WISKUNDE-IN-AKSIE (MATHEMATICS-IN-ACTION): QUESTION PAPER FOR GRADE 6 AND 7

31 JULY 2015

TIME: 60 MINUTES

Examiner: Prof. Marthie van der Walt
Moderators: Prof. Gerrit Stols; Dr Annalie Roux

INSTRUCTIONS

1. You may use calculators when writing this question paper.
2. Learners should make sure that their question paper consists of all the pages (15 pages and 42 questions).
3. Learners should immediately fill in their personal details on the answer sheet. School and learner code MUST be clearly written on the answer sheet.
4. Answer all questions on the **answer sheet** provided. All multiple choice questions (questions 1 to 40) are answered on the **front page** and questions 41 and 42 are answered on the **back** of the answer sheet.
5. **Answer sheet for multiple choice questions:** Choose only one of the options (a, b, c, d, or e) and use the answer sheet provided to indicate, clearly shaded, the answer you choose. Only one answer per question is allowed. No marks will be allocated if more than one answer is given in a question.
6. Calculations can be done on the question paper or on a separate clean page that the teacher/invigilator may give to you.
7. A maximum of 60 minutes are allowed to complete the question paper.
8. Your answer sheet must be handed in after 60 minutes.
9. **NB! Answer the first 40 questions on the multiple choice answer sheet. When the learner has finished this, he/she can turn over the answer sheet and complete questions 41 and 42 at the back of the answer sheet .**

MULTIPLE CHOICE QUESTIONS

1. Calculate:

$$\frac{1}{2} \div \frac{2}{3} \div \frac{3}{4} \div \frac{4}{5} \div \frac{5}{6} \div \frac{6}{7} \div \frac{7}{8} =$$

a. 8
b. $\frac{7}{8}$
c. $\frac{1}{2}$
d. 2
e. $\frac{1}{8}$

2. Justin solved the problem below. Which expression could be used to check his answer?

1364 ÷ 3 equals 454 with 2 remaining:

a. (454 x 3) + 2
b. (454 x 2) + 3
c. (454 + 3) x 2
d. (454 + 2) x 3
e. None of these.

3. Find the sequence and fill in the blanks:

$$(\frac{3}{7}, \frac{7}{14}), (\frac{11}{21}, \frac{15}{28}), (\frac{19}{35}, \frac{23}{42}), (\frac{27}{49}, \frac{31}{56}), \ldots$$

The **7th group** is **$(-, -)$**

a. $(\frac{31}{56}, \frac{35}{63})$
b. $(\frac{11}{21}, \frac{15}{28})$
c. $(\frac{59}{105}, \frac{63}{112})$
d. $(\frac{77}{43}, \frac{84}{47})$
e. $(\frac{51}{91}, \frac{55}{98})$

4. Which fraction is the largest?

$$\frac{3}{5}, \frac{10}{17}, \frac{15}{22}, \frac{30}{54}, \frac{60}{121}$$

a. $\frac{60}{121}$
b. $\frac{30}{54}$
c. $\frac{15}{22}$
d. $\frac{10}{17}$
e. $\frac{3}{5}$

5. Samuel is running the *Comrades Marathon* from Durban to Pietermaritzburg. His friend, Joseph, dropped him off in Durban, waited until Samuel got his athlete number and then drove halfway back to Pietermaritzburg. He parked next to the road and waited with other family members, friends and spectators to watch the runners pass the halfway mark. He then realised that he didn't memorise Samuel's athlete number. This number can make it easier to spot Samuel from a distance.

- He remembered it was a 4-digit number;
- He remembered seeing a number 3 in the tens position;
- In the hundreds position he remembered the number was 4 times the number of that in the thousands position;
- He said the number in the ones position was 3 times the number in the tens position;
- Finally he said the number 2 was in the thousands position.

What is Samuel's athlete number?

a. 1 342
b. 3 432
c. 31 241
d. 2 839
e. 3 831

6. Jeannine made a list of all the whole numbers between 2 to 100. How many times did she write the number 2?

a. 20
b. 19
c. 10
d. 9
e. 18

7. The first page in the Maths textbook is on the right side. When you turn the page over, facing pages are 2 and 3. Mr Hugo asked the learners to open their books to the facing pages whose page numbers add up to 109. To which pages should the learners turn?

a. 100 and 9
b. 52 and 57
c. 83 and 26
d. 54 and 55
e. 53 and 56

8. Thabo's birthday is on 25 May. If 1 January 2016 is on a Friday, on which day of the week is Thabo's birthday in the year 2017?

a. Wednesday
b. Thursday
c. Monday
d. Friday
e. Saturday

9. A train is 200 metres long. A tunnel is 1 kilometre long. The train travels at 600 metres per minute. How long is the time between the moment the front of the train enters the tunnel and the moment the end of the train exits the tunnel?

