000} = 0.125 = 12.5\%$
30. $66 \div 220\% = 66 \div 2.2 = 30$, and indeed $30 \times 220\% = 30 \times 2.2 = 66$.
31. $\frac{2}{3} \times 60 = 40$
32. 35.6
33. -1
34. $180 \div 250 = 72\%$
35. The area $= \frac{1}{2} \times 12 \times 16$
 $= 96 = \frac{1}{2} \times h \times 20$
 $h = \boxed{9.6 \text{ cm}}$
36. $30\% \times 24 = 7.2 = \boxed{7 \text{ hr and } 12 \text{ min}}$
37. 400
38. 1.5
39. 8
40. $2 \times (1.5 + 2.7) = 8.4$
41. $.018 \div 200 = .00009$
42. $1.18 \times 5 = \$5.90$
43. 11
44. 0.0004
45. $\frac{28}{25}$
46. 250%
47. $\frac{4}{9}$
48. 3
 $5(x + 3) = 30$
 $x + 3 = 6$
 $x = 3$
49. $65 \times 3 - 55 = 140$
 $140 \div 2 = \boxed{70 \text{ lb}}$
50. 4
51. $2(x - 1) + 3(x + 1) = 6$
 $5x + 1 = 6$
 $x = 1$
52. Method I)
 $2(100\pi - 200) = \boxed{228}$
Method II)
 $2(\text{quarter circle}) \setminus \text{square}$
 $= 200\pi - 400 = \boxed{228}$
53. A
 $1D = 10 = \frac{1}{5} \times 50 = \frac{1}{5}(2Q)$
 $1D \text{ and } 2Q$
54. The least common multiple of 2, 3, and 4 is 12. To leave 1 as remainder, the number has to be
 $12 + 1 = 13$
 $2 \times 12 + 1 = 25$
 $3 \times 12 + 1 = 37$
 $4 \times 12 + 1 = 49$ (a multiple of 7)
55. $1 = 1$
 $3 = 1 + 2$
 $6 = 1 + 2 + 3$
 $10 = 1 + 2 + 3 + 4$
 $1 + 3 + 6 + 10 = \boxed{20}$

GT7 CogAT (Spring, 2020) Issue 2

56. $1 = 1$
 $3 = 1+2$
 $6 = 1+2+3$
 $12 = 1+2+3+6$
 $1 + 3 + 6 + 12 = \boxed{22}$
57. $1 + 4 + 9 + 16 = \boxed{30}$
58. The following diagram shows a simple case of 5×3 rectangle. The diagonal passes $\boxed{7}$ squares.
- 
59. $(R, B) = (6, 1), (6, 2), (5, 1), (5, 2), (4, 1), (3, 1)$
 $\frac{6}{36} = \frac{1}{6}$
60. $\boxed{3}$ lily pads: 6, 12, 18
61. 8 factors: 1, 2, 3, 5, 6, 10, 15, and 30.
62. C
63. $2^3+2^3+2^3+2^3 = 4 \times 2^3 = 2^2 \times \boxed{2^3}$
64. A
65. The ones digit of 3^{2003} is the same as $3^3 = 27$, which is 7.
66. $10 \div 2 + 20 \div 4 + 40 \div 8$
 $= 5 + 5 + 5$
 $= 15$
 $= 60 \div \boxed{4}$
67. $\frac{1}{2} \times 6 \times 5 = 15$ handshakes
68. $11 \times 2 = 22$
 $28 - 22 = 6$
 $6 \div (4 - 2) = 3$ (pigs)
 $11 - 3 = 8$ (ducks)
69. $1 - \frac{1}{4} = \frac{3}{4}$
 $12 \div \frac{3}{4} = 16$ points
70. $1 - \frac{1}{5} = \frac{4}{5}$
 $20 \times \frac{4}{5} = 16$ points
71. Let x be the average of the first 7 tests, so $x + 2$ be the average of the 8 tests. The difference of the total of the 8 tests and the total of the first 7 tests is
 $8(x + 2) - 7x = x + 16$,
which is the score of the 8th test, 16 marks more than x .
72. A

