

## **2023 Summer Math Assignments**

### ***Rising 8th Grade Algebra Students***

While the summer break is a good time to take a much-needed rest from academic work, because of the cumulative nature of math, it is also important to continue to practice some basic mathematical skills so that you do not lose any of the useful problem-solving and sense-making skills you have been developing in your math education.

The worksheets below involve mathematics that you have seen in previous courses. While the difficulty of these exercises vary, it should take you, on average, about 10 - 15 minutes to complete a page. Feel free to ask for help from a knowledgeable person when necessary.

You can either print these pages and then complete your work on the pages themselves, or view the pages digitally and complete your work on separate sheets of paper. **Many of the exercises below require that you write an explanation in a complete sentence or that you show your mathematical calculations.** We, the math teachers at St. Michael's, will collect your completed work during the first week of school.

A. **The Powers of Primes.** Use the prime numbers 2, 3, 5, 7, and 11. Choose a base and an exponent from these numbers to equal the number in each problem. The first problem is done for you.

1.  $25 = \underline{5^2}$

2.  $8 = \underline{\hspace{2cm}}$

3.  $27 = \underline{\hspace{2cm}}$

4.  $32 = \underline{\hspace{2cm}}$

5.  $49 = \underline{\hspace{2cm}}$

6.  $125 = \underline{\hspace{2cm}}$

7.  $4 = \underline{\hspace{2cm}}$

8.  $9 = \underline{\hspace{2cm}}$

9.  $343 = \underline{\hspace{2cm}}$

10.  $243 = \underline{\hspace{2cm}}$

11.  $121 = \underline{\hspace{2cm}}$

12.  $2,048 = \underline{\hspace{2cm}}$

**B. Cubes and Squares.** Find the numbers related to squares and cubes. **Show your work.**

1. Find the only one-digit number that is both a square number and a cubic number.
2. Find the only two-digit number that is both a square number and a cubic number.
3. Find the only three-digit number that is both a square number and a cubic number.
4. Find a two-digit number that is one more than a square number and one less than a cubic number.
5. Find the smallest two-digit square number that can be written as the sum of two square numbers.
6. Find the smallest three-digit square number that is the sum of two square numbers.
7. Find the only one-digit number that can be written as the sum of two different cubic numbers.
8. Find the smallest two-digit number that can be written as the sum of two different cubic numbers.
9. Find the largest two-digit number that can be written as the sum of two different cubic numbers.
10. Find a two digit number that is one less than a square number, and when doubled is one less than a square number.

C. **What's Next?** Find the missing numbers to complete the pattern. Write an explanation of the pattern next to each one.

1. 5, \_\_\_\_\_, \_\_\_\_\_, 8, \_\_\_\_\_, 10

2. 1, 2, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 32

3. 9, 8, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 4

4. 0, \_\_\_\_\_, \_\_\_\_\_, 15, \_\_\_\_\_, 25

5. 2, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 11, 13

6. \_\_\_\_\_, \_\_\_\_\_, 9, 16, \_\_\_\_\_, 36

7. 9, \_\_\_\_\_, \_\_\_\_\_, 18, 21, \_\_\_\_\_

8. \_\_\_\_\_, 240, 120, \_\_\_\_\_, 30, \_\_\_\_\_

9. 2, 5, 11, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

10. 4, \_\_\_\_\_, \_\_\_\_\_, 10, \_\_\_\_\_, 19

**D. A Place for Everything.** Follow the directions to place each coordinate at its correct point on the number line. Label your steps on the given number line.



1.  $0$  is the coordinate of  $O$ .
2.  $A$  is 5 units to the right of  $O$ .
3.  $H$  is 2 units from  $A$  and 3 units from  $O$ .
4.  $I$  is 2 units to the left of  $O$ .
5.  $B$  is 5 units from  $I$ .
6.  $O$  is the midpoint of  $\overline{IF}$ .
7.  $C$  is the midpoint of  $\overline{HA}$ .
8.  $K$  is 5 units from  $H$ .
9.  $M$  is the same distance from zero as  $A$  is.
10.  $L$  is 1 unit from  $F$ .
11.  $N$  is paired with the opposite of the value that  $H$  is paired with.
12.  $R$  is 1 unit from  $N$ .
13.  $S$  is the largest negative integer.
14.  $T$  is 1 unit to the left of  $B$ ;  $X$  is 1 unit to the right of  $B$ .
15. The distance from  $F$  to  $E$  is 5 units.
16.  $Z$  is between  $A$  and  $E$ .

E. **Common Knowledge.** All of the equations, terms, or points in each set below have something in common. Identify these common characteristics. Write your answers and explanations on the lines beneath the problems or on a separate sheet of paper.

1.  $y = 3x + 2$

$y = 7x + 9$

$y = -4x - 2$

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2.  $2x = 3y$

$y = 4x$

$2x + 5y = 0$

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3.  $y = 3x + 5$

$-4x + 2y = 4$

$-6y = -7x + 1$

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4.  $4y = 0$

$3y = 1$

$-8y = 5$

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5.  $4y = 4x - 2$

$x - y = \frac{1}{2}$

$y = x - \frac{1}{2}$

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6.  $m$

$\frac{\text{rise}}{\text{run}}$

$\frac{y_2 - y_1}{x_2 - x_1}$

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7.  $y = 3x - 2$

$y = 7x - 2$

$y = -4x - 2$

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8.  $(0,4)$

$(0,0)$

$(0,-2)$

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9.  $(-3,-4)$

$(-8,-1)$

$(-1,-15)$

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10.  $(0,2)$

$(-2,0)$

$(0,-2)$

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F. **Create a Pattern.** Starting with the first number in each set, create a pattern that leads to the last number. The first one is done for you.

1. 9, 7, 5, 3, 1

2.  $2\frac{1}{2}$ , \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,  $4\frac{1}{2}$

3. 100, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 20

4. 3.25, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 1.25

5. 5, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 3,125

6. 4, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 5

7. 80, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 90

8. 4, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 36

9. 42, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 22

10. 1, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, 0.0001

11.  $\frac{1}{2}$ , \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,  $\frac{1}{6}$

12.  $\frac{1}{2}$ , \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_,  $\frac{5}{6}$

G. **Numbers and Values.** Match each term with an equivalent form. Choose your answers from the Answer Bank.

1.  $\frac{1}{4} =$  \_\_\_\_\_
2.  $80\% =$  \_\_\_\_\_
3.  $19 =$  \_\_\_\_\_
4.  $3^2 =$  \_\_\_\_\_
5.  $\sqrt{64} =$  \_\_\_\_\_
6.  $7.5 =$  \_\_\_\_\_
7.  $0.3 =$  \_\_\_\_\_
8.  $\frac{27}{4} =$  \_\_\_\_\_
9.  $1 =$  \_\_\_\_\_
10.  $16\frac{1}{3}\% =$  \_\_\_\_\_
11.  $13 =$  \_\_\_\_\_
12.  $\frac{1}{20} =$  \_\_\_\_\_

### Answer Bank

$4^2 + 3$

$\frac{1}{6}$

$0.05$

$2^2 + 2^2$

$25\%$

4 out of 5

$\frac{3}{10}$

$2^2 + 3^2$

$2^3 + 1$

$\frac{15}{2}$

$100\%$

$6\frac{3}{4}$