

Math Mammoth End-of-the-Year Test - Grade 6

South African 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 South African Version 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 word 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 judgment.

A calculator is not allowed, except on the page about measuring units.

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, finding the percentage of a number
- prime factorisation, the greatest common factor and the least common multiple
- 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

In order to continue with the *Math Mammoth Grade 7 South African Version Complete Worktext*, I recommend that the student score a minimum of 80% on this test, and that the teacher or parent revise with the student any content areas in which the student may be weak. Students scoring between 70% and 80% may also continue with grade (year) 7, depending on the types of errors (careless errors or not remembering something, versus a lack of understanding). Again, use your judgment.

Grading

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 | |
| <i>subtotal</i> | | / 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 | |
| <i>subtotal</i> | | / 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 | |
| <i>subtotal</i> | | / 20 |

| Question | Max. points | Student score |
|------------------------|-------------|---------------|
| Measuring Units | | |
| 30 | 3 points | |
| 31 | 1 point | |
| 32 | 2 points | |
| 33 | 3 points | |
| 34 | 6 points | |
| 35 | 4 points | |
| <i>subtotal</i> | | / 19 |
| Ratio | | |
| 36 | 2 points | |
| 37 | 2 points | |
| 38 | 2 points | |
| 39 | 2 points | |
| 40 | 2 points | |
| 41 | 2 points | |
| 42 | 2 points | |
| <i>subtotal</i> | | / 14 |
| Percent | | |
| 43 | 3 points | |
| 44 | 4 points | |
| 45 | 2 points | |
| 46 | 2 points | |
| 47 | 2 points | |
| <i>subtotal</i> | | / 13 |

| Question | Max. points | Student score |
|---|-------------|---------------|
| Prime Factorisation, GCF and LCM | | |
| 48 | 3 points | |
| 49 | 2 points | |
| 50 | 2 points | |
| 51 | 2 points | |
| 52 | 2 points | |
| <i>subtotal</i> | | /11 |
| Fractions | | |
| 53 | 3 points | |
| 54 | 2 points | |
| 55 | 2 points | |
| 56 | 2 points | |
| 57 | 3 points | |
| 58 | 3 points | |
| <i>subtotal</i> | | /15 |
| Integers | | |
| 59 | 2 points | |
| 60 | 2 points | |
| 61 | 2 points | |
| 62 | 4 points | |
| 63 | 5 points | |
| 64 | 6 points | |
| 65 | 4 points | |
| <i>subtotal</i> | | /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 | |
| <i>subtotal</i> | | /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 | |
| <i>subtotal</i> | | /13 |
| TOTAL | | /194 |

Math Mammoth End-of-the-Year Test - Grade 6

South African Version

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. $2 \times 2 \times 2 \times 2 \times 2$

b. five cubed

c. ten to the seventh power

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

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

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

4. Round to the place of the underlined digit.

a. $6299\underline{5}04 \approx$ _____

b. $6609\underline{9}42 \approx$ _____

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 $x = 2$

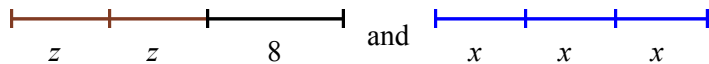
b. $\frac{65}{p} \cdot 3$ when $p = 5$

7. Write an expression for each situation.

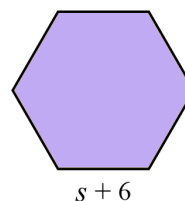
a. You bought m packets of groundnuts for R2 each and paid with R50.
What is your change?

b. the area of a square with the side length s

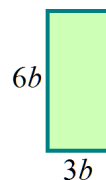
8. Write an expression for the total length of the line segments, and simplify it.



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. $\underline{\hspace{1cm}} (6x + 5) = 12x + 10$ | b. $5(2h + \underline{\hspace{1cm}}) = 10h + 30$ |
|---|--|

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.

