Math Mammoth End-of-the-Year Test, Grade 6, Answer Key

Instructions to the teacher:
In order to continue with the *Math Mammoth Grade 7 Complete Worktext*, I recommend that the student score a minimum of 80% on this test, and that the teacher or parent review with the student any content areas in which the student may be weak. Students scoring between 70% and 80% may also continue with grade 7, depending on the types of errors (careless errors or not remembering something, versus a lack of understanding). Use your judgment. My suggestion for points per item is as follows. The total is 194 points. A score of 155 points is 80%.

Question #	Max. points	Student score
Basic Operations		
1	2 points	
2	3 points	
3	2 points	
4	2 points	
	subtotal	/ 9
Expressions and Equations		
5	4 points	
6	2 points	
7	2 points	
8	1 point	
9	2 points	
10	2 points	
11	2 points	
12	2 points	
13	2 points	
14	2 points	
15	1 point	
16	2 points	
17	2 points	
18	2 points	
19	4 points	
	subtotal	/ 32
Decimals		
20	2 points	
21	2 points	
22	1 point	
23	2 points	
24	2 points	
25	1 point	
26	2 points	

Question #	Max. points	Student score
Decimals, cont.		
27	2 points	
28a	1 point	
28b	2 points	
29	3 points	
	subtotal	/ 20
Measuring Units		
30	3 points	
31	1 point	
32	2 points	
33	3 points	
34	6 points	
35	4 points	
	subtotal	/ 19
Ratio		
36	2 points	
37	2 points	
38	2 points	
39	2 points	
40	2 points	
41	2 points	
42	2 points	
	subtotal	/ 14
Percent		
43	3 points	
44	4 points	
45	2 points	
46	2 points	
47	2 points	
	subtotal	/13

Question #	Max. points	Student score
Prime Factorization, GCF, and LCM		
48	3 points	
49	2 points	
50	2 points	
51	2 points	
52	2 points	
	subtotal	/11
Fractions		
53	3 points	
54	2 points	
55	2 points	
56	2 points	
57	3 points	
58	3 points	
	subtotal	/15
Integers		
59	2 points	
60	2 points	
61	2 points	
62	4 points	
63	5 points	
64	6 points	
65	4 points	
	subtotal	/25

| Question #	Max. points	Student score
Geometry		
66	1 point	
67	1 point	
68	3 points	
69	4 points	
70	2 points	
71a	1 point	
71b	3 points	
72	4 points	
73a	2 points	
73b	2 points	
	subtotal	/23
Statistics		
74a	2 points	
74b	1 point	
74c	2 points	
75a	1 point	
75b	1 point	
76a	2 points	
76b	1 point	
76c	1 point	
76d	2 points	
	subtotal	/13
	TOTAL	/194

The Basic Operations

1. a. $2{,}000 \div 38 = 52$ R24. There will be 52 bags of cinnamon.

2. a. $2^5 = 32$ b. $5^3 = 125$ c. $10^7 = 10{,}000{,}000$

3. a. 70,200,009
   b. 304,500,100

4. a. 6,300,000
   b. 6,609,900

Expressions and Equations

5. a. $s - 2$ b. $(7 + x)^2$ c. $5(y - 2)$ d. $\dfrac{4}{x^2}$

6. a. $40 - 16 = 24$

   b. $\dfrac{65}{5} = 13 \cdot 3 = 39$

7. a. $\$50 - 2m$ or $\$50 - m \cdot 2$
   b. s^2

8. $z + z + 8 + x + x + x = 2z + 3x + 8$ or $3x + 2z + 8$ or $2z + 8 + 3x$

9. $6(s + 6)$ or $(s + 6 + s + 6 + s + 6 + s + 6 + s + 6 + s + 6$. It simplifies to $6s + 36$.

10. $6b \cdot 3b = 18b^2$

11. a. $3x$ b. $14w^3$

12. a. $7(x + 5) = 7x + 35$
    b. $2(6p + 5) = 12p + 10$

13. a. $\underline{2}(6x + 5) = 12x + 10$
    b. $5(2h + \underline{6}) = 10h + 30$

14.

a.	$\dfrac{x}{31} = 6$	b.	$a - 8.1 = 2.8$
	$x = 6 \cdot 31$		$a = 2.8 + 8.1$
	$x = 186$		$a = 10.9$

15. $y = 2$

16. $0.25 \cdot x = 16.75$ OR $25x = 1675$. The solution is $x = 67$ quarters.

