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

Instructions

This test is quite long, because it contains lots of questions on all of the major topics covered in the *Math Mammoth Grade 6 Complete Curriculum*. Its main purpose is to be a diagnostic test—to find out what the student knows and does not know. The questions are quite basic and do not involve especially difficult problems.

Since the test is so long, I do not recommend that you have the student do it in one sitting. You can break it into 3-5 parts and administer them on consecutive days, or perhaps on morning/evening/morning/evening. Use your judgement.

A calculator is not allowed, except in the problems about measurement units and about geometry.

The test is evaluating the student's ability in the following content areas:

- exponents, expanded form and rounding
- writing and simplifying expressions
- the distributive property
- the concept of an equation and solving simple equations
- the concept of inequality
- all operations with decimals
- conversions between measuring units
- basic ratio concepts
- the concept of percentage, finding percentages and finding the percent of number
- prime factorization, the greatest common factor and the least common multiple
- the four operations with fractions, focusing on division of fractions
- basic concepts related to integers
- addition and subtraction of integers
- the area of triangles, parallelograms, and polygons
- surface area and nets
- the volume of rectangular prisms
- describing statistical distributions
- measures of centre
- statistical graphs

Instructions to the student:
Do not use a calculator, except in the sections and exercises marked with a calculator symbol. Answer each question in the space provided.

Instructions to the teacher:
In order to continue with the *Math Mammoth Grade 7*, I recommend 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, versus a lack of understanding). Use your judgment.

My suggestion for points per item is as follows. The total is 191 points. A score of 153 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	
27	2 points	
28a	1 point	
28b	2 points	
29	3 points	
	subtotal	/ 20

Question #	Max. points	Student score
Measurement 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	
	subtotal	/ 12
Percent		
42	3 points	
43	4 points	
44	2 points	
45	2 points	
46	2 points	
	subtotal	/13

Question #	Max. points	Student score
Prime Factorization, GCF, and LCM		
47	3 points	
48	2 points	
49	2 points	
50	2 points	
51	2 points	
	subtotal	/11
Fractions		
52	4 points	
53	2 points	
54	2 points	
55	2 points	
56	3 points	
	subtotal	/13
Integers		
57	2 points	
58	2 points	
59	2 points	
60	4 points	
61	5 points	
62	6 points	
63	4 points	
	subtotal	/25

Question #	Max. points	Student score
Geometry		
64	2 points	
65	1 point	
66	3 points	
67	4 points	
68	2 points	
69a	1 point	
69b	3 points	
70	4 points	
71a	1 point	
71b	2 points	
	subtotal	/23
Statistics		
72a	5 points	
72b	1 point	
73a	3 points	
73b	1 point	
74a	2 points	
74b	1 point	
74c	1 point	
	subtotal	/14
	TOTAL	/191

Math Mammoth End-of-Year Test - Grade 6
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Basic Operations

1. Two kilograms of ground cinnamon is packaged into bags containing 38 g each. There will also be some cinnamon left over. How many bags will there be?

2. Write the expressions using an exponent. Then solve.

a. $2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$

b. five cubed

c. ten to the seventh power

3. Write in normal form (as a number).

a. $7 \cdot 10^7 + 2 \cdot 10^5 + 9 \cdot 10^0$

b. $3 \cdot 10^8 + 4 \cdot 10^6 + 5 \cdot 10^5 + 1 \cdot 10^2$

4. Round to the place of the underlined digit.

a. 6 29<u>9</u> 504 ≈ _____ **b.** 6 609 <u>9</u>42 ≈ _____

Expressions and Equations

5. Write an expression.

a. 2 less than s

b. the quantity $7 + x$, squared

c. 5 times the quantity $y - 2$

d. the quotient of 4 and x^2

6. Evaluate the expressions when the value of the variable is given.

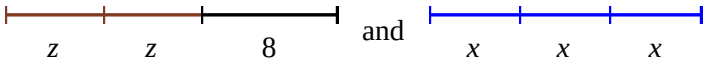
a. $40 - 8x$ when $x = 2$	**b.** $\frac{65}{p} \cdot 3$ when $p = 5$

7. Write an expression for each situation.

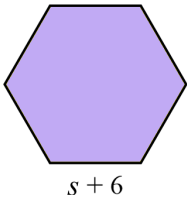
a. You bought m yogurt cups at \$2 each and paid with \$50.
What is your change?

b. What is the area of a square with side length s?