a. 600 minutes
b. 1 800 metres
c. 2 metres
d. 2 minutes
e. 10 minutes

10. The side of square X is five times the length of a side of square Y. How many times greater is the area of square X than the area of square Y?

a. 6 more
b. 10 times greater
c. 5 times greater
d. 24 more
e. 25 times greater

11. Christien, Berta and Jeannine are daughters of Mr Strauss, Mr Maree and Mr Barnard. Four of these people are playing tennis doubles. Mr Barnard's daughter and Mr Strauss are partners. Christien's father and Mr Maree's daughter are also partners. There aren't any father-daughter combinations. Who is Christien's father?

a. Mr Barnard
b. Mr Du Plessis
c. Mr Strauss
d. Mr Maree
e. Mr Marais

12. Four kids – Attie, Bernadette, Carli and Dedré – have R200 which they want to divide between themselves so that they all have the same amount of money. They each have some money of their own, but decide to share the R200 as follows: Attie gives Bernadette R26, Bernadette gives Carli R36, Carli gives Dedré R32 and Dedré gives Attie R4. They all end up with the same amount. How much money did each of them have to start with?

a. Attie: R200; Bernadette: R26; Carli: R36; Dedré: R4
b. Attie: R4; Bernadette: R26; Carli: R3; Dedré: R32
c. Attie: R50; Bernadette: R50; Carli: R50; Dedré: R50
d. Attie: R50; Bernadette: R51; Carli: R49; Dedré: R50
e. Attie: R72; Bernadette: R60; Carli: R46; Dedré: R22

13. When 265 is divided by a two digit number, the remainder is 5. How many such two digit numbers exist?

a. 6
b. 1
c. 2
d. 3
e. 5

14. Martin is 2 metres tall. He is standing next to a flag post on a sunny day. Martin's shadow is 1,5 metres long. At the same time, the shadow of the flag is 12 metres long. How tall is the flag post?

a. 15,5 meters
b. 3 meters
c. 16 meters
d. 13,5 meters
e. 14 meters

15. A man is trapped in a steep construction hole that is 21 metres deep. He manages to climb 3 metres every 15 minutes, but then slips back 1 metre. How long will it take him to get out of the hole?

a. 120 minutes
b. $2\frac{1}{2}$ hour
c. Three quarters of an hour
d. 2 hours
e. 90 minutes

16. Peter's house used to have 80 m² of living space. Then he added a room that was 4 m by 5 m. What was the fractional increase of living space?

a. $\frac{4}{5}$
b. $\frac{5}{4}$
c. $\frac{80}{5} = \frac{16}{1}$
d. $\frac{20}{80} = \frac{1}{4}$
e. $\frac{20}{100} = \frac{1}{5}$

17. The average of eight numbers is 39. If 1 is added to the first number, 2 is added to the second number, 3 is added to the third number, and so on up to the eighth number, what is the new average?

a. 75
b. 4,5
c. 43,5
d. 9
e. 36

18. By how much is the greatest of the numbers – listed below – greater than the smallest?

10 101; 11 001; 11 100; 10 110

a. 999
b. 900
c. 891
d. 9 009
e. 9

19. Which fraction is closest to 1?

a. $\frac{10}{11}$
b. $\frac{11}{10}$
c. $\frac{9}{11}$
d. $\frac{9}{10}$
e. $\frac{10}{9}$

20. In the FUN MATHS SCHOOL, 50% of the learners are younger than 11, $\frac{3}{20}$ are 11 years old and $\frac{3}{10}$ are older than 11 but younger than 14. The remaining 90 learners are 14 years or older. How many learners are 11 years old?

a. 90
b. 270
c. 540
d. 50
e. 18

21. Monica ran the 4,5 kilometre race in 45 minutes. Annelise ran the 2 kilometre race in 16 minutes. How many metres per minute does each one of them run?

a. Monica runs 0,1 km/min; Annelise runs 125 m/min
b. Monica runs 100 m/min; Annelise runs 0,125 km/min
c. Monica runs 10 km/min; Annelise runs 9 m/min
d. Monica runs 4 500 m/min; Annelise runs 200 m/min
e. Monica runs 100 m/min; Annelise runs 125 m/min

22. Consider the following number sentences. Which number sentence represents a two-digit number that is equal to twice the product of the digits making up that number?

a. **18** = 2 x (3 x 3)
b. **24** = 3 x (2 x 2 x 2)
c. **6** = 2 x (3 x 1)
d. **36** = 2 x (3 x 6)
e. **54** = 2 x (3 x 3 x 3)

23. If you change the digit 2 to 4 in the number 82 798, what will be the difference?

a. Three thousand
b. Two hundred
c. Four thousand
d. Two thousand
e. Twenty thousand