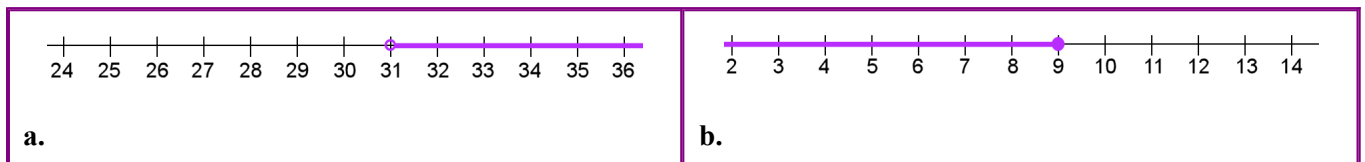
The value of a certain number of 20-cent coins is 1680 cents. How many 20-cent coins are there?

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

a. Eat at most 5 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.



19. An automobile is travelling at 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.

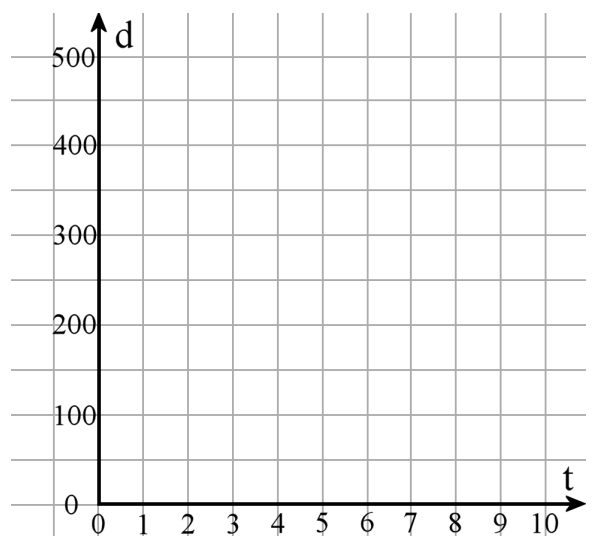
a. Fill in the table.

| | | | | | | | |
|-------------|---|---|---|---|---|---|---|
| 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 in your head.

a. $0,8 \div 0,1 =$

b. $0,06 \times 0,008 =$

24. a. Estimate the answer to $7,1 \times 0,0058$.

b. Calculate the exact answer.

25. What number is 22 ten-thousandths more than $1 \frac{1}{2}$?

26. Multiply or divide.

a. $10^5 \times 0,905 =$

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. Ansie bought $\frac{3}{4}$ kg of oranges, which cost R12,80 per kg.

a. Estimate the cost.

b. Find the exact amount she had to pay.

29. Amanda and Bongeka bought three toy cars for their three cousins.

The price for one car was R19,80. Value added tax totalling R8,30 was added to the total cost. The two girls shared the total cost equally. How much did each girl pay?

Measuring Units *A calculator is allowed in this section.*



30. How many kilometres is 60 000 centimetres?



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

32. A packet of 36 milk chocolate candy bars costs R72. Each bar weighs 44 g.
Calculate how much one kilogram of these chocolate bars would cost (price per kilogram).



33. Convert the measurements. You can write the numbers in the place value 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 |

34. a. One brick is 215 mm long. How many of these bricks, put end to end, will cover a 5,15 metre wall?



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

Ratio

35. **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.

36. 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 |
|--------------------------|----------------------------|

37. Express these rates in the lowest terms.

| | |
|-----------------------|--|
| a. R56 : 16 kg | b. There are six teachers for every 108 students. |
|-----------------------|--|

38. Change to unit rates.

| | |
|-------------------------------------|---|
| a. R20 for five bars of soap | b. 72 kilometres in half an hour |
|-------------------------------------|---|

39. **a.** It took 7 hours to mow four equal-sized 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?

40. Joe and Muzi also worked on a project unequally. They decided to divide their pay in a ratio of 3:4 (3 parts for Joe, 4 parts for Muzi). The total pay was R280. Calculate how much Muzi got.

41. Use the given ratios to convert the measuring units. If necessary, round the answers to three decimal digits.

a. Use $1 = \frac{1.6093 \text{ km}}{1 \text{ mi}}$ and convert 7.08 miles to kilometres.

7.08 mi =

b. Use $1 = \frac{1 \text{ qt}}{0.946 \text{ L}}$ and convert 4 litres to quarts.

