Math Mammoth Grade 6
End-of-Year Test Answer Key
International Version

Basic Operations

1. a. $2000 ÷ 38 = 52$ 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.		b.	
$\dfrac{x}{31}$	$= 6$	$a − 8.1$	$= 2.8$
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. $p \leq 5$. The variable students use for "pieces of bread" may vary.
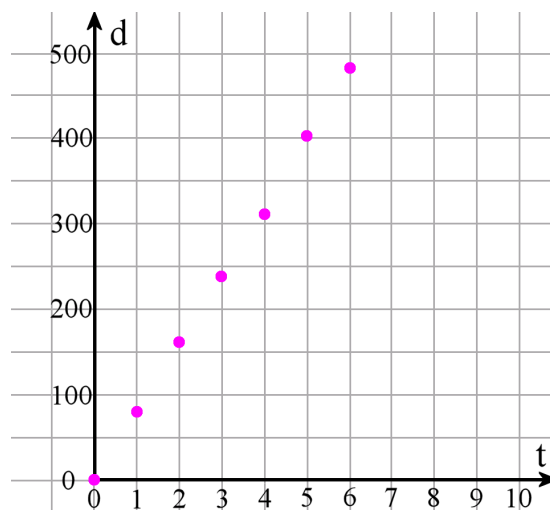   b. $a \geq 21$. The variable students use for "age" may vary.

18.

a. $x > 31$

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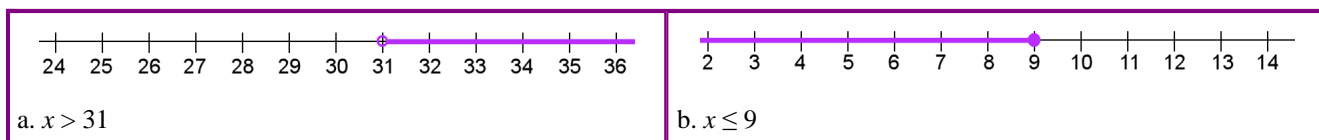
19. a.

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: $7 \cdot 0.006 = 0.042$
   b. Exact: $7.1 \cdot 0.0058 = 0.04118$

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: $13 \div 4 \cdot 3 = (3.25) \cdot 3 = \$9.75$
   b. Exact: $9.69

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

Measurement Units

30. a. 178 metres ≈ 0.18 km   b. 1267 grams ≈ 1.27 kg

31. 0.6 km

32. You can get ten 200-ml servings.

33. <u>It is $104 per kilogram.</u>
    To calculate the price per kilogram, simply divide the cost by the weight in kilograms. A pack of 20 candies weighs
    20 · 25 g = 500 g = 0.5 kg. Now simply divide the cost of those candies by their weight in kilograms to get the
    price per kilogram: $52 ÷ 0.5 kg = $104 / kg.

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 = 3200 cg

			3	2	0	0
kg	hg	dag	g	dg	cg	mg

35. a. Division gives us 5150 mm ÷ 215 mm ≈ 23.9535, so <u>24 bricks</u> will cover the span of the wall.
    b. Now let's add 10 mm to each brick, and this time division gives us 5150 mm ÷ 225 mm ≈ 22.8889.
       So, now, <u>23 bricks</u> will cover the span of the wall.

Ratio

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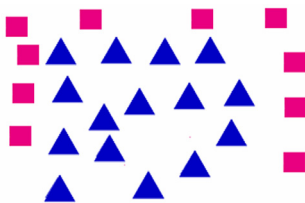
b. 10:15 = 2:3

37. a. 3000 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. 144 kilometres 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 $180 ÷ 7 · 4 = <u>$102.86</u>.

Percent

42.

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

43.

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

44. The discounted price is $39. You can multiply $0.6 \cdot \$65 = \$39$, 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.

45. The store had 450 notebooks at first. Since 90 is 1/5 of the notebooks, the total is $90 \cdot 5 = 450$.

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

Prime Factorization, GCF and LCM

47. a. $3 \cdot 3 \cdot 5$ b. $2 \cdot 3 \cdot 13$ c. 97 is a prime number

48. a. 8   b. 18

49. a. 2   b. 15

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

51.