24. What is the relationship between the 8 after the decimal comma and the last 8 in the number 8,808?

a. A hundred times greater
b. A thousand times greater
c. 10 times greater
d. $\frac{1}{100}$ times greater
e. $\frac{1}{1000}$ times greater

25. The mid-year estimates are an annual statistical publication produced by *Statistics South Africa* (*Stats SA*) and it provides an estimate of the population of South Africa every year in July. *Statistics South Africa* estimates the population of South Africa to be 54 million as at July 2014, where about 30,0% of the population is aged younger than 15 years and approximately 8,4% (4,54 million) is 60 years or older. The mid-year population estimates further indicate that approximately 51% (approximately 27,64 million) of the population is female and the majority of the population are black Africans (80,2%), approximately 43,33 million. The proportion of elderly persons, aged 60 and older, is increasing over time. Those younger than 15 years, approximately 22,7% (3,66 million), live in KwaZulu-Natal; and 18,8% (3,05 million), live in Gauteng. (http://www.statssa.gov.za/?p=2990)

From the information in the paragraph above, which one of the following statements is not true:

For July 2014, the estimated population of South Africa –

a. was 54 million
b. indicated that about 30,0% of the population was aged younger than 65 years;
c. indicated that approximately 8,4% (4,54 million) of the population is 60 years or older;
d. indicate that approximately 27,64 million of the population was female;
e. indicated that approximately 3,66 million people live in KwaZulu-Natal.

26. When asked to round off 38 456 to the nearest thousand, which one is correct?

a. 39 000
b. 38 000
c. 38 500
d. 38 450
e. 38 460

27. The number of elements in the set {□, □, □, □, □, □} is $\frac{3}{4}$ of a unit. How many elements are in the unit?

a. 2
b. 6
c. 3
d. 7
e. 8

28. The number of elements in the set {○, ○, ○, ○, ○, ○, ○, ○, ○, ○, ○, ○, ○, ○, ○} is $\frac{5}{3}$ of a unit. How many elements are in the unit?

a. 20
b. 8
c. 9
d. 15
e. 5

29. On every hour a clock strikes the number of hours. How many times does the clock strike from 8 am to 5 pm?

a. 10 times
b. 17 times
c. 8 times
d. 65 times
e. 116 times

30. According to the Census 2011 data from *Statistics South Africa*, the country's population then was 51 770 560. The following table indicates the population per province. How many more lived in Gauteng than in North West?

POPULATION BY PROVINCE 2011		
Province	**Population**	**% of total**
Eastern Cape	6 562 053	12.7%
Free State	2 745 590	5.3%
Gauteng	12 272 263	23.7%
KwaZulu-Natal	10 267 300	19.8%
Limpopo	5 404 868	10.4%
Mpumalanga	4 039 939	7.8%
Northern Cape	1 145 861	2.2%
North West	3 509 953	6.8%
Western Cape	5 822 734	11.3%
TOTAL	**51 770 560**	**100%**

Source: Statistics South Africa

a. 15 782 216
b. 51 770 560
c. 11 126 402
d. 8 762 310
e. 3 509 953

31. How many different rational numbers are in the list?

$\frac{35}{40}$; **6;** $\frac{15}{18}$; **808 954;** $\frac{14}{28}$; $\frac{3}{2}$; **4; 6,7**

a. 5
b. 3
c. 8
d. 6
e. 4

32. Solve this problem: If the sum of a number and a seventh ($\frac{1}{7}$th) of that number is 24, what is the number?

a. 21
b. 24
c. 168
d. 192
e. 31

33. Henré has to evaluate the sum $\frac{1}{3} + \frac{3}{5}$. Which of the following calculations gives the correct answer?

a. $\frac{1}{3} + \frac{3}{5} = \frac{4}{8} = \frac{1}{2}$
b. $\frac{1}{3} + \frac{3}{5} = \frac{3}{15} = \frac{1}{5}$
c. $\frac{1}{3} + \frac{3}{5} = \frac{1}{3} \times \frac{3}{5} = \frac{1}{5}$
d. $\frac{1}{3} + \frac{3}{5} = \frac{5}{15} + \frac{9}{15} = \frac{14}{15}$
e. $\frac{1}{3} \times \frac{5}{3} = \frac{5}{9}$

34. The following sequence of operations is done on a number: minus 2, divide by 30, multiply by 27, add 6, and subtract 17. The final result is 70. What is the original number?

a. 50,199
b. 51,3
c. 50
d. 92
e. 63

35. Emma has checked that 180 is divisible by the prime numbers 2, 3, and 5. The question asked is the prime factorization of 180. Which one of the following is correct?

a. $2 \times 3 \times 5$
b. $2 \times 3 \times 20$
c. $2 \times 5 \times 18$
d. 30×6
e. $2 \times 2 \times 3 \times 3 \times 5$

36. The speed of light in a vacuum is 186 282 miles per second (299 792 kilometres per second), and in theory nothing can travel faster than light. In miles per hour, light speed is a lot, about 670 616 629 miles per hour. If you could travel at the speed of light, you could go around the earth 7,5 times in one second. Which of the following statements <u>is not correct</u>?

a. The speed of light in a vacuum is 186 282 miles per second;
b. 186 282 miles per second is the same as 299 792 kilometres per second;
c. The speed of light is about 670 616 629 miles per hour;
d. If you could travel at the speed of light, you could go around the earth 7,5 times in one second;
e. The distance around the earth is 670 616 629 miles.

