

## #1

1. Find all roots of the following equations:

A)  $5x^2 + 9x - 7 = 0$

B)  $3x^2 + 14x + 15 = 0$

C)  $x^3 - 3x^2 - x + 3 = 0$

D)  $2x^2 - 20x = -48$

## #2

2. Find the solutions to the following systems of equations

A) 
$$\begin{aligned} 4x + 7y &= 9 \\ 5y + 3x &= -1 \end{aligned}$$

C) 
$$\begin{aligned} 5x + 4y - 10 &= 0 \\ 10x + 8y - 15 &= 0 \end{aligned}$$

B) 
$$\begin{aligned} -7x + 11y &= -24 \\ 2x - 6y &= 4 \end{aligned}$$

D) 
$$\begin{aligned} 4x - 13y &= 51 \\ 78y - 24x &= -306 \end{aligned}$$

## #3

3. Turn the following repeating decimals into equivalent fractions

A)  $\overline{.51}$

B)  $\overline{.24}$

C)  $2\overline{.1} - 1\overline{.45}$

D)  $4.\overline{78}$

## #4

4. Solve for x:

A)  $x+9 < 13$

B)  $\sqrt{x-1} < -3$

C)  $|x+4| > 5$

D)  $(|x-1|+4)^2 \geq 36$

## #5

5. Given:  $f(x) = 2x^2 - x - 15$ ,  $g(x) = \sqrt{21 - 2x} - 4$ ,  $h(x) = \frac{4}{x+3} + x + 8$

- A) What is  $f(3) + g(4) + h(5)$ ?
- B) What is  $h(g(h(1)))$ ?
- C) What is  $g(10)$ ?
- D) What is  $g((f(f^{-1}(-15))) + 1)$ ?

## #6

6. True or False?

- A) The whole numbers are a subset of the natural numbers
- B) -2 is an integer
- C)  $\sqrt{4}$  is a rational number
- D) The absolute value of any integer is a natural number

## #7

7. A) Andrew has \$4.50 in a total of 33 quarters, dimes, and nickels, and he has 3 more nickels than dimes. How many quarters does he have?

B) Omar can canoe up a 10 mile river in  $\frac{5}{4}$  of an hour and can canoe down the same river in  $\frac{5}{8}$  of an hour. If he always canoes at the same speed and the river's current is 4mph, how fast, in miles per hour, is Omar canoeing?

C) Mahesh needs to drain his swimming pool, and so he hired Leo to drain all of the water out of his pool. Leo could completely drain the pool if it were full in 8 hours. Sadly for Leo and Mahesh, it's raining, and the rain could fill the pool in 12 hours if it were totally empty and Leo wasn't around. How long will it take to drain the pool? The pool starts out completely filled.

D) Haafiz decided to get Joseph back for disassembling his shoes one day, so he decided to hide some high-quality laxative in his milk the morning before a math competition. If the mixture is already 400mLs, 40 of which are laxative, how much more laxative must be added to make the mixture 85% milk?

## #8

8. Simplify the following expressions in prime factored form.

A)  $2^4 + 2^4 + 2^4 + 2^4$

B)  $\frac{3^6}{3^3 \times 3^{-2}}$

C)  $(11^2)^3$

D)  $5^{\frac{1}{2}} \times 125^{\frac{1}{2}}$

## #9

9. Find the slope of each of the following lines

A)  $y = 3x + x + 1$

B)  $2x + 3y = -4$

C)  $-6x = 2y + 11$

D)  $y = 2$

## #10

10. A) What is the 17<sup>th</sup> prime number?

B) What is the biggest 3-digit prime number?

C) How many composite numbers are less than 30?

D) What is the average of the first 10 prime numbers?

## #11

11. A) Simplify by rationalizing the denominator of  $\frac{3}{\sqrt{7}+2}$

B) Solve for x:  $\sqrt{8+2x} = x$

C) Simplify :  $\sqrt{1008} + \sqrt{343}$

D) Simplify:  $\frac{2}{\sqrt{2}} \times \frac{8}{\sqrt{8}} \div \frac{32}{\sqrt{32}}$

## #12

12. A) How many factors does 96 have?

B) What is the greatest common factor of 384 and 288?

C) What is the prime factorization of 3960?

D) What is the smallest number with 12 factors?

## #13

13. Expand:

- A)  $(2x+3)(4x-2)$
- B)  $(3x-4)(6)(2x-1)$
- C)  $(2x+1)^2(5x-5)$
- D)  $(x-1)(2x+3)(x^2+x-4)$

## #14

14.

- A) 40 tickets are sold to a play that severely fell short of its expectations. An adult ticket costs \$7, and adult and child tickets are sold for more than \$7. Children cannot buy tickets for themselves because the play is rated R. If 13 children see the play (none of which snuck in), and \$280 in tickets are sold in total, how much would it cost for 3 adults and 2 children to see the play?
- B) What is the slope of  $2x-3y=6$ ?
- C) What degree is  $4^2x^2y^2zw^9$ ?
- D) How many subsets are there for the set  $\{0,\pi,e,101,-1337\}$ ?

## #15

15. Emily, Minty, and Allison are thinking of numbers. They are thinking of different numbers for each part of this question.

- A) Emily's number is twice as big as Allison's, and they both add to 30. What is Emily's number?
- B) Minty's number is six more than twice as much as Emily's number, which is a multiple of seven that is also prime. What is Minty's number?
- C) Allison's number is the cube of Minty's number, which is the number of positive integers satisfying the equation  $-|x-1| \geq -6$ . What is Allison's number?
- D) Emily's number is one less than three times Minty's number, which is one half of Allison's number, which is neither prime nor composite. What is the sum of their three numbers?