

Name: \_\_\_\_\_

School: \_\_\_\_\_

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1. \_\_\_\_\_ Evaluate the product of the first 5 odd triangular numbers.
2. \_\_\_\_\_ What is the difference between the larger and smaller angles between the hands of a clock with time 8:36 AM (in degrees)?
3. \_\_\_\_\_ A posse of escape room enthusiasts decide to take on the hard task of completing 5 different escape rooms. Last time they took on this task they got an average score of 80. This time, in the easy difficulty escape room they get a score of 98, in easy-medium difficulty escape room they got a score of 68 due to confusion between themselves, in the medium difficulty escape room they got a score of 78, in the medium-hard difficulty escape room they got a score of 72. What is the least possible score they must get on the 5th and hardest difficulty escape room in order to surpass their average from last time?
4. \_\_\_\_\_  $\sum_{n=0}^8 (6 + \sqrt{4^n}) =$
5. \_\_\_\_\_ Farzan is playing poker and gets dealt a 2-7 offsuit. A 2-7 offsuit is when one of the two cards you are dealt is one suit (eg. hearts) and the other of the two cards you are dealt is another suit (eg. diamonds), and your cards are a 2 and a 7. Assuming that him and his friends are playing with two complete 52-card decks, what is the probability that Farzan gets dealt a 2-7 offsuit for his random, 2-card hand (as a fraction)?
6. \_\_\_\_\_ Evaluate the determinant of the matrix: 
$$\begin{bmatrix} 3 & 4 & 4 & 3 \\ 15 & 15 & 12 & 16 \\ 5 & 5 & 6 & 5 \\ 3 & 3 & 4 & 3 \end{bmatrix}$$
7. \_\_\_\_\_ Evaluate the product of the sum of the positive integers and the sum of the negative integers from the satisfactory values of  $x$  in  $|6x - 4| < 48$ .
8. \_\_\_\_\_ Find the determinant of the matrix: 
$$\begin{bmatrix} 10 & 7 & 4 \\ 6 & 8 & 3 \\ 9 & 2 & 11 \end{bmatrix}$$
9. \_\_\_\_\_ What is the remainder when  $x^5 - 3x^4 + 6x^3 - 12x^2 + 24x - 11$  is divided by  $x - 3$ ?
10. \_\_\_\_\_ What is the area of the triangle with vertices at coordinates (3,3), (7,10), and (10,2) (as a decimal)?
11. \_\_\_\_\_ If the product of two numbers,  $x$  and  $y$ , is 3072 and their difference is 16, what is the value of  $x^2 + y^2$ ?
12. \_\_\_\_\_ What is the area of a sector of a circle given that the angle of the sector is  $40^\circ$  and the arc length is  $2\pi$ ? (Give your answer in terms of pi)
13. \_\_\_\_\_ If  $A \& B = \frac{A \times B}{A + B}$  and  $C \$ D = (C + D) \times (C - D)$  then what is  $((24 \$ 6) \& 12)$  rounded to the nearest hundredth?
14. \_\_\_\_\_ Assuming pi is equal to 3.14, what is the volume of an ellipsoid with semi-axes of lengths 8, 14, and 23 rounded to the nearest hundredth?
15. \_\_\_\_\_  $\sum_{n=1}^{\infty} \frac{n}{2^n} =$
16. \_\_\_\_\_ Evaluate  $\sin\left(-\frac{\pi}{2}\right) + \cos\left(\frac{12\pi}{6}\right) + \tan\left(-\frac{3\pi}{4}\right) + \csc\left(\frac{3\pi}{18}\right) - \sec\left(\frac{4\pi}{4}\right) + \cot\left(-\frac{5\pi}{6}\right)$ .
17. \_\_\_\_\_ If  $21859x + 14568 = 189440$ , then what is  $3278x - 453$ ?
18. \_\_\_\_\_ Evaluate the sum of the following infinite geometric series:  $\frac{3}{4} + \frac{9}{16} + \frac{27}{64} + \frac{81}{256} + \dots$
19. \_\_\_\_\_ What is  $2(1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 + 12 + 14 + 15 + 16 + 17 + 18 + 19 + 20) + 1$ ?
20. \_\_\_\_\_ Find the last digit of  $2021 \times 2019 \times 2017 \dots \times 2005$ ?