

# Mathematics Challenge

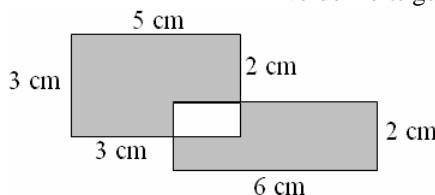
## GRADE 7 FINAL ROUND

### 11 OCTOBER 2006

#### NOTE:

- Answer the questions according to the instructions on the answer sheet.
- You may use a calculator.
- The questions test insight. Complex calculations will therefore not be necessary.
- We hope you enjoy it!

1. The figure is a combination of two rectangles with dimensions as shown. What is the area of the shaded part?

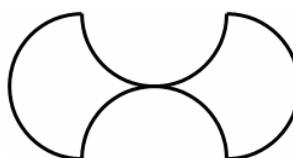


- (A)  $19 \text{ cm}^2$       (B)  $23 \text{ cm}^2$       (C)  $25 \text{ cm}^2$       (D)  $26 \text{ cm}^2$       (E)  $27 \text{ cm}^2$

2. What is the perimeter of the figure in question 1?

- (A) 21 cm      (B) 32 cm      (C) 30 cm      (D) 28 cm      (E) None of these  
Nie een hiervan nie

3. The figure is a combination of four semi-circles, each with a radius of 3 cm. What is the area of the figure?



- (A)  $24 \text{ cm}^2$       (B)  $9 \text{ cm}^2$       (C)  $36 \text{ cm}^2$       (D)  $27 \text{ cm}^2$       (E) None of these  
Nie een hiervan nie

4. The average mass of 3 boys is 75 kg. The average mass of 6 girls is 66 kg. What is the average mass of the 9 children together?

- (A) 70,5 kg      (B) 68 kg      (C) 70 kg      (D) 69 kg      (E) 69,5 kg

5. What is the value of  $a$  in the table?

5. Wat is die waarde van  $a$  in die tabel?

1	2	3	4	...	$a$
4	6	8	10	...	64

- (A) 31      (B) 16      (C) 5      (D) 57      (E) 34



In cooperation with the  
Western Cape Education Department  
Gauteng Education Department

# Wiskunde-uitdaging

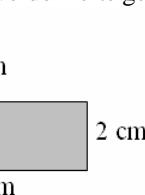
## GRAAD 7 FINALE RONDE

### 11 OKTOBER 2006

#### LET OP:

- Beantwoord die vrae volgens die instruksies op die antwoordblad.
- Jy mag 'n sakrekenaar gebruik.
- Die vrae toets insig. Omslagtige berekening is dus onnodig en tydrowend.
- Ons hoop jy geniet dit!

1. Die figuur is 'n samestelling van twee reghoeke met afmetings soos getoon. Wat is die oppervlakte van die verdonkerde gedeelte?



- (A)  $19 \text{ cm}^2$       (B)  $23 \text{ cm}^2$       (C)  $25 \text{ cm}^2$       (D)  $26 \text{ cm}^2$       (E)  $27 \text{ cm}^2$

2. Wat is die omtrek van die figuur in vraag 1?

- (A) 21 cm      (B) 32 cm      (C) 30 cm      (D) 28 cm      (E) None of these  
Nie een hiervan nie

3. Die figuur is 'n samestelling van vier semisirkels, elk met 'n radius van 3 cm. Wat is die oppervlakte van die figuur?



- (A)  $24 \text{ cm}^2$       (B)  $9 \text{ cm}^2$       (C)  $36 \text{ cm}^2$       (D)  $27 \text{ cm}^2$       (E) None of these  
Nie een hiervan nie

4. Die gemiddelde massa van 3 seuns is 75 kg. Die gemiddelde massa van 6 meisies is 66 kg. Wat is die gemiddelde massa van die 9 kinders saam?

