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

The Basic Operations and Place Value

1. a. 25 b. 10,000 c. 1 d. 16 e. 100 f. 27

2. a. The perimeter is 40 meters. b. The side is 3 inches.

3.

a. $120 + 3 \times 10 = 150$	b. $2^3 \div 2 + 5 = 9$
c. $40 - (2 + 4)^2 = 4$	d. $\frac{30 \times 50}{10 - 5} \times (15 + 5) = 6{,}000$

4. a. 5,080,007,000 b. 6,000,392,000,500 c. 9,020,154,000,000

5. a. 290,700 b. 905,300,000

6. a. $3 \times 6 + 8 = 26$	b. $\frac{40}{8} \times 12 = 60$

7. a. x = 120 b. x = 500 c. x = 70 d. x = 7,200

Ratios and Proportions

8. a. 2:6 = 1 : 3
   b. 9 balls to 12 triangles = 3 balls to 4 triangles
   c. 200 g to 2 kg = 200 g : 2,000 g = 1 g : 10 g or 1 : 10
   d. 15:21 = 5 : 7

9. a. $\frac{7 \text{ km}}{30 \text{ min}} = \frac{3.5 \text{ km}}{15 \text{ min}} = \frac{10.5 \text{ km}}{45 \text{ min}}$ b. $\frac{\$96}{8 \text{ hr}} = \frac{\$24}{2 \text{ hr}} = \frac{\$120}{10 \text{ hr}}$

10. Eileen needs 200 ml of water to make the juice. She has a total of 280 ml of juice.

11.

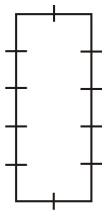
a.	$\frac{x}{5} = \frac{7}{3}$	First cross-multiply.	b.	$\frac{11}{214} = \frac{2}{M}$	First cross-multiply.
	$3x = 5 \times 7$	Next, calculate what is on the right side.		$11M = 214 \times 2$	Next, calculate what is on the right side.
	$3x = 35$	Next, divide both sides of the equation by 3.		$11M = 428$	Next, divide both sides of the equation by 11.
	$\frac{3x}{3} = \frac{35}{3}$	Simplify on the left. Do the division on the right.		$\frac{11M}{11} = \frac{428}{11}$	Simplify on the left. Do the division on the right.
	$x = 11\ 2/3$	This is the final answer.		$M = 38\ 10/11$	This is the final answer.

12. $\frac{20 \text{ laps}}{18 \text{ min}} = \frac{10 \text{ laps}}{9 \text{ min}} = \frac{50 \text{ laps}}{45 \text{ min}}$

13. $\frac{\$3{,}300}{600} = \frac{\$2{,}500}{X}$

14. a. The car would need 4.7 liters of gasoline to travel 54 km.
b. A car can travel on 205.7 km on 18 liters of gasoline.

15. From the illustration you can see that there are 14 "parts" in the perimeter. Each part is 140 cm ÷ 14 = 10 cm. Since one side is 2 "parts" and the other is 5 "parts", the sides are 20 cm and 50 cm.



Decimals

16. a. 0.003 b. 1.2 c. 0.067534 d. 0.0027

17. a. 34/1000 (or 17/500) b. 3467/100,000 c. 3 92432/100,000 (or 3 5777/6250)

18.

a. 0.017 0.0711 0.701	b. 1.000306 1.00404 1.0403

19.

a.	b.	c.
0.4 + 0.7 = 1.1 0.4 + 0.07 = 0.47	0.02 + 0.06 = 0.08 0.02 + 0.0006 = 0.0206	0.009 + 0.007 = 0.016 0.00009 + 0.007 = 0.00709

20. a. $1\frac{4}{10} + 0.06 = 1.46$ b. $0.1 + \frac{72}{100} = 0.82$ c. $3.005 - \frac{2}{1000} = 3.003$

21. a. 0.8 × 7 = 5.6 d. 0.08 × 0.07 = 0.0056	b. 10 × 0.0005 = 0.005 e. 1000 × 0.05 = 50	c. 400 × 0.09 = 36 f. 0.012 × 0.004 = 0.000048

22. a. 0.036 ÷ 6 = 0.006 d. 0.0048 ÷ 8 = 0.0006	b. 3 ÷ 1000 = 0.003 e. 0.07 ÷ 10 = 0.007	c. 3.4 ÷ 100 = 0.034 f. 710 ÷ 1000 = 0.71

23.

