UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

UP MATHEMATICS COMPETITION

Department of Mathematics and Applied Mathematics

Departement Wiskunde en Toegepaste Wiskunde

GRADES 8 AND 9

26 July – 1 Aug 2021

TIME: 2 HOURS

GRADE 8 EN 9

26 July – 1 Aug 2021

TYD: 2 URE

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Denkleiers • Leading Minds • Dikgopolo tša Dihlalefi

Leading Minds

Question 1

Recall that $1.2\overline{34} = 1.234343434\ldots$ Which of the following is closest to 1?

(**A**) $0.\overline{95}$ (**B**) $1.\overline{05}$ (**C**) $1.\overline{040}$ (**D**) $0.9\overline{5}$ (**E**) $0.\overline{960}$

Vraag 1

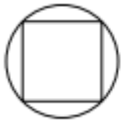
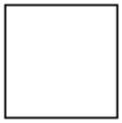
Onthou dat $1.2\overline{34} = 1.234343434\ldots$ Watter van die volgende getalle is die naaste aan 1?

Question 2

Which one of the following figures cannot be drawn without lifting your pen off the page and without drawing along the same line twice?

Vraag 2

Watter een van die volgende figure kan nie geteken word sonder om jou pen op te lig nie en ook nie twee keer oor dieselfde lyn te trek nie?

A  B  C  D  E 

Question 3

What is the remainder when 1234×5678 is divided by 5?

(**A**) 0 (**B**) 1 (**C**) 2 (**D**) 3 (**E**) 4

Vraag 3

Wat is die res as 1234×5678 deur 5 gedeel word?

Question 4

What is the value of $(4 - \frac{1}{4}) \div (2 - \frac{1}{2})$?

(**A**) $\frac{27}{8}$ (**B**) $\frac{3}{2}$ (**C**) 2 (**D**) $\frac{5}{2}$ (**E**) 3

Vraag 4

Wat is die waarde van $(4 - \frac{1}{4}) \div (2 - \frac{1}{2})$?

Question 5

Aneesu do not like multiples of 3. She counts $1, 2, 4, 5, 7, 8, 10, 11, \ldots$ avoiding multiples of 3. Note that the 5th number on the list is 7. What is the 55th number on her list?

(**A**) 79 (**B**) 82 (**C**) 83 (**D**) 85 (**E**) None of these/Geen van hierdie

Vraag 5

Aneesu hou nie van veelvoude van 3 nie. Sy tel $1, 2, 4, 5, 7, 8, 10, 11, \ldots$ en vermy veelvoude van 3. Let op dat die 5de getal op die lys is 7. Wat is die 55ste getal op haar lys?

Question 6

$2021-2020+2019-2018+\ldots+5-4+3-2+1$ equals

(**A**) 0 (**B**) 1 (**C**) 1010 (**D**) 1011 (**E**) None of these/Geen van hierdie

Vraag 6

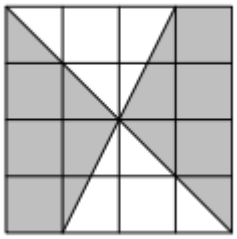
$2021-2020+2019-2018+\ldots+5-4+3-2+1$ is gelyk aan

Question 7

What fraction of the figure is shaded?

Vraag 7

Watter breuk van die figure is ingekleur?



(**A**) $\frac{13}{16}$ (**B**) $\frac{13}{32}$ (**C**) $\frac{1}{2}$ (**D**) $\frac{9}{16}$ (**E**) $\frac{5}{8}$

Question 8

The value of $2^4 4^8 8^{16}$ is

Vraag 8

Die waarde van $2^4 4^8 8^{16}$ is

(**A**) 2^{16} (**B**) 2^{52} (**C**) 2^{68} (**D**) 2^{84} (**E**) 2^{92}

Question 9

On the highway to Pretoria, the speed limit is 120 km/h. The fine for exceeding this speed is $R105$ for each km/h. If the fine received is $R9450$, at what speed was the motorist driving?