- (A) 70,5 kg      (B) 68 kg      (C) 70 kg      (D) 69 kg      (E) 69,5 kg

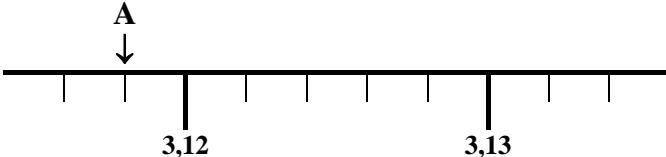
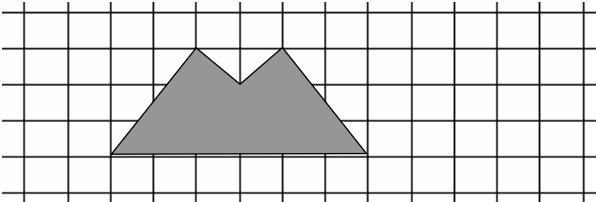
Nasou Via Afrika

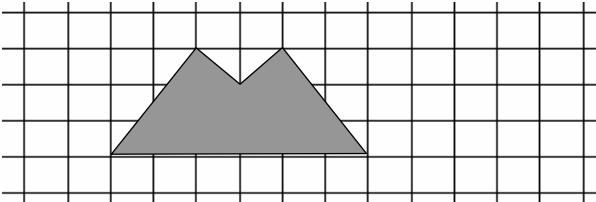


CASIO

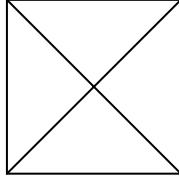
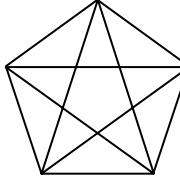
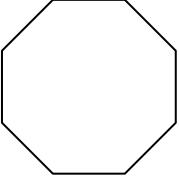
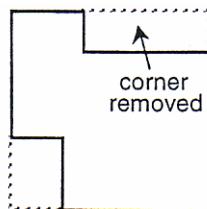
RUMEUS

Research Unit for Mathematics Education  
of the University of Stellenbosch

6. An article costs R36,15. This price includes Value Added Tax (VAT) of 14 %. What does the article cost without VAT?  
 (A) R31,08      (B) R31,09      (C) R31,72      (D) R31,71      (E) R31,07
7. What is the number indicated by A on the ruler?  
  
 (A) 3,11      (B) 3,1      (C) 3,118      (D) 3,15      (E) 3,18
8. What is the area of the shaded figure below if one square represents  $1 \text{ cm}^2$ ?  
  
 (A)  $9 \text{ cm}^2$       (B)  $10 \text{ cm}^2$       (C)  $11 \text{ cm}^2$       (D)  $12 \text{ cm}^2$       (E)  $13 \text{ cm}^2$
9. What is the difference between the sum of the even numbers and the sum of the odd numbers from 1 to 100, both included?  
 (A) 50      (B) 51      (C) 49      (D) 100      (E) 99
10. Sandy is 7 years younger than Mandy. In 4 years time she will be half Mandy's age. What is the sum of their ages now?  
 (a) 13      (b) 15      (c) 17      (d) 19      (e) 21
11. How many two-digit numbers are there with both digits odd?  
 (A) 20      (B) 25      (C) 45      (D) 50      (E) 30
12. 20 can be written as the sum of two squares:  

$$20 = 4 + 16 = 2^2 + 4^2$$
  
 In how many different ways (ignore the order) can 85 be written as the sum of two squares?  
 (A) 0      (B) 1      (C) 2      (D) 4      (E) 5
13. A painter takes two days to paint a room (all four walls and the ceiling). If he works at the same pace, how many days will he take to paint a room that is twice as wide, twice as long and twice as high?  
 (A) 2      (B) 4      (C) 5      (D) 6      (E) 8
6. 'n Artikel kos R36,15. Hierdie prys sluit Belasting op Toegevoegde Waarde (BTW) van 14% in. Hoeveel kos die artikel sonder BTW?  
 (D) R31,71      (E) R31,07
7. Wat is die getal aangedui deur A op die liniaal?  
 (A) 3,11      (B) 3,1      (C) 3,118      (D) 3,15      (E) 3,18
8. Wat is die oppervlakte van die verdonkerde figuur hieronder as een vierkantjie  $1 \text{ cm}^2$  voorstel?  