Number:	0.229748	1.056734	3.3349725
…three decimals	0.230	1.057	3.335
…to the nearest ten-thousandth	0.2297	1.0567	3.3350

24. a. $6y = 6 \times 0.02 = 0.12$ b. $6y = 6 \times 0.0002 = 0.0012$ c. $6y = 6 \times 0.00002 = 0.00012$

25. a. 2.3127 b. 2.327622 c. 1.794

26. a. 0.42857 b. 1.66667

27.

a. 6.45 ÷ 0.3 Multiply both by 10: 64.5 ÷ 3 = 21.5	b. 12.075 ÷ 0.05 Multiply both by 100: 1,207.5 ÷ 5 = 241.5

28. Ten books. Nine pounds is 9 × 16 = 144 ounces. 144 oz ÷ 14 = 10.29. So you can pack 10 books in the box.

29. a. 52 oz = 3.25 lb b. 1.3 lb = 20.8 oz
c. 3.6 ft = 43.2 in d. 76 in = 6.33 ft

30. a. 125 cm = 1.25 m = 1.250 mm b. 300 g = 0.3 kg = 300,000 mg

31. Ten cakes. Two kilograms of flour equals 3.2 liters, or 3,200 ml. 3,200 ml ÷ 300 ml = 10 and remainder of 200 ml.

32. 14,050 g left for your carry-on luggage. The laptop weighs 3.3 kg or 3,300 g. Laptop and its case weigh together 3,300 g + 650 g = 3,950 g. 18 kg is 18,000 grams. Subtract 18,000 g − 3,950 g = 14,050 g.

Number Theory

33. 283 is not divisible by 24 because an odd number cannot be divisible by an even number.
OR 283 is not divisible by 24 because 283 ÷ 24 leaves a reminder.

34.

Divisible by	2	3	4	5	6	9
2,966	x					
9,423		x				x

Divisible by	2	3	4	5	6	9
5,845				x		
278	x					

35. a. 2 × 11 b. 5 × 13 c. 2 × 2 × 2 × 2 × 3

36. a. The GFC is 9. b. The GFC is 40.

37. a. The LCM is 21. b. The LCM is 36.

Fractions

38. a. cross it out. b. 2/7 c. cross it out d. 72/132

39. a. $1\frac{7}{30}$ b. $\frac{5}{9}$ c. $3\frac{11}{12}$ d. $8\frac{3}{28}$

40. a. $\frac{2}{3} > \frac{7}{11}$ b. $\frac{11}{13} > \frac{4}{5}$ c. $\frac{56}{100} > \frac{524}{1000}$ d. $\frac{3}{7} > \frac{2}{5}$

41. No, the correct answer is 2/7. $\frac{2}{3} \times$  = 

42. You can get 19 pieces. You can divide 33 1/2 ÷ 1 3/4 = (67/2) ÷ (7/4) = (67/2) × (4/7) = 134/7 = 19 1/7.
Or, you can make a guess, and check. Guess first that you could get ten pieces. 10 × 1 3/4 in. = 10 × 1.75 in = 17.5 in. This is about half of 33 1/2 inches, so next time guess 20 pieces: 20 × 1.75 in = 2 × 17.5 in. = 35 in. This is a little bit too much. Therefore, 19 pieces is probably right. Now, 19 × 1 3/4 in. is 35 in. - 1 3/4 in. = 33 1/4 in. So that works.

43. a. 2 2/9 b. 2 1/7 c. 3/10 d. 2 20/23

44. a. The grocery bill was $306. b. Dad has $1224 left now.

45. The club has 30 members.
Since 3/5 of the members is 18 members, then 1/5 of the members is 6 members. Then, all members, or 5/5 of the members is 5 × 6 = 30.

46. a. The area is 30 1/4 sq ft. b. The area is 4,356 square inches. You can change the sides of the garden into inches, and multiply: 5 1/2 ft = 66 in. The area is 66 in. × 66 in. = 4,356 sq. in.

47. The short piece is 4 1/2 inches long and the longer piece is 2 ft 7 1/2 in. long.
Imagine the board cut into 8 equal pieces (the ratio 1:7 means 1 piece and 7 pieces). Each piece is then 3 ft. ÷ 8 = 36 in. ÷ 8 = 4 1/2 in. The short piece is one part, or 4 1/2 in. The long piece is the rest, or 31 1/2 in. = 2 ft 7 1/2 in.

