

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

Please see the test for grading instructions.

The Basic Operations

- a. $2,000 \div 38 = 52$ R4. There will be 52 bags of cinnamon.
- a. $2^5 = 32$ b. $5^3 = 125$ c. $10^7 = 10,000,000$
- a. 70,200,009 b. 304,500,100
- a. 6,300,000 b. 6,609,900

Expressions and Equations

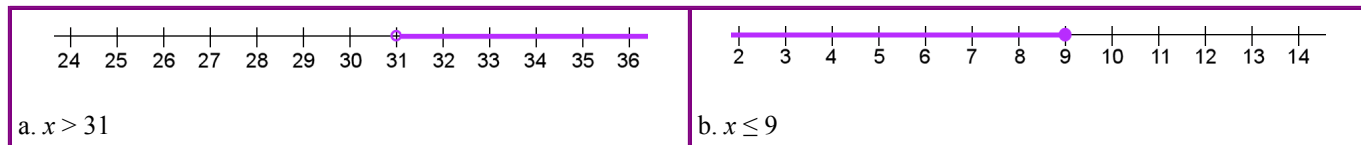
- a. $s - 2$ b. $(7 + x)^2$ c. $5(y - 2)$ d. $\frac{4}{x^2}$
- a. $40 - 16 = 24$
b. $\frac{65}{5} = 13 \cdot 3 = 39$
- a. $\$50 - 2m$ or $\$50 - m \cdot 2$ b. s^2
- $z + z + 8 + x + x + x = 2z + 3x + 8$ or $3x + 2z + 8$ or $2z + 8 + 3x$
- $6(s + 6)$ or $(s + 6 + s + 6 + s + 6 + s + 6 + s + 6 + s + 6)$. It simplifies to $6s + 36$.
- $6b \cdot 3b = 18b^2$
- a. $3x$ b. $14w^3$
- a. $7(x + 5) = 7x + 35$ b. $2(6p + 5) = 12p + 10$
- a. $2(6x + 5) = 12x + 10$ b. $5(2h + 6) = 10h + 30$
-

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

- $y = 2$
- $0.25 \cdot x = 16.75$ 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.

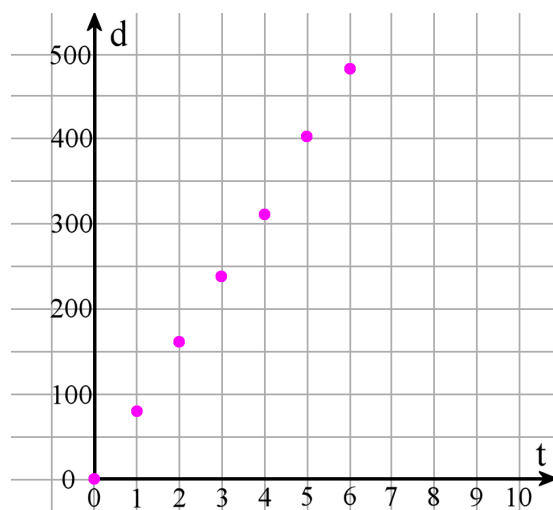
18.



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. $\frac{78}{100,000}$ b. $2 \frac{302}{1,000,000}$

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. $\frac{2}{9} = 0.222$

28. a. Estimate: $13 \div 4 \times 3 = (3 \frac{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. $178 \text{ fl. oz.} = \underline{5.56} \text{ qt}$ b. $0.412 \text{ mi.} = \underline{2,175.36} \text{ ft}$ c. $1.267 \text{ lb} = \underline{20.27} \text{ oz}$

31. 0.947 mile

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

33. It is about \$6.65 per pound.

To calculate the price per pound, simply divide the cost by the weight in pounds. A pack of 36 candy bars weighs $36 \times 1.55 \text{ oz} = 55.8 \text{ oz} = 3.4875 \text{ lb}$. Now simply divide the cost of those candy bars by their weight in pounds to get the price per pound: $\$23.20 \div 3.4875 \text{ lb} = \$6.652329749103943 / \text{lb}$.

34. a. $39 \text{ dl} = 3.9 \text{ L}$

			3	9		
kl	hl	dal	l	dl	cl	ml

b. $15,400 \text{ mm} = 15.4 \text{ m}$

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

c. $7.5 \text{ hm} = 75,000 \text{ cm}$

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

d. $597 \text{ hl} = 59,700 \text{ L}$

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

e. $7.5 \text{ hg} = 0.75 \text{ kg}$

0	7	5				
kg	hg	dag	g	dg	cg	mg

f. $32 \text{ g} = 3,200 \text{ cg}$

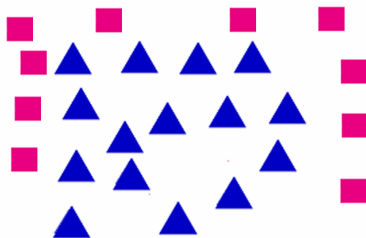
		3	2	0	0	
kg	hg	dag	g	dg	cg	mg

35. a. Twenty-four bricks will cover the span of the wall. $5150 \text{ mm} \div 215 \text{ mm} = 23.953488$.

b. Twenty-four bricks will still cover the span of the wall. $5150 \text{ mm} \div 216 \text{ mm} = 23.842593$.

