## Newtown Middle School Summer Math Problems Students Entering 8th Grade

Dear Parents and Students,

Summer is a wonderful opportunity for students to build their math skills and prepare themselves for their next mathematics course. Students are encouraged to complete 5-15 problems each week and then review their solutions with a parent, guardian, or another capable family member. All problems are aligned to the Connecticut Core Standards for Mathematics.

While you are reviewing the problems, think about the concept and not just the process. Show your thinking by writing out your work. Below are some questions that you should ask yourself:

- 1. Does my answer make sense?
- 2. Are there other ways to solve this problem?
- 3. Why does my mathematics procedure work?
- 4. How is this used in the real world?

In addition to these problems, please practice your skills by exploring the following websites:

#### Math Tutorials:

www.kahnacademy.com http://patrickjmt.com/ http://www.artofproblemsolving.com/videos

#### Practice Problems & Games:

https://www.tenmarks.com/consumer/signup http://www.arcademics.com/ http://www.hoodamath.com/index.html http://www.pbslearningmedia.org/collection/mathcore/ http://www.math-play.com/Middle-School-Math-Games.html

Have a wonderful summer!

Sincerely,

The Newtown Middle School Mathematics Department

# Summer Skills Practice for Students Entering 8<sup>th</sup> Grade (Revised 7/2016)

Directions: Please complete WITHOUT the use a calculator. At the bottom of each page, an answer bank has been provided to use as a guide to check your work.

- Write an algebraic expression that models the word phrase: two less than five times a number
- 2. Write an algebraic expression that models the word phrase: five more than half a number
- Write an algebraic expression that models the word phrase: the quotient of five and two times a number
- 4. Find the sum. -18 + 22

Name

- 5. Find the sum. -9 + (-7)
- 6. Find the sum. 26 + (-4) + (-9)
- 7. Find the sum. -18+11+(-5)
- 8. Find the difference. 6-28
- 9. Find the difference. 10 (-14)
- 10. Find the difference. -3-(-17)
- **11. Evaluate.**  $32 12 \div 2 \cdot 3 + 6$
- 12. Evaluate.  $[8-(16 \div 4-3)+5]^2$

- 13. Evaluate 7 + 3(n 4), when n = 11.
- 14. Evaluate 2m+10n, when m=8 and n=12
- 15. Find the product. (4)(-8)(5)
- 16. Find the product. (10)(-9)(-3)
- 17. Evaluate 14 2(x + 5), when x = 6.
- 18. Evaluate 7a+4b, when a=3 and b=-6.
- 19. Evaluate  $\frac{5x}{y} + 2xy$ , when x = -3 and y = -5.
- 20. Evaluate each of the following.
  - a. |-18|b. |2-10|c. -|-11|
  - d. |-18-5|
  - e. 9+|-20|

### ANSWER BANK FOR PROBLEMS 1 – 20(a-e).

-160	-22	-16	-12	-11	-8
-3	$\frac{1}{2}n+5$	4	$\frac{5}{2n}$	5 <i>n</i> -2	8
13	14	18	20	23	24
28	29	33	136	144	270

 Becky runs a business dog-sitting for her neighbors' dogs while they are away on vacation. The table below shows Becky's earnings for the months of April, May, June, July, August, and September.

Museum Visitors				
Month	Earnings (Dollars)			
April	120			
May	55			
June	40			
July	450			
August	320			
September	75			

- a. Find the mean value of Becky's earnings
- b. Find the median value of Becky's earnings
- c. Find the mode value of Becky's earnings
- d. Find the range in values of Becky's earnings
- 22. Write each of the following numbers in scientific notation.
  - a. 14,300,000
  - b. 0.00143

- 23. Write each of the following numbers in standard form.
  - a.  $2.9 \times 10^3$
  - b.  $2.9 \times 10^{-6}$
- 24. Find the value of n for each of the following equations.
  - a.  $75,400 = 7.54 \times 10^{n}$
  - b.  $2.7 \times 10^n = 270,000,000$
  - c.  $0.058 = 5.8 \times 10^n$

# For problems 25 – 33, solve using the algebraic process.

25. Solve. x - 23 = 11214 = -16 + f26. Solve. -18 = x - 327. Solve. 28. Solve. t + 12 = 32x = 2829. Solve. -6 = -30n30. Solve.  $18 = \frac{2}{3}x$ 31. Solve.  $\frac{w}{-2} = 8$ 32. Solve.  $\frac{h}{6} = 24$ 33. Solve.