Answer Key

1. $\frac{17}{30}$
2. 0.4
3. .008
4. .03
5. .018
6. $\frac{2}{3}$
7. 350000
8. 3
9. 5.78
10. 6,000
11. 32
12. 10.92
13. 400
14. 8,000
15. 164
16. 521.6
17. .09
18. 331.4
19. $.8 \times 380 = 304$
20. 16.8

$$\begin{array}{r} 3 \overline{) 375} \\ \underline{51} 5 \\ 5 \overline{) 25} \\ \underline{5} \\ 0 \end{array}$$
21. $375 = 3 \times 5 \times 5 \times 5 = 3 \times 5^3$
22. $\Delta = 18$
23. $\frac{3}{4}$
24. 87
25. 215%
26. 0.896
27. 8
28. 150%
29. 48.6
30. 224
31. $1333\frac{1}{3}\%$
32. 54
33. The GCD of 84 and 96 is 12, therefore, the largest size of square marbles is 12 in. The number of such marbles are needed is $(84 \div 12) \times (96 \div 12) = 7 \times 8 = \boxed{56 \text{ pieces.}}$
34. 125
35. 560000
36. $9.45 \div 3 = \$3.15$
37. 1

$$\begin{array}{r} \frac{15}{24} \\ - \frac{8}{24} \\ \hline \frac{7}{24} \end{array}$$
38. $\frac{7}{24}$
39. 1440

$$\begin{array}{r} \frac{5}{16} \\ + \frac{3}{8} \\ \hline \frac{11}{16} \end{array}$$
40. $\frac{11}{16}$
41. 75 in²
42. $150 \div 6 = 25$
 $25 = 5 \times 5$
 $5 \times 5 \times 5 = \boxed{125 \text{ in}^3}$
43. -10
44. -0.09
45. $\frac{1}{4}$
46. $\frac{3}{12} = \frac{1}{4}$
47. $\frac{3}{12} = \frac{1}{4}$
48. $18 \div 60 = 0.3 \text{ (hr)}$
 $80 \times 0.3 = \boxed{24 \text{ mi}}$
49. $2000 \times 25\% = 2000 \times 0.25 = \boxed{500}$
50. 0.089
51. 0.0144
52. $-20 \times 30 \times -40 \times \frac{1}{2} \times \frac{1}{3} \times \frac{1}{4}$
 $= 20 \times 30 \times 40 \times \frac{1}{2} \times \frac{1}{3} \times \frac{1}{4}$
 $= (20 \times \frac{1}{2}) \times (30 \times \frac{1}{3}) \times (40 \times \frac{1}{4})$
 $= \boxed{1000}$
 (Note: Simplify before multiply.)
53. 2220
54. 0
55. $24 \div 2 = 12 \text{ mi}$ (midway, when Kevin gets to the park)
 $1 + 2 = 3$
 $12 \times \frac{1}{3} = 4 \text{ mi}$ (further to meet Kevin)
 $12 + 4 = 16 \text{ mi}$ (total distance by Jamie)
56.



$$a^2 + b^2 = c^2$$

$$800 = a^2 + b^2 + c^2 = 2c^2$$

$$c^2 = 800 \div 2 = 400$$

$$c = \sqrt{400} = 20$$

GT7 CogAT (Spring, 2020) Issue 3

57. It has to start with 2 to avoid carry, then to be followed by 4.

It cannot end with 7 as $3 \times 7 = 21$ violating the closure rule.

$$2475 \times 3 = 7425$$

58. $1xy9 \times 9 = 9yx1$

Since the sum of these 4 digits must be a multiple of 9, we must have

$$1 + x + y = 9, \text{ or}$$

$$x + y = 8.$$

$x, y = (0, 8), (2, 6), \text{ or } (3, 5)$, but not $(1, 7)$ or $(4, 4)$ for repetition.

By verifying these pairs, we are certain that only $(0, 8)$ works.

59. D

$$\frac{3}{8} - \frac{1}{4} = \frac{1}{8}$$

$$\frac{1}{4} - \frac{5}{16} = \frac{1}{16}$$

$$\frac{9}{32} - \frac{1}{4} = \frac{1}{32}$$

$$\frac{17}{64} - \frac{1}{4} = \frac{1}{64}$$

60. 1st day: $0 + 3 = 3, 3 - 1 = 2$

$$2^{\text{nd}} \text{ day: } 2 + 3 = 5, 5 - 1 = 4$$

$$3^{\text{rd}} \text{ day: } 4 + 3 = 7, 7 - 1 = 6$$

$$4^{\text{th}} \text{ day: } 6 + 3 = 9, 9 - 1 = 8$$

$$5^{\text{th}} \text{ day: } 8 + 3 = 11, 11 - 1 = 10$$

$$6^{\text{th}} \text{ day: } 10 + 3 = 13$$

61. two heads and a tail

The full range of possibilities is shown below.

HHH

HHT HTH THH

HTT THT TTH

TTT

62. $2^3 = 8$

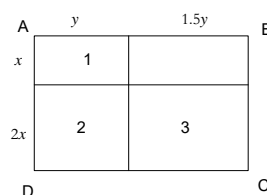
Note: The original cube does not fit.

63. Let x and y be the width and the length of the smallest inner rectangle.

$$AD = 3x$$

$$AB = 4y$$

The area of ABCD is $(3x)(2.5y) = 7.5xy$, therefore, 7.5 units.



