Mathematics Challenge

GRADE 7 FIRST ROUND
SEPTEMBER 2007

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 EERSTE RONDE
SEPTEMBER 2007

LET OP:

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

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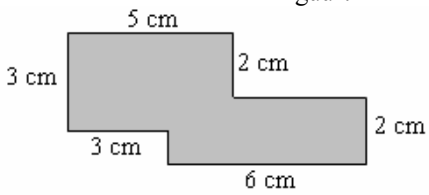
1. The figure is a combination of two rectangles with dimensions as shown. What is the area of the figure?



(A) 19 cm^2 (B) 23 cm^2 (C) 25 cm^2 (D) 26 cm^2 (E) 27 cm^2

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

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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

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

(E) Nie een hiervan nie

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3. The average mass of 4 boys is 75 kg. The average mass of 6 girls is 65 kg. What is the average mass of the 10 children together?

(A) 70,5 kg (B) 66 kg (C) 70 kg (D) 69 kg (E) 74 kg

3. Die gemiddelde massa van 4 seuns is 75 kg. Die gemiddelde massa van 6 meisies is 65 kg. Wat is die gemiddelde massa van die 10 kinders saam?

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4. What is the value of a in the table?

1	2	3	4	…	a
4	6	8	10	…	64

(A) 7 (B) 16 (C) 5 (D) 57 (E) 31

4. Wat is die waarde van a in die tabel?

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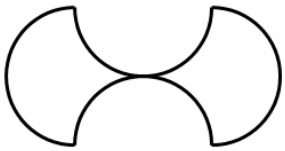
5. The figure is a combination of four semi-circles, each with a radius of 3 cm. What is the area of the figure?



(A) 24 cm^2 (B) 9 cm^2 (C) 36 cm^2 (D) 27 cm^2 (E) None of these

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

(E) Nie een hiervan nie

AMESA The Association for Mathematics Education of South Africa

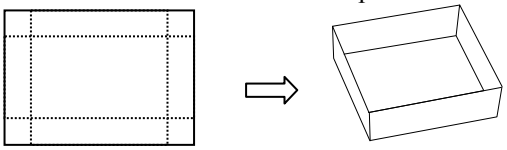
In cooperation with the
Western Cape Education Department
Gauteng Education Department

Nasou Via Afrika

CASIO

RUMEUS
Research Unit for Mathematics Education of the University of Stellenbosch

6. Four squares are cut from the corners of a rectangular sheet of cardboard. It is then folded up to make a box that is 15 cm long and 8 cm wide with a volume of 120 cm^3. What was the area of the original sheet of cardboard?



(A) 144 cm^2 (B) 143 cm^2 (C) 170 cm^2 (D) 120 cm^2 (E) 240 cm^2

6. Vier vierkante word uit die hoeke van 'n reghoekige stuk karton gesny. Die karton word dan opgevou om 'n boks te maak wat 15 cm lank en 8 cm wyd is met 'n volume van 120 cm^3. Wat was die oppervlakte van die oorspronklike stuk karton?

7. Calculate:

$2 - 1 + 3 - 2 + 4 - 3 + 5 - 4 + 6 - 5 + \ldots + 101 - 100$

(A) 99 (B) 100 (C) 101 (D) 102 (E) None of these

7. Bereken:

$2 - 1 + 3 - 2 + 4 - 3 + 5 - 4 + 6 - 5 + \ldots + 101 - 100$

(E) Nie een hiervan nie

8. Three pencils and five books cost R44 altogether. One pencil and one book cost R10 altogether. What is the price of a book?

(A) R6,50 (B) R7 (C) R7,50 (D) R8 (E) R8,50

8. Drie potlode en vyf boeke kos saam R44. Een potlood en een boek kos saam R10. Wat kos 'n boek?

9. If a coin is tossed, the probability that it will land heads up is $\frac{1}{2}$ or 50%. What is the probability that in four successive tosses, the coin lands heads up each time?

(A) $\frac{1}{2}$ (B) $\frac{1}{4}$ (C) $\frac{1}{8}$ (D) $\frac{1}{16}$ (E) None of these

9. As 'n muntstuk opgeskiet word, is die waarskynlikheid dat dit kruis ("kop") na bo val $\frac{1}{2}$ of 50%. As die muntstuk vier keer opgeskiet word, wat is die waarskynlikheid dat dit elke keer kruis land?

(E) Nie een hiervan nie

10. In question 9: After the coin has landed heads up four times after each other, it is tossed a fifth time. What is the probability that it now lands head up *again*?