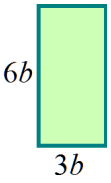
8. Write an expression for the total length of the line segments, and simplify it.



9. Write an expression for the perimeter of the figure, and simplify it.



10. Write an expression for the area of the figure, and simplify it.



11. Simplify the expressions.

a. $9x - 6x$	**b.** $w \cdot w \cdot 7 \cdot w \cdot 2$

12. Multiply using the distributive property.

a. $7(x + 5) =$	**b.** $2(6p + 5) =$

13. Find the missing number in the equations.

a. $\_\_\_\_\ (6x + 5) = 12x + 10$	**b.** $5(2h + \_\_\_\_\ ) = 10h + 30$

14. Solve the equations.

a. $\frac{x}{31} = 6$	**b.** $a - 8.1 = 2.8$

15. Which of the numbers 0, 1, 2, 3 or 4 make the equation $\frac{8}{y^2} = 2$ true?

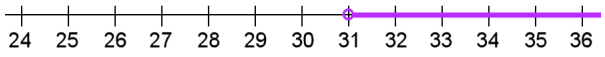
16. Write an equation EVEN IF you could easily solve the problem without an equation! Then solve the equation. The value of a certain number of quarters (25-cent coins) is 1675 cents.
How many coins are there?

17. Write an inequality for each phrase. You will need to choose a variable to represent the quantity in question.

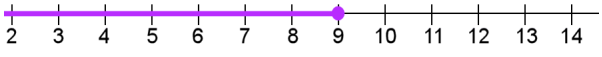
a. Eat at most five pieces of bread.

b. You have to be at least 21 years of age.

18. Write an inequality that corresponds to the number line plot.



a.



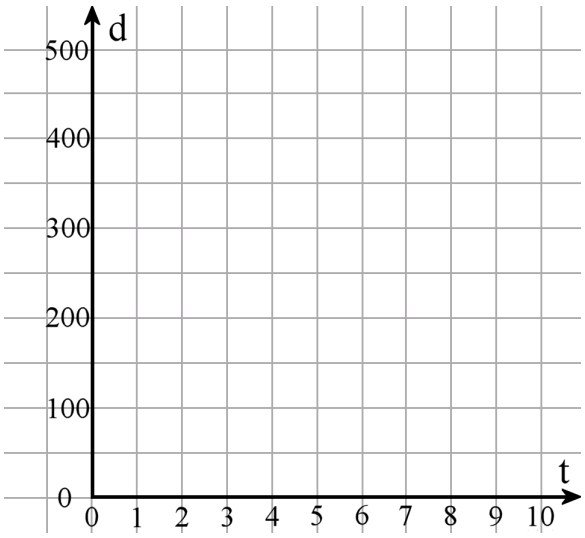
b.

19. A car is travelling with a constant speed of 80 kilometres per hour. Consider the variables of time (t), measured in hours, and the distance travelled (d), measured in kilometres.

a. Fill in the table.

t (hours)	0	1	2	3	4	5	6
d (km)							

b. Plot the points on the coordinate grid.



c. Write an equation that relates t and d.

d. Which of the two variables is the independent variable?

Decimals

20. Write as decimals.

a. 13 millionths **b.** 2 and 928 ten-thousandths

21. Write as fractions or mixed numbers.

a. 0.00078 **b.** 2.000302

22. Find the value of the expression $x + 0.07$ when x has the value 0.0002.

23. Calculate mentally.

a. $0.8 \div 0.1 =$	**b.** $0.06 \cdot 0.008 =$

24. **a.** Estimate the answer to $7.1 \cdot 0.0058$.

b. Calculate the exact answer.