48. a. 3 3/8 in. and 3 in.
The ratio 2:3 means that the two "parts" in the original rectangle correspond to three "parts" in the larger. So, we divide each side of the original rectangle into two "parts," or we simply divide each side length of the original rectangle by 2, and then multiply that by 3 to get the three "parts" in the large one:
2 1/4 in. ÷ 2 × 3 = 9/4 in. ÷ 2 × 3 = 9/8 in. × 3 = 27/8 in. = 3 3/8 in. and 2 in. ÷ 2 × 3 = 3 in.

b. The area is 3 3/8 in. × 3 in. = 9 9/8 sq. in. = 10 1/8 sq. in.

Percent

49.

a. $66\% = \frac{66}{100} = 0.66$	b. $3\% = \frac{3}{100} = 0.03$	c. $89\% = \frac{89}{100} = 0.89$
d. $270\% = 2\frac{70}{100} = 2.70$	e. $1.5\% = \frac{15}{1000} = 0.015$	f. $94.3\% = \frac{943}{1000} = 0.943$

50. a. 1/7 = 14.3% b. 13/20 = 65%

51. The new price is $24. First calculate 10% of $20, which is $2. Double that to get 20% of $20, which is $4. Add $4 to the original price to get $24.

52. Compare the non-fiction books to the total number of books: 4/16 = 1/4 = 25%.

53. Jane is 144 cm tall. Calculate 0.9 × 160 cm = 144 cm.

54. It costs $4.86. Calculate 10% of $5.40 which is $0.54. Subtract $5.40 − $0.54 = $4.86.

55. Arthur's height is 80% of Jim's height. Compare Arthur's height to Jim's height: 64 cm/80 cm = 64/80 = 8/10 = 80%.

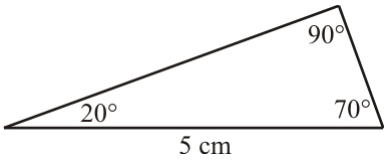
56. There was a 33% increase. Compare the difference to the original: 5/15 = 1/3 ≈ 33%.

57. The decrease was 5%. Compare the difference to the original: $10/$200 = 10/200 = 5/100 = 5%.

Geometry

58. A = 50°; B = 130°

59. a. right b. Image not to scale:



60. The area of the square is 12 cm × 12 cm = 144 cm^2. The area of one triangle is 1/4 of that, or 36 cm^2.
In square millimeters, it is 3,600 mm^2. To find that out, you can either remember that 1 cm^2 = 100 mm^2, or you could change the measurements to millimeters: 120 mm × 120 mm = 14,400 mm^2, and 1/4 of that is 3,600 mm^2.

61. c.

62. c.

63. 42.5 cm. The sides of the bigger triangle are 2.5 times the sides of the smaller triangle, so the unknown side is 2.5 × 17 cm = 42.5 cm.

64. The figure consists of a parallelogram with base 6 cm and height 2.2 cm, and a triangle with base 6 cm and height 2.2 cm. The total area is 6 cm × 2.2 cm + 6 cm × 2.2 cm ÷ 2 = 19.8 cm^2. You could also think of the figure as three identical triangles.

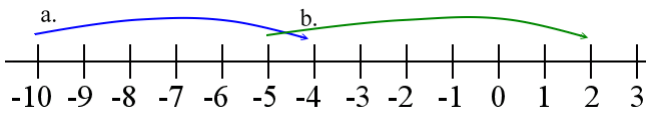
65. One face of the cube has the area of 3 cm × 3 cm = 9 cm^2. There are six faces, so the total surface area is 54 cm^2.

66. The volume is $(3\text{ cm})^2 \times 3.14 \times 10\text{ cm} = 282.6\text{ cm}^3 \approx 280\text{ cm}^3$.

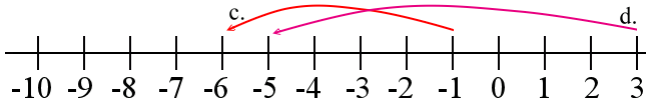
Integers

67. a. −9 −7 0 7 b. −23 −13 −10 −3

68. a. −10 + 6 = − 4 b. −5 + 7 = 2



c. −1 − 5 = − 6 d. 3 − 8 = −5



69. a. 3 + (−8) = − 5 (−3) + 8 = 5	b. (−6) + (−9) = −15 6 − 9 = −3	c. 2 + (−9) = −7 −6 − 5 = −11	d. 4 − (−2) = 6 −4 − (−2) = −2