17. a. $p \le 5$. The variable students use for "pieces of bread" may vary.
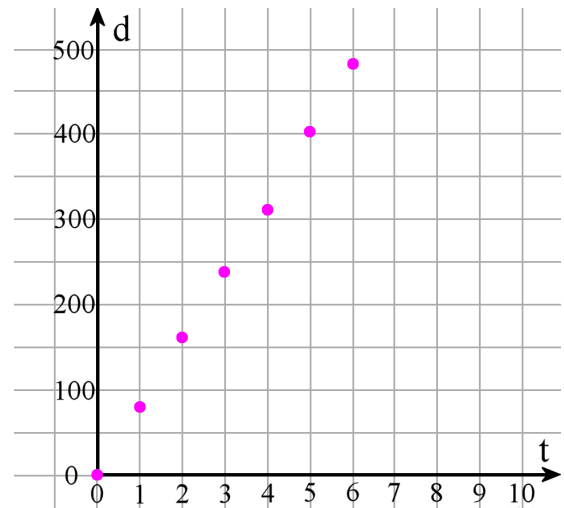   b. $a \ge 21$. The variable students use for "age" may vary.

18.

a. $x > 31$ b. $x \le 9$
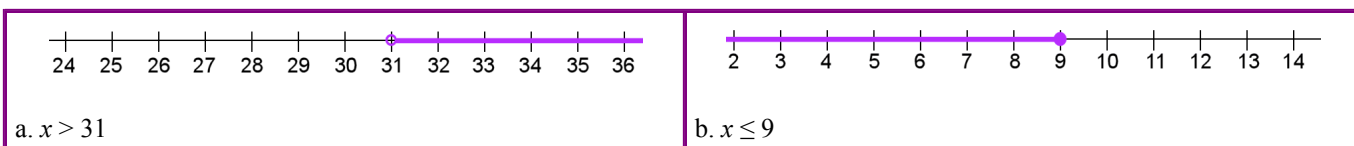
19. a.

t (hours)	0	1	2	3	4	5	6
d (km)	0	80	160	240	320	400	480

b. See the grid on the right.
c. $d = 80t$
d. t is the independent variable

Decimals

20. a. 0.000013   b. 2.0928

21. a. $\dfrac{78}{100,000}$ b. $2\dfrac{302}{1,000,000}$

22. 0.0702

23. a. 8
    b. 0.00048

24. a. Estimate: $7 \times 0.006 = 0.042$
    b. Exact: $7.1 \times 0.0058 = 0.04118$

25. $1.5 + 0.0022 = 1.5022$

26. a. 90,500
    b. 0.0024

27. a. $175 \div 0.3 = 583.333$

    b. $\dfrac{2}{9} = 0.222$

28. a. Estimate: $13 \div 4 \times 3 = (3\ 1/4) \times 3 = \$9.75$
    b. Exact: $9.69

29. $(3 \times \$3.85 + \$4.56) \div 2 = \$8.06$

Measuring Units

30. a. 178 fl. oz. = <u>5.56</u> qt   b. 0.412 mi. = <u>2,175.36</u> ft   c. 1.267 lb = <u>20.27</u> oz

31. 0.947 mile

32. You can get 10 six ounce serving and have 4 ounces left over.

33. The unit price is $6.44 per pound. Notice that ten bars makes one pound, because 10 × 1.6 oz = 16 oz = 1 lb.
    If 36 bars cost $23.20, then ten bars (which is 1 lb of bars) cost $23.20 ÷ 36 × 10 ≈ $6.44.

