1. $a + (4\frac{1}{3})a = 64 \Rightarrow a = 12$ (Answer: C)

2. $(3(2)+2)\Delta(2(3)+3) = 8\Delta 9 = 8(9)+9 = 81$ (Answer: D)

3. Let a be the length of the rectangle, let b be the side of the square—the side of the entire design is then $a + a - b \Rightarrow b^2 = \frac{4}{9}(2a-b)^2 \Rightarrow b = \frac{2}{3}(2a-b) \Rightarrow \frac{a}{b} = \frac{5}{4}$ (Answer: A)

4. Six reports per hour $\Rightarrow 6 \times 24 \times 7 = 1008$ (Answer: A)

5. Let d be the number of dimes, so she has $24 - d$ nickels. $1.72 < 0.10d + 0.05(24-d) < 2.11 \Rightarrow 10.4 < d < 18.2 \Rightarrow 11$ dimes (Answer: B)

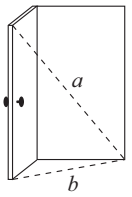
6. $A_{TUVW} = A_{PQRS} - 4 \cdot A_{\triangle \mathrm{PTW}} = 100 - 4(\frac{1}{2}(8)(2)) = 68$ (Answer: E)

7. $s - 16 = \dfrac{s(12)}{60} \Rightarrow s = 20$ (Answer: D)

8. $\dfrac{A+2B}{2} = 7$, $\dfrac{A+2C}{2} = 8 \Rightarrow \dfrac{2A+2B+2C}{2} = 15 \Rightarrow A+B+C = 15 \Rightarrow \dfrac{A+B+C}{3} = 5$ (Answer: C)

9. Trial and error. Looking at a list of perfect squares reveals: AMATYC = 898,704 = 948^2 (Answer: E)

10. From the figure shown, $b = \sqrt{4^2+4^2} = \sqrt{32}$ then $a = \sqrt{7^2+b^2} = 9$ (Answer: B)



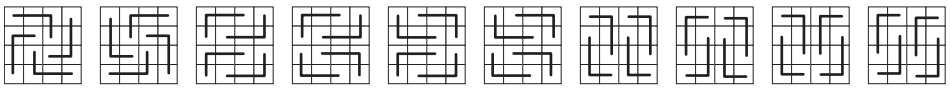
Problem 10

11. $M = \frac{3}{2}F$, $\dfrac{F+3}{M+F} = 0.44 \Rightarrow \dfrac{F+3}{\frac{3}{2}F+F} = 0.44 \Rightarrow F = 30$, $M = 45$ (Answer: C)

12. $2! \cdot 3! \cdot 3! = 72$ (Answer: B)

13. $N + 4n^2 = M \Rightarrow N(1+4N) = M$, M is prime iff $N = \pm 1$ (Answer: C)

14. (16, 9), (15, 10), (14, 11), (13, 12), (8, 1), (7, 2), (6, 3), (5, 4); largest diff. is $16 - 9 = 8 - 1 = 7$ (Answer: B)

15.  (Answer: E)

16. 7 is the smallest integer that is not a factor of 360° (Answer: E)

17. (Answer: B)

18. Add to get $rs + r + t + st = 27 \Rightarrow (s+1)(r+t) = 27$, $s+1$ must be a factor of 27 which gives possible answers for s: 0, 2, 8, 26. This leads to the only possible ordered triples: $(13, 0, 14)$ and $(5, 2, 4)$. (Answer: A)

19. $\dfrac{n^2 + (n+1)^2 + (n+2)^2 + ... + (n+16)^2}{17} = n^2 + 16n + 88 = (n^2 + 16n + 64) + 24 \Rightarrow k = 24$ (Answer: D)

20. Law of sines gives: $\dfrac{9}{\sin\theta} = \dfrac{SL}{\sin 2\theta} \Rightarrow SL = \dfrac{9 \sin 2\theta}{\sin\theta} = 18\cos\theta$, law of cosines gives: $81 = SL^2 + 49 - 14(SL)\cos\theta$, substitute $\cos\theta = \dfrac{SL}{18}$ into this equations and solve for SL. (Answer: C)