#### ANSWER BANK FOR PROBLEMS 21 – 33.

No mode	-16	-15	_9	-2
0.0000029	$\frac{1}{5}$ or 0.2	1.43×10 <sup>-3</sup>	1.43×10 <sup>7</sup>	4
8	14	27	30	97.5
135	144	176.6	410	2900

- 35. Write each decimal as a fraction in simplest form.
  - a. 0.72
  - b. 2.4
  - c. -0.005
- 36. Order the following rational numbers from least to greatest.

9		4		3		4		2
12	,	$\overline{5}$	,	20	,	6	,	5

What is the median value?

37. Find the sum.  $4\frac{1}{5} + 2\frac{3}{4}$ 38. Find the difference.  $8\frac{7}{8} - 2\frac{2}{3}$ 39. Find the sum.  $3\frac{7}{8} + 3\frac{5}{6}$ 

- 40. Find the difference.  $9\frac{1}{6} 1\frac{3}{4}$
- 41. Find the product. Write answer in simplest

form.

 $\frac{8}{9} \cdot \frac{6}{22} \cdot \frac{33}{40}$ 

42. Find the product. Write answer in simplest

form.  $\frac{2}{3} \cdot \left(-2\frac{2}{5}\right)$ 

- 43. Find the quotient. Write answer in simplest form.  $\frac{2}{3} \div \frac{6}{7}$
- 44. Find the quotient. Write answer in simplest form.  $1\frac{3}{5} \div 2\frac{1}{2}$
- 45. Sydney is making cookies for her teammates on the track team. If the recipe that she is

following calls for  $2\frac{1}{4}$  cups flour and makes 3

dozen cookies, how many cups of flour would she need to make 48 cookies?

- 46. Find the quotient.  $24.96 \div 12$
- 47. Find the quotient.  $1.519 \div 49$
- 48. Find the quotient.  $2.892 \div .04$
- 49. What is 8% of 12?
- 50. 20 is 160% of what number?
- 51. 12 is what percent of 32?
- 52. Find the **simple interest** paid on a loan of \$450 at 6% for 3 years.

$-1\frac{3}{5}$ or $-\frac{8}{5}$	$-\frac{1}{200}$	0.031	$\frac{1}{5}$	$\frac{2}{5}$
$\frac{16}{25}$	18 25	$\frac{7}{9}$	0.96	2.08
$2\frac{2}{5}$ or $\frac{12}{5}$	3	$6\frac{5}{24}$	$6\frac{19}{20}$	$7\frac{5}{12}$
$7\frac{17}{24}$	12.5	37.5%	72.3	81

#### ANSWER BANK FOR PROBLEMS 34 – 52.

#### Challenging!

- 53. Find the **final balance** in your savings account after 24 months if you start with \$1000 and your money earns 1.3% simple interest per year.
- 54. Evan buys an \$80 tennis racquet. Since CT sales tax is 6.35%, what is the **total cost** of the tennis racquet?
- 55. Eighty-five percent of the students in Montvale School ride the bus to school in the morning. If there are 1300 students in the school, how many students ride the bus to school?
- 56. 12% of the students enrolled at a certain high school are participating in the school musical. Some students are the main performers and others are in the chorus. Even more of the students are in the pit orchestra. Almost half are in the crew. If 108 students are participating in the musical, how many students are enrolled in the school?
- 57. The original cost of a plane ticket is \$335. The sale price is \$195. Find the **percent of discount** (round your answer to the nearest tenth).
- 58. C.J. bought a new elliptical machine on sale for \$2210. If this was after a 15% discount, what was the original price?
- 59. A builder is installing a circular window in the cabin of a ship. If the window has a diameter of 14 inches, how many square inches of glass will be needed? Use  $\frac{22}{7}$  as an approximation for  $\pi$  and  $A = \pi r^2$ . (in square inches)

#### ANSWER BANK FOR PROBLEMS 53 – 64.

60. The two circles in the figure below are congruent. Each has a radius of 10 mm. Find the area of the shaded region in the figure below (in mm<sup>2</sup>). (Use 3.14 for  $\pi$ )



- 61. A circle has a circumference of  $24\pi$  inches. Find the radius of the circle. (in inches)
- 62. If one angle in a pair of vertical angles measures 36°, and the other measures  $(5x - 4)^\circ$ , find the value of x.
- 63. Find the value of x in the diagram below.



