Fakulteit Natuur- & Landbouwetenskappe

Faculty of Natural & Agricultural Sciences

Department of Mathematics and Applied Mathematics

Departement Wiskunde en Toegepaste Wiskunde

MATHEMATICS COMPETITION **WISKUNDE KOMPETISIE**

GRADES 10 AND 11

GRADE 10 EN 11

AUGUST 2015

TIME: 2 HOURS

AUGUSTUS 2015

TYD: 2 URE

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Denkleiers • Leading Minds • Dikgopolo tša Dihlalefi

Leading Minds

INSTRUCTIONS

- No calculators or other calculation aids are allowed.

- **Mark allocation**
  Every question counts 1 mark.
  Random guessing is not advisable, as the mark allocated to a question may be deducted for a wrong answer.

- Every question has five possible answers, (**A**) to (**E**).
  Only **ONE** answer is correct.
  Colour in the rectangle of the correct answer on the answer sheet.
  Do not colour outside the rectangle.
  Use a soft pencil.

Example:
Suppose Question 21 reads:
The smallest integer larger than 1 is

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

The correct answer is 2, which is answer (**D**).
On the answer sheet you must colour in the rectangle (**D**) against Question 21.

Question 21 / Vraag 21 (**A**) (**B**) (**C**) (**D**) (**E**)

INSTRUKSIES

- Geen sakrekenaars of ander rekenhulpmiddels word toegelaat nie.

- **Puntetoekenning**
  Elke vraag tel 1 punt.
  Raaiery word nie aanbeveel nie, aangesien die punt toegeken aan die vraag afgetrek mag word vir ’n ’n verkeerde antwoord.

- Elke vraag het vyf moontlike antwoorde, (**A**) tot (**E**).
  Slegs **EEN** antwoord is korrek.
  Kleur die reghoek van die korrekte antwoord op die antwoordvel in.
  Moenie buite die reghoek inkleur nie.
  Gebruik ’n sagte potlood.

Voorbeeld:
Gestel Vraag 21 is:
Die kleinste heelgetal groter as 1 is

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

Die korrekte antwoord is 2, en dit is antwoord (**D**).
Op die antwoordvel moet jy die reghoek (**D**) inkleur teenoor Vraag 21.

Question 21 / Vraag 21 (**A**) (**B**) (**C**) (**D**) (**E**)

Question 1

If $\sqrt{2+\sqrt{x}} = 3$, then $x =$

(**A**) 1 (**B**) $\sqrt{7}$ (**C**) 7 (**D**) 49 (**E**) 121

Vraag 1

As $\sqrt{2+\sqrt{x}} = 3$, dan is $x =$

Question 2

$0,70 \times 0,36$ is equal to

(**A**) $0,252$ (**B**) $2,52$ (**C**) $25,2$ (**D**) 252 (**E**) $0,0252$

Vraag 2

$0,70 \times 0,36$ is gelyk aan

Question 3

The value of $9^3 \times 3^2$ is

(**A**) 27^5 (**B**) 27^6 (**C**) 3^{12} (**D**) 3^7 (**E**) 3^8

Vraag 3

Die waarde van $9^3 \times 3^2$ is

Question 4

The table below shows some of the results of a survey by radio station Jacaranda FM. What percentage of the males surveyed listens to the station?

	Listen	Don't Listen	Total
Males	?	26	?
Females	58	?	96
Total	136	64	200

(**A**) 48 (**B**) 52 (**C**) 55 (**D**) 75 (**E**) 78

Vraag 4

Die tabel hieronder toon van die resultate van 'n steekproef deur radiostasie Jakaranda FM. Watter persentasie van die mans in die steekproef luister na die stasie?

	Luister	Luister nie	Totaal
Mans	?	26	?
Dames	58	?	96
Totaal	136	64	200

Question 5

A car travels r km on a liter of petrol. Petrol costs s rands per liter. The cost of the petrol, in rands, for a journey of t km is

(**A**) $\frac{st}{r}$ (**B**) $\frac{rt}{s}$ (**C**) $\frac{r}{st}$ (**D**) $\frac{rs}{t}$ (**E**) $\frac{t}{rs}$

Vraag 5

'n Motor kan r km met 'n liter petrol ry. Petrol kos s rand per liter. Die koste van die petrol, in rand, vir 'n reis van t km is

Question 6

If $m > 0$ and the points $(m; 3)$ and $(1; m)$ lie on a line with slope m, then m is

(**A**) 1 (**B**) $\sqrt{2}$ (**C**) $\sqrt{3}$ (**D**) 2 (**E**) $\sqrt{5}$

Vraag 6

As $m > 0$ en die punte $(m; 3)$ en $(1; m)$ le op 'n lyn met helling m, dan is m

Question 7

If $n! = 1 \times 2 \times 3 \times 4 \times \ldots \times n$, what is the value of $\frac{11!}{4!7!}$?