64. 117 is divisible by 3.

$$119 = 7 \times 17$$

127 is a prime.

65. The data are tabulated below.

color	White	Blue	Red
blackroof#	15	10	5
blackroof%	100%		25%
total#	15		20

Since half of the cars with black roofs are white,

$$15 - 10 = 5 \text{ (red cars with black roofs)}$$

$$5 \div 25\% = 5 \times 4 = 20 \text{ red cars}$$

66. C

$$189 = 21 \times 9$$

67. $1995 \times \frac{5}{95} = 1995 \times \frac{1}{19} = 105$ empty seats

68. $95 \times 5 = 100 \times 5 - 25 = 475$

69. ABC BCD CDE

ABD BCE

ABE BDE

ACD

ADE

There are 10 triangles.

70. A

71. From 12250 to 12349, there are $12349 - 12250 + 1 = 100$ whole numbers.

72. $12 \div 2 = 6$ (Jane)

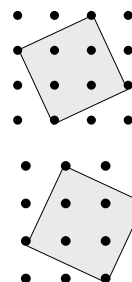
$$6 \div 3 = 2 \text{ (Sue)}$$

Answer Key

1. -9
2. -75
3. .00004
4. .04
5. -.18
6. $0.5 \div 0.75 = \frac{2}{3}$, and indeed $\frac{2}{3} \times 0.75 = 0.5$.
7. 93
8. 12
 $15\% \times 80 = 0.15 \times 80 = 12$
9. 1.23
10. 60,000
11. 36 ($25\% \times \square = 9 \Rightarrow \square = 36$)
12. 8.86
13. 198
14. $40/30 = \frac{4}{3} = 1\frac{1}{3}$
15. $1\frac{1}{5}$
16. 33
17. .09
18. 451
19. 400000
20. 1,800
21. {1, 2, 4, 5, 10, 20, 25, 50, 100}.
22. $\Delta = 38$
23. 125
24. 92
25. 20%
26. 35
27. 80%
28. 10
29. 125%
30. 80
31. 200
32. $231 = 91\frac{20}{3}\% \times \square$
 $\square = \frac{23100 \times 3}{275} = \frac{23100 \times 3 \times 4}{275 \times 4} = \frac{23100 \times 12}{1100} = 252$
33. $x = -6$
34. $4^5 \div 2^7 = 2^{10} \div 2^7 = 2^3$
35. $4\frac{1}{3}$
36. The sum is 36.
Dan is 24 and Anna is 12.
The difference is 12.
37. $9^4 \times 3^3 = 3^{11}$
38. 4

39. (-9, -9)
40. (6, -9)
41. (6, 6)
42. (-9, 6)
43. .00007
44. $\frac{1}{2}(12) = \boxed{6 \text{ in}}$
45. $63.75 \div 5 = \$12.75$
46. $20 \times 1.5 = 30$
 $12 \times 30 = \$360$
47. -70.9
48. $60 \times 5\% = 60 \times 0.05 = 3$
 $60 + 3 = \boxed{\$63.00}$
49. 60°
50. $3 \times 6 = 18$ (not enough)
 $4 \times 6 = 24$
4 boxes are needed.
51. $3.1 \times .03 = .093$
52. 203%
53. 5D2Q, or
3N1D3Q
54. $9 + 4 + 1 + 4 + 2 = 20$ squares

<input type="checkbox"/>	1 by 1	$3 \times 3 = 9$
<input type="checkbox"/>	2 by 2	$2 \times 2 = 4$
<input type="checkbox"/>	3 by 3	$1 \times 1 = 1$
<input type="checkbox"/>	one dot enclosed	$2 \times 2 = 4$
<input type="checkbox"/>	4 dots enclosed (shown below)	2



55. B
56. 0
57. $2^4 = 4^2 = 16$
 $4 \times 16 = 64 = 2^6 = 8^2$
58. T1 = 10, B1 = 3
T2 = 20, B2 = 5

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$$T3 = 60, B3 = 9$$

$$\text{Total} = 10 + 20 + 60 = 90$$

$$B3/\text{Total} = 9/90 = 0.1 = 10\%$$

59. The sums of rolling two dice are listed below.
Boldfaced are composite numbers.

	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

The probability of getting a composite number is

$$(3 + 5 + 5 + 4 + 3 + 1)/36 = 21/36 = \frac{7}{12}$$

60. (a)

$$24 \div 2 = 12 \text{ (pirates)}$$

$$12 \div 2 = 6$$

$$12 \div 4 = 3$$

$$24 - 6 + 3 = 21 \text{ (swords)}$$

b)

$$21 \div 3 = 7$$

$$21 - 7 = 14 \text{ (swords)}$$

61. $13 + 11 = 24$

$$36 \div 24 = 1.5$$

$$1.5 \times 100 = \boxed{150 \text{ km}}$$

Double-check:

$$1.5 \times (13 + 11) = 36 \text{ liters}$$

$$62. 11^2 = 121$$

$$31^2 = 961$$

$$32^2 = \boxed{1024}$$

63. A

$$64. \left(\frac{1}{5}\right)^4 = \frac{1}{625}$$

65. 2000 is a leap year, so it has 366 days.

