

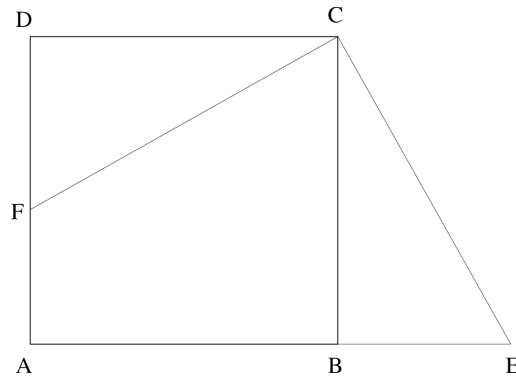
SAMPLE UNITO PROBLEMS (FROM PAST AMC-12 EXAMS)

(Note: No calculators are allowed in the AMC or UNitO.)

- (1) If $3(4x + 5\pi) = P$, then $6(8x + 10\pi) =$
 (A) $2P$ (B) $4P$ (C) $6P$ (D) $8P$ (E) $18P$
- (2) When simplified $\log 8 \div \log \frac{1}{8}$ becomes:
 (A) $6 \log 2$ (B) $\log 2$ (C) 1 (D) 0 (E) -1
- (3) The ratio of w to x is 4:3, of y to z is 3:2 and of z to x is 1:6. What is the ratio of w to y ?
 (A) $1 : 3$ (B) $16 : 3$ (C) $20 : 3$ (D) $27 : 4$ (E) $12 : 1$
- (4) $\frac{15^{30}}{45^{15}} =$
 (A) $\left(\frac{1}{3}\right)^{15}$ (B) $\left(\frac{1}{3}\right)^2$ (C) 1 (D) 3^{15} (E) 5^{15}
- (5) In 2001, the United States hosted the International Mathematical Olympiad. Let I , M , and O be distinct integers such that the product $I \cdot M \cdot O = 2001$. What is the largest possible value of the sum $I + M + O$?
- (6) On an auto trip, the distance read from the instrument panel was 450 miles. With snow tires on for the return trip over the same route, the reading was 440 miles. Find, to the nearest hundredth of an inch, the increase in radius of the wheels if the original radius was 15 inches.
 (A) 0.33 (B) 0.34 (C) 0.35 (D) 0.38 (E) 0.66
- (7) After finding the average of 35 scores, a student carelessly included the average with the 35 scores and found the average of these 36 numbers. The ratio of the second average to the true average was
 (A) $1 : 1$ (B) $35 : 36$ (C) $36 : 35$ (D) $2 : 1$ (E) None of these
- (8) The fourth power of $\sqrt{1 + \sqrt{1 + \sqrt{1}}}$ is
 (A) $\sqrt{2} + \sqrt{3}$ (B) $\frac{1}{2}(7 + 3\sqrt{5})$ (C) $1 + 2\sqrt{3}$ (D) 3 (E) $3 + 2\sqrt{2}$
- (9) If 2007^{2007} is multiplied out, the units' digit in the final product is:
 (A) 1 (B) 3 (C) 5 (D) 7 (E) 9
- (10) Thirty-one books are arranged from left to right in order of increasing prices. The price of each books differs by \$2 from that of each adjacent book. For the price of the book at the extreme right a customer can buy the middle book and an adjacent one. Then:
 (a) The adjacent book referred to is at the left of the middle book.
 (b) The middle book sells for \$36.
 (c) The cheapest book sells for \$4.
 (d) The most expensive book sells for \$64.
 (e) None of these is correct.

*Note: the original AMC problem asked for the units' digit in 2137^{753} .

- (11) Point F is taken in side AD of square $ABCD$. At C a perpendicular is drawn to CF , meeting AB extended at E . The area of $ABCD$ is 256 square inches and the area of CEF is 200 square inches. Then the length of BE (in inches) is equal to:
- (A) 12 (B) 14 (C) 15 (D) 16 (E) 20

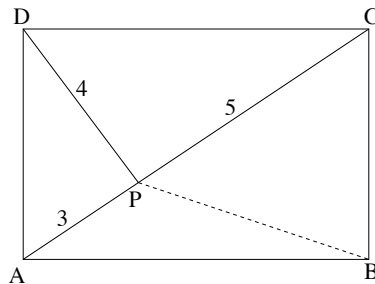


- (12) If

$$f\left(\frac{x}{x-1}\right) = \frac{1}{x} \quad \text{for all } x \neq 0, 1$$

and $0 < \theta < \pi/2$, then $f(\sec^2 \theta) =$

- (A) $\sin^2 \theta$ (B) $\cos^2 \theta$ (C) $\tan^2 \theta$ (D) $\cot^2 \theta$ (E) $\csc^2 \theta$
- (13) P is a point interior to rectangle $ABCD$ and such that $PA = 3$ inches, $PD = 4$ inches, and $PC = 5$ inches. Then PB , in inches, equals:
- (A) $2\sqrt{3}$ (B) $3\sqrt{2}$ (C) $3\sqrt{3}$ (D) $4\sqrt{2}$ (E) 2



- (14) In this figure $\angle RFS = \angle FDR$, $FD = 4$ inches, $DR = 6$ inches, $FR = 5$ inches, $FS = 7\frac{1}{2}$ inches. The length of RS , in inches, is:

- (A) undetermined (B) 4 (C) $5\frac{1}{2}$ (D) 6 (E) $6\frac{1}{4}$

