SAMO Grade 9 First Round 2014 – Solutions

1. **C** The triangle is isosceles, so its vertical angle must be $180° - 2\times 65° = 50°$.
x is what remains of a complete revolution once we subtract this 50° and also two right angles, and is thus $360° - 50° - 180° = 130°$

2. **A** $42 = 2 \times 3 \times 7$, and $2 + 3 + 7 = 12$

3. **D** $\sqrt{\dfrac{60.01}{0.98} + 3.96} \approx \sqrt{\dfrac{60}{1} + 4} = \sqrt{60+4} = 8$

4. **C** The value is $5^2 - 6 = 25 - 6 = 19$

5. **E** $\sqrt{(9)^{\sqrt{4}} \times \left(\sqrt{9}\right)^4} = \sqrt{9^2 \times 3^4} = 9 \times 3^2 = 81$

6. **D** There are two triangles of equal area of $\frac{1}{2}(4)(8)$. Their combined area is therefore 32 with a common overlap of $\frac{1}{2}(4)(4) = 8$. So the area of the shaded region is equal to $32 - 8 = 24$

7. **C** By Pythagoras the diagonal of the rectangle must have length 10 cm; this is therefore the radius of the circle. The shaded area is ¼ area of circle – area of rectangle
$= \frac{1}{4}\pi.10^2 - 6.8 = 25\pi - 48$.

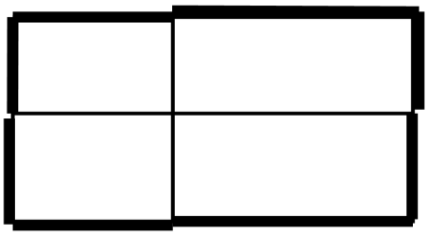
8. **A** $C\hat{P}B = \hat{C} = 70°$, and $\hat{A} = 180° - 2(70°) = 40°$. Since $C\hat{P}B = \hat{A} + x$, that means $x = 70° - 40° = 30°$.

9. **E** $w = 2 - 3 = -1$, and then $x = -1 + 5 = 4$

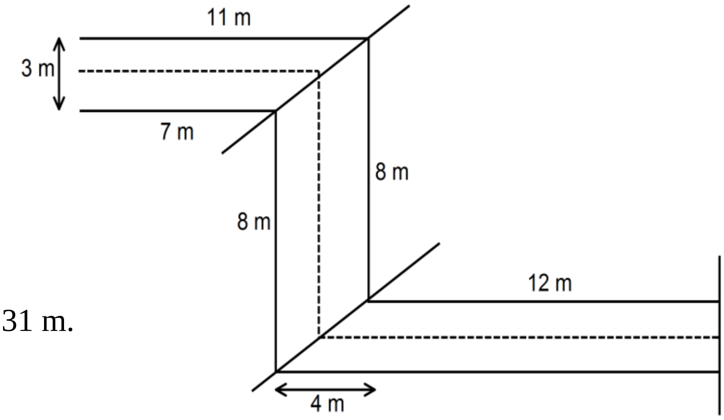
10. **D** For his average over five weeks to be 60 km he needs to have run a total of $5 \times 60 = 300$ km over the five weeks. The graph shows that he ran $20 + 60 + 100 + 40 = 220$ km in the first four weeks, and so he must run $300 - 220 = 80$ km in the fifth week.

11. **D** With each die having six possible results, there are $6 \times 6 \times 6$ results for the three dice in combination. There are only 6 ways in which the dice can all show the same number, so the required probability is $\frac{6}{6\times6\times6} = \frac{1}{36}$

12. **A** For each small rectangle, half its perimeter lies along the edges of the big rectangle. The total of the four small perimeters will thus be twice the perimeter of the large rectangle, so that perimeter must be ½ (4 + 5 + 6 + 7) = 11



13. **C** We note that the vertical section of the corridor has width 11 – 7 = 4 m. The top dotted line has length $\frac{1}{2}(7 + 11) = 9$ m. The vertical dotted part has length 8 m. The bottom horizontal part has length $\frac{1}{2}[12 + (12 + 4)] = 14$ m. Adding these gives the total length of the dotted path as 31 m.



14. **B** ΔADQ and ΔABP are each $\frac{1}{4}$ the area of ABCD, and ΔPCQ is $\frac{1}{8}$ of the area of ABCD.
So ΔAPQ $1-\frac{1}{4}-\frac{1}{4}-\frac{1}{8}=\frac{3}{8}$ of the area of ABCD = $\frac{3}{8}$ of 72 cm^2 = 27 cm^2

15. **A** BC : CD = 9 : 5 = $9k : 5k$ while AB : BC = 1 : 3 = $3k : 9k$.
Then AB : BD = $3k : (9k + 5k)$ = 3 : 14

16. **B** $65^2 - 63^2 = (65 - 63)(65 + 63) = 2 \times 128 = 256 = 16^2$.
Now $20^2 - 16^2 = 400 - 256 = 144$.

17. **D** The last digit of 5^n is always 5; the last digits of 2^n form the repeating sequence 2; 4; 8; 6; 2; 4; … and so the last digit of the differences forms the sequence 3; 1; 7; 9; 3; … which repeats every four times. To achieve a last digit of 7 we need n to leave a remainder of 3 on division by 4, and only 103 among the given options does that.

18. **E** Let the side length of each square be x cm. AEFC is a trapezium with area $= \frac{1}{2}(2x)(\text{AE}+\text{CF}) = 56x =$ area EBFD. This is half the area made up of 7 squares, therefore $7x^2 = 112x \Rightarrow x = 16$ and so the area of each square is $16 \times 16 = 256\ \text{cm}^2$

19. **B** Let the 2-digit number be $10x + y$. Then $x + y + 5 = 2(x + y)$, so $x + y = 5$.
The possible original numbers are therefore 14, 41, 23, 32 and 50.

20. **C** It must be that the total area of the rectangle is equal to the area of the semicircle. Since the circle has radius 1, that means PS × 2 = ½ $\pi(1)^2$, so that 4.PS = π and therefore PS = $\pi/4$