37. The British units for mass are pounds (lb or lbs) and ounces (oz) and 16 ounces equal 1 pound. We use kilograms (kg) and grams (g) (metric units) and 1 000 grams equal 1 kilogram. If 1 kilogram equals 2,2 pounds, solve the following problem:

How many pounds equal 266,2 kg?

a. 266 200 lbs;
b. 4 259,2 lbs;
c. 585,64 lbs;
d. 121 lbs;
e. 426,8 lbs.

38. In which of the following will area units be used?

a. The length of an athletics track;
b. The contents of a 2-liter Coke bottle;
c. The weight of a bag of rice;
d. The height of a flag post;
e. The size of a floor.

39. David rolled a dice 30 times and listed the number appearing each time, in a table. The numbers that appeared are shown below:

2	1	2	2	6	1	4	4	2	6
1	6	3	6	3	3	4	1	4	2
5	2	5	4	1	2	6	4	3	2

Find the number that appeared the maximum number of times:

a. 1
b. 2
c. 3
d. 4
e. 5

40. **Mrs Jacobs, one of the Maths teachers at a primary school in Cape Town, needs to be at school by 07:10 in the morning. It takes her 45 minutes to prepare for the day, 22 minutes to drive to school when it is not peak traffic hour. However, she sits in the traffic for at least 30 extra minutes every morning. What time should she get up so that she can get to school on time?**

a. 05:33
b. 06:30
c. 01:37
d. 08:47
e. 05:47

Questions 41 and 42 should be done at the back of the multiple choice answer sheet in the spaces provided.

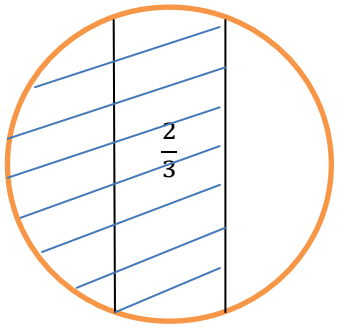
QUESTION 41:

When Armand's father died, he left a stable with 17 horses. His will stipulated that half of his horses should go to Armand, his oldest son, a third to his middle son, John, and a ninth to his youngest son, Carel. The executor of the estate decided to make the distribution easier by contributing his own horse to the estate. With 18 horses now available, he gave 9 horses (a half) to Armand, the oldest son, 6 horses (a third) to the middle son, John, and 2 horses (a ninth) to the youngest son, Carel. This satisfied the terms of the will, and since 9 + 6 + 2 = 17 horses were given to the sons, the executor was able to retain his own horse.

Explain what has happened. **[5]**

QUESTION 42:

When asked to illustrate the concept of $\frac{2}{3}$ by colouring a region on a given circle, Peter coloured the circle as shown below.



42.1 Three (3) marks are allocated. How many marks will you allocate Peter? ____

If you gave Peter full marks (3) in 42.1, you don't have to answer 42.2 and 42.3.

42.2 If you didn't allocate full marks to Peter in 42.1, what is the mistake he made?

42.3 How would you explain to Peter to eliminate the error in future?

[5]

THE FOLLOWING RESOURCES ARE ACKNOWLEDGED:

- http://mathtop10.com/7th_grade_math_challenge_free/7th_grade_math_P6.htm
- athtop10.com/6th_grade_math_challenge_free/6th_grade_math_competition%20P1.htm
- http://www.onlinemathlearning.com/7th-grade-word-problems.html Singapore
- http://www.redshift.com/~bonajo/singaporeword.htm - www.teach-nology.com
- http://mathtop10.com/7th_grade_math_challenge_free/7th_grade_math_P6.htm
- Long, C.T., DeTemple, & Millman, R.S. 2015. Mathematical reasoning for elementary teachers, 7th addition. Pearson New York.
- Sobecki, D., Bluman, A.G. & Schrick-Matthews A. 2011. Math in our world. McGraw-Hill, New York.
- Van Zyl, J.A. 1977. Enrichment exercises in Mathematics for the senior phase of the primary school Standard 4. Maskew Miller: Cape Town.
- https://www.edugain.com/sampleWorksheet/grade-6/Data-Handling/Printed
- *Statistics South Africa*: http://www.statssa.gov.za/?p=2990
- How fast does light travel?: http://www.space.com/15830-light-speed.html