25. What number is 22 ten-thousandths more than 1 ½?

26. Multiply or divide.

a. $10^5 \cdot 0.905 =$	**b.** $24 \div 10^4 =$

27. Divide, and give your answer as a decimal. If necessary, round the answers to three decimal digits.

a. $175 \div 0.3$	**b.** $\frac{2}{9}$

28. Annie bought 0.75 kg of cocoa powder, which cost $12.92 per kg.

a. Estimate the cost.

b. Find the exact amount she had to pay.

29. Alyssa and Anna bought three toy cars for their three cousins from a store online. The price for one car was $3.85. A shipping fee of $4.56 was added to the total cost. The two girls shared the total cost equally. How much did each girl pay?

Measurement Units

A calculator is allowed in this section. 

30. Convert to the given unit. Round your answers to two decimals.

a. 178 metres ≈ _____ kilometres	**b.** 1267 grams ≈ _____ kilograms

31. How many kilometres is 60 000 centimetres?

32. A big coffee pot makes 2 litres of coffee.
How many 200-ml servings can you get from that?

33. A packet of 20 milk chocolate candies costs $52. Each candy weighs 25 g.
Calculate how much one kilogram of these chocolate candies would cost (price per kilogram). 

34. Convert the measurements. You can write the numbers in the charts to help you.

a. 39 dl = _____ L **b.** 15 400 mm = _____ m

c. 7.5 hm = _____ cm **d.** 597 hl = _____ L

e. 7.5 hg = _____ kg **f.** 32 g = _____ cg

kl	hl	dal	l	dl	cl	ml

kg	hg	dag	g	dg	cg	mg

km	hm	dam	m	dm	cm	mm

35. **a.** One brick is 215 mm long. How many of these bricks, put end to end, will cover 5.15 metres of wall?

b. Calculate the answer to the previous question again, assuming 1 cm of mortar is laid between the bricks.

Ratio

36. **a.** Draw a picture where there are a total of ten squares, *and* for each two squares, there are three triangles.

b. Write the ratio of squares to all triangles, and simplify this ratio to the lowest terms.

37. Write ratios of the given quantities. Then, simplify the ratios. You will need to *convert* one quantity so it has the same measuring unit as the other.

a. 3 kg and 800 g	**b.** 2.4 m and 100 cm

38. Express these rates in the lowest terms.

a. \$56 : 16 kg	**b.** There are six teachers for every 108 students.

39. Change to unit rates.

a. \$20 for five T-shirts	**b.** 72 km in half an hour

40. **a.** It took 7 hours to mow four equal-size lawns. At that rate, how many lawns could be mowed in 35 hours? You can use the table below to help.

Lawns					
Hours					

b. What is the unit rate?

41. Joe and Mick worked on a project unequally. They decided to divide their pay in a ratio of 3:4 (3 parts for Joe, 4 parts for Mick). The total pay was $180. Calculate how much Mick got.

Percent

42. Write as percentages, fractions and decimals.

a. _____% = $\frac{35}{100}$ = _____	**b.** 9% = $\frac{\square}{\square}$ = _____	**c.** _____% = $\frac{\square}{\square}$ = 1.05

43. Fill in the table, using mental math.

	510
1% of the number	
5% of the number	
10% of the number	
30% of the number	

44. A pair of roller skates is discounted by 40%. The normal price is $65. What is the discounted price?

45. A store has sold 90 notebooks, which is 20% of all the notebooks they had. How many notebooks did the store have at first?

46. Janet has read 17 of the 20 books she borrowed from the library. What percentage of the books she borrowed has she read?