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

52. a. $(4/5) \cdot (5/1) = 4$. Or, you can think that 1/5 fits into 4/5 exactly four times.
 b. $25/8 \div (3/2) = (25/8) \cdot (2/3) = (25/4) \cdot (1/3) = 25/12 = 2\ 1/12$
 c. $(4/3) \cdot (15/2) = (2/1) \cdot (5/1) = 10$
 d. $2\ 32/40 + 1\ 15/40 = 3\ 47/40 = 4\ 7/40$

53. $3\dfrac{3}{5} \div \dfrac{3}{5} = \dfrac{18}{5} \cdot \dfrac{5}{3} = 6$. The fraction 3/5 fits six times into 3 3/5.

54. 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.

55. There are ten servings. $(7\ 1/2) \div (3/4) = (15/2) \div (3/4) = (15/2) \cdot (4/3) = 60/6 = 10$.

56. The area of the room is $(3\ ¾\ m) \cdot 5\ m = 15/4\ m \cdot 5\ m = 75/4\ m^2 = 18\ ¾\ m^2$.
 One-third of that is $18\ ¾ \div 3 = \underline{6\ ¼\ square\ metres}$.

Integers

57. a. >   b. >

58. a. $-7°$ C $> -12°$ C.
    b. $\$5 > -\$5$.

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

60. a. -7 b. $|-6| = 6$ c. $|5| = 5$ d. $|-6| = 6$
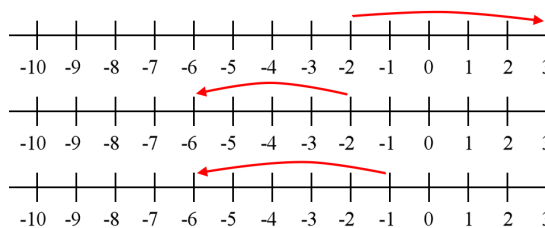
61. a.- c See the grid on the right.
    d. $6 \cdot 10 \div 2 = 30$
       The area of the resulting triangle is 30 square units.
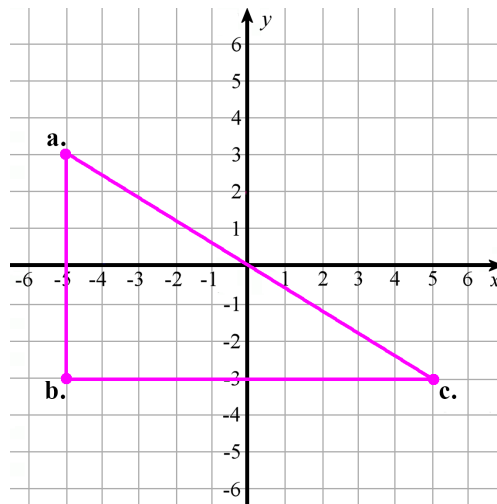
62. a. $-2 + 5 = 3$

    b. $-2 - 4 = -6$

    c. $-1 - 5 = -6$
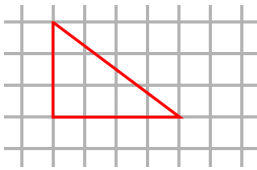
63. a. That would make his money situation to be $-\$4$.

> $\$10 - \$14 = -\$4$
> OR
> $\$10 + (-\$14) = -\$4$

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

> -2 m -1 m $= -3$ m
> OR
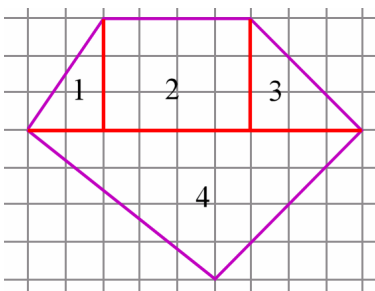> -2 m $+ (-1$ m$) = -3$ m

Geometry

64.

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

65. 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.
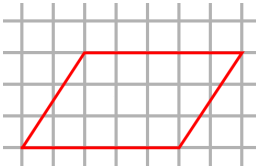
66. Divide the shape into triangles and rectangles, for example like this:
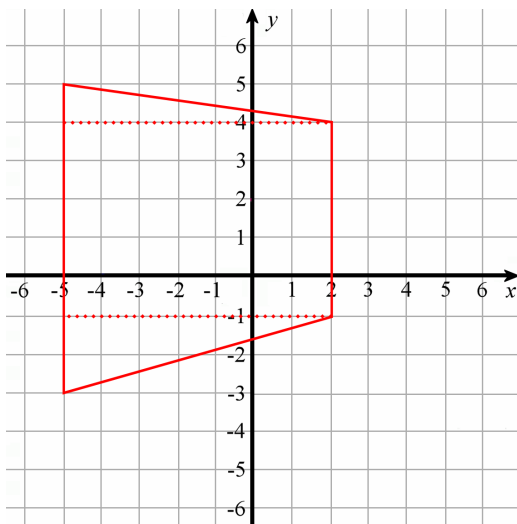
The areas of the parts are:

