

# Math Mammoth End-of-the-Year Test, Grade 6 South African Version, Answer Key

## Instructions

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
<b>Basic Operations</b>		
1	2 points	
2	3 points	
3	2 points	
4	2 points	
<i>subtotal</i>		/ 9
<b>Expressions and Equations</b>		
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

<b>Decimals</b>		
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
<b>Measuring Units</b>		
30	3 points	
31	1 point	
32	2 points	
33	3 points	
34	6 points	
35	4 points	
<i>subtotal</i>		/ 19

<b>Ratio</b>		
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
<b>Percent</b>		
43	3 points	
44	4 points	
45	2 points	
46	2 points	
47	2 points	
<i>subtotal</i>		/13
Question	Max. points	Student score
<b>Prime Factorisation, GCF and LCM</b>		
48	3 points	
49	2 points	
50	2 points	
51	2 points	
52	2 points	
<i>subtotal</i>		/11
<b>Fractions</b>		
53	3 points	
54	2 points	
55	2 points	
56	2 points	
57	3 points	
58	3 points	
<i>subtotal</i>		/15
<b>Integers</b>		
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
<b>Geometry</b>		
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
<b>Statistics</b>		
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
	<b>TOTAL</b>	/194

## The Basic Operations

1. a.  $2\,000 \div 38 = 52 \text{ r}4$ . 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

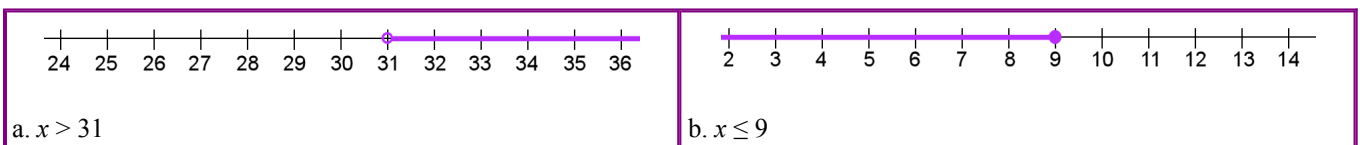
## Expressions and Equations

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.  $R50 - 2m$  or  $R50 - m \cdot 2$    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.  $2(6x + 5) = 12x + 10$    b.  $5(2h + 6) = 10h + 30$   
 14.

<p>a. <math>\frac{x}{31} = 6</math>  <math>x = 6 \cdot 31</math>  <math>x = 186</math></p>	<p>b. <math>a - 8,1 = 2,8</math>  <math>a = 2,8 + 8,1</math>  <math>a = 10,9</math></p>
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15.  $y = 2$   
 16.  $0,20 \cdot x = 16,80$  OR  $20x = 1680$ . The solution is  $x = 84$  20-cent coins.  
 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.



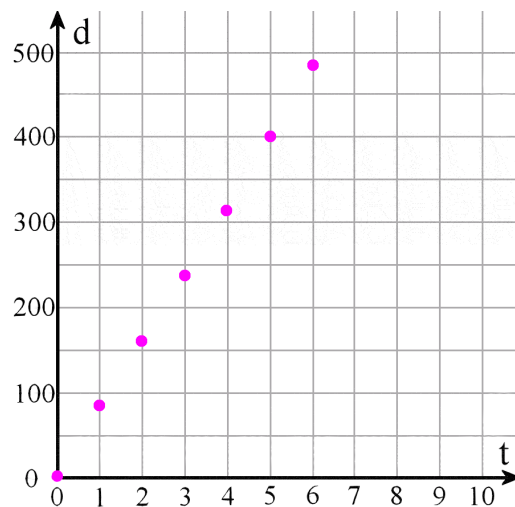
19. a.

$t$ (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:  $13 \div 4 \times 3 = (3 \frac{1}{4}) \times 3 = R9,75$     b. Exact: R9,60

29.  $(3 \times R19,80 + R8,30) \div 2 = R33,85$

## Measuring Units

30. 0,6 kilometre

31. You can get ten 200-ml servings.

32. It is about R45,45 per kilogram.

To calculate the price per kilogram, simply divide the cost by the weight in kilograms. A pack of 36 candy bars weighs  $36 \times 44 \text{ g} = 1\,584 \text{ g} = 1,584 \text{ kg}$ . Now simply divide the cost of those candy bars by their weight in kilograms to get the price per kilogram:  $R72 \div 1,584 \text{ kg} = R45,454545454545 / \text{kg}$ .

33. 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

e.  $7,5 \text{ hg} = 0,75 \text{ kg}$

0	7	5				
kg	hg	dag	g	dg	cg	mg

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

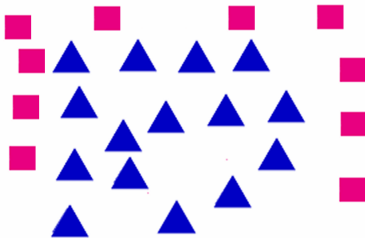
		3	2	0	0	
kg	hg	dag	g	dg	cg	mg

34. 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

35. a.



b.  $10:15 = 2:3$

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

37. a. R7:2 kg    b. 1 teacher per 18 students

38. a. R4 per bar of soap.    b. 144 kilometres in an hour

39. 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).

