

Math Mammoth Grade 6

End-of-Year Test Answer Key

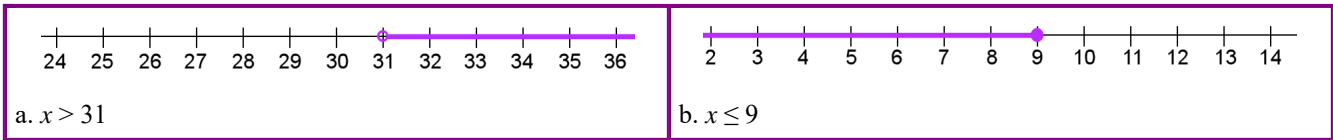
Basic Operations

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. $\frac{4}{x^2}$
6. a. $40 - 16 = 24$
b. $\frac{65}{5} = 13 \cdot 3 = 39$
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 $s + 6 + s + 6 + s + 6 + s + 6 + s + 6 + s + 6 + s + 6$. 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. $2(6x + 5) = 12x + 10$
b. $5(2h + 6) = 10h + 30$
- 14.
- | | | | |
|----|---|----|--|
| a. | $\frac{x}{31} = 6$
$x = 6 \cdot 31$
$x = 186$ | b. | $a - 8.1 = 2.8$
$a = 2.8 + 8.1$
$a = 10.9$ |
|----|---|----|--|
15. $y = 2$
16. $0.25 \cdot x = 16.75$ OR $25x = 1,675$ cents. 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.



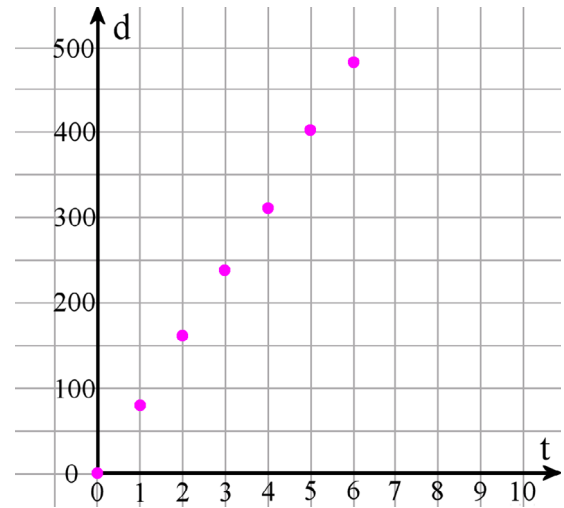
19. a.

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: $7 \cdot 0.006 = 0.042$
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. $\frac{2}{9} = 0.222$

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. $178 \text{ fl. oz.} = \underline{5.56} \text{ qt}$ b. $1.267 \text{ lb} = \underline{20.27} \text{ oz}$
31. 0.947 mile
32. You can get 10 six ounce servings and have 4 ounces left over.
33. The unit price is \$6.44 per pound. Notice that ten bars make one pound, because $10 \cdot 1.6 \text{ oz} = 16 \text{ oz} = 1 \text{ lb}$.
If 36 bars cost \$23.20, then ten bars (which is 1 lb of bars) cost $\$23.20 \div 36 \cdot 10 \approx \6.44 .

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

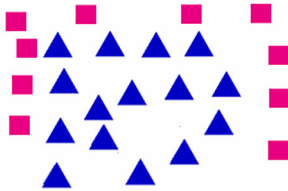
f. $32 \text{ g} = 3,200 \text{ cg}$

		3	2	0	0	
kg	hg	dag	g	dg	cg	mg

35. a. Division gives us $5,150 \text{ mm} \div 215 \text{ mm} \approx 23.9535$, so 24 bricks will cover the span of the wall.
b. Now let's add 10 mm to each brick, and this time division gives us $5,150 \text{ mm} \div 225 \text{ mm} \approx 22.8889$.
So, now, 23 bricks will cover the span of the wall.

Ratio

36. a.



b. $10:15 = 2:3$

37. a. $3000 \text{ g} : 800 \text{ g} = 15:4$

b. $240 \text{ cm} : 100 \text{ cm} = 12:5$

38. a. \$7:2 kg

b. 1 teacher per 18 students

39. a. \$4 per t-shirt.

b. 90 miles in an hour or 90 mph

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 $\$180 \div 7 \cdot 4 = \underline{\$102.86}$.

