OLD MUTUAL SOUTH AFRICAN

MATHEMATICS OLYMPIAD

Grade EIGHT First Round 2020

Solutions

1. **E** $\frac{2020}{202} = \frac{202\times10}{202} = 10$

2. **A** $60 \times 20 = 1200$ seconds

3. **B** $\sqrt{2 \times 10 \times 2 \times 10} = \sqrt{20 \times 20} = \sqrt{20^2} = 20$

4. **C** The train leaves at 20:40 and takes 20 minutes, arriving at its destination at 21:00.

5. **E** 20 m = 2000 cm and 2000 cm $\div$ 20 cm = 100.

6. **E** Each small gradation on the ruler is 0,002 cm. Thus A is at 3,14 – 0,002 = 3,138.

7. **B** $\frac{20°}{360°} = \frac{1}{18}$

8. **D** Each square has area $2 \times 2 = 4\ cm^2$. We can subdivide the shaded area into 6 squares, 4 half-square triangles (each with area $2\ cm^2$), and a 6 cm by 2 cm triangle (with area 6 cm^2). The total area is thus: $6 \times 4 + 4 \times 2 + 6 = 38\ cm^2$.

9. **D** There are ten different products:
$1\times2\,;1\times3\,;1\times4\,;1\times5\,;\,2\times3\,;\,2\times4\,;\,2\times5\,;\,3\times4\,;\,3\times5\,;\,4\times5.$
Seven of these products have at least one even factor. The probability that the product is even is thus $\frac{7}{10}$.

10. **E** 6 tins each contain 6 litres. 4 tins each contain 4 litres. The remaining 2 tins each contain 2 litres. $6\times6+4\times4+2\times2=56$ litres.

11. **C** Each side of the 50th triangle contains 50 dots. However, the dots at each vertex would have been counted twice, thus $3 \times 50 - 3 = 147$.

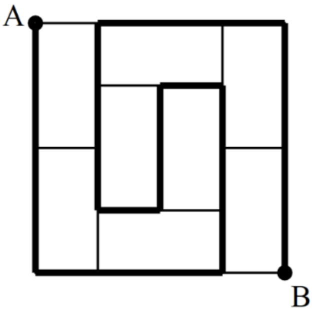
12. **A** The sum of the five integers is $5 \times 9 = 45$. For one of the integers to be as large as possible, the other four need to be as small as possible. Since all the integers need to be different, the four smallest integers would need to be 1, 2, 3 and 4. The greatest possible integer would thus be $45 - (1 + 2 + 3 + 4) = 35$.

13. **B** At the start of the second day he had $32 \times \frac{10}{8} = 40$ sweets, and at the start of the first day he had $40 \times \frac{10}{8} = 50$ sweets.

14. **A** The largest amount possible is $4 \times R100 + 3 \times R50 + 3 \times R20 + 3 \times R10 = R640$.

15. **D** Note that 8 + a + b = K, 10 + c = K, 11 + d = K, and 13 + e + f = K. We thus have: 4K = 42 + a + b + c + d + e + f = 42 + (2 + 4 + 5 + 6 + 8 + 9) = 76. Thus K = 19.

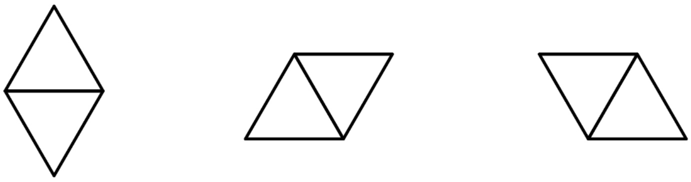
16. **D** $7 \times 2 + 10 \times 1 = 24$ cm.



17. **C** Note that $9 = 3^2$, $10 = 2 \times 5$ and $12 = 2^2 \times 3$. The lowest number divisible by all three of the numbers 9, 10 and 12 is thus $2^2 \times 3^2 \times 5 = 180$. There are 5 multiples of 180 which are 3-digit numbers.

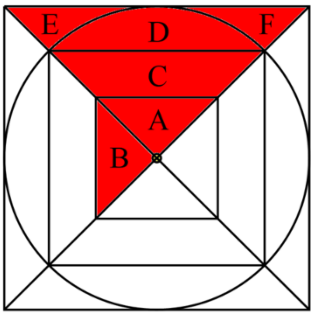
18. **B** For every 60 minutes that passed, the clock only moved forward by 55 minutes. From when the clock showed 6 a.m. to when the clock showed 5 p.m. a total of $11 \times \frac{60}{55} = 12$ hours would have passed in real time. The clock thus stopped when the actual time was 6 p.m. The correct time now is thus 8 p.m.

19. **C** There are three different possible orientations for rhombuses formed from two adjacent small triangles:



The grid contains six rhombuses in each of these three orientations, making a total of 18 rhombuses.

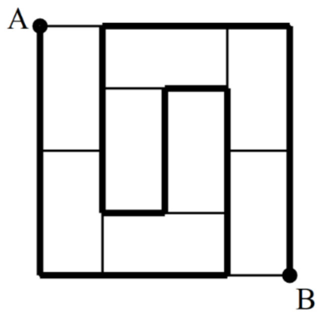
20. **A** Move the shaded areas as shown. The regions A, C, D, E and F represent a quarter of the largest square and thus have combined area $\frac{1}{4} \times 20^2 = 100$ cm^2. B thus has area 36 cm^2. Since B is a quarter of the smallest square, the smallest square must have area 144 cm^2, and thus side length of 12 cm and perimeter 48 cm.