9. Wat is die verskil tussen die som van die ewe getalle en die som van die onewe getalle van 1 tot 100, albei ingesluit?  
 (D) 100      (E) 99
10. Sandy is 7 jaar jonger as Mandy. Oor 4 jaar sal sy die helfte so oud as Mandy wees. Wat is die som van hul huidige ouderdomme?  
 (d) 19      (e) 21
11. Hoeveel tweesyfer-getalle is daar met beide syfers onewe?  
 (D) 50      (E) 30
12. 20 kan geskryf word as die som van twee vierkante:  

$$20 = 4 + 16 = 2^2 + 4^2$$
  
 Op hoeveel verskillende maniere (ignoreer die volgorde) kan 85 as die som van twee vierkante geskryf word?  
 (D) 4      (E) 5
13. 'n Verwer neem twee dae om 'n kamer te verf (al vier mure en die plafon). As hy teen dieselfde pas werk, hoeveel dae sal hy verf aan 'n kamer twee keer so lank, twee keer so breed en twee keer so hoog?

14. Split the number 18 into two whole numbers (e.g. 3 and 15). Now multiply these two numbers. What is the largest possible answer?
- (A) 80      (B) 77      (C) 72      (D) 100      (E) 81
15. How many whole numbers divide exactly into 2000 (i.e. how many *factors* does 2000 have)?
- (A) 15      (B) 18      (C) 19      (D) 20      (E) 17
16. In the magic square below the sum of the three numbers in each row, in each column and in each diagonal is 18. What number comes in block Z?
- |    |   |    |
|----|---|----|
|    |   | Z  |
| 11 | 6 |    |
|    |   | 10 |
- (A) 1      (B) 3      (C) 9      (D) 7      (E) 8
17. The three digits of a three-digit number add up to 25. How many such three-digit numbers are there?
- (A) 2      (B) 4      (C) 6      (D) 8      (E) 10
18. A square has 2 diagonals and a pentagon has 5. How many diagonals does an octagon have? (An octagon has 8 sides.)
- 
- 
- 
- (A) 20      (B) 28      (C) 16      (D) 24      (E) 40
19. The average of eleven numbers is 8. If a twelfth number is added to these numbers, the average of all twelve numbers is now 11. What is the twelfth number?
- (A) 11      (B) 12      (C) 33      (D) 44      (E) 36
20. Vusi bought a square carpet. He cut out two rectangles as shown in the sketch, and the carpet then exactly fitted the shape of his bedroom. If the perimeter of the room is 12 m, what was the area of the original carpet?
- 
- (A)  $144 \text{ m}^2$       (B)  $12 \text{ m}^2$       (C)  $16 \text{ m}^2$       (D)  $9 \text{ m}^2$       (E) None of these  
Nie een hiervan nie

14. Verdeel die getal 18 in twee telgetalle (bv. 3 en 15). Vermenigvuldig nou hierdie twee getalle. Wat is die grootste moontlike antwoord?

(D) 100      (E) 81

15. Hoeveel telgetalle deel presies in 2000 in (d.w.s. hoeveel faktore het 2000)?

(D) 20      (E) 17

16. In die towervierkant hieronder is die som van die drie getalle in elke ry, in elke kolom en in elke skuinslyn gelyk aan 18. Watter getal kom in blokkie Z?

		Z
11	6	
		10

(A) 1      (B) 3      (C) 9      (D) 7      (E) 8

17. Die som van die drie syfers van 'n driesyfergetal is 25. Hoeveel sulke driesyfergetalle is daar?

(D) 8      (E) 10

18. 'n Vierkant het 2 hoeklyne en 'n vyfhoek het 5. Hoeveel hoeklyne het 'n agthoek?