(A) $\frac{1}{32}$ (B) 50% (C) More than 50% (D) Less than 50% (E) One cannot say

10. In vraag 9: Nadat die muntstuk vier keer na mekaar kruis geland het, word dit 'n vyfde keer opgeskiet. Wat is die waarskynlikheid dat dit nou *weer* kruis land?

(C) Meer as 50% (D) Minder as 50% (E) Mens kan nie sê nie

11. How many two-digit numbers are there with both digits even (e.g. 26)?

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

11. Hoeveel tweesyfer-getalle is daar met beide syfers ewe (bv. 26)?

12. A shop increases the price of its goods by 10 %. Clients paying cash get a 10% discount on the increased price. Which of these statements is true?

(A) The cash price is more than the old price
(B) The cash price is less than the old price
(C) The cash price is the same as the old price
(D) Not enough information

12. 'n Winkel verhoog die prys van hul goedere met 10%. Mense wat kontant betaal, kry 10% afslag op die verhoogde prys. Watter van hierdie bewerings is waar?

(A) Die kontantprys is meer as die ou prys
(B) Die kontantprys is minder as die ou prys
(C) Die kontantprys is dieselfde as die ou prys
(D) Nie genoeg inligting nie

13. The 100 whole numbers from 1 to 100 are written on the blackboard. You must erase any two numbers a and b and write the number $a + b$ in its place. If this is repeated over and over again, only one number will remain on the board in the end. What is this number?

(A) 5050 (B) 10100 (C) 100 (D) 4950 (E) One cannot be sure

13. Die 100 heelgetalle van 1 tot 100 word op die bord geskryf. Jy moet enige twee getalle a en b uitvee en dan die getal $a + b$ in die plek daarvan skryf. As dit oor en oor herhaal word, sal daar uiteindelik slegs een getal op die bord oorbly. Wat is hierdie getal?

(E) Mens kan nie sê nie

14. Calculate:

$$\frac{24\times18\times15 + 24\times18\times13 + 24\times18\times7}{24\times18}$$

(A) $\frac{35}{36}$ (B) 35 (C) 11 340 (D) 75 355 (E) None of these / Nie een hiervan nie

14. Bereken:

$$\frac{24\times18\times15 + 24\times18\times13 + 24\times18\times7}{24\times18}$$

15. 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

15. '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?

16. The length of a rectangle is four times as long as its width. The area of the rectangle is 100 m^2. What is the perimeter of the rectangle?

(A) 50 m (B) 25 m (C) 20 m (D) 15 cm (E) 60 m

16. Die lengte van 'n reghoek is vier keer so lank as sy breedte. Die oppervlakte van die reghoek is 100 m^2. Wat is die omtrek van die reghoek?

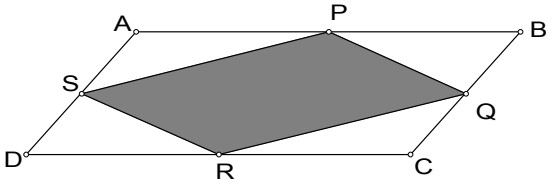
17. In the magic square below the sum of the three numbers in each row, in each column and in each diagonal is 18. What number comes in X?

		X
11	6	
		10

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

17. 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 X?

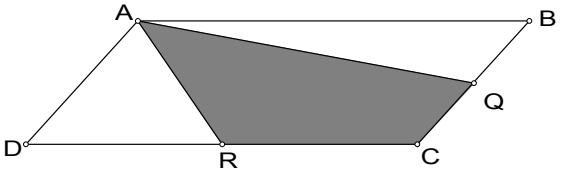
18. In the sketch P, Q, R and S are midpoints of the sides of parallelogram ABCD. What fraction of ABCD is shaded?



(A) $\frac{7}{12}$ (B) $\frac{1}{2}$ (C) $\frac{5}{8}$ (D) $\frac{3}{4}$ (E) None of these / Nie een hiervan nie

18. In die skets is P, Q, R en S middelpunte van die sye van die parallelogram ABCD. Watter breuk van ABCD is verdonker?

19. In the sketch R and Q are midpoints of the sides of parallelogram ABCD. What fraction of ABCD is shaded?



(A) $\frac{7}{12}$ (B) $\frac{1}{2}$ (C) $\frac{5}{8}$ (D) $\frac{3}{4}$ (E) None of these / Nie een hiervan nie

19. In die skets is R en Q middelpunte van die sye van die parallelogram ABCD. Watter breuk van ABCD is verdonker?

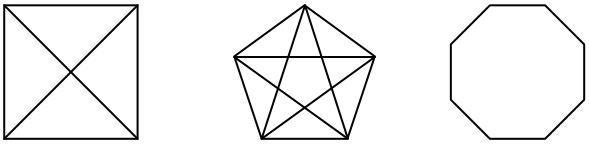
20. A goldmine mines 5% of its total reserves per year on average. After how many years will less than half of the mine's reserves remain?