64. Find the volume of the figure below. (in cm<sup>3</sup>) (Not drawn to scale)



8	12	14	41.8	\$85.08	154
172	175	900	\$1026	1105	\$2600

65. Solve.	3h + 4 = 28	79. Simplify.	$2\frac{1}{3} - 8\frac{3}{5}$
66. Solve.	15 = 6x - 9	80 Simplify	$-12\frac{4}{-}7\frac{1}{-}$
67. Solve.	6x + 13 = -5	oo. ompiny.	12 5 3 7 1
68. Solve.	-4m - 12 = -20	81. Simplify.	$6\frac{1}{8} - 9\frac{1}{4}$
69. Solve.	$30 = 24 + \frac{n}{4}$	82. Simplify.	$\frac{1}{2} - \frac{2}{3} + \frac{5}{6} - \frac{3}{4}$
70. Solve	$\frac{x}{3} + 13 = -5$	83. Simplify	$-3\frac{1}{2} + \left(-6\frac{2}{3}\right) + 1\frac{1}{4} + \left(-2\frac{5}{6}\right)$
71. Solve.	$-18 = \frac{5}{7}x - 23$	84. Simplify	5 + 2(4x - 3)
72. Simplify.	5x + 2 - 8x + 4	85. Solve.	3(4x-1) = -1
73. Simplify.	-2(6x-4)	86. Solve.	26 = 2(3x + 4)
74. Simplify.	3(2x-5) + 6(x+3)	87. Solve.	$\frac{5x-8}{12} = \frac{1}{2}$
75. Solve.	3x + 7 + 2x = 2	88. Solve.	7x - 3 = 4x + 12
		89. Solve.	-2m = 4 - 20m

Most Challenging!!! (Problem #'s 76 – 135b are specifically included for those students scheduled to take Algebra I in 8<sup>th</sup> grade and those who are planning to be reconsidered for it).

76. Simplify.	$-3\frac{1}{4}+5\frac{2}{3}$
77. Simplify.	$-4\frac{1}{8} + \left(-7\frac{3}{4}\right)$
78. Simplify.	$10\frac{5}{6} - \left(-3\frac{1}{2}\right)$

os. simpiny	$3\frac{1}{2}$ $\left( 0\frac{1}{3}\right)$ $1\frac{1}{4}$ $\left( 0\frac{1}{3}\right)$
84. Simplify	5 + 2(4x - 3)
85. Solve.	3(4x-1) = -1
86. Solve.	26 = 2(3x+4)
87. Solve.	$\frac{5x-8}{12} = \frac{1}{2}$
88. Solve.	7x - 3 = 4x + 12
89. Solve.	-2m = 4 - 20m
90. Solve.	7t - 10 = 5t + 8 - 2t
91. Solve.	$\frac{3}{4}x + 4\frac{2}{5} = 8\frac{1}{2}$
92. Solve.	$-6\frac{4}{5} = \frac{1}{5}h - 3\frac{1}{3}$
93. Solve.	$\frac{3}{5}x + \frac{7}{10} = \frac{11}{15}x - \frac{2}{5}$
94. Solve.	7 - 3(2x - 2) = 25

#### ANSWER BANK FOR PROBLEMS 65 - 94.

-54	$-20\frac{2}{15}$	$-17\frac{1}{3}$	-12x+8	$-11\frac{7}{8}$	$-11\frac{3}{4}$
$-6\frac{4}{15}$	-3	-3x+6	$-2\frac{3}{8}$	-2	-1
$-\frac{1}{12}$	$\frac{1}{6}$	$\frac{2}{9}$	2	$2\frac{5}{12}$	$2\frac{4}{5}$
3	4	$4\frac{2}{15}$	$4\frac{1}{2}$	5	7
8	8 <i>x</i> -1	$8\frac{1}{4}$	12x + 3	$14\frac{1}{3}$	24

- 95. From the following list, which number is irrational?  $\frac{5}{3}$ , 0.07,  $\sqrt{10}$ , 0
- 96. From the following list, which number is irrational?  $2\pi$ ,  $\frac{0}{6}$ ,  $2.\overline{8}$ ,  $\sqrt{49}$
- 97. Using estimation strategies, what is the value of  $\sqrt{7}$  in decimal form?
- 98. Order the following numbers from least to greatest. Which value is fourth?