$$366 \div 12 = \boxed{30.5}$$

66. $6 \div 4 = 1.5$

$$1.5^2 = \boxed{2.25 \text{ or } 2\frac{1}{4}} \text{ cm}^2$$

67. C

They are all multiples of 11. See the following examples.

$$13 + 31 = 44$$

$$26 + 62 = 88$$

$$47 + 74 = 121$$

$$54 + 45 = 99$$

$$68 + 86 = 154$$

68. $2 + 3(2) + 5(2) = 18$

$$69. 1 - \frac{1}{2} - \frac{1}{8} = \frac{3}{8}$$

$$\frac{3}{8} \div 3 = \frac{1}{8}$$

70. C

$$1 + 2 + 3 + 4 = 10$$

$$10 = 2 \times \boxed{5}$$

71. $2 \times 5 = 10$ (Sam)

$$4 \times 5 = 20$$
 (Sylvia)

72. A, KQ, J, T

A, QK, J, T

$$4 \times 3 \times 2 \times 1 \times 2 = 48 \text{ outcomes}$$

Answer Key

1. $(\frac{3}{4})^2 - (\frac{1}{2})^4 = \frac{9}{16} - \frac{1}{16} = \frac{1}{2}$

2. $56\frac{1}{6}$

3. .0001

4. .06

5. 31.5%

6. 0.162

7. 0.0024

8. 13.03

9. 22.2

10. 100

11. .5

12. 5.4

13. 122

14. $1\frac{1}{3} = 40/30 = \frac{4}{3}$

15. $1\frac{1}{5}$

16. $55\% \times 70 = 38.5$

17. $6400 \div .008 = 800000$

18. $72 \div 120 = .6 = 60\%$

19. 16,000

20. 18,000

21. {1, 2, 4, 5, 10, 20, 25, 50, 100}

22. 4

23. 40%

24. 266

25. 270

26. 32%

27. 1300

28. 1400

29. 5.4

30. 81.6

31. $83\frac{1}{3}\%$

32. $66\frac{2}{3}\%$

33. 0.00032

34. $(2-1) + (4-3) + (6-5) + (8-7) + (10-9) = 5$

35. 9

36. 60°

37. $16/81$

38. $.014 \times .07 = .00098$

39. $\frac{2}{3}$

40. $420 \times .3 = \$126.00$

41. $2.1^2 = 4.41$

42. 12

43. $2,000 \times 0.8 = 1,600$

$1,600 \times 0.05 = \$80.00$

44. $\frac{9}{14}$

45. $3\frac{11}{12}$

46. $\frac{1}{4}$

47. $\frac{7}{16}$

48. $2^2 \times 2^3 = 2^{2+3} = 2^5$

49. .01

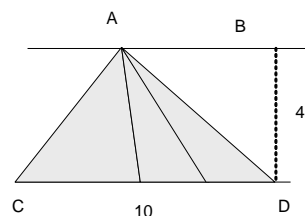
50. $40 \div 8 = 5$

$3 \times 5 \times 5 = 75 \text{ in}^2$

51. $x = \frac{20}{3}$

52. $1\frac{35}{36}$

53. $\frac{1}{2} \times 10 \times 4 = 20$



54. B

55. B

Either 20-20-140 or 20-80-80

56. See the table below.

Round	Players	Games
1 st	16	8
2 nd	8	4
3 rd	4	2
4 th	2	1
		Total = 15

57. $\frac{1}{40} = 0.025 = 2.5\%$

58. B

$1 \times 2 = 2$

59. 3 (smallest)

$3 \times 2 = 6$

$6 \times 2 = 12$

$12 \times 2 = 24$

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$$24 \times 2 = 48$$

$$3 + 6 + 12 + 24 + 48 = 93$$

60. Their payments are listed below:

M	\$56.97	\$83.29	\$140.26
C	\$41.99	\$37.47	\$79.46

$$\frac{1}{2}(M - C) = \frac{1}{2}(60.8) = \$30.40$$

61. $90 \times 20 = 1800$

$$1800 - 800 = 1000 \text{ m}$$

62. $12 \div 4 = 3$

$$3 \times 15 = 45$$

63. $9 = 3 \times 3$

$$3 \times 8 = 24 \text{ cm}$$

64. B

65. $\frac{1}{\frac{1}{4} + \frac{1}{6} + \frac{1}{12}} = \frac{1}{\frac{1}{2}} = 2 \text{ hrs}$