<b>Lawns</b>	4	8	12	16	20
<b>Hours</b>	7	14	21	28	35

40. Muzi got R160.  $R280 \div 7 \times 4 = R160$ .

41. a. 11.394 km    b. 4.23 qt

## Percent

42.

a. $35\% = \frac{35}{100} = 0,35$	b. $9\% = \frac{9}{100} = 0,09$	c. $105\% = 1 \frac{5}{100} = 1,05$
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43.

	<b>510</b>
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 R39. You can multiply  $0,6 \times R65 = R39$ , or you can find out 10% of the price, which is R6,50, multiply that by 4 to get the discount (R26), and subtract the discounted amount.

45. The shop had 450 notebooks at first. Since 90 is  $\frac{1}{5}$  of the notebooks, the total is  $90 \times 5 = 450$ .

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

## Prime Factorisation, GCF and LCM

47. a.  $3 \times 3 \times 5$    b.  $2 \times 3 \times 13$    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   b.  $2 \frac{1}{12}$    c.  $5 \frac{3}{5}$

53.  $3 \frac{2}{3} \div \frac{3}{5} = 6 \frac{1}{9}$

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

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

55. You can get 10 bags.  $(7 \frac{1}{2}) \div (\frac{3}{4}) = (\frac{15}{2}) \div (\frac{3}{4}) = (\frac{15}{2}) \times (\frac{4}{3}) = \frac{60}{2} = 10$ .

56.  $5 \frac{1}{6}$  square metres.

The area of the room is  $(3 \frac{3}{4}) \times (4 \frac{2}{3}) = (\frac{15}{4}) \times (\frac{14}{3}) = \frac{210}{12} = 17 \frac{6}{12} = 17 \frac{1}{2}$  square metres.

One-third of that is  $(17 \frac{1}{2}) \times (\frac{1}{3}) = \frac{35}{6} = 5 \frac{1}{6}$ .

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

57.  $11 \frac{17}{20}$  centimetres and  $7 \frac{9}{10}$  centimetres or 11,85 centimetres and 7,9 centimetres.

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  $39 \frac{1}{2} \text{ cm} \div 10 = 3,95 \text{ cm} \div 10 = 3,95 \text{ centimetres}$ . The one side is three times that, and the other is two times that. The sides are 11,85 cm and 7,9 cm. If you use fractions, you get  $(39 \frac{1}{2} \text{ cm}) \div 10 = (\frac{79}{2} \text{ cm}) \div 10 = \frac{79}{20} \text{ cm}$ , and the two sides are  $3 \times \frac{79}{20} \text{ cm} = \frac{237}{20} \text{ cm} = 11 \frac{17}{20} \text{ cm}$  and  $2 \times \frac{79}{20} \text{ cm} = \frac{158}{20} \text{ cm} = 7 \frac{9}{10} \text{ cm}$ .

# Integers

58. a.  $>$     b.  $>$

59. a.  $-7^{\circ}\text{C} > -12^{\circ}\text{C}$ .    b.  $R5 > -R5$ .

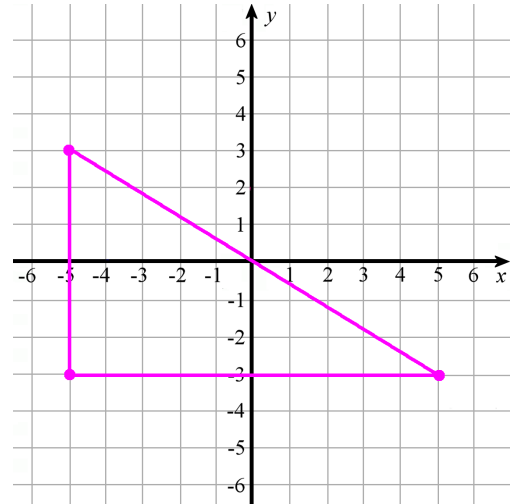
60. a. The difference is 23 degrees.    b. The difference is 12 degrees.

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

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

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

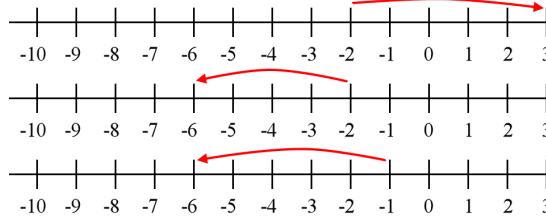
The area of the resulting triangle is 30 square units.



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

b.  $-2 - 4 = -6$

c.  $-1 - 5 = -6$



64. a. That would make his money situation to be  $-R4$ .

$$R10 - R14 = -R4$$

OR

$$R10 + (-R14) = -R4$$

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

$$-2 \text{ m} - 1 \text{ m} = -3 \text{ m}$$

OR

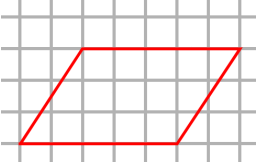
$$-2 \text{ m} + (-1 \text{ m}) = -3 \text{ m}$$

## Geometry

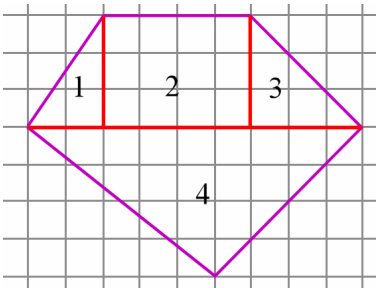
65. The area is  $4 \times 3 \div 2 = 6$  square units.