34. a.   39 dl = 3.9 L

			3	9		
kl	hl	dal	l	dl	cl	ml

b. 15,400 mm = 15.4 m

		1	5	4	0	0
km	hm	dam	m	dm	cm	mm

c.   7.5 hm = 75,000 cm

	7	5	0	0	0	
km	hm	dam	m	dm	cm	mm

d. 597 hl = 59,700 L

5	9	7	0	0		
	kl	hl	dal	l	dl	cl	ml

e.   7.5 hg = 0.75 kg

0	7	5				
kg	hg	dag	g	dg	cg	mg

f. 32 g = 3,200 cg

		3	2	0	0	
kg	hg	dag	g	dg	cg	mg

35. a. Twenty-four bricks will cover the span of the wall. 5150 mm ÷ 215 mm = 23.953488.
    b. Twenty-three bricks will cover the span of the wall. 5150 mm ÷ 225 mm = 22.88.

Ratio

36. a.
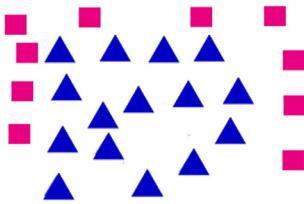
b. 10:15 = 2:3

37. a. 3,000 g:800 g = 15:4
    b. 240 cm:100 cm = 12:5

38. a. $7:2 kg
    b. 1 teacher per 18 students

39. a. $4 per t-shirt.
    b. 90 miles in an hour

40. a. You could mow 20 lawns in 35 hours.
    b. The unit rate is 105 minutes per lawn (or 1 h 45 min per lawn).

Lawns	4	8	12	16	20
Hours	7	14	21	28	35

41. Mick got $102.84. $180 ÷ 7 × 4 = $102.84.

42. a. 11.394 km   b. 4.23 qt

Percent

43.

a. $35\% = \dfrac{35}{100} = 0.35$	b. $9\% = \dfrac{9}{100} = 0.09$	c. $105\% = 1\dfrac{5}{100} = 1.05$

44.

	510
1% of the number	5.1
5% of the number	25.5
10% of the number	51
30% of the number	153

45. The discounted price is \$39. You can multiply $0.6 \times \$65 = \$39$, or you can find out 10% of the price, which is \$6.50, multiply that by 4 to get the discount (\$26), and subtract the discounted amount.

46. The store had 450 notebooks at first. Since 90 is 1/5 of the notebooks, the total is 90 ×5 = 450.

47. She has read 85% of the books she borrowed from the library. 17/20 = 85/100 = 85%.

Prime Factorization, GCF, and LCM

48. a. $3 \times 3 \times 5$ b. $2 \times 3 \times 13$ c. 97 is a prime number

49. a. 8   b. 18

50. a. 2   b. 15

51. Any three of the following numbers will work: 112, 140, 168, 196

52.

a. GCF of 18 and 21 is 3. $18 + 21 = 3 \cdot 6 + 3 \cdot 7 = 3(6 + 7)$
b. GCF of 56 and 35 is 7. $56 + 35 = 7(8 + 5)$

Fractions

53. a. 4   b. 2 1/12   c. 5 3/5

54. $3\dfrac{2}{3} \div \dfrac{3}{5} = 6\dfrac{1}{9}$

55. Answers will vary. Please check the student's work.
Example: There was 1 3/4 pizza left over and three people shared it equally. Each person got 7/12 of a pizza.

56. There are ten servings. (7 1/2) ÷ (3/4) = (15/2) ÷ (3/4) = (15/2) × (4/3) = 60/6 = 10.

57. 63 8/9 square feet.
The area of the room is (12 1/2) × (15 1/3) = (25/2) × (46/3) = 25 × 23/3 = 575/3 = 191 2/3 square feet.
One-third of that is (191 2/3) × (1/3) = 574/9 = 63 8/9.
Or, you can first divide one of the dimensions by three, and then multiply to find the area.

58. 4 13/20 inches and 3 1/10 inches or 4.65 inches and 3.1 inches.

The ratio of 3:2 means the two sides are as if three "parts" and two "parts", and the total perimeter is 10 of those parts. Therefore, one part is 15 1/2 in. ÷ 10 = 15.5 in. ÷ 10 = 1.55 inches. The one side is three times that, and the other is two times that. So, the sides are 4.65 in. and 3.1 in. If you use fractions, you get (15 1/2 in.) ÷ 10 = (31/2 in.) ÷ 10 = 31/20 in., and the two sides are then 3 × 31/20 in. = 93/20 in. = 4 13/20 in. and 2 × 31/20 in. = 62/20 in. = 3 1/10 in.