66. $4 \times 2 = 8$

$$8 + 4 + 1 = 13$$

67. Let r be the radius of the circle. Note that r is half the length of the diagonal.

$$12 \div 2 = 6$$

$$8 \div 2 = 4$$

$$r^2 = 6^2 + 4^2 = 52 \text{ (Why?)}$$

$$r^2 \pi = 52\pi$$

68. $1 - \frac{1}{2} - \frac{1}{4} - \frac{1}{6} = \frac{1}{12}$

$$12 \div \frac{1}{12} = 144$$

69. $1000 \div 9 = 111 \text{ R } 1$

There are 111 multiples of 9.

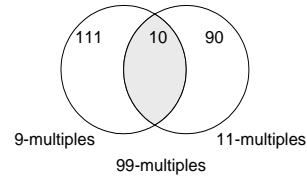
$$1000 \div 11 = 90 \text{ R } 10$$

There are 90 multiples of 11.

$$1000 \div 99 = 10 \text{ R } 10$$

There are 10 multiples of 99.

$$111 + 90 - 10 = 191$$



70. -1

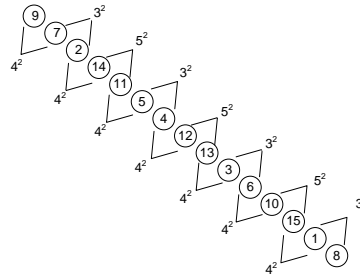
71. B

$$1000 \div 365 = 2 \text{ R } 270$$

$$270 \div 30 = 9 \text{ (mon)}$$

$$\text{Feb} + 9 = \text{Nov}$$

72. 9, 7, 2, 14, 11, 5, 4, 12, 13, 3, 6, 10, 15, 1, and 8.



Answer Key

1. $\frac{23}{108}$
2. $\frac{2}{3}$
3. .00287
4. 14%
5. 49.5%
6. 3
7. 1.4
8. 50
9. 2.69
10. $2000 \div .1 = 20000$
11. 50000
12. 197
13. 6.6
14. $40 \div 30 = 1.33... = 133\%$
15. 150
16. $70 = 38.5 \div 55\%$
17. 75
18. $72 \div 120 = .6 = 60\%$
19. 160,000
20. 18,000
21. {1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120}.
22. $\Delta = 5$
23. 104.5
24. 3000
25. 25%
26. 205%
27. 11
28. 120
29. $\frac{36}{48} = \frac{3}{4}$
30. $40/30 = \frac{4}{3} = 1\frac{1}{3}$
31. $30 \div 40 = 0.75 = 75\%$
32. $\frac{.5}{.75} = \frac{2}{3}$
33. $\frac{2}{3} \times 60 = 40$
34. $\frac{4}{5} \times 75 = 60$
35. $20\% \times 750 = 150$
36. $440 \times 25\% = 110$
37. $60\% \times 1600 = 0.6 \times 1600 = 960$
38. $144 \div 160\% = 144 \div 1.6 = \underline{90}$
39. $66 \div 220\% = 66 \div 2.2 = \underline{30}$
40. $4/10 = \frac{2}{5} = 0.4 = 40\%$
41. $\frac{2}{5} \times 20 = 8$
42. $20 \div \frac{2}{5} = 50$
43. $\frac{1}{2}x - \frac{1}{3}x = 6$
 $\frac{1}{6}x = 6$
 $x = 36$
44. 6
45. $30 \times 0.7 = 21$
46. $32000 \div 400 = 80 \text{ sec} = 1 \text{ min } 20 \text{ sec}$
47. -24
48. $7\frac{7}{10}$
49. $\frac{14}{3}$ or $4\frac{2}{3}$
50. $5 \times 12 \div 6 = 10$ pieces of tile
 $6 \times 12 \div 6 = 12$
 $10 \times 12 = 120$ pieces
51. Note that shaded area
 $= \frac{1}{4}(\text{circle}) - \Delta$
 $= \frac{1}{4} \times (400\pi) - \frac{1}{2}(400)$
 $= 100\pi - 200 = 314 - 200 = \boxed{114}$
52. $x = 9$
53. 3
54. $(\frac{1}{2} \times \frac{2}{3} \times \frac{3}{4} \times \frac{4}{5} \times \frac{5}{6})^2 = (\frac{1}{6})^2 = \boxed{\frac{1}{36}}$
55. $9 = 7 + 2$
 $15 = 9 + 6$
 $17 = 15 + 2$
 $23 = 17 + 6$
 $\boxed{25} = 23 + 2$
56. Let's split 12 into 3 parts: 2 for the tens digit, and 1 for the ones digit. So, tens digit is 8 and ones digit is 4. The number is $\boxed{84}$.
57. $1 - \frac{1}{3} - \frac{1}{2} \times \frac{2}{3} = \frac{1}{3}$ (unsold)
 $1 - \frac{1}{3} = \frac{2}{3}$ (sold)
 $50 \times 2 = \boxed{100}$
58. C
59. $\frac{1}{2} \times (20 \times 10) = 100$
60. 24
61. .0125
62. A
63. Let $11n + 9$ be the number of cards. Note that $11n + 9$ is divisible by 5. The smallest n is 6. You must have $11 \times 6 + 9 = 75$ cards.

