

No Calculators

Problems 1-2. Time limit 10 minutes.

- Find (in simplest form) the reciprocal of $\frac{2}{x} + \frac{7}{x+1}$. Write your answer as a single rational expression.
- The price of a VCR is reduced 20%. The next day, the price is reduced 20% again. The next day, it is reduced 20% again. By what percent has the original price been reduced after the third day?

Problems 3-4. 10 minutes.

- Define $x * y = 2x + y$. Compute $2 * (1 * ((3 * 1) * 2))$.
- (a classic) Arrange the four numbers below from smallest to largest:

$$2^{\frac{1}{2}}$$

$$3^{\frac{1}{3}}$$

$$5^{\frac{1}{5}}$$

$$6^{\frac{1}{6}}$$

Problems 5-6. 10 minutes.

- In a right triangle, the arithmetic mean of the legs is 10, and the geometric mean of the legs is 8. Find the length of the hypotenuse. Write the exact answer in simplified form $a\sqrt{b}$, where b contains no perfect square factors greater than 1, and a and b are positive integers.
- On the planet Skyron, every native is one of two types, a BLANC or a MONGE. Blancs always tell the truth and Monges always lie. As I approached three natives, the first native identified her type, but I couldn't hear. Turning to the second, I asked "What did the first native say?" The second native replied, "She said she was a Monge." Turning to native number 3 I inquired, "Are you the same type as number 1?" Number 3 said, "Yes." Turning to number 1 I queried, "What would you say about number 3?" Number 1 replied, "She always tells the truth." Which (if any) of the three natives are Monges?