Prime Factorisation, GCF, and LCM

47. Find the prime factorisation of each of the following numbers. Below, write the prime factorisation as a product.

a. 45 / \	**b.** 78 / \	**c. 9**7 / \
45 =	78 =	97 =

48. Find the least common multiple of these pairs of numbers.

a. 2 and 8	**b.** 9 and 6

49. Find the greatest common factor of the given number pairs.

a. 30 and 16	**b.** 45 and 15

50. List three different multiples of 28 that are more than 100 and less than 200.

51. First, find the GCF of the numbers. Then factor the expressions using the GCF.

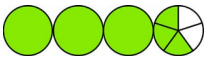
a. The GCF of 18 and 21 is _____ 18 + 21 = ____ · ____ + ____ · ____ = ____ (____ + ____)
b. The GCF of 56 and 35 is _____ 56 + 35 = ____ (____ + ____)

Fractions

52. Solve.

a. $\frac{4}{5} \div \frac{1}{5}$	**b.** $3\frac{1}{8} \div 1\frac{1}{2}$
c. $1\frac{1}{3} \cdot 7\frac{1}{2}$	**d.** $2\frac{4}{5} + 1\frac{3}{8}$

53. Write a division sentence, and solve.

How many times does  go into  ?

54. Write a real-life situation to match this fraction division: $1\frac{3}{4} \div 3 = \frac{7}{12}$.

55. How many ¾-cup servings can you get from 7 ½ cups of coffee?

56. A rectangular room measures 3 ¾ metres by 5 metres. It is divided into three equal parts. Calculate the area of one of those parts.

Integers

57. Compare the numbers, writing **<** or **>** in the box.

a. 0 ☐ −3 **b.** −2 ☐ −8

58. Write a comparison to match each situation (with < or >).

a. The temperature −7° C is warmer than −12° C.

b. Harry has $5. Emily owes $5.

59. Find the difference between the two temperatures.

a. −13° C and 10° C **b.** −9° C and −21° C

60. Write using mathematical symbols, and simplify (solve) if possible.

a. The opposite of 7 **b.** the absolute value of −6

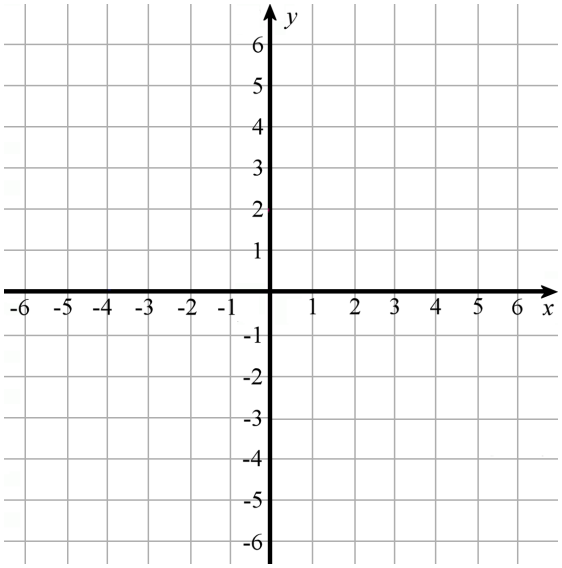
c. the absolute value of 5 **d.** the absolute value of the opposite of 6

61. **a.** Plot the point (−5, 3).

b. Reflect the point in the *x*-axis .

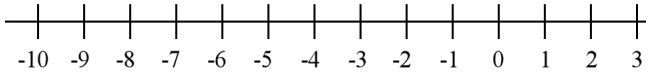
c. Now, reflect the point you got in (b) in the *y*-axis.

d. Join the three points with line segments.
What is the area of the resulting triangle?

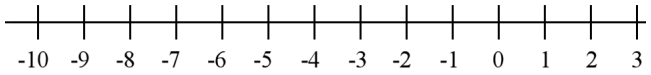


62. Draw a number line jump for each addition or subtraction sentence, and solve.

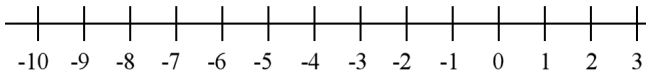
a. −2 + 5 = _____



b. −2 − 4 = _____



c. −1 − 5 = _____



63. Write an addition or subtraction in the box to match each situation, and fill in the blanks.

a. Elijah has saved $10. He wants to buy shoes for $14.
That would make his money situation to be _____.