64. $25 + 50 \times 5 + 100 \times 10 \div 25$
 $= 1 + 10 + 40$
 $= \boxed{51}$

65. $\frac{1}{2} \times 0.001 = \boxed{0.0005}$

66. $\frac{1}{2} + \frac{1}{6} = \frac{2}{3}$

67. D
 $\frac{1}{100} \times 7 = 0.07 \text{ day} \neq \frac{3}{16} \text{ day}$

68. $4 + 9 + 25 = 38 = 2 \times \boxed{19}$

69. B
 162
 $= 1 \times 162$
 $= 2 \times 81$
 $= 3 \times 54$
 $= 6 \times 27$
 $= 9 \times 18$

Only 1, 2, 3, 6, and 9.

70. $(x - 10) \times 10\% = (x - 20) \times 20\%$
 $x - 10 = 2(x - 20)$
 $x - 10 = 2x - 40$
 $x = \$30.00 \text{ (list price)}$

71. $666^2 - 333^2 = (666 - 333)(666 + 333) = 333 \times 999 =$
 $333 \times (1000 - 1) = 333000 - 333 = 332667$

72. $18 \times \frac{1}{2} = 9 \text{ (Alex, each day)}$
 $9 \times 5 = 45 \text{ (lollipops, Alex)}$

$18 \times \frac{1}{3} = 6 \text{ (Claudia, each day)}$
 $6 \times 5 = 30 \text{ (lollipops, Claudia)}$

73. $50 \div 10 = 5 \text{ people}$

74. $1000 \div 60 = 16R40$
 $12:00 \text{ A.M.} + 16:40 = 4:40 \text{ P.M.}$

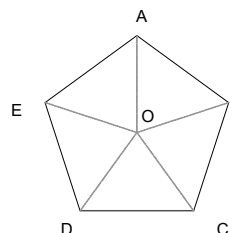
75. A = 1
 B = 5
 C = 3
 D = 7

$1535 \times 5 = 7675$

$C + D = 3 + 7 = \boxed{10}$

76. $35 - 30 = 5 \text{ (jam only)}$
 $41 - 30 = 11 \text{ (peanut butter only)}$
 $50 - (5 + 11 + 30) = 4 \text{ (neither)}$

77. (a) $\angle AOB = 360 \div 5 = 72$
 b) $\angle OAB = \angle OBA = \frac{1}{2}(180 - 72) = 54^\circ$
 c) $\angle BAE = 2\angle OAB = 108^\circ$



78. $1 + 2 = 3 \text{ (up to Tuesday)}$
 $3 + 3 = 6 \text{ (up to Wednesday)}$
 $6 + 4 = 10 \text{ (up to Thursday)}$
 $10 + 5 = 15 \text{ (up to Friday)}$

79. 15 edges 7 faces 10 vertices

80. D

81. $95 \times 76 + 4 \times 1 = 7224$

82. $1 \text{ min} \div 55 \times 16500 = 300 \text{ min} = 5 \text{ hr}$

Answer Key

- | | | |
|-------|------------------------------|---------------------------|
| 1. C | 43. E | not considered genetic |
| 2. C | 44. E | mutations |
| 3. D | 45. D | -Genetic mutations |
| 4. B | 46. A | cannot be traced back |
| 5. B | 47. B | to parents, twins can |
| 6. C | 48. C | 59. Possible answers may |
| 7. B | 49. A | include: |
| 8. D | 50. D | -tadpoles/frogs, lizards, |
| 9. D | 51. B | rabbits, deer |
| 10. A | 52. C | -any other animals that |
| 11. A | 53. Children with same | change color to blend |
| 12. D | parents | into the environment |
| 13. D | 54. Large painting on a wall | -ways animals protect |
| 14. A | 55. unknown; rare; not | themselves from |
| 15. C | mainstream | predators or live in |
| 16. B | 56. If a mutation is | extreme conditions |
| 17. C | advantageous for a | |
| 18. B | particular organism, that | |
| 19. D | organism is more likely | |
| 20. B | to survive and | |
| 21. D | procreate, therefore | |
| 22. A | passing on a useful trait. | |
| 23. A | 57. When organisms | |
| 24. D | reproduce, there are so | |
| 25. D | many variables coming | |
| 26. B | from each parent, that is | |
| 27. C | is highly unlikely there | |
| 28. A | will be an identical | |
| 29. D | combination as an | |
| 30. C | outcome. | |
| 31. A | 58. Students should note: | |
| 32. C | -Twins may have many | |
| 33. B | similar or identical | |
| 34. C | physical characteristics, | |
| 35. A | but they are still largely | |
| 36. E | individual beings. - | |
| 37. D | twins may have a higher | |
| 38. B | instance if similarities, | |
| 39. A | but they are not | |
| 40. C | completely genetically | |
| 41. B | identical. | |
| 42. C | -Twins or multiples are | |