4 L =

Percent

42. Write as percentages, fractions and decimals.

a. _____% = $\frac{35}{100}$ = _____

b. 9% = $\frac{\text{yellow}}{\text{yellow}}$ = _____

c. _____% = $\frac{\text{yellow}}{\text{yellow}}$ = 1,05

43. Fill in the table, using mental maths.

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

44. A soccer ball is discounted by 40%. The normal price is R65.
What is the discounted price?

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

46. Jeanny has read 17 of the 20 books she borrowed from the library.
Of the books she borrowed, what percentage has she read?

Prime Factorisation, GCF and LCM

47. Find the prime factorisation of the following numbers.

| | | |
|--------------------|--------------------|--------------------|
| a. 45 /\ | b. 78 /\ | c. 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 _____ $18 + 21 = \underline{\quad} \cdot \underline{\quad} + \underline{\quad} \cdot \underline{\quad} = \underline{\quad} (\underline{\quad} + \underline{\quad})$ |
| b. The GCF of 56 and 35 is _____ $56 + 35 = \underline{\quad} (\underline{\quad} + \underline{\quad})$ |

Fractions

52. Solve.

| | | |
|-----------------------------------|-------------------------------------|-------------------------|
| a. $\frac{4}{5} \div \frac{1}{5}$ | b. $3\frac{1}{8} \div 1\frac{1}{2}$ | c. $4 \div \frac{5}{7}$ |
|-----------------------------------|-------------------------------------|-------------------------|

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 $\frac{3}{4}$ -kilogram bags of rice can you get from $7\frac{1}{2}$ kilograms of rice?

56. A rectangular room measures $3\frac{3}{4}$ metres by $4\frac{2}{3}$ metres. It is divided into three equal parts. Calculate the area of one of those parts.

57. The perimeter of a rectangular screen is $39\frac{1}{2}$ centimetres, and the ratio of its width to its height is 3:2. Find the width and height of the screen.

Integers

58. Compare the numbers, writing $<$ or $>$ in the box.

a. $0 \square -3$

b. $-2 \square -8$

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

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

b. Hannes has R5. Elize owes R5.

60. Find the difference between the two temperatures.

a. -13°C and 10°C

b. -9°C and -21°C

61. 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

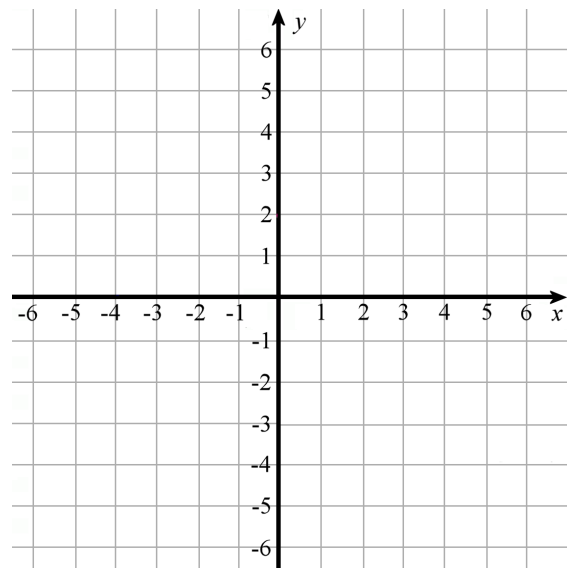
d. the absolute value of the opposite of 6

62. a. Plot the point $(-5, 3)$.

b. Reflect the point in the x -axis.

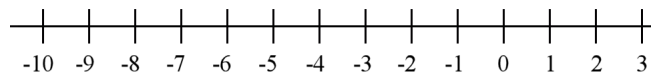
c. Now, reflect the point you got in (b) in the y -axis.

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

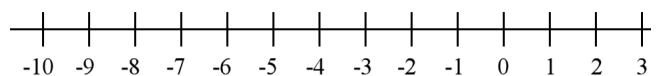


63. Draw a number line jump for each addition or subtraction sentence, and solve.

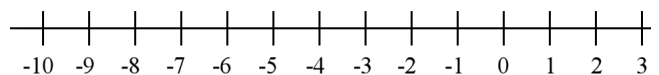
a. $-2 + 5 = \underline{\hspace{2cm}}$



b. $-2 - 4 = \underline{\hspace{2cm}}$



c. $-1 - 5 = \underline{\hspace{2cm}}$



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

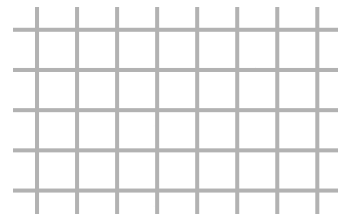
a. Lunga has saved R10. He wants to buy balloons for R14.
That would make his money situation to be _____.