Integers

59. a. >   b. >

60. a. −7°C > −12°C.
    b. $5 > −$5.

61. a. The difference is 23 degrees.
    b. The difference is 12 degrees.

62. a. −7   b. |−6| = 6   c. |5| = 5   d. |−6| = 6
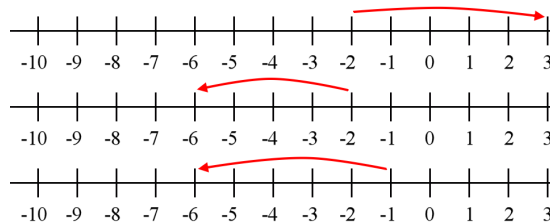
63. a.- c See the grid on the right.
    d. 6 × 10 ÷ 2 = 30
       The area of the resulting triangle is 30 square units.
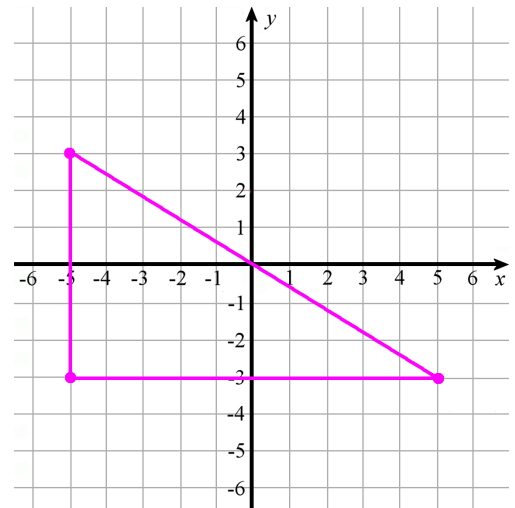
64. a. −2 + 5 = 3

    b. −2 − 4 = −6

    c. −1 − 5 = −6

65. a. That would make his money situation to be −$4.

$10 −$14 = −$4
OR
$10 + (−$14) = −$4

    b. Now he is at the depth of −3 m.

−2 m −1 m = −3 m
OR
−2 m + (−1 m) = −3 m

7

Geometry

66.

The area is $4 \times 3 \div 2 = 6$ square units.

67. Answers may vary. The base and altitude of the parallelogram could be for example 5 and 3, or 3 and 5, or 6 and 2 1/2.
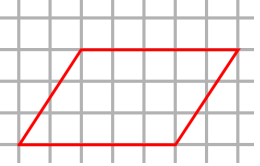
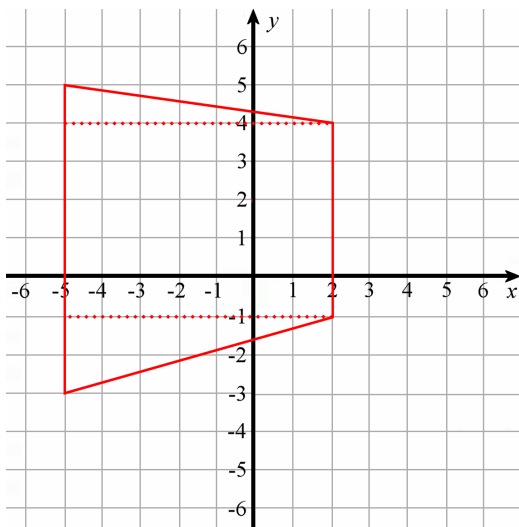68. Divide the shape into triangles and rectangles, for example like this:
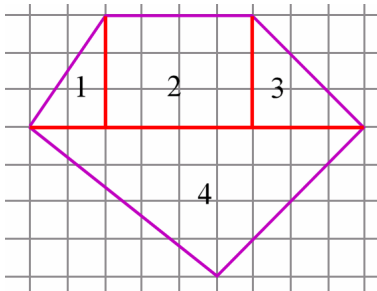
The areas of the parts are:

triangle 1: 3 square units
rectangle 2: 12 square units
triangle 3: 4.5 square units
triangle 4: 18 square units