Answer Key

- | | | | | | |
|-------|-------|-------|-------|-------|-------|
| 1. A | 11. C | 21. D | 31. B | 41. E | 51. D |
| 2. D | 12. A | 22. C | 32. B | 42. C | 52. C |
| 3. D | 13. C | 23. D | 33. A | 43. E | 53. A |
| 4. C | 14. C | 24. D | 34. B | 44. B | 54. B |
| 5. D | 15. A | 25. D | 35. C | 45. A | 55. B |
| 6. D | 16. A | 26. D | 36. A | 46. E | 56. A |
| 7. A | 17. A | 27. D | 37. C | 47. E | 57. C |
| 8. B | 18. D | 28. D | 38. C | 48. B | |
| 9. B | 19. B | 29. B | 39. C | 49. C | |
| 10. A | 20. C | 30. A | 40. A | 50. D | |
-
58. Very fine sheet made from animal skin; used for writing
59. Professional writer, especially before the invention of printing
60. the art of (decorative) writing
61. -Johannes Gutenberg, a German blacksmith
-to mass produce the Christian Bible
62. -most people could not read
- literacy was limited to monks
63. -paper could be manufactured cheaply
-paper was easier to handle than parchment
-paper was thinner than parchment so it could be bound into book page more easily, in larger quantities
64. -at first paper was not seen as worthy of the religious words of the Qur'an because it was cheaper than parchment
-the demand for copies of the Qur'an grew as people became literate
- paper quality improved; demand grew, so the Qur'an was printed and distributed widely
- in Europe, Gutenberg's printing press allowed for mass production of the Christian Bible
- making religious texts available and accessible to the general population helped spread the religious beliefs of each culture
65. *Students should note something similar to the following:*
- spread of paper enabled more people to learn to read and write
- spread of paper increased knowledge because books were more readily available over the Muslim empire
- disparate regions were coming together through the written word
- advances in science and technology (as in the Abbasid Caliphate) could now reach more people with the use of paper/books

Answer Key

Analogies

1. A
2. D
3. C
4. A

cause-effect

purgative: purging or cleansing, especially by causing evacuation of the bowels.

5. C
6. D
7. B
8. D
9. C
10. C
11. B
12. A

text display

13. C
14. D
15. C
16. C
17. A

to deter

discern: to distinguish; to differentiate

Misleading makes it hard to comprehend.

Camouflaging makes it hard to discern.

18. D
19. B
20. C

Sentence Completion

21. A
22. D
23. B
24. B
25. A
26. A
27. B

28. A
29. A
30. A
31. D
32. C
33. C
34. D
35. D

Vocab for GT Middle School

36. candid
37. abstract
38. fundamental
39. digital
40. evidence
41. magnificent
42. infinity
43. cultural
44. symbolic
45. endurance
46. hospitality
47. placid
48. statistics
49. fantastic
50. random
51. mainstay
52. enlighten
53. cubicle
54. coincide
55. eulogy
56. satellite
57. accord
58. commend
59. efficiency
60. opponent
61. challenge
62. successful
63. official
64. fulfill
65. assistant
66. grammatical
67. barren
68. access

69. irritate
 70. offensive
 71. fortress
 72. illusion
 73. mammals
 74. vengeance
 75. dialogue
 76. diaphragm
 77. ghastly
 78. vague
 79. camouflage
 80. subtle
 81. fatigue
 82. chaos
 83. debris
- ## Vocab for GT Middle School
84. grotesque
 85. aerial
 86. excess
 87. wretched
 88. mechanism
 89. chaos
 90. digital
 91. debris
 92. efficiency
 93. vague
 94. enlighten
 95. fulfill
 96. infinity
 97. abstract
 98. subtle
 99. although
 100. symbolic
 101. guarantee
 102. repeatedly
 103. challenge
 104. mainstay
 105. successful
 106. diaphragm
 107. endurance
 108. official
 109. accord

- 110. candid
- 111. evidence
- 112. fundamental
- 113. ghastly
- 114. dialogue, speculate
- 115. magnificent
- 116. vengeance
- 117. fatigue
- 118. satellite
- 119. Although
- 120. camouflage
- 121. opponent
- 122. assistant
- 123. coincide
- 124. commend
- 125. uncoiled
- 126. gratify
- 127. petunia

Answer Key

Sentence Completion

1. B
2. C
3. B
4. D
5. B
6. D
7. A
8. C
9. C
10. D
11. A
12. C
13. A
14. B
15. D

Analogies

16. B
17. B
18. D

“before”

Design before **build** as
compose before
perform.