Ratio

36. a.



b. $10:15 = 2:3$

37. a. $3,000 \text{ g}:800 \text{ g} = 15:4$ b. $240 \text{ cm}:100 \text{ cm} = 12:5$

38. a. $\$7:2 \text{ kg}$ 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 \div 7 \times 4 = \102.84 .

42. a. 11.394 km b. 4.23 qt

Percent

43.

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

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 $90 \times 5 = 450$.

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. $2 \frac{1}{12}$ c. $5 \frac{3}{5}$

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

55. Answers will vary. Please check the students' work.

Example: There was $1 \frac{3}{4}$ pizzas left over and three people shared it equally. Each person got $7/12$ of a pizza.

56. There are ten servings. $(7 \frac{1}{2}) \div (3/4) = (15/2) \div (3/4) = (15/2) \times (4/3) = 60/6 = 10$.

57. $63 \frac{8}{9}$ square feet.

The area of the room is $(12 \frac{1}{2}) \times (15 \frac{1}{3}) = (25/2) \times (46/3) = 25 \times 23/3 = 575/3 = 191 \frac{2}{3}$ square feet.

One-third of that is $(191 \frac{2}{3}) \times (1/3) = 574/9 = 63 \frac{8}{9}$.

Or, you can first divide one of the dimensions by three, and then multiply to find the area.

58. $4 \frac{13}{20}$ inches and $3 \frac{1}{10}$ inches or 4.65 inches and 3.1 inches.

The ratio of 3:2 means the two sides are like three "parts" and two "parts", and the total perimeter is 10 of those parts. So, one part is $15 \frac{1}{2} \text{ in.} \div 10 = 1.55 \text{ in.}$ The one side is three times that, and the other is two times that. The sides are 4.65 in. and 3.1 in. If you use fractions, you get $(15 \frac{1}{2} \text{ in.}) \div 10 = (31/2 \text{ in.}) \div 10 = 31/20 \text{ in.}$, and the two sides are $3 \times 31/20 \text{ in.} = 93/20 \text{ in.} = 4 \frac{13}{20} \text{ in.}$ and $2 \times 31/20 \text{ in.} = 62/20 \text{ in.} = 3 \frac{1}{10} \text{ in.}$

Integers

59. a. $>$ b. $>$

60. a. $-7^{\circ}\text{C} > -12^{\circ}\text{C}$. b. $\$5 > -\5 .

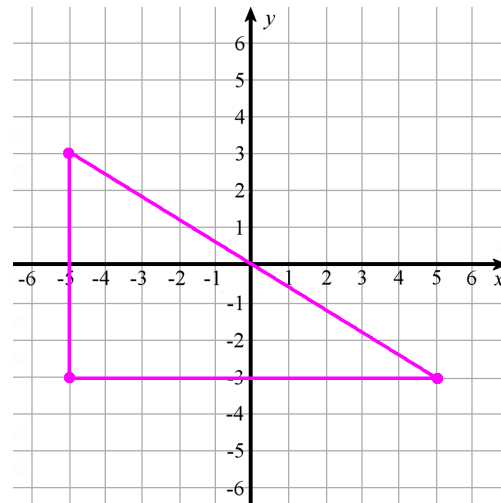
61. a. The difference is 23 degrees. b. The difference is 12 degrees.

62. a. -7 b. $|-6|=6$ c. $|5|=5$ d. $|-6|=6$

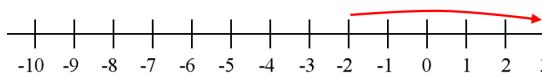
63. a.- c See the grid on the right.

d. $6 \times 10 \div 2 = 30$

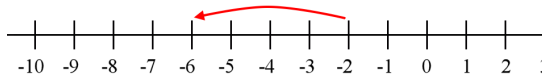
The area of the resulting triangle is 30 square units.



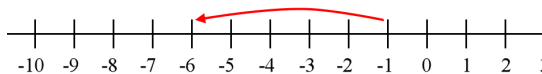
64. a. $-2 + 5 = 3$



b. $-2 - 4 = -6$



c. $-1 - 5 = -6$



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

$$\begin{aligned} \$10 - \$14 &= -\$4 \\ \text{OR} \\ \$10 + (-\$14) &= -\$4 \end{aligned}$$

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

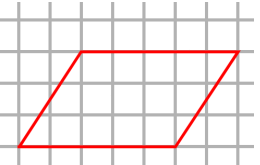
$$\begin{aligned} -2 \text{ m} - 1 \text{ m} &= -3 \text{ m} \\ \text{OR} \\ -2 \text{ m} + (-1 \text{ m}) &= -3 \text{ m} \end{aligned}$$

Geometry

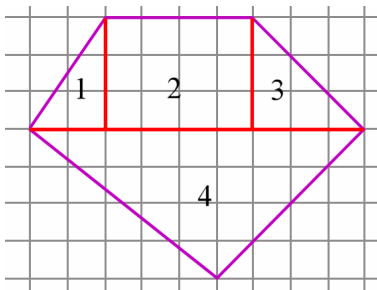
66. The area is $4 \times 3 \div 2 = 6$ square units.