70. a. −3 × (−5) = 15 −3 × 5 = − 15	b. (−7) × (−8) = 56 7 × (−9) = −63	c. (−2) × 3 × (−2) = 12 −8 × (−2) × (−1) = −16

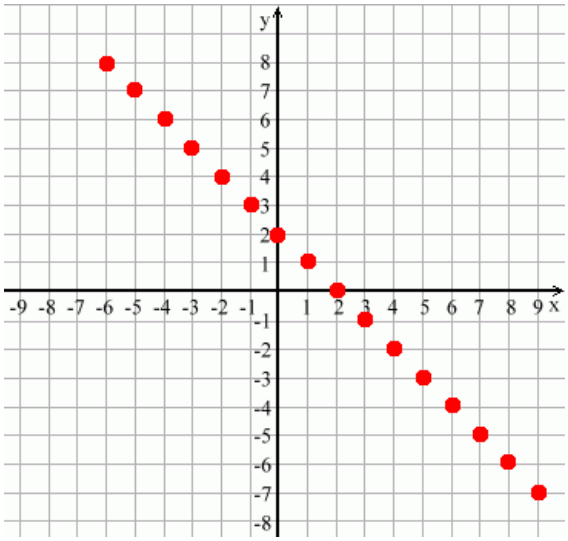
71. a. −20 ÷ (−5) = 4 33 ÷ (−3) = −11	b. (−48) ÷ (−4) = 12 21 ÷ (−7) = −3	c. −72 ÷ 8 = − 9 −150 ÷ (−10) = 15

72. a. −5 + (−5) = −10	b. 2 × (−7) = −14	c. 3 − 5 = −2
d. −48 ÷ (−8) = 6	e. 4 + (−4) = 0	f. −1 − 8 = −9

73.

x	−6	−5	−4	−3	−2	−1	0	1
y	8	7	6	5	4	3	2	1

x	2	3	4	5	6	7	8	9
y	0	−1	−2	−3	−4	−5	−6	−7



Statistics & Probability

74. a. P(yellow) = 5/10 or 1/2 b. P(not red) = 8/10 or 4/5 c. (blue or red) = 5/10 or 1/2

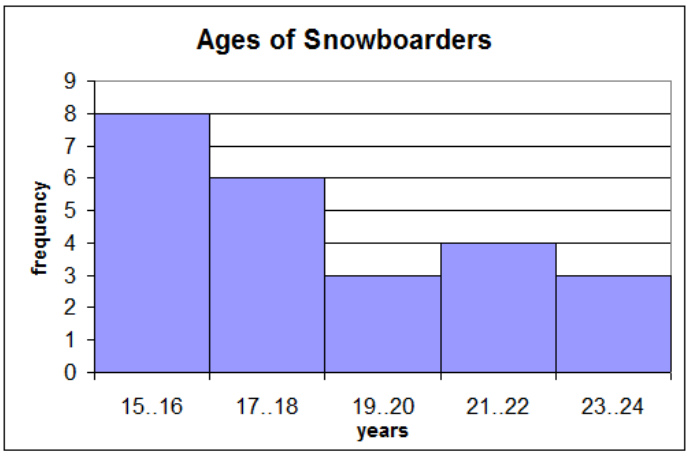
75. a. P(blue; blue) = (3/10) × (3/10) = 9/100 b. P(not yellow; not yellow) = (1/2) × (1/2) = 1/4

76. a. mean (none) median (none) mode blue b. mean 10.7 median 10.5 mode 10

77. a. About 950,000 candles were sold in 2009.
b. About 200,000 more candles were sold in 2010 than in 2005.
c. The increase in sales was about 24% from 2005 to 2010. Compare the difference of 200,000 to the original value of 850,000. 200,000/850,000 = 20/85 = 4/17 ≈ 24% (use long division to divide 4 by 17). It is also acceptable to answer about 25%, and estimate 200,000/850,000 = 4/17 ≈ 4/16 = 1/4 = 25%.

78.

Age (years)	Frequency
15 - 16	8
17 - 18	6
19 - 20	3
21 - 22	4
23 - 24	3



79. a. The median is 33. b. The range is 11.