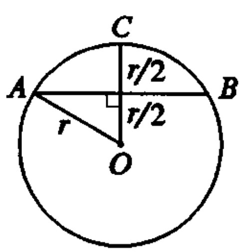
The following were changed at the resolution center at the convention: 14 D, 21 D, 24 A

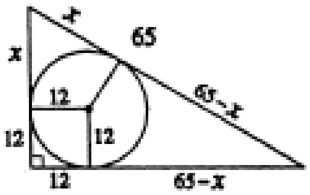
1. D: 2^{3^2} exponents are right associative. $2^9 = 512$
2. C: The distance of $3-4i$ to the origin is 5.
3. B Change of base rule: $\frac{\log_3 9^{\frac{1}{3}}}{\log_3 3^{\frac{1}{2}}} = \frac{\log_3 3^{\frac{2}{3}}}{\log_3 3^{\frac{1}{2}}} = \frac{\frac{2}{3}\log_3 3}{\frac{1}{2}\log_3 3} = \frac{4}{3}$
4. C: (a+bi)+(a-bi) = 2a. A: No a could be 0. B: No (no i) D
5. E: use the Harmonic mean $\frac{2}{\frac{1}{40}+\frac{1}{50}} = \frac{400}{9} = 44.4$
6. C 122121 → 577 → 19
7. A **7** 7^2 = 4**9** 7^3 = 34**3** 7^4=240**1** cycles 7,9,3,1 42 mod 4 = 2 **9**
   2^7 = 12**8** so 8+9 = 17 answer **7**
8. D repeated div 625 / 5 = 125 125/5 = 25 25/5 = 5 5/5 = 1 125+25+5+1 = 156
9. A replace x,y and z with 1 (2+3-3)^10 = 2^10 = 1024
10. B $\sqrt{34-24\sqrt{2}} = a+b\sqrt{2} \to 34-24\sqrt{2} = a^2+2b^2+2ab\sqrt{2} \to a^2+2b^2 = 34, ab = -12$ by substitution of $b = -\frac{12}{a}$ leads to $a^4 - 34a^2 + 288 = 0$ a=±4 or $a = \pm 3\sqrt{2}$ so
$a+b\sqrt{c} = 4-3\sqrt{2}$ or $-4+3\sqrt{2}$ we need the positive answer so $-4+3\sqrt{2}$ so a+b+c=1
11. C 9886^2 = (9887-1)^2 = 9887^2 – 2* 9887 + 1 = 97752769 – 2*9887+1 = 97732996
    sum of the digits is 52
12. A x = 3.192192… 1000x = 3192.192… subtract 999x = 3189 x = 3189/999 reduce 1063/333 sum 1396
13. A

Draw $\overline{AO}$, forming a 30°-60°-90° right triangle. Since the length of the leg opposite the 60° angle is $3\sqrt{3}$, the length of the radius is 6 and the area of the circle is $\boxed{36\pi}$.

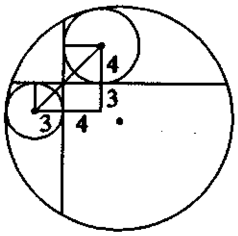


The following were changed at the resolution center at the convention: 14 D, 21 D, 24 A

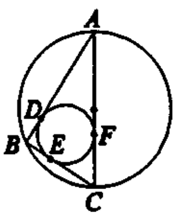
14. C In the diagram, the sides of the square are 12. Let the segments of the hypotenuse be x and 65-x. Since tangents drawn to a circle from the same outside point are congruent, two segments have length x and two have length 65-x, The perimeter of the triangle is 24 + 2(65-x) + 2x = 154



15. C As can be seen in the figure, the distance between the centers is the length of the hypotenuse of an isosceles right triangle with legs 7. $7\sqrt{2}$



16. A Let CF = x. Since the diameter of the circle is 20, AF = 20-x. Tangents to a circle from the same outside point are congruent, so AD=AF=20-x, and CE=CF=x. Since the perimeter of triangle ABC is 42, EB+BD+AD+AF+CF+CE=EB+BD+40=42 so EB+BD = 2



17. B The nth row of Pascal's triangle (start counting at 0) has a sum of 2^n.

18 E Both -2 and -1 must be excluded

19. C $(1\otimes 2)\otimes 3=\left(1+2-3\left(\frac{1}{2}\right)\right)\otimes 3=\frac{3}{2}\otimes 3=\frac{3}{2}+3-3\left(\frac{\frac{3}{2}}{3}\right)=3$

20. E: Harmonic Series diverges.

21: E $\frac{5!}{2}$

22. D f(-1) = 9 + 2 -4 -6 -2 – 1 = -2

23. A $\frac{1}{1\cdot 2\cdot 3}+\frac{2}{2\cdot 3\cdot 4}+\frac{3}{3\cdot 4\cdot 5}+\cdots+\frac{98}{98\cdot 99\cdot 100}=\frac{1}{2\cdot 3}+\frac{1}{3\cdot 4}+\frac{1}{4\cdot 5}+\cdots+\frac{1}{99\cdot 100}$

The following were changed at the resolution center at the convention: 14 D, 21 D, 24 A

These terms are from a telescoping series

$\frac{1}{n(n+1)}=\frac{1}{n}-\frac{1}{n+1}$ so series turns into $\frac{1}{2}-\frac{1}{3}+\frac{1}{3}-\frac{1}{4}+\ldots\frac{1}{99}-\frac{1}{99}+\frac{1}{100}=\frac{1}{2}-\frac{1}{100}=\frac{50-1}{100}=\frac{49}{100}$ so a+b=149

24. B $\begin{vmatrix} 3 & 2 & 7 \\ k & -1 & k \\ 0 & 1 & -4 \end{vmatrix} = -2k+4$

3*4+7k+0 – (0 +3k -8k) = -2k + 4 → 12 + 7k +5k = -2k+4 → 12+12k=-2k+4 k = -4/7

25. D Center is (4,3) radius is $\sqrt{7}$

26. D. ln(?)=0 → $\log_2(\log_3 x)=1$ → $\log_3 x = 2$ → $x=9$

27. A $\begin{matrix} 2x+7x=3 \\ -2x+2y=6 \end{matrix}$ → 9y=9 → y=1 → 2x+7=3→ x=-2 x+y = -1

28. A a = 2b/3 b=5c/7 so a=10c/21 → a/c = 10/21

29. C x^2 8! = 9! → x^2 = 9 so x=+3 -3

30. A f(5) = 2 f(2) = 1 f(1) = 4 and f(4) = 0