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

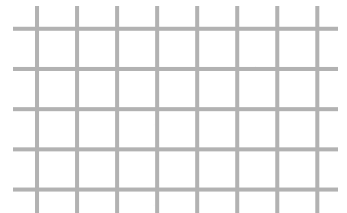
Geometry

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

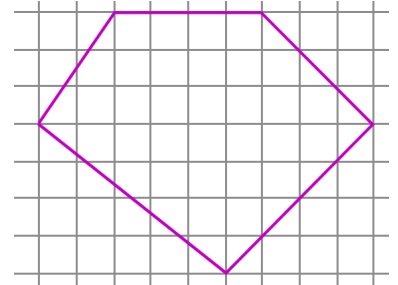
Calculate its area.



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



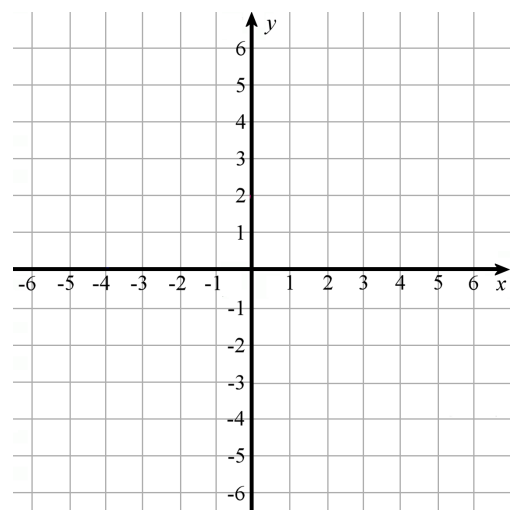
67. Find the area of this polygon, in square units.



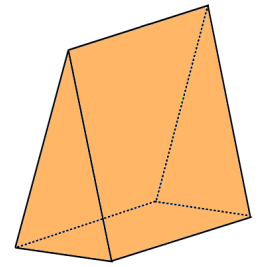
68. Draw a quadrilateral in the grid with vertices $(-5, 5)$, $(-5, -3)$, $(2, -1)$ and $(2, 4)$.

What is the quadrilateral called?

Find its area.

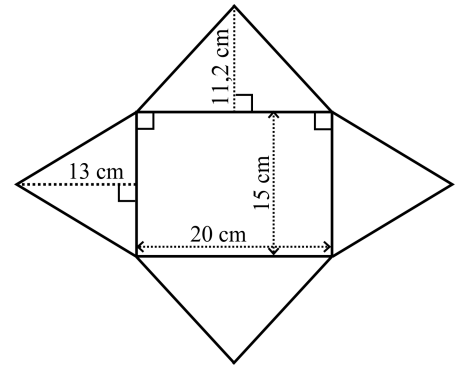


69. Name this solid. Draw a sketch of its net.

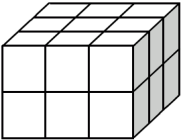
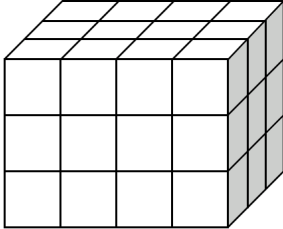


70. a. Name the solid that can be built from this net.

b. Calculate its surface area.



71. The edges of each little cube measure $\frac{1}{2}$ cm. What is the total volume of these figures, in cubic units?

| | |
|--|---|
|  <p>a.</p> |  <p>b.</p> |
|--|---|

72. A box containing a construction toy measures $4\frac{2}{5}$ cm by $21\frac{3}{5}$ cm by 15 cm.

a. Calculate its volume.

b. How many of these boxes fit into a crate with the inside measurements of 30 cm by 30 cm by 30 cm?

