

Mathematics Challenge

GRADE 7 FINAL ROUND

12 OCTOBER 2005

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!

Wiskunde-uitdaging

GRAAD 7 FINALE RONDE

12 OKTOBER 2005

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. What number is exactly halfway between 5,6 and 5,65?

- (A) 5,025 (B) 5,625 (C) 5,62

1. Watter getal is presies halfpad tussen 5,6 en 5,65?

- (D) 5,605 (E) 5,635

2. Which one of these is *not* true?

- (A) $1 \times 1 \div 1 \times 1 = 1$ (B) $2 \div 2 + 2 \div 2 = 2$ (C) $3 \times 3 - 3 + 3 = 3$ (D) $(4 - 4) \div 4 + 4 = 4$ (E) $5 + 5 \times (5 - 5) = 5$

3. What is the 83rd number in the following pattern?

1; 3; 5; 7;....

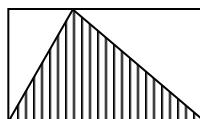
3. Wat sal die 83ste getal in die volgende patroon wees?

- (A) 85 (B) 165 (C) 62

1; 3; 5; 7;....

- (D) 97 (E) 102

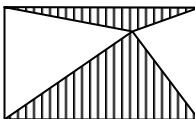
4. The sketch shows a 6 cm by 4 cm rectangle.
What area is shaded?



4. Die skets toon 'n 6 cm by 4 cm reghoek.
Watter oppervlakte is verdonker?

- (A) 12 cm² (B) 10 cm² (C) 9 cm² (D) 8 cm² (E) 7 cm²

5. The sketch shows a 6 cm by 4 cm rectangle.
What area is shaded?



5. Die skets toon 'n 6 cm by 4 cm reghoek.
Watter oppervlakte is verdonker?

- (A) 12 cm² (B) 10 cm² (C) 9 cm² (D) 8 cm² (E) 7 cm²

6. Calculate the value of

$$1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}$$

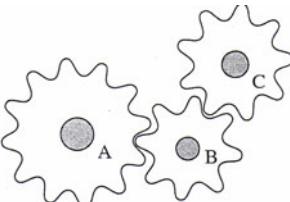
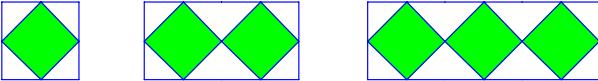
- (A) $1\frac{3}{5}$ (B) $\frac{5}{8}$ (C) $1\frac{2}{3}$ (D) $3\frac{1}{2}$ (E) $5\frac{1}{2}$

6. Bereken die waarde van

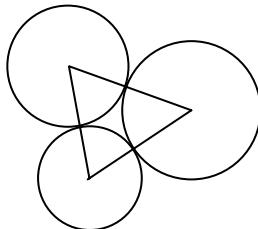
$$1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}$$

- (A) $1\frac{3}{5}$ (B) $\frac{5}{8}$ (C) $1\frac{2}{3}$ (D) $3\frac{1}{2}$ (E) $5\frac{1}{2}$