42. a. $7.08 \text{ mi} \cdot \frac{1.6093 \text{ km}}{1 \text{ mi}} \approx 11.394 \text{ km}$

b. $4 \text{ L} \cdot \frac{1 \text{ qt}}{0.946 \text{ L}} \approx 4.228 \text{ qt}$

Percent

43.

$$\text{a. } 35\% = \frac{35}{100} = 0.35$$

$$\text{b. } 9\% = \frac{9}{100} = 0.09$$

$$\text{c. } 105\% = 1 \frac{5}{100} = 1.05$$

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 \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.

46. The store had 450 notebooks at first. Since 90 is $\frac{1}{5}$ of the notebooks, the total is $90 \cdot 5 = 450$.

47. She has read 85% of the books she borrowed from the library. $\frac{17}{20} = \frac{85}{100} = 85\%$.

Prime Factorization, GCF, and LCM

48. a. $3 \cdot 3 \cdot 5$ b. $2 \cdot 3 \cdot 13$ 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.

$$\text{a. GCF of 18 and 21 is 3.}$$
$$18 + 21 = 3 \cdot 6 + 3 \cdot 7 = 3(6 + 7)$$

$$\text{b. GCF of 56 and 35 is 7.}$$
$$56 + 35 = 7(8 + 5)$$

Fractions

53. a. $(\frac{4}{5}) \cdot (\frac{5}{1}) = 4$. Or, you can think that $\frac{1}{5}$ fits into $\frac{4}{5}$ exactly four times.

$$\text{b. } \frac{25}{8} \div (\frac{3}{2}) = (\frac{25}{8}) \cdot (\frac{2}{3}) = (\frac{25}{4}) \cdot (\frac{1}{3}) = \frac{25}{12} = 2 \frac{1}{12}$$

$$\text{c. } (\frac{4}{3}) \cdot (\frac{15}{2}) = (\frac{2}{1}) \cdot (\frac{5}{1}) = 10$$

$$\text{d. } 2 \frac{32}{40} + 1 \frac{15}{40} = 4 \frac{7}{40}$$

54. $3 \frac{3}{5} \div \frac{3}{5} = \frac{18}{5} \cdot \frac{5}{3} = 6$. The fraction $\frac{3}{5}$ fits six times into $3 \frac{3}{5}$.

55. Answers will vary. Please check the student's work.

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

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

57. The area of the room is $(3 \frac{3}{4} \text{ m}) \cdot 5 \text{ m} = \frac{15}{4} \text{ m} \cdot 5 \text{ m} = \frac{75}{4} \text{ m}^2 = 18 \frac{3}{4} \text{ m}^2$.

One-third of that is $18 \frac{3}{4} \div 3 = \underline{6 \frac{1}{4} \text{ square meters}}$.

Integers

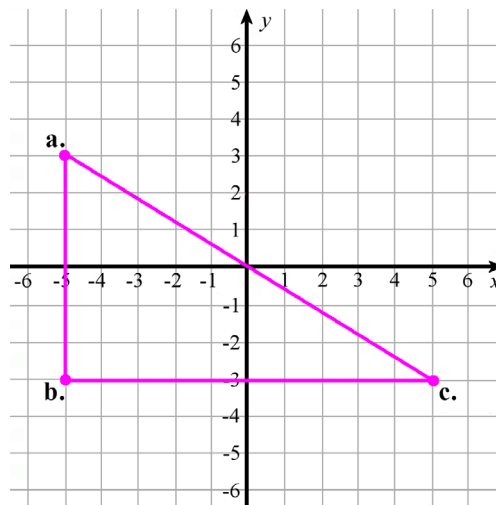
58. a. $>$ b. $>$

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

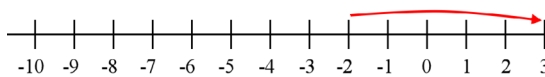
60. a. The difference is 23 degrees.
 b. The difference is 12 degrees.

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

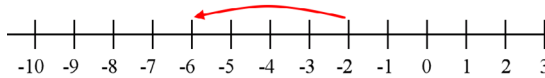
62. a.- c See the grid on the right.
 d. $6 \cdot 10 \div 2 = 30$
 The area of the resulting triangle is 30 square units.



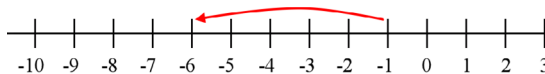
63. a. $-2 + 5 = 3$



b. $-2 - 4 = -6$



c. $-1 - 5 = -6$



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

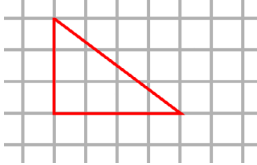
$$\begin{aligned} \$10 - \$14 &= -\$4 \\ \text{OR} \\ \$10 + (-\$14) &= -\$4 \end{aligned}$$

b. Now it is at the depth of 3 m.