2.1, 
$$\pi$$
,  $\sqrt{7}$ ,  $\frac{13}{4}$ ,  $\sqrt[3]{8}$ ,  $\left(\frac{2}{3}\right)^{3}$ 

- 99. Using estimation strategies, what is the value of  $\sqrt{3}$  in fraction form?
- 100. Order the following numbers from least to greatest. Which value is fourth?

 $1^5$  ,  $\frac{0}{\pi}$  ,  $\sqrt{3}$  ,  $1\frac{1}{2}$  ,  $\frac{\pi}{2}$ 

- 101. Write  $0.\overline{77}$  as a fraction in lowest terms.
- 102. Write  $0.\overline{12}$  as a fraction in lowest terms.
- 103. Simplify.  $-2^4$
- 104. Simplify.  $(-5)^2$
- 105. Simplify. 8<sup>0</sup>
- 106. Find the product. Write your answer in scientific notation.
  - $(4 \times 10^{-8})(5 \times 10^{3})$
- 107. Find the product. Write your answer in<br/>scientific notation. $6(3 \times 10^3)$

#### ANSWER BANK FOR PROBLEMS 95 – 115.

- 108. Find the quotient. Write your answer in<br/>scientific notation. $\frac{2 \times 10^6}{8 \times 10^3}$
- 109. The formula for the area of a triangle is  $A = \frac{1}{2} b \cdot h$ . Transform the formula to solve for h in terms of A and b. h =
- 110. The formula for the Pythagorean Theorem is  $a^2 + b^2 = c^2$ . Transform the formula to solve for a in terms of b and c. a =
- 111. The formula for the volume of a cone is  $V = \frac{1}{3} \pi \cdot r^2 \cdot h$ . Transform the formula to solve for r in terms of  $V, \pi$  and h. r =
- 112. If one leg on a right triangle is 6 cm and another leg is 8 cm, how many centimeters long is the hypotenuse?
- 113. If one leg on a right triangle is 7 cm and another leg is 2 cm, what is the exact length of the hypotenuse in centimeters? (Answer should be left in radical form)
- 114. If one leg on a right triangle is 6 cm and the hypotenuse is 11 cm, what is the exact length of the other leg in centimeters? *(Answer should be left in radical form)*
- 115. If the hypotenuse on a right triangle is 17 cm and the length of one leg is 15 cm, what is the exact length of the other leg in centimeters?

-16	$\frac{4}{33}$	$\frac{7}{9}$	1	$1\frac{2}{3}$	$\frac{\pi}{2}$	$1.8 \times 10^4$
$2 \times 10^{-4}$	2π	$\frac{2A}{b}$	$2.5 \times 10^2$	2.6	$\sqrt{\frac{3V}{h\pi}}$	$\sqrt{7}$
8	$\sqrt{10}$	10	25	$\sqrt{53}$	$\sqrt{85}$	$\sqrt{c^2-b^2}$

- 116. An acute triangle has 3 angles with the following measures:  $47^{\circ}$ ,  $58^{\circ}$ , and  $(3x 6)^{\circ}$ . Find the value of x and the degree measure of the third angle.
- 117. Given the following diagram (*not drawn to scale*), find the values of *x* and *y*.



118. Given the following diagram (*not drawn to scale*), find the values of *x* and *y*.



119. Given the following diagram of two parallel lines and a transversal (not drawn to scale), find the values of x, y and z.