Vraag 9

Op die snelweg na Pretoria, is die spoedgrens 120 km/h. Die boete as jy die spoed oorskry is $R105$ vir elke km/h. As die boete $R9450$ is, teen watter spoed het die bestuurder gery?

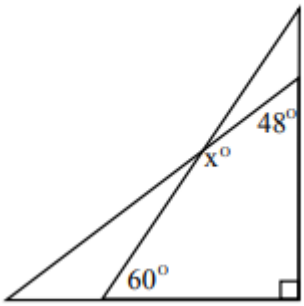
(**A**) $180\,km/h$ (**B**) $190\,km/h$ (**C**) $200\,km/h$ (**D**) $210\,km/h$ (**E**) $220\,km/h$

Question 10

Find the value of x in the diagram below.

Vraag 10

Bepaal die waarde van x in die diagram hieronder.



(**A**) 162 (**B**) 108 (**C**) 138 (**D**) 158 (**E**) 152

Question 11

If $\frac{7}{u} - \frac{5}{4} = \frac{5}{6}$, then u equals

Vraag 11

As $\frac{7}{u} - \frac{5}{4} = \frac{5}{6}$, dan is u gelyk aan

(**A**) 3.16 (**B**) 3.26 (**C**) 3.36 (**D**) 3.46 (**E**) 3.56

Question 12

Let a, b, and c be real numbers such that $c < a < 0 < b$. Which of the following is a positive real number? (That is a real number bigger than zero.)

Vraag 12

Laat a, b en c reële getalle wees sodat $c < a < 0 < b$. Watter een van die volgende is 'n positiewe reële getal? (Dit is 'n reële getal groter as nul.)

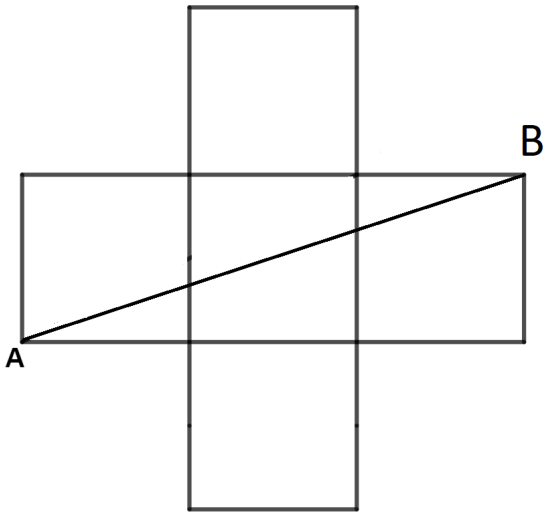
(**A**) $(c-a)\,b$ (**B**) a^3bc^2 (**C**) $(b-c)a$ (**D**) a^2bc (**E**) ab^2c^3

Question 13

The figure below consists out of 5 squares. If $AB = 30$ meters, what is the area of the entire figure in meter squares?

Vraag 13

Die figuur hieronder bestaan uit 5 vierkante. As $AB = 30$ meter, wat is die oppervlakte van die hele figuur in vierkante meter?



(**A**) 300 (**B**) 450 (**C**) 400 (**D**) 900 (**E**) 500

Question 14

In the sequence $a, b, c, d, 18, 32, 59, 110$ each term after the first four terms is the sum of the previous four terms. The first term of the sequence is

Vraag 14

In die ry $a, b, c, d, 18, 32, 59, 110$ is elke term na die vierde term die som van die vorige vier terme. Die eerste term van die ry is

(**A**) 3 (**B**) 9 (**C**) 8 (**D**) 1 (**E**) 4

Question 15

Define the function $R(n)$ that reverses the digits of n and $S(n)$ that adds all the digits of n. For example, $R(435) = 534$ and $S(435) = 4 + 3 + 5 = 12$. Suppose n is a four-digit number such that $R(n) + S(n) = 2021$. If x is the biggest solution and y the smallest solution, determine $x - y$.

