

1. Find the sum of the first twenty odd integers.

2. If $M = \begin{bmatrix} 1 & 0 & 1 \\ 2 & -2 & 1 \\ -1 & 0 & -3 \end{bmatrix}$. Evaluate $M' - M \cdot M^{-1}$.

3. ~~How many different three letter combinations can be made from the letters 'T', 'E', 'C', and 'H'?~~

4. Determine the number of positive integer factors of 151,200.

5. Three years ago, Rachel was 7 more than nine times Jacob's age. In four years, Rachel will be 4 less than four times Jacob's age. What is the sum of their ages now?

6. Find the sum of 3143_{five} and 2130_{five} . Express your answer in base ten.

7. Given that the *trace* of a square matrix is the sum of the elements along the main diagonal, find all values of x , such that the trace of matrix AB is 17.

$$A = \begin{bmatrix} 1 & x \\ x+1 & x-1 \end{bmatrix} \text{ and } B = \begin{bmatrix} x & 1 \\ x-1 & 2 \end{bmatrix}$$

8. Find $\frac{BC}{A}$

A = the probability of rolling a sum of seven on two fair, standard six-sided dice.

B = the probability of randomly selecting 2 red gumballs out of a bag containing 6 red and 4 blue gumballs.

C = the # of 5-person committees that can be formed from a group of 7 people.

9. Chris starts a test at noon and must stop working the first time the hands of the clock are 132° apart. How long can he work on the test?
10. Three girls are competing in the 1996 Olympic 100-meter race. In the heats, Ashley beat Wendy by 17-meters, and Amy lost to Wendy by 12-meters. To the nearest meter, by how many meters will Ashley beat Amy?
11. If $\log 2 = a$ and $\log 3 = b$, express $\log_6 120$ in terms of a and b .
12. Find the area of the polygon whose vertices are the x-intercepts of $y = x^2 - 2x - 3$ and the y-intercepts of $x = -y^2 - 2y + 8$.
13. Working alone, Pipe A can fill the new Olympic pool in 12 hours. Also working alone, Pipe B can fill the same Olympic pool in 18 hours. If the pool can be drained completely by Drain A in 24 hours, how long will it take (to the nearest minute) to fill the pool with Pipes A and B running and Drain A opened?
14. Find the sum of the following:

$$1 + \frac{2}{3} + \frac{3}{9} + \frac{4}{27} + \frac{5}{81} + \dots$$

15. Calculate: $A^B + \log_C D$

$$A = (\log_5 36)(\log_{\sqrt{6}} 5\sqrt{5})$$

$$B = \log 2\sqrt{2} + \log \sqrt{5} + \log 5\sqrt{10}$$

$$C = \left[(2^{\log 5}) (4^{\log 2\sqrt{5}}) - 1 \right]^{1/2}$$

$$D = 3 \log_{\sqrt{2}} 2\sqrt{2}$$