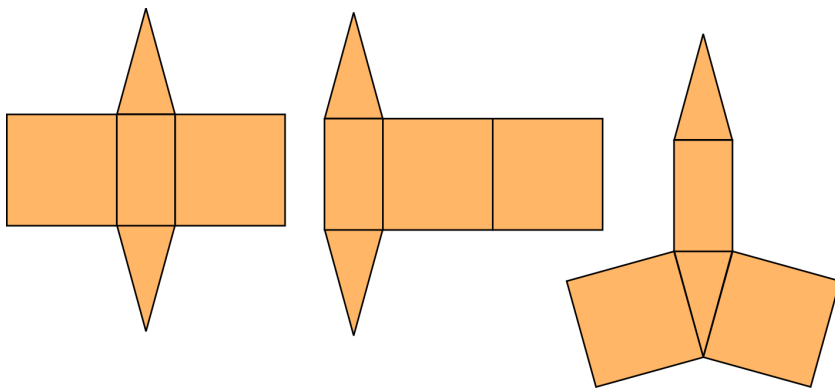The overall shape (pentagon): 37.5 square units

69. It is a trapezoid. To calculate its area, divide it into triangles and rectangle(s).

The area is: $3.5 + 35 + 7 = 45.5$ square units

70. It is a triangular prism. Some possible nets are shown below:

71. a. It is a rectangular pyramid.

b. The rectangle has the area of 300 cm². The top and bottom triangles: 2×20 cm $\times 11.2$ cm $\div 2 = 224$ cm².
The left and right triangles: 2×15 cm $\times 13$ cm $\div 2 = 195$ cm². The total surface area is 719 cm².

72. The volume of each little cube is $(1/2$ cm$) \times (1/2$ cm$) \times (1/2$ cm$) = 1/8$ cm³.
a. $18 \times (1/8)$ cm³ $= 18/8$ cm³ $= 9/4$ cm³ $= 2\ 1/4$ cm³.
b. $36 \times (1/8)$ cm³ $= 36/8$ cm³ $= 9/2$ cm³ $= 4\ 1/2$ cm³.

73. a. $1\ 3/4$ in $\times 8\ 1/2$ in $\times 6$ in $= (7/4)$ in $\times (17/2)$ in $\times 6$ in $= (119/4) \times 6$ in³ $= (29\ 3/4) \times 3$ in³ $= 87\ 9/4$ in³ $= 89\ 1/4$ in³.
This calculation can also be done (probably quicker) by using decimals: 1.75 in $\times 8.5$ in $\times 6$ in $= 89.25$ in³.

b. Imagine you place the boxes in rows, standing up, so that the height is 6 inches. Then we can stack two rows on top of each other, since the height of the box is 1 ft or 12 inches. The width of each box is 1 3/4 in., and 6 boxes fit in the space of 1 ft, because $6 \times (1\ 3/4$ in.$) = 6\ 18/4$ in. $= 10\ 1/2$ in. Since the last dimension is over 8 inches, we can only fit one row. So, we can fit two rows of 6 boxes, stacked on top of each other, or a total of 12 boxes.

Statistics

74. a. See the plot on the right.
b. The median is 68.5 years.
c. The first quartile is 63, and the third quartile is 75.5.
The interquartile range is thus 12.5 years.

Stem	Leaf
5	5 9
6	1 2 4 5 5 5 8 9
7	0 2 4 7
8	3 9
9	4

75. a. It is right-tailed or right-skewed. You can also describe it as asymmetrical.
b. Median. Mean is definitely not the best, because the distribution is so skewed. Without seeing the data itself, we cannot know if mode would work or not - it may not even exist, since typically for histograms, the data is very varied numerically and has to first be grouped.

76. a.
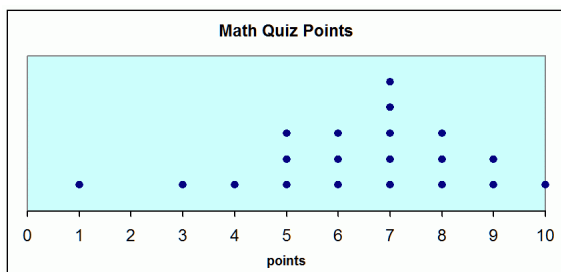
b. It is fairly bell-shaped but is somewhat left-tailed or left-skewed. You can also say it is asymmetrical.
c. The data is spread out a lot.
d. Any of the three measures of center works. Mean: 6.4. Median: 7. Mode: 7.