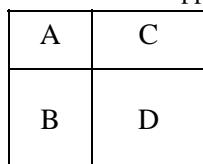
7. The average of eleven numbers is 8. If a twelfth number is added to these numbers, the average of all twelve numbers is now 11. What is the twelfth number added?
- (A) 11 (B) 12 (C) 33 (D) 44 (E) 22
-
8. Arnie, Bender and Cross are three robots. They are weighed two at a time. Here are the results:
 $A + B = 12 \text{ kg}$ $B + C = 14 \text{ kg}$ $C + A = 16 \text{ kg}$
 How much will all three weigh together?
- (A) 21 kg (B) 42 kg (C) 28 kg (D) 32 kg (E) 24 kg
-
9. In question 8, how much does Bender weigh on its own?
- (A) 5 kg (B) 6 kg (C) 7 kg (D) 8 kg (E) 9 kg
-
10. Three gears mesh together as shown. In the time that gear A makes three revolutions, how many revolutions does gear C make?
- 
- (A) 6 (B) 5 (C) 4 (D) 3 (E) 2
-
11. In the pattern below, the diagram with two squares has six triangles. If the pattern continues to grow, how many triangles are there in a diagram with six squares?
- 
- (A) 12 (B) 14 (C) 16 (D) 18 (E) 20
-
12. In question 11, how many triangles are there in a diagram with 60 squares?
- (A) 120 (B) 122 (C) 140 (D) 160 (E) 142
-
13. In question 11, how many squares are there in a diagram with 60 triangles?
- (A) 30 (B) 32 (C) 28 (D) 29 (E) 31
-
14. With one digit you can form one number, e.g. 9. With two digits you can form two numbers, e.g. 68 and 86. How many different four-digit numbers can be formed with four different digits?
- (A) 8 (B) 10 (C) 16 (D) 24 (E) 32
-
7. Die gemiddelde van elf getalle is 8. As 'n twaalfde getal by hierdie getalle getel word, is die gemiddelde van al twaalf getalle nou 11. Wat is die twaalfde getal wat bygetel is?
- (D) 44 (E) 22
-
8. Arnie, Bender en Cross is drie robotte. Hulle word twee op 'n slag geweeg. Hier is die lesings:
 $A + B = 12 \text{ kg}$ $B + C = 14 \text{ kg}$ $C + A = 16 \text{ kg}$
 Hoeveel sal al drie saam weeg?
- (D) 32 kg (E) 24 kg
-
9. In vraag 8, hoeveel weeg Bender op sy eie?
- (D) 8 kg (E) 9 kg
-
10. Drie ratte werk saam soos getoon. In die tyd dat rat A drie omwentelings maak, hoeveel omwentelings maak rat C?

15. Three circles with radii 7 cm, 8 cm and 9 cm touch each other externally without overlapping. What is the perimeter of the triangle formed by joining the three centres of the circles?



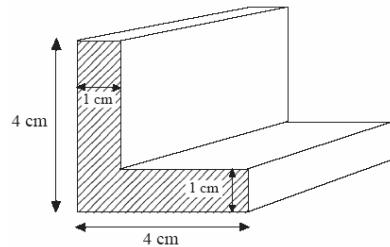
- (A) 30 cm (B) 24 cm (C) 48 cm (D) 12 cm (E) $7\pi + 8\pi + 9\pi$

16. If the areas of rectangles A, B and C below are 12 cm^2 , 21 cm^2 and 20 cm^2 respectively, find the area of rectangle D.



- (A) 32 cm^2 (B) 35 cm^2 (C) 55 cm^2 (D) 56 cm^2 (E) 88 cm^2

17. The figure below shows a metal bar which is 4 cm high, 4 cm wide, 1 cm thick and 12 cm long. What is the volume of the bar?



- (A) 96 cm^3 (B) 7 cm^2 (C) 16 cm^2 (D) 192 cm^3 (E) 84 cm^3

18. How many two-digit numbers are there with both digits even?

- (A) 20 (B) 25 (C) 45 (D) 50 (E) 30

19. Numbers are arranged in the following pattern:

| | | | | | | |
|-----|-----|-----|-----|-----|-----|--------------|
| 1 | 2 | 3 | 4 | 5 | 6 | row 1 |
| 7 | 8 | 9 | 10 | 11 | 12 | row 2 |
| 13 | 14 | 15 | 16 | 17 | 18 | row 3 |
| ... | ... | ... | ... | ... | ... | row 4 |

What will the third number in row 81 be?

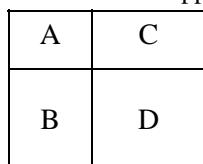
- (A) 480 (B) 486 (C) 483 (D) 485 (E) 241

20. 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 (D) 36 min (E) 60 min

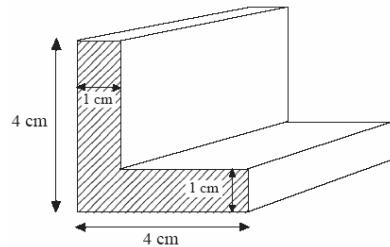
15. Drie sirkels met radiusse van 7 cm, 8 cm en 9 cm raak mekaar uitwendig. Wat is die omtrek van die driehoek wat gevorm word deur die drie middelpunte van die sirkels te verbind?

16. Die oppervlakte van reghoeke A, B en C hieronder is onderskeidelik 12 cm^2 , 21 cm^2 en 20 cm^2 . Vind die oppervlakte van reghoek D.