(A) 5 (B) 10 (C) 12 (D) 14 (E) 15

20. 'n Goudmyn ontgin gemiddeld 5% van sy totale reserwes per jaar. Na hoeveel jaar sal minder as die helfte van die myn se reserwes oorbly?

21. A square has 2 diagonals and a pentagon has 5. How many diagonals does an octagon have? (An octagon has 8 sides.)

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



(A) 20 (B) 28 (C) 16 (D) 24 (E) 40

22. In a square the size of each angle is 90°. In a regular pentagon each interior angle is 108°. What is the size of each angle in a regular octagon?

22. In 'n vierkant is die grootte van elke binnehoek 90°. In 'n reëlmatige vyfhoek is elke binnehoek 108°. Hoe groot is elke binnehoek van 'n reëlmatige agthoek?

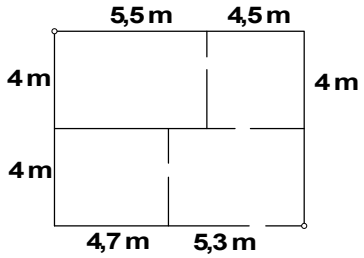
(A) 120° (B) 126° (C) 130° (D) 135° (E) 162°

23. A small business wants to buy an air conditioner for their offices. There are five sizes of air conditioners available that can adequately cool total volumes of 150 m^3, 180 m^3, 280 m^3, 340 m^3 and 400 m^3 respectively. What is the smallest air conditioner that will adequately cool the offices?

The offices have a ceiling that is 2,4 m high and there are four rooms measuring 4 m by 5,5 m, 4 m by 4,7 m, 4 m by 4,5 m and 4 m by 5,3 m respectively as shown in the floor plan.

23. 'n Klein maatskappy wil 'n lugversorger vir hul kantore koop. Daar is vyf groottes lugversorgers beskikbaar wat totale volumes van 150 m^3, 180 m^3, 280 m^3, 340 m^3 en 400 m^3 onderskeidelik kan verkoel. Wat is die kleinste lugversorger wat die kantore effektief sal verkoel?

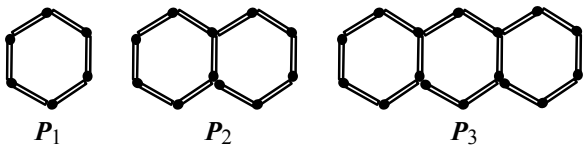
Die kantore se plafon is 2,4 m hoog en daar is vier kamers met afmetings van 4 m by 5,5 m, 4 m by 4,7 m, 4 m by 4,5 m en 4 m by 5,3 m onderskeidelik – sien die vloerplan.



(A) 150 m^3 (B) 180 m^3 (C) 280 m^3 (D) 340 m^3 (E) 400 m^3

24. Zolile uses matches to build hexagon patterns as shown below. How many matches are there in pattern $\boldsymbol{P}_{50}$?

24. Zolile bou seshoek-patrone met vuurhoutjies soos hieronder. Hoeveel vuurhoutjies is daar in patroon $\boldsymbol{P}_{50}$?



$\boldsymbol{P}_1$ $\boldsymbol{P}_2$ $\boldsymbol{P}_3$

(A) 298 (B) 300 (C) 301 (D) 251 (E) None of these / Nie een hiervan nie

25. Two different temperature scales are being used: degrees Celsius (°C) is used in Europe, while degrees Fahrenheit (°F) is still being used in the United States. The table below shows some corresponding readings on the two scales. If the temperature is 32 °C, what is the corresponding temperature in degrees Fahrenheit?

25. Twee verskillende temperatuurskale word gebruik: grade Celsius (°C) word in Europa gebruik, terwyl grade Fahrenheit (°F) in die Verenigde State gebruik word. Die tabel hieronder toon 'n aantal ooreenstemmende lesings op die twee skale. As die temperatuur 32 °C is, wat is die ooreenstemmende temperatuur in grade Fahrenheit?

Celsius (°C)	0	10	20	30	40	50	100
Fahrenheit (°F)	32	50	68	86	104	122	212

(A) 89,6 °F (B) 89 °F (C) 88 °F (D) 87,8 °F (E) 101 °F