Math Field Day

Mad Hatter A sample questions - 2

1. $\dfrac{254 \times 399 - 145}{254 + 399 \times 253} =$
   (a) 253,254
   (b) 1
   (c) 0.5
   (d) 254^2
   (e) 399
2. If $a = 5$ and $b = 25$, then $a^2(a + b^2)(a^4 - b^{10})(a^2 - b) =$
   (a) 0
   (b) 1
   (c) 5
   (d) 25
   (e) 1/5
3. Factor: $a^3 + 2a^2 - 3 =$
   (a) $(a - 1)(a^2 + 3a - 3)$
   (b) $(a - 1)(a^2 - 3a - 3)$
   (c) $(a + 1)(a^2 - 3a + 3)$
   (d) $(a - 1)(a^2 - 3a - 3)$
   (e) $(a - 1)(a^2 + 3a + 3)$
4. Find the sum of the squares of the roots of the equation $ax^2 + bx + c = 0$:
   (a) $-b$
   (b) b
   (c) b^2
   (d) $(b - a)^2$
   (e) $(b^2 - 2ac)/a^2$
5. Simplify: $-\log_2 \log_2 \sqrt{\sqrt[4]{2}}$
   (a) 1
   (b) $\sqrt{2}$
   (c) $\sqrt[4]{2}$
   (d) 3
   (e) 2

6. ABC is a right triangle, C is its right angle, CH is the corresponding height, and CD is the corresponding bisector. The angle between CH and CD is 12^o. Find the acute angles of the triangle ABC.
   (a) $12^o,\ 78^o$
   (b) $33^o,\ 57^o$
   (c) $30^o,\ 60^o$
   (d) $45^o,\ 45^o$
   (e) $12^o,\ 75^o$
7. $\frac{1}{20}+\frac{1}{30}+\frac{1}{42}+\frac{1}{56}+\frac{1}{72}+\frac{1}{90}+\frac{1}{110}+\frac{1}{132}=$
   (a) $\frac{1}{6}$
   (b) 1
   (c) 0.1
   (d) 0.5
   (e) 2/7
8. Find the greatest possible number of diagonals that can be drawn in a polygon with 103 sides.
   (a) 103
   (b) 206
   (c) 1030
   (d) 5150
   (e) None of the above
9. What is greater: m or n?
   $m=4+\frac{5}{8}+\frac{6}{8^2}+\frac{3}{8^3}+\frac{7}{8^4}$
   $n=4+\frac{5}{8}+\frac{5}{8^2}+\frac{7}{8^3}+\frac{6}{8^4}$
   (a) m
   (b) n
   (c) $m=n$
   (d) Undefined
   (e) None of the above

10. The base of an isosceles triangle is 16 cm, and the lateral side is 10 cm. Find the radius of the inscribed circle.
    (a) 8 cm
    (b) 8/3 cm
    (c) 16 cm
    (d) 4.5 cm
    (e) 2 cm
11. In the proportion $x_1 : x_2 = x_3 : x_4$, the sum of the first three numbers is 58. The third number is equal to 2/3 of the first number, and the second number is equal to 3/4 of the first number. Find the fourth number x_4.
    (a) 12
    (b) 58
    (c) 10
    (d) 15
    (e) 20
12. Simplify: $\tan 255^o - \tan 195^o =$
    (a) $2\sqrt{3}$
    (b) $3\sqrt{2}$
    (c) $-2\sqrt{3}$
    (d) $\tan 60^o$
    (e) None of the above