(D) 24      (E) 40

19. The average of eleven numbers is 8. If a twelfth number is added to these numbers, the average of all twelve numbers is now 11. What is the twelfth number?
- (A) 11      (B) 12      (C) 33      (D) 44      (E) 36

19. Die gemiddelde van elf getalle is 8. As 'n twaalfde getal by hierdie getalle gevoeg word, is die gemiddelde van al twaalf getalle nou 11. Wat is die twaalfde getal?

20. Vusi bought a square carpet. He cut out two rectangles as shown in the sketch, and the carpet then exactly fitted the shape of his bedroom. If the perimeter of the room is 12 m, what was the area of the original carpet?

20. Vusi koop 'n vierkantige mat. Hy sny twee reghoeke uit soos in die skets getoon, en die mat pas toe presies die vorm van sy slaapkamer. As die omtrek van die kamer 12 m is, wat was die oppervlakte van die oorspronklike mat?

(A)  $144 \text{ m}^2$       (B)  $12 \text{ m}^2$       (C)  $16 \text{ m}^2$       (D)  $9 \text{ m}^2$       (E) None of these  
Nie een hiervan nie

21. A bath fills in 12 minutes if the plug is in. It empties in 18 minutes when the tap is off. If the tap is running and the plug is out, how long will it take to fill the bath?

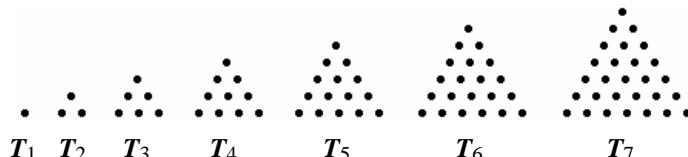
(A) 15 min      (B) 18 min      (C) 24 min

21. 'n Bad loop in 12 minute vol met die prop in. Dit loop in 18 minute leeg as die kraan toe is. As die kraan oop is en die prop is uit, hoe lank neem dit die bad om vol te loop?

(D) 36 min      (E) 60 min

22. Zola uses dots to build triangle patterns as shown below.

How many dots are there in pattern  $T_{50}$ ?



(A) 2601      (B) 1275      (C) 2550

22. Zola bou driehoek patrone met kolletjies soos hieronder. Hoeveel kolletjies is daar in patroon  $T_{50}$ ?

(D) 1250      (E) None of these  
Nie een hiervan nie

23. Which one of the following numbers will appear in the sequence

2; 5; 10; 17; 26; 37; ...?

(A) 901      (B) 902      (C) 903

23. Watter een van die volgende getalle sal voorkom in die getalry

2; 5; 10; 17; 26; 37; ...?

(D) 904      (E) None of these  
Nie een hiervan nie

24. A goldmine mines 5% of its total reserves per year on average. After how many years will more than half of the mine's reserves be extracted?

(A) 5      (B) 10      (C) 12

24. 'n Goudmyn ontgin gemiddeld 5% van sy totale reserwes per jaar. Na hoeveel jaar sal meer as die helfte van die myn se reserwes ontgin wees?

(D) 14      (E) 15

25. Study the pattern shown below. What is the product of the numbers?

$$(1+1) \times (1+\frac{1}{2}) \times (1+\frac{1}{3}) \times (1+\frac{1}{4}) \times (1+\frac{1}{5}) \times \dots \times (1+\frac{1}{100})$$

(A)  $\frac{99}{100}$       (B)  $\frac{101}{100}$       (C)  $\frac{1}{100}$

25. Bestudeer die patroon hieronder. Wat is die produk van die getalle?

$$(1+1) \times (1+\frac{1}{2}) \times (1+\frac{1}{3}) \times (1+\frac{1}{4}) \times (1+\frac{1}{5}) \times \dots \times (1+\frac{1}{100})$$

(D) 100      (E) 101