



**2022 Wits Mathematics Competition**  
**Qualifying Round**  
**Middle Primary**

**Instructions**

This exam consists of 20 multiple choice questions. There is one correct answer to each question. There is no penalty for incorrect answers. The mark allocation is as follows:

Questions 1-5 are each worth 3 points,  
Questions 6-10 are each worth 4 points,  
Questions 11-15 are each worth 5 points,  
Questions 16-20 are each worth 6 points.  
The total number of points available is 90.

The time limit on this exam is 75 minutes, calculators may NOT be used. A ruler and compass may be used but all other geometric aids are NOT allowed. A translation aid (such as a dictionary) from English to another language is allowed. If you are using the computer-friendly answer sheet you should fill it in in BLACK pen (other colours do not scan well). Time may be given for filling in name, school and other personal details.

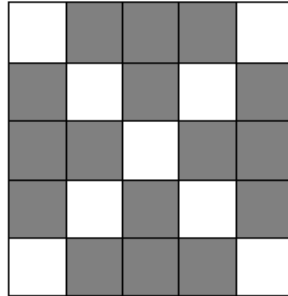
It is a safe rule to apply that, when a mathematical or philosophical author writes with a misty profundity, he is talking nonsense” — Alfred North Whitehead

## A. 3 point questions

1. What is the value of  $43 - 12$ ?

- A) 21                      B) 26                      C) 31                      D) 33                      E) 35

2. In the picture below, how many more squares are shaded than not shaded?



- A) 6                      B) 7                      C) 8                      D) 9                      E) 10

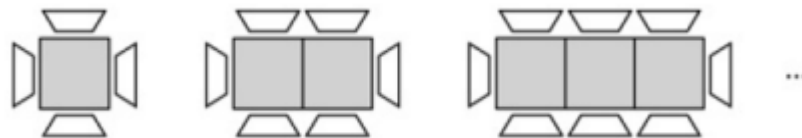
3. Malwande is competing in his school's cross country race and he has just overtaken the runner that was in 5th place. If Malwande then overtakes another 2 runners and gets overtaken by 4 runners, what is Malwande's final position?

- A) 3rd                      B) 4th                      C) 5th                      D) 6th                      E) 7th

4. Tristan leaves home at 6:47 in the morning. It takes him 55 minutes to travel to school. He arrives 8 minutes before school starts. What time is school scheduled to start?

- A) 6:55                      B) 7:42                      C) 7:47                      D) 7:50                      E) 7:55

5. A sequence of tables and chairs is shown below. How many chairs will there be in the fourth image?



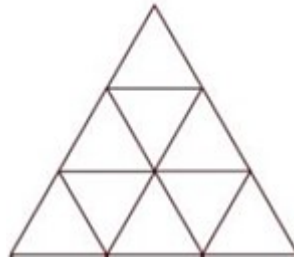
- A) 8                      B) 9                      C) 10                      D) 11                      E) 12

## B. 4 point questions

6. Alex opens his favourite mathematics puzzle book and notes that the product of the page numbers facing him is 132. Find the sum of these two page numbers. [Note: All pages are numbered consecutively.]

A) 12                  B) 23                  C) 45                  D) 57                  E) 71

7. How many triangles (of any size) are in the picture below?



A) 10                  B) 11                  C) 12                  D) 13                  E) 14

8. In the image below, which square can be removed to increase the total perimeter of the shape? Perimeter means the total distance around the shape.



A) Square A          B) Square E          C) Square F          D) Square J          E) Square K

9. Which fraction below is equal to  $\frac{1}{3}$ ?

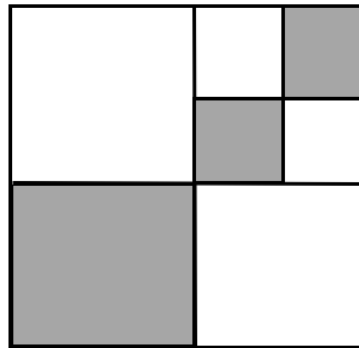
A)  $\frac{2}{8}$                   B)  $\frac{3}{9}$                   C)  $\frac{5}{12}$                   D)  $\frac{6}{30}$                   E)  $\frac{12}{30}$

10. The Olympic committee printed numbered bibs for each of the athletes competing in the ski jump event, starting from the number 1. If 55 digits were printed overall, how many athletes competed?

A) 5                  B) 17                  C) 32                  D) 45                  E) 55

### C. 5 point questions

11. Lungi and Kagiso are cousins, aged 10 and 34 respectively. How old will Lungi be when his age is exactly half of Kagiso's age?
- A) 10                  B) 22                  C) 24                  D) 34                  E) 48
12. A box containing four Wits maths textbooks weighs 10kg, the same box with six Wits maths textbooks weighs 13kg. How much, in kg, does an empty box weigh, if all books have the same weight?
- A) 1.5                  B) 2                  C) 3                  D) 4                  E) 6
13. The large square below has an area of  $16\text{cm}^2$ . It has been split into various smaller squares. Calculate the area, in  $\text{cm}^2$ , of the shaded region.



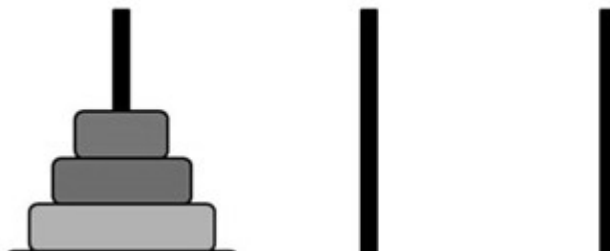
- A) 4                  B) 6                  C) 8                  D) 12                  E) 16
14. The first 56 odd numbers, starting from the number '1', are written. How many times does the digit '7' appear?
- A) 16                  B) 18                  C) 21                  D) 26                  E) 30
15. Along a highway, there are electric poles on one side of the highway and telegraph poles on the other side. The electric poles are separated by 15m and the telegraph poles are separated by 40m. If an electric and telegraph pole are both present at the point where the highway begins, after what distance, in m, will they be in front of each other again?
- A) 40                  B) 60                  C) 80                  D) 120                  E) 180

## D. 6 point questions

16. A water tank is  $\frac{7}{9}$  full. When 30 litres is released the tank is  $\frac{5}{9}$  full. What is the full capacity of the tank (in litres)?
- A) 30                      B) 35                      C) 135                      D) 270                      E) 900
17. A palindrome reads the same forwards and backwards. The number 202202 is a 6-digit palindrome. What is the difference of the palindrome directly before 202202 and the palindrome directly after 202202?
- A) 1                      B) 2                      C) 2200                      D) 200002                      E) 202202
18. Tumelo makes a large cube from 27 small white cubes. She paints all the faces of the large cube (shaded in the picture below). She then removes a small cube from four corners, as shown. While the paint is still wet, she stamps each of the new faces onto a piece of paper. How many of the following stamps can Tumelo make?



- A) 1                      B) 2                      C) 3                      D) 4                      E) 5
19. A tower of rings (called the Tower of Hanoi) is shown below. What is the minimum number of moves required to reform the tower (in the exact order of biggest ring at the bottom and smallest ring at the top) on either the second or third pole? You can only move one ring at a time, and may only place a smaller ring on top of a larger ring.



- A) 4                      B) 5                      C) 7                      D) 8                      E) 10

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20. A stand sells movie popcorn in only 2 sizes. Their prices are R4 and R7 per serving. What is the greatest popcorn sales value, in Rands, that is NOT POSSIBLE?
- A) 15            B) 17            C) 23            D) 43            E) None