(**A**) 1 (**B**) 110 (**C**) 120 (**D**) 210 (**E**) 330

Vraag 7

As $n! = 1 \times 2 \times 3 \times 4 \times \ldots \times n$, wat is die waarde van $\frac{11!}{4!7!}$?

Question 8

A triangle has vertices $A(0; 0), B(2; 3)$ and $C(4; 5)$. What is the area of triangle ABC?

(**A**) 0.5 (**B**) 1 (**C**) 1.5 (**D**) 2 (**E**) 2.5

Vraag 8

'n Driehoek het hoekpunte $A(0; 0), B(2; 3)$ en $C(4; 5)$. Wat is die oppervlak van driehoek ABC?

Question 9

Solve for x if $2^x + 2^{x+2} = 20$.

(**A**) -2 (**B**) -1 (**C**) 0 (**D**) 1 (**E**) 2

Vraag 9

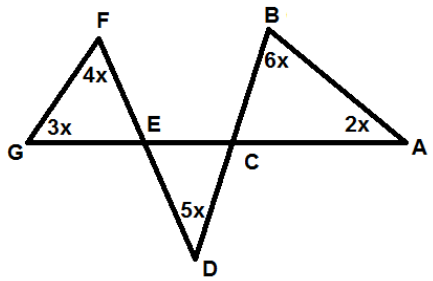
Los op vir x as $2^x + 2^{x+2} = 20$.

Question 10

In the figure, what is the size of angle CBA?

Vraag 10

In die figuur, wat is die grootte van hoek CBA?



(**A**) 90° (**B**) 108° (**C**) 120° (**D**) 132° (**E**) 144°

Question 11

$(a^{-1}+b^{-1})^{-1}$ is equal to

(**A**) $a^{-2}+b^{-2}$ (**B**) $\dfrac{ab}{a+b}$ (**C**) $a+b$ (**D**) $-a-b$ (**E**) $\dfrac{a+b}{ab}$

Vraag 11

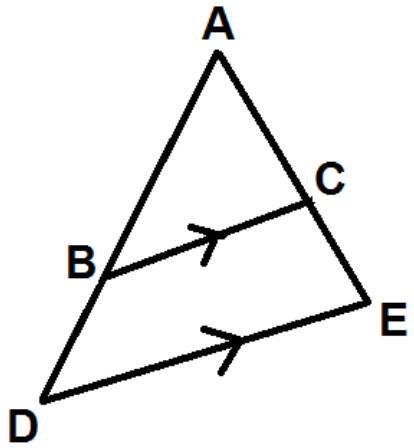
$(a^{-1}+b^{-1})^{-1}$ is gelyk aan

Question 12

In the triangle BC and DE are parallel. Which of the following is always true if $AB=p$, $BD=q$,$AC=r$ and $CE=s$?

Vraag 12

In die driehoek is BC en DE parallel. Watter een van die volgende is altyd waar as $AB=p$, $BD=q$,$AC=r$ en $CE=s$?



(A) p+q=r+s **(B)** p-q=r-s **(C)** pq=rs **(D)** $\dfrac{p}{q}=\dfrac{r}{s}$ **(E)** None of these/Geen van die

Question 13

Which one of the numbers below is a term of this arithmetic sequence $4, 11, 18, 25, \ldots$? (Note the common difference!)

(**A**) 1000 (**B**) 2000 (**C**) 3000 (**D**) 4000 (**E**) 5000

Vraag 13

Watter een van die volgende getalle is 'n term van die rekenkundige ry $4, 11, 18, 25, \ldots$? (Let op die gemene verskil!)

Question 14

The graph of $5+2y-3x=0$ is translated 3 units to the right. What is the equation of the new graph?