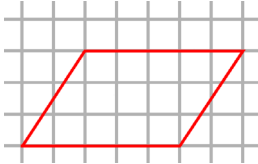
$$\begin{aligned} -2 \text{ m} - 1 \text{ m} &= -3 \text{ m} \\ \text{OR} \\ -2 \text{ m} + (-1 \text{ m}) &= -3 \text{ m} \end{aligned}$$

Geometry

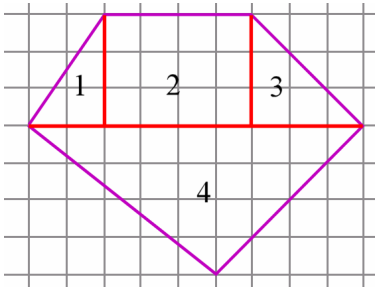
65. The area is $4 \cdot 3 \div 2 = 6$ square units.



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



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

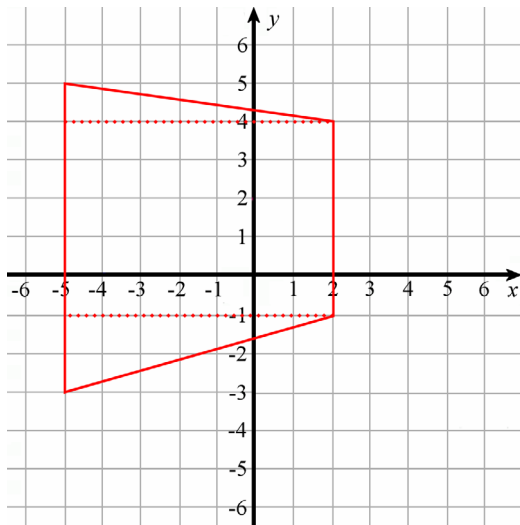


The areas of the parts are:

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

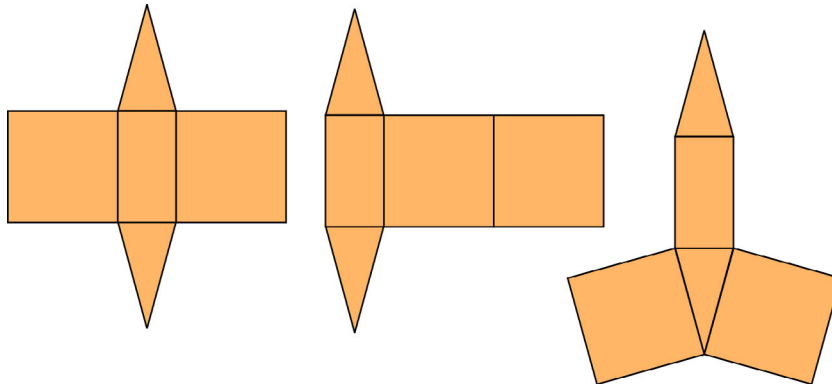
The overall shape (pentagon): 37.5 square units

68. 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

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



70. a. It is a rectangular pyramid.

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

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

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

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

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

a. $1 \frac{1}{2} \cdot 1 \frac{1}{2} \cdot 1 = (\frac{3}{2}) \cdot (\frac{3}{2}) = \frac{9}{4} = \underline{2 \frac{1}{4} \text{ cubic units}}$.

b. $2 \cdot 1 \frac{1}{2} \cdot 1 \frac{1}{2} = 2 \cdot (\frac{3}{2}) \cdot (\frac{3}{2}) = \frac{18}{4} = \underline{4 \frac{1}{2} \text{ cubic units}}$.

72. a. The volume is $4.4 \text{ cm} \cdot 21.6 \text{ cm} \cdot 15 \text{ cm} = 1,425.6 \text{ cm}^3 \approx \underline{1,430 \text{ cm}^3}$.

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

Statistics

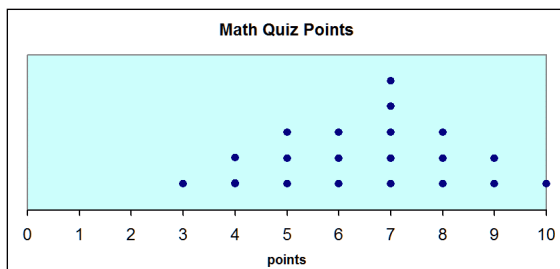
73. a. Minimum: 55 First quartile: 63 Median: 68.5 Third quartile: 76 Maximum: 94

b. Based on the interquartile range, half of the members are between 63 and 76 years old.

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

b. Median. 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.

75. a.



b. It is bell-shaped.

c. Any of the three measures of center works. Mean: 6.55. Median: 7. Mode: 7.