19. C
20. D
21. B
22. D
23. C
24. B
25. A
26. C
27. C

function

28. B
29. B

charged by

A taxi driver charges
fare for services.

A lawyer charges fee for
services.

passbook: a small book

or ledger for each
customer in which a
merchant keeps a record
of goods sold on credit
and the amounts owed
and paid.

30. C
31. B
32. B
33. A
34. A
35. D

Vocab for GT Middle School

36. foreign
37. veins
38. priestly
39. Reining
40. heirloom
41. Weighty
42. sovereign
43. seizure
44. unyielding
45. perceive
46. seaboard
47. comparable
48. sovereign
49. unyielding
50. faculty
51. perceive
52. haunted
53. thoughtful
54. cede
55. exceed

Vocab for GT Middle School

56. obligation
57. pollution
58. distortion
59. hesitation
60. anticipation
61. nutrition
62. aggravation
63. revision

64. precision
65. fascination
66. preliminary
67. preposition
68. predetermine
69. unnecessary
70. involuntary
71. unpredictable
72. indirect
73. computation
74. confirm
75. reaffirm

Vocab for GT Middle School

76. stationary
77. dissent
78. affect
79. duel
80. baron
81. descent
82. dual
83. effect
84. stationery
85. barren
86. stationary
87. descent
88. duel
89. dissent
90. dual
91. barren
92. effect
93. baron, affect
94. stationary
95. kernel
96. epic
97. epoch
98. colonel
99. excepting
100. accepting

Vocab for GT Middle School

101. attendance
102. excellence
103. assurance

- 104. independence
- 105. prudence
- 106. eloquence
- 107. brilliance
- 108. significance
- 109. alliance
- 110. consequence
- 111. acceptance
- 112. reliance
- 113. radiance
- 114. arrogance
- 115. intelligence
- 116. constitution
- 117. Expansion
- 118. narration
- 119. supervision
- 120. persuasion
- 121. Proclamation
- 122. discrimination
- 123. segregation
- 124. Opposition
- 125. dedication

Answer Key

Sentence Completion

1. A
2. D
3. B
4. A
5. B
6. D
7. A
8. D
9. A
10. D
11. B
12. D
13. D
14. C
15. A
16. A
17. C
18. D
19. D
20. D

Analogies

21. A
22. D
23. A
24. C

gender contrasting

corny: a close friend or companion; chum.

confidante: a woman to whom secrets are confided or with whom private matters and problems are discussed.

25. B
26. C
27. D
28. A
29. C
30. D
31. D
32. A

33. C
34. B

cause-effect

35. A
36. B
37. C
38. A
39. A
40. A

Vocab for GT Middle School

41. vigor
42. kernel
43. secede
44. minimum
45. flawless
46. reigning
47. priestly
48. slaughter
49. supersede
50. concede
51. heirloom
52. authentic
53. seizure, philosopher
54. percentage
55. succeeding
56. precaution, status
57. preceded
58. weighty

Vocab for GT Middle School

59. unnecessary
60. segregation
61. timidity
62. indirect
63. involuntary
64. reaffirm
65. probability
66. supervision
67. predetermine
68. independence
69. unanticipated
70. preservation
71. competent

72. congregate
73. recycling
74. attendance
75. creativity
76. narration
77. significance
78. formality
79. prudence
80. maturity
81. constitution
82. expansion
83. alliance

Vocab for GT Middle School

84. feudal
85. futile
86. faze
87. phase
88. feudal
89. idle
90. idol
91. allusion
92. illusion
93. petal
94. pedal
95. idle
96. idol
97. petal
98. faze
99. feudal
100. faze
101. futile, phase
102. Pedal
103. illusion

Vocab for GT Middle School

104. indescribable
105. transcript
106. deferment
107. subscription
108. inference
109. vocation
110. permissive
111. omission

- 112. provoke
- 113. revoke
- 114. commit
- 115. admission
- 116. vocabulary, transmit
- 117. evoke
- 118. invocation
- 119. submission
- 120. advocated
- 121. permission
- 122. irrevocable
- 123. provocation