- (A) 32 cm^2 (B) 35 cm^2 (C) 55 cm^2 (D) 56 cm^2 (E) 88 cm^2

17. Die skets hieronder wys 'n metaalstaaf wat 4 cm hoog, 4 cm breed, 1 cm dik en 12 cm lank is. Wat is die volume van die staaf?



- (A) 96 cm^3 (B) 7 cm^2 (C) 16 cm^2 (D) 192 cm^3 (E) 84 cm^3

18. Hoeveel tweesyfer-getalle is daar met beide syfers ewe?

- (A) 20 (B) 25 (C) 45 (D) 50 (E) 30

19. Getalle word in die volgende patroon rangskik:

| | | | | | | |
|-----|-----|-----|-----|-----|-----|-------------|
| 1 | 2 | 3 | 4 | 5 | 6 | ry 1 |
| 7 | 8 | 9 | 10 | 11 | 12 | ry 2 |
| 13 | 14 | 15 | 16 | 17 | 18 | ry 3 |
| ... | ... | ... | ... | ... | ... | ry 4 |

Wat sal die derde getal in ry 81 wees?

- (A) 480 (B) 486 (C) 483 (D) 485 (E) 241

20. '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?

- (A) 15 min (B) 18 min (C) 24 min (D) 36 min (E) 60 min

21. a, b, c and d are four adjacent dates in a calendar as shown. Which statement is NOT true for *any* calendar?

21. a, b, c en d is vier aangrensende datums in 'n kalender soos hieronder. Watter bewering is NIE waar vir *enige* kalender nie?

| Mon | Tues | Wed | Thu | Fri | Sat | Sun |
|-----|------|-----|-----|-----|-----|-----|
| | | | | | | |
| | | a | b | | | |
| | | c | d | | | |
| | | | | | | |

- (A) $c - a = d - b$ (B) $c = a + 7$ (C) $d = a + 8$ (D) $a + c = b + d$ (E) $a + d = c + b$

22. In the above calendar, $a + b + c + d = 52$. What is $a + b$?

- (A) 19 (B) 25 (C) 26

22. In die kalender hierbo is $a + b + c + d = 52$. Wat is $a + b$?

- (D) 27 (E) One cannot say
Mens kan nie sê nie

23. a, b, c and d are *any* four consecutive numbers, for example 2, 3, 4, 5 or 14, 15, 16, 17. Which statement is NOT true for any such four numbers?

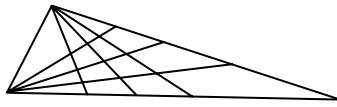
- (A) $c - a = d - b$ (B) $c = a + 2$ (C) $d = a + 3$

23. a, b, c en d is *enige* vier opeenvolgende getalle, byvoorbeeld 2, 3, 4, 5 of 14, 15, 16, 17. Watter bewering is NIE waar vir enige sulke vier getalle nie?

- (D) $a + c = b + d$ (E) $a + d = c + b$

24. In the triangle three lines are drawn from two corners to the opposite sides of the triangle. This divides the triangle into 16 non-overlapping sections. If 10 lines from two corners are drawn in the same way, how many non-overlapping sections will the triangle have?

24. In die driehoek word drie lyne vanaf twee hoeke na die teenoorstaande sye van die driehoek getrek. Dit verdeel die driehoek in 16 dele wat mekaar nie oorvleuel nie. As 10 lyne op dieselfde manier van twee hoeke getrek word, hoeveel nie-oorvleuelende dele sal daar wees?



- (A) 100 (B) 121 (C) 20 (D) 107 (E) 54

25. Calculate $(1 - \frac{1}{2}) \times (1 - \frac{1}{3}) \times (1 - \frac{1}{4}) \times \dots \times (1 - \frac{1}{2005})$

25. Bereken $(1 - \frac{1}{2}) \times (1 - \frac{1}{3}) \times (1 - \frac{1}{4}) \times \dots \times (1 - \frac{1}{2005})$

- (A) $\frac{1}{2005}$ (B) $\frac{2}{2005}$ (C) $\frac{1}{25}$ (D) $\frac{24}{2005}$ (E) $\frac{2004}{2005}$