_____

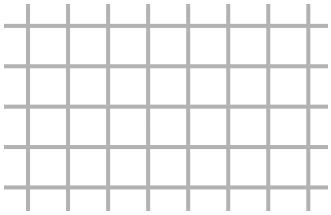
b. A fish was swimming at the depth of 2 m. Then it sank 1 m.
Now he is at the depth of _____ m.

_____

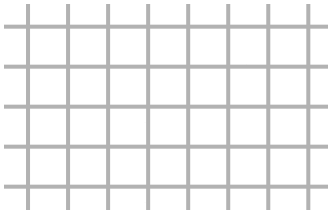
Geometry *A calculator is allowed in this section.*

64. Draw in the grid a right triangle with a base of 4 units and a height of 3 units.

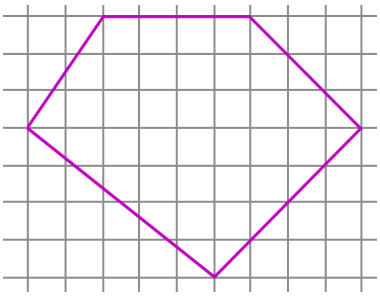
Calculate its area.



65. Draw in the grid a parallelogram with an area of 15 square units.



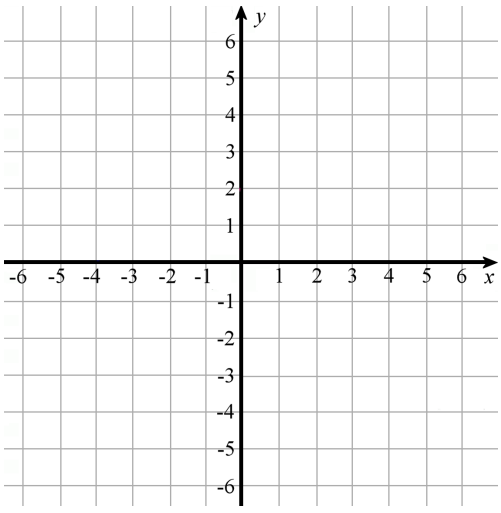
66. Find the area of this polygon, in square units.



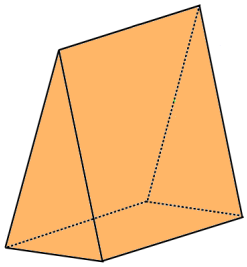
67. Draw a quadrilateral in the grid with vertices
(−5, 5), (−5, −3), (2, −1), and (2, 4).

What is the quadrilateral called?

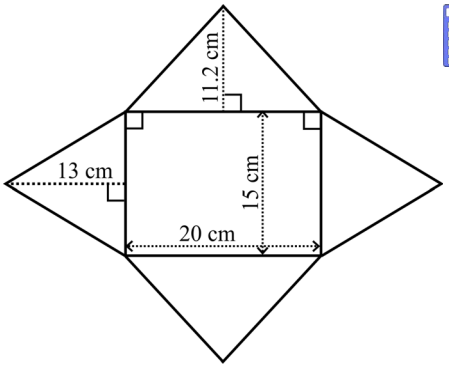
Find its area.



68. Name this solid. Draw a sketch of its net.

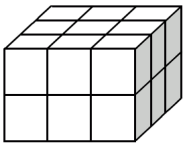
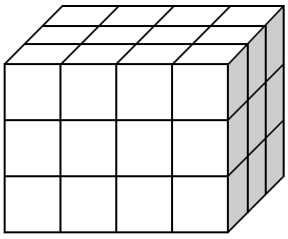


69. **a.** Name the solid that can be built from this net.



b. Calculate its surface area.

70. The edges of each little cube measure **1/2 unit**. Write a multiplication for the total volume of each figure, and solve.

 **a.**	 **b.**

71. A box containing a construction toy measures 4.4 cm by 21.6 cm by 15 cm.

a. Calculate the volume of the box, to the nearest ten cubic centimetres.

b. Calculate its surface area, to the nearest ten square centimetres.