(**A**) 2989 (**B**) 2988 (**C**) 2889 (**D**) 2788 (**E**) None of these/Geen van hierdie

Vraag 15

Laat $R(n)$ die getal wees wat die syfers van n omdraai en $S(n)$ die som van die syfers van n. Byvoorbeeld, $R(435) = 534$ en $S(435) = 4+3+5 = 12$. Laat n 'n vier-syfer getal wees sodat $R(n)+S(n) = 2021$. As x die grootste oplossing is en y die kleinste oplossing, bepaal $x - y$.

Question 16

The time 2021 minutes after 20 : 21 on a digital 24-hour clock is

(**A**) 03 : 02 (**B**) 04 : 02 (**C**) 05 : 02 (**D**) 06 : 02 (**E**) None of these/Geen van hierdie

Vraag 16

Die tyd 2021 minute na 20 : 21 op 'n elektroniese 24-uur horlosie is

Question 17

Each of the factors of 100 is to be placed in a 3 by 3 grid, one per cell, in such a way that the products of the three numbers in each row, column and diagonal are all equal. The positions of the numbers $1, 2, 50$ are shown in the diagram. What is the value of $U + P$?

Vraag 17

Al die faktore van 100 moet in 'n 3 by 3 blokkie geplaas word, een per blokkie, sodat die produkte van die drie getalle in elke ry, kolom en hoeklyn gelyk is aan mekaar. Die posisies van die getalle $1, 2, 50$ word in die diagram getoon. Wat is die waarde van $U + P$?

	1	50
U		**P**
2		

(**A**) 19 (**B**) 29 (**C**) 39 (**D**) 49 (**E**) None of these/Geen van hierdie

Question 18

Each of four dwarfs is either normal or mutant. A normal dwarf has four eyes and always lies. A mutant dwarf has either three or five eyes and always tells the truth. When asked how many eyes they have among them, their respective responses are 13, 14, 15 and 16. The total number of eyes among these four dwarfs is

Vraag 18

Elkeen van vier dwergies is normaal of mutant. 'n Normale dwerg het vier oë en jok altyd. 'n Mutante dwerg het drie of vyf oë en praat altyd die waarheid. Op die vraag hoeveel oë hulle het, antwoord hulle: 13, 14, 15 en 16. Die totale aantal oë onder hierdie vier dwergies is

(**A**) 13 (**B**) 14 (**C**) 15 (**D**) 16 (**E**) Cannot be determined/Kan nie bepaal word nie

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Question 19

Bart Simpson wrote all the 6-digit integers containing all the digits $1, 2, 3, 4, 5, 6$ exactly once on a board. How many of these numbers are divisible by 8?

Vraag 19

Bart Simpson skryf al die 6-syfer getalle wat al die syfers $1, 2, 3, 4, 5, 6$ presies een keer bevat op 'n bord. Hoeveel van die getalle is deelbaar deur 8?

(**A**) 72 (**B**) 96 (**C**) 120 (**D**) 84 (**E**) None of these/Geen van hierdie

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Question 20

Thabo, Tumi and Thandi are students in the same mathematics class that wrote a test. The average mark of all students in the class except Thabo is 63.1. The average mark of all the students in the class except Thabo and Tumi is 62. The average mark of all students in the class except Thabo, Tumi and Thandi is 60.625. If you know, Thabo, Tumi and Thandi got the same mark for the maths test, how many students are in the class?

Vraag 20

Thabo, Tumi en Thandi is in dieselde wiskunde klas wat 'n toets geskryf het. Die gemiddelde punt vir die toets vir die hele klas behalwe, Thabo is 63.1. Die gemiddelde punt vir die toets vir die hele klas behalwe, Thabo en Tumi is 62. Die gemiddelde punt vir die toets vir die hele klas behalwe, Thabo, Tumi en Thandi is 60.625. As jy weet dat Thabo, Tumi en Thandi dieselfde punt gekry het vir die wiskunde toets, hoeveel studente is in die klas?

(**A**) 10 (**B**) 11 (**C**) 12 (**D**) 13 (**E**) Not enough information/Nie genoeg inligting