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 1/2.



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

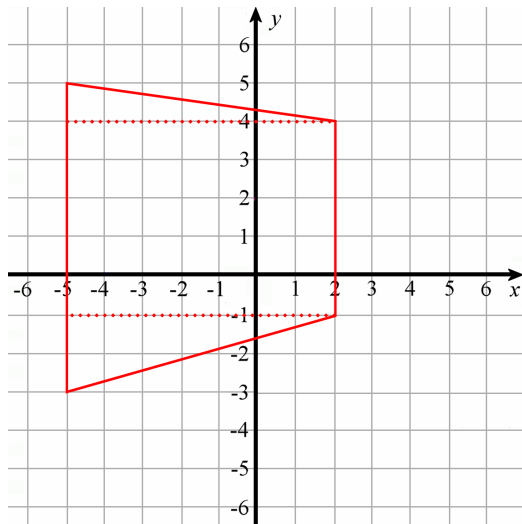


The areas of the parts are:

- 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

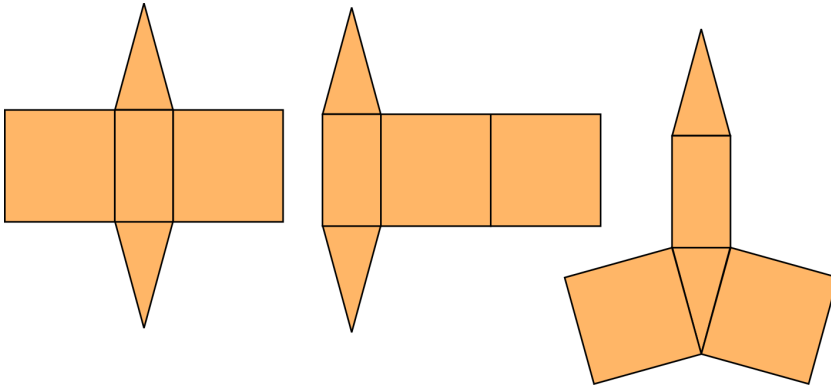
68. It is a trapezium. To calculate its area, divide it into triangles and rectangle(s).



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  $300 \text{ cm}^2$ . 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  $719 \text{ cm}^2$ .

71. 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.  $36 \times (1/8) \text{ cm}^3 = 36/8 \text{ cm}^3 = 9/2 \text{ cm}^3 = 4 \frac{1}{2} \text{ cm}^3$ .

72. a.  $(4 \frac{2}{5} \text{ cm}) \times (21 \frac{3}{5} \text{ cm}) \times 15 \text{ cm} = (2376/25) \text{ cm} \times 15 \text{ cm}^3 = (95 \frac{1}{25}) \times 15 \text{ cm}^3 = (1425 + 15/25) \text{ cm}^3$   
 $= 1425 \frac{15}{25} \text{ cm}^3 = \underline{1425 \frac{3}{5} \text{ cm}^3}$ .

This calculation can also be done (probably quicker) by using decimals:  $4,4 \text{ cm} \times 21,6 \text{ cm} \times 15 \text{ cm} = \underline{1425,6 \text{ cm}^3}$ .

b. Imagine you place the boxes in rows, standing up, so that the height is 15 centimetres. Then we can stack two rows on top of each other, since the height of the box is 30 centimetres. The width of each box is  $4 \frac{2}{5} \text{ cm}$ , and 6 boxes fit in the space of 30 cm, because  $6 \times (4 \frac{2}{5} \text{ cm}) = 26 \frac{2}{5} \text{ cm}$  and another box would exceed the 30 cm. Since the last dimension is over 21 centimetres, we can only fit one row. So, we can fit two rows of 6 boxes, stacked on top of each other, or a total of 12 boxes.

## Statistics

73. a. See the plot on the right.

b. The median is 68,5 years.

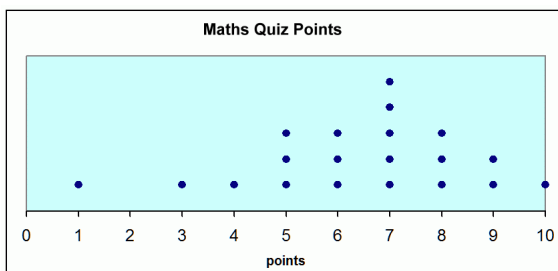
c. The first quartile is 63, and the third quartile is 75,5.  
The interquartile range is thus 12,5 years.

Stem	Leaf
5	5 9
6	1 2 4 5 5 8 9
7	0 2 4 7
8	3 9
9	4

74. 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.

75. 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 centre works. Mean: 6.4. Median: 7. Mode: 7.