Vraag 14

Die grafiek $5+2y-3x=0$ word 3 eenhede na regs getransleer. Wat is die vergelyking van hiernie nuwe grafiek?

(A) $14+2y-3x=0$ **(B)** $8+2y-3x=0$ **(C)** $-4+2y-3x=0$

(D) $2+2y-3x=0$ **(E)** $11+2y-3x=0$

Question 15

Jack tosses one coin and Jill tosses two coins. What is the probability that Jack and Jill gets the same number of heads?

Vraag 15

Jack skiet een muntstuk en Jill skiet twee muntstukke op. Wat is die waarskynlikheid dat Jack en Jill dieselfde aantal koppe kry?

(**A**) $\frac{1}{4}$ (**B**) $\frac{3}{8}$ (**C**) $\frac{1}{2}$ (**D**) $\frac{2}{3}$ (**E**) $\frac{3}{4}$

Question 16

There are 29 people in a room. Of these, 11 speak Afrikaans, 24 speak English and 3 speak neither Afrikaans nor English. How many people in the room speak both Afrikaans and English?

Vraag 16

Daar is 29 persone in 'n vertrek. Uit die groep, 11 kan Afrikaans praat, 24 kan Engels praat en 3 persone praat nie een van Afrikaans of Engels. Hoeveel persone in die groep kan beide Afrikaans en Engels praat?

(**A**) 3 (**B**) 4 (**C**) 6 (**D**) 8 (**E**) 9

Question 17

At a certain point there are n people at a party. After that, 31 women leave the party, leaving twice as many men as women in the party. Later 55 men leave, leaving three times as many women as men in the party. What is the number n?

Vraag 17

Op 'n sekere stadium was daar n mense by 'n partyjie. Na 'n rukkie verlaat 31 vrouens die partytjie, wat twee keer soveel mans as vroue by die partyjie laat. Daarna verlaat 55 mans die partytjie, wat nou drie keer soveel vroue as mans by die partytjie laat. Wat is die waarde van n?

(**A**) 100 (**B**) 115 (**C**) 105 (**D**) 130 (**E**) None of these/Geen van die

Question 18

If $f(x) = x^2 - 1$, calculate $\dfrac{f(f(x)+x)}{f(x)}$.

(**A**) $x^2 + x + 1$ (**B**) $x^2 + 2x + 1$ (**C**) $x^2 + x$ (**D**) $x^2 + 2x + 2$ (**E**) $x^2 + 2x$

Vraag 18

As $f(x) = x^2 - 1$, bereken $\dfrac{f(f(x)+x)}{f(x)}$.

Question 19

If $\frac{x}{8-y} = \frac{y}{15-z} = \frac{z}{10-x} = 2$, find the value of $x + y + z$.

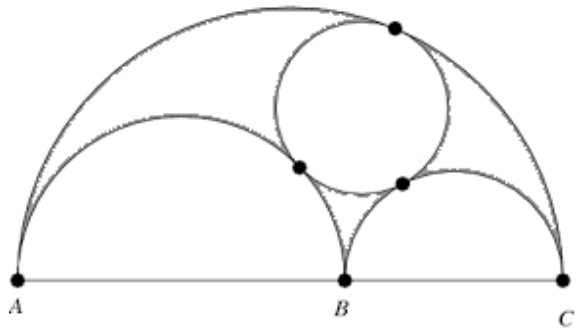
(**A**) 22 (**B**) 44 (**C**) 31 (**D**) 53 (**E**) 67

Vraag 19

Indien $\frac{x}{8-y} = \frac{y}{15-z} = \frac{z}{10-x} = 2$, bepaal die waarde van $x + y + z$.

Question 20

Three semi-circles with diameters AB, BC and AC are drawn as shown below. A circle is inscribed in this diagram so that it touches all three of the semi-circles. Find the radius of this circle if $AB = 4$ and $BC = 2$.



(**A**) $\dfrac{3}{7}$ (**B**) $\dfrac{4}{7}$ (**C**) $\dfrac{5}{7}$ (**D**) $\dfrac{6}{7}$ (**E**) None of these/geen van die

Vraag 20

Drie semi-sirkels met middellyne AB, BC en AC word geteken soos hieronder aangetoon. 'n Sirkel wat aan al die semi-sirkels raak, word binne die figuur geteken. Bereken die radius van die sirkel as $AB = 4$ en $BC = 2$.