14. **A** Die grootste bedrag is $4 \times R100 + 3 \times R50 + 3 \times R20 + 3 \times R10 = R640$.

15. **D** Let op dat 8 + a + b = K, 10 + c = K, 11 + d = K, en 13 + e + f = K. Ons het dus:
4K = 42 + a + b + c + d + e + f = 42 + (2 + 4 + 5 + 6 + 8 + 9) = 76. Dus K = 19.

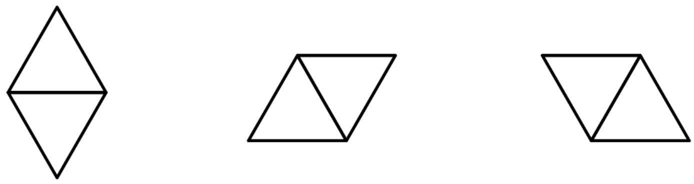
16. **D** $7 \times 2 + 10 \times 1 = 24$ cm.



17. **C** Let op dat $9 = 3^2$, $10 = 2 \times 5$ en $12 = 2^2 \times 3$. Die kleinste getal deelbaar deur al drie van die getalle 9, 10 en 12 is dus $2^2 \times 3^2 \times 5 = 180$. Daar is 5 veelvoude van 180 wat 3-syfer getalle is.

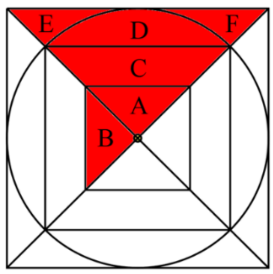
18. **B** Vir elke 60 minute wat verloop het, het die horlosie met slegs 55 minute aangeskuif. Vandat die horlosie 6 vm. getoon het totdat die horlosie 5 nm. getoon het, het ’n totaal van $11 \times \frac{60}{55} = 12$ ure in werklike tyd verloop. Die horlosie het dus gestop toe die werklike tyd 6 nm. was. Die werklike tyd is dus nou 8 nm.

19. **C** Daar is drie verskillende oriëntasies van ruite gevorm deur twee aangrensende klein driehoeke:



Die rooster bevat ses ruite in elk van hierdie oriëntasies, wat ’n totaal van 18 ruite gee.

20. **A** Verskuif die ingekleurde gebiede soos aangetoon. Die gebiede A, C, D, E en F verteenwoordig ’n kwart van die grootste vierkant en het dus ‘n area van $\frac{1}{4} \times 20^2 = 100$ cm^2. B het dus ‘n area van 36 cm^2. Aangesien B ’n kwart van die kleinste vierkant is moet die kleinste vierkant ’n area van 144 cm^2 hê en dus ’n sylengte van 12 cm en omtrek van 48 cm hê.



OLD MUTUAL SUID-AFRIKAANSE
WISKUNDE OLIMPIADE
Graad AGT Eerste Ronde 2020
Oplossings

1. **E** $\frac{2020}{202} = \frac{202\times10}{202} = 10$

2. **A** $60 \times 20 = 1200$ sekondes

3. **B** $\sqrt{2 \times 10 \times 2 \times 10} = \sqrt{20 \times 20} = \sqrt{20^2} = 20$

4. **C** Die trein vertrek 20:40 en neem 20 minute en kom 21:00 by sy bestemming aan.

5. **E** 20 m = 2000 cm en 2000 cm $\div$ 20 cm = 100.

6. **E** Elke klein afmeting op die liniaal is 0,002 cm. Dus is A by 3,14 – 0,002 = 3,138.

7. **B** $\frac{20°}{360°} = \frac{1}{18}$

8. **D** Elke vierkant het 'n oppervlakte van $2 \times 2 = 4\ cm^2$. Ons kan die ingekleurde gebied dus opdeel in 6 vierkante, 4 driehoeke gevorm deur gehalveerde vierkante (elk met oppervlakte van $2\ cm^2$) en 'n 6 cm by 2 cm driehoek (met oppervlakte van $6\ cm^2$). Die totale oppervlakte is daarom $6 \times 4 + 4 \times 2 + 6 = 38\ cm^2$.

9. **D** Daar is tien verskillende produkte:
$1\times2\,;1\times3\,;1\times4\,;1\times5\,;2\times3\,;2\times4\,;2\times5\,;3\times4\,;3\times5\,;4\times5.$
Sewe van hierdie produkte het ten minste een ewe faktor. Die waarskynlikheid dat die produk ewe is, is dus $\frac{7}{10}$.

10. **E** 6 Verfblikke bevat elk 6 liter. 4 Verfblikke bevat elk 4 liter. Die oorblywinde 2 verfblikke bevat elk 2 liter. $6\times6+4\times4+2\times2=56$ liter.

11. **C** Elke sy van die 50ste driehoek bevat 50 kolletjies, maar die kolletjies by elke hoek is twee keer getel. Dus $3 \times 50 - 3 = 147$.

12. **A** Die som van die vyf heelgetalle is $5 \times 9 = 45$. Vir een van die heelgetalle om so groot as moontlik te wees moet die ander vier so klein as moontlik wees. Aangesien al die heelgetalle verskillend moet wees moet die vier kleinste heelgetalle 1, 2, 3 en 4 wees. Die grootste moontlike heelgetal is dus $45 - (1 + 2 + 3 + 4) = 35$.

13. **B** In die begin van die tweede dag het hy $32 \times \frac{10}{8} = 40$ lekkers en in die begin van die eerste dag het hy $40 \times \frac{10}{8} = 50$ lekkers.