67. Answers may vary. For example, the base and altitude of the parallelogram could be 5 and 3, or 3 and 5, or 6 and $2\frac{1}{2}$.



68. Divide the shape into triangles and rectangles, for example like this:

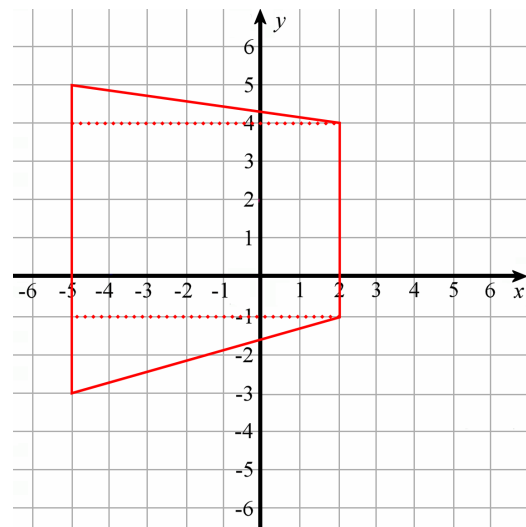


The areas of the parts are:

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

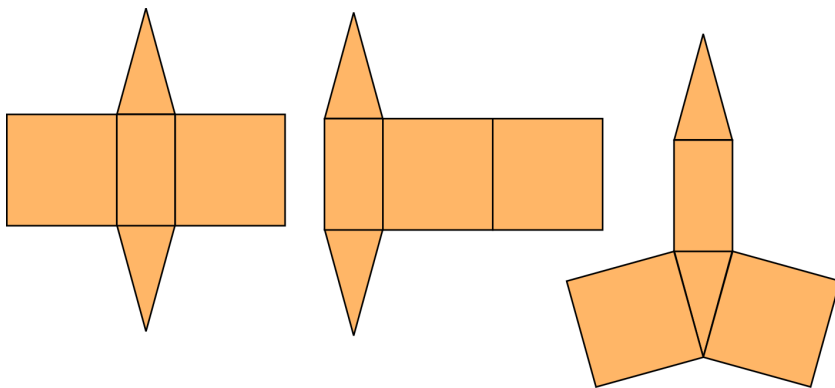
The overall shape (pentagon): 37.5 square units

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 cm^2 . The top and bottom triangles: $2 \times 20 \text{ cm} \times 11.2 \text{ cm} \div 2 = 224 \text{ cm}^2$.
The left and right triangles: $2 \times 15 \text{ cm} \times 13 \text{ cm} \div 2 = 195 \text{ cm}^2$. The total surface area is 719 cm^2 .

72. The volume of each little cube is $(1/2 \text{ cm}) \times (1/2 \text{ cm}) \times (1/2 \text{ cm}) = 1/8 \text{ cm}^3$.

- a. $18 \times (1/8) \text{ cm}^3 = 18/8 \text{ cm}^3 = 9/4 \text{ cm}^3 = 2 \frac{1}{4} \text{ cm}^3$.
- b. $36 \times (1/8) \text{ cm}^3 = 36/8 \text{ cm}^3 = 9/2 \text{ cm}^3 = 4 \frac{1}{2} \text{ cm}^3$.

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

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 $1 \frac{3}{4} \text{ in.}$, and 6 boxes fit in the space of 1 ft., because $6 \times (1 \frac{3}{4} \text{ in.}) = 6 \frac{18}{4} \text{ in.} = 10 \frac{1}{2} \text{ in.}$ Since the last dimension is over 8 inches, we cannot fit but 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.

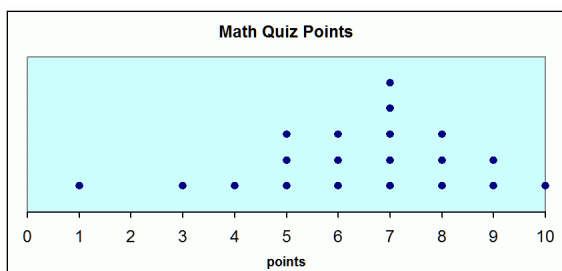
- b. The median is 68.5 years.
- c. The first quartile is 63, and the third quartile is 75.5.
The interquartile range is thus 12.5 years.

Stem	Leaf
5	5 9
6	1 2 4 5 5 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.