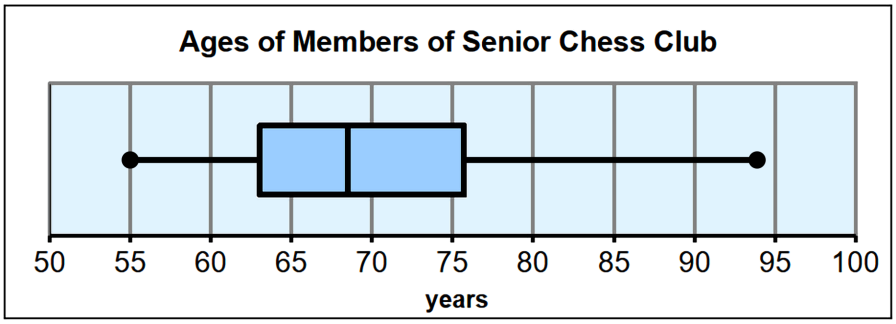
Statistics

72. **a.** Fill in the five-number summary using the boxplot.

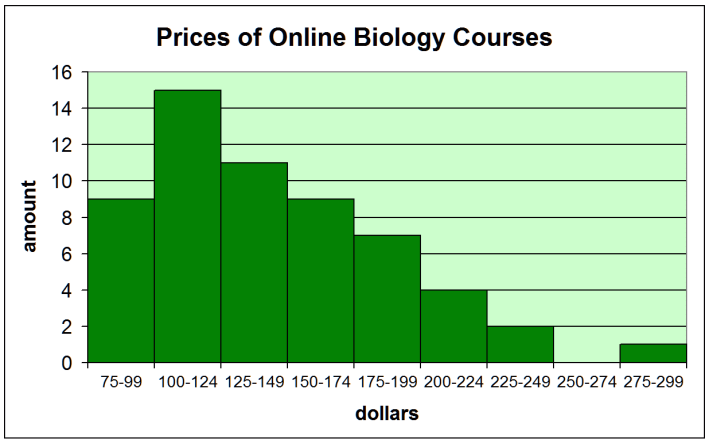
Minimum: _____ First quartile: _____ Median: _____ Third quartile: _____ Maximum: _____

b. Fill in:

Based on the interquartile range, half of the members are between ____ and _____ years old.



73. **a.** Describe the overall shape or pattern of the distribution, including any striking deviations from the overall pattern (outliers, gaps, additional minor peaks/clusters).

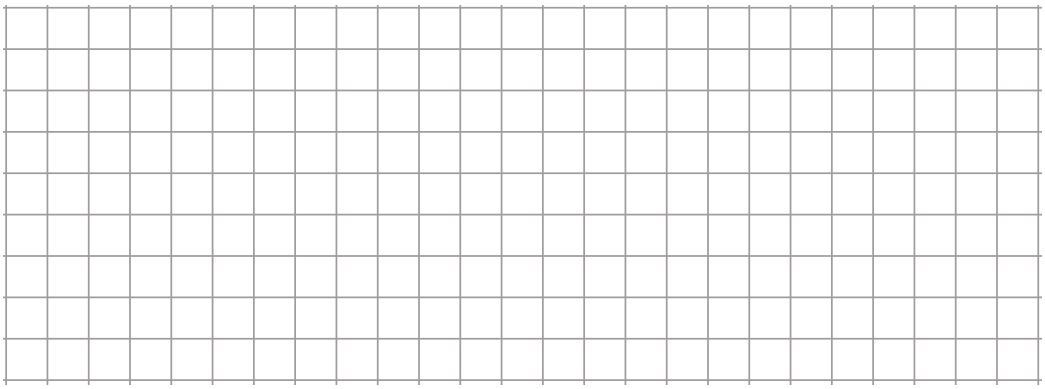


b. Which measure of centre, mean, median, or mode, would best describe the central tendency of this distribution?

74. **a.** Create a dot plot from this data.

9 10 5 6 4 8 7 3 8 4 7 7 5 7 8 9 5 6 6 7

(points on a math quiz of a group of students)



b. Describe the shape of the distribution.

c. Choose a measure of centre to describe the data, and determine its value.