Practice Fermat Number 3

1. The largest angle in a **scalene** triangle is $75^\circ$. The other 2 angles, when measured in degrees, are integers. Determine the smallest possible value of the smallest angle in the triangle, in degrees
   a) 29  b) 1  c) 15  d) 31  e) 59

2. Four positive integers, $a$, $b$, $c$ and $d$ satisfy the relations $5a = 3b$, $2b = 3c$ and $2c = d$. The smallest possible sum $a + b + c + d$ is:
   a) 24  b) 36  c) 52  d) 64  e) 54

3. If $a^2 + b^2 = 89$ and $ab = 40$ a possible value for $a - b$ is:
   a) 2  b) 3  c) 5  d) 8  e) 13

4. The smallest integer $N$ so that the product of 432 and $N$ is a perfect square is
   a) 2  b) 3  c) 6  d) 12  e) 48

5. Triangle $ABC$ has $AB = 24$ and $AC = 36$. Points $D$ and $E$ are chosen on $AC$ and $AB$ respectively so that $AD = 24$ and $AE = 16$. What is the ratio of the area of $\triangle AED$ to the area of $\triangle ABC$?
   a) 2:3  b) 3:7  c) 4:9  d) 5:13  e) 6:17

6. If $a$, $b$, $c$, and $d$ are digits and “$ab$”×“$cb$” = “ddd” determine the sum “$ab$”+ “$cb$”.
   (Note: “$ab$” is the 2 digit number with digits $a$ and $b$.)
   a) 49  b) 52  c) 64  d) 72  e) 80

7. There are integer values of $a$ and $b$ such that the quadratic equation $x^2 + ax + b = 0$ has distinct roots $a$ and $b$. Determine $a + b$
   a) $-1$  b) 0  c) 1  d) 2  e) 3

8. Which of the following has the largest area?
   a) A square of side 3.5.
   b) A rectangle of length 4 and width 3.
   c) A triangle with sides 5, 5 and 6.
   d) A trapezoid with sides 3, 2, 3 and 6 where the parallel sides are of length 2 and 6.
   e) A semicircle of radius 3

9. Determine the number divisors of $30^{30}$ that are perfect squares, including 1 and the number itself.
   a) 4096  b) 3375  c) 29791  d) 1024  e) 900
10. Two circles intersect perpendicularly. In other words, if \( C \) is a point of intersection and \( A \) and \( B \) are the centres of the 2 circles, then the radii \( AC \) and \( BC \) are perpendicular to each other. If the radii of the circles are 3 and \( \sqrt{3} \) what is their area of overlap?

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\text{a) } \frac{5}{2} \pi - 3\sqrt{3} \quad \text{b) } \frac{7}{2} \pi - 4\sqrt{3} \quad \text{c) } \frac{9}{2} \pi - 5\sqrt{3} \quad \text{d) } \frac{5}{2} \pi - 2\sqrt{3} \quad \text{e) } \frac{7}{2} \pi - 3\sqrt{3}
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