- 120. Triangle *NMS* is graphed on a coordinate grid and has the following coordinates: N(-12,7), M(3,10), S(-2,-3)
  - a. Find the slope of  $\overline{NS}$
  - b. Find N' if NMS is rotated 180° about the origin
  - c. Find *M*' if *NMS* is translated 7 units left and 2 units up
  - d. Find S' if NMS is reflected over the x-axis
- 121. Triangle *PET* is graphed on a coordinate grid and has the following coordinates:

P(8,-1), E(-6,1), T(11,3)

- a. Find the slope of  $\overline{PE}$
- b. Find the length (in units) of  $\overline{PT}$
- c. Find P' if PET is rotated 90° clockwise about the origin
- d. Find T' if PET is translated 4 units right and 6 units down
- e. Find E'' if PET is first rotated 90° counter clockwise about the origin, then reflected over the *y*-axis

#### ANSWER BANK FOR PROBLEMS 116 – 121e.

(-4,12)	(-2,3)	-1	(-1,-8)	$-\frac{1}{7}$	(1,-6)
5	(12,-7)	14	(15,-3)	24	27
42	48	53	75	132	138

122. The data in the table below is linear (the points all fall on a line).

x	-3	0	1	4
у	-7	2	5	14

- a. What is the rate of change (slope)?
- b. What is the *y*-intercept?
- c. Write an equation in slope-intercept form to represent the data.
- 123. Given the following equation:  $y = \frac{2}{3}x 4$ ,
  - a. Identify the slope
  - b. What is the *y*-intercept?
  - c. What would be the slope of a line that is perpendicular to the given line?
- 124. Find the volume of a cylinder that has a radius of 3 cm and a height of 10 cm. *Leave answer in terms of*  $\pi$ .
- 125. Find the volume of a cylinder that has a diameter of 22 cm and a height of 3 cm. *Leave answer in terms of*  $\pi$ .
- 126. A cylinder has a volume of  $245\pi$  cubic inches and a radius of 7 inches. Find the height of the cylinder (in inches).

- 127. A cylinder has a volume of  $396\pi$  cubic cm and a height of 11 cm. Find the radius of the cylinder (in cm).
- 128. Refer to the diagram below to answer **a** + **b**.



- a. Use Pythagorean Theorem to find the measurement of the radius (*x*).
- b. Find the volume of the cone. Leave your answer in terms of  $\pi$ .
- 129. A cone has a volume of  $70\pi$  cu. in. If the diameter of the base is 20 inches, what is the height of the cone?
- 130. Most often, marbles have a diameter of 1.3 – 2.54 cm. If Ashley's favorite marble has a diameter of 2.4 cm., what would the volume of the marble be? Leave your answer in terms of  $\pi$ . (*Be sure to use the proper formula:*  $V = \frac{4}{2}\pi r^3$ ).
- 131. A sphere has a volume of  $36\pi$  cu. inches. What is the radius of the sphere (in inches)?

-4	$-\frac{3}{2}$	$\frac{2}{3}$	2	2.1
2.304π	3	3	3	y = 3x + 2
5	6	12π	90π	363π

#### ANSWER BANK FOR PROBLEMS 122 – 131.

132. The following two triangles are congruent. Refer to the diagram to respond to  $\mathbf{a} - \mathbf{d}$  below.



- a. Complete the congruence statement for the two triangles:  $\triangle PET \cong \triangle$ \_\_\_\_\_
- b. Find the measure of *x*.
- c. Describe the transformation(s) necessary to map the *preimage* onto the *image*.
- d. Use the Pythagorean Theorem to determine whether the two triangles are acute, right or obtuse triangles.
- 133. Given that  $\triangle PET \cong \triangle CAT$  in the following triangles, respond to  $\mathbf{a} \mathbf{d}$  below.



- a. Find the measure of *x*.
- b. Find the measure of *y*.
- c. Describe the transformation(s) necessary to map the *preimage* onto the *image*.
- d. Use the Pythagorean Theorem to determine whether the two triangles are acute, right or obtuse triangles.

134. Each of the following sets of two triangles are congruent. Identify what postulate (SSS, SAS, ASA, AAS, or HL) proves it?



135. Use the following diagram to respond toa and b below.



- a. Complete the similarity statement:  $\triangle CAP \sim \triangle$ \_\_\_\_\_
- b. Find the measure of *x*.

#### Reflection over ASA COD ΗL acute vertical line, then right translate up 90° rotation about point E, reflection YLF 3.5 21 56 64 over vertical line, then translate right

#### ANSWER BANK FOR PROBLEMS 132 – 135b.