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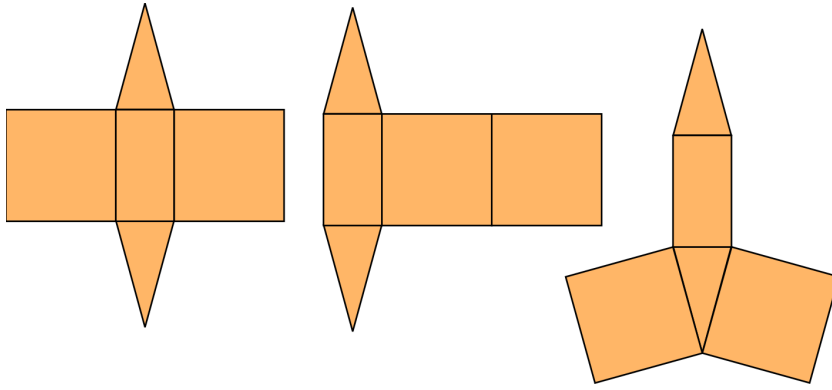triangle 4: 18 square units

The overall shape (pentagon): 37.5 square units

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

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

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

69. a. It is a rectangular pyramid.

   b. The rectangle has the area of 300 cm^2. The top and bottom triangles: $2 \cdot 20$ cm $\cdot$ 11.2 cm $\div 2 = 224$ cm^2.
   The left and right triangles: $2 \cdot 15$ cm $\cdot$ 13 cm $\div 2 = 195$ cm^2. The total surface area is $\underline{719 \text{ cm}^2}$.

70. There are (at least) two ways to solve the volume. One is to first calculate the volume of one individual little cube, and then multiply that by the number of little cubes in each figure.

   The volume of each little cube is $\frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} = 1/8$ cubic units. Then, the volume of each figure is:

   a. $18 \cdot (1/8) = 18/8 = 9/4 = \underline{2\frac{1}{4} \text{ cubic units}}$.
   b. $36 \cdot (1/8) = 36/8 = 9/2 = \underline{4\frac{1}{2} \text{ cubic units}}$.

   The other way is to multiply the three dimensions of each figure:

   a. $1\frac{1}{2} \cdot 1\frac{1}{2} \cdot 1 = (3/2) \cdot (3/2) = 9/4 = 2\frac{1}{4}$ cubic units.
   b. $2 \cdot 1\frac{1}{2} \cdot 1\frac{1}{2} = 2 \cdot (3/2) \cdot (3/2) = 18/4 = 4\frac{1}{2}$ cubic units.

71. a. The volume is 4.4 cm $\cdot$ 21.6 cm $\cdot$ 15 cm = 1425.6 cm^3 $\approx \underline{1430 \text{ cm}^3}$.

   b. The surface area is $2 \cdot 4.4$ cm $\cdot$ 21.6 cm $+ 2 \cdot 21.6$ cm $\cdot$ 15 cm $+ 2 \cdot 4.4$ cm $\cdot$ 15 cm
   = 190.08 cm^2 + 648 cm^2 + 132 cm^2 = 970.08 cm^2 $\approx \underline{970 \text{ cm}^2}$.

Statistics

72. a. Minimum: $\underline{55}$ First quartile: $\underline{63}$ Median: $\underline{68.5}$ Third quartile: $\underline{76}$ Maximum: $\underline{94}$

   b. Based on the interquartile range, half of the members are between $\underline{63}$ and $\underline{76}$ years old.

73. a. It is right-tailed or right-skewed, with a gap at $250-$274.

   b. <u>Median</u>. Mean is definitely not the best, because the distribution is 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.

74. a.
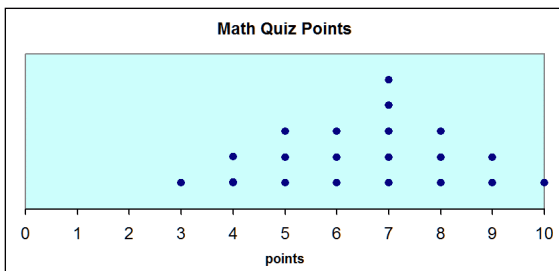
   b. It is bell-shaped.
   c. Any of the three measures of centre works. Mean: 6.55. Median: 7. Mode: 7.