



**2022 Wits Mathematics Competition**  
**Qualifying Round**  
**Upper 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. Compute  $20 \times 22$ .

- A) 380      B) 400      C) 420      D) 440      E) 460

2. What percentage of the squares in the diagram below are shaded?

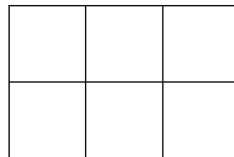


- A) 20      B) 40      C) 60      D) 80      E) 100

3. Compute  $10 - 9 + 8 - 7 + 6 - 5 + 4 - 3 + 2 - 1$ .

- A) 1      B) 5      C) 10      D) 25      E) 55

4. How many rectangles are in the following diagram? (*Squares are also rectangles.*)



- A) 9      B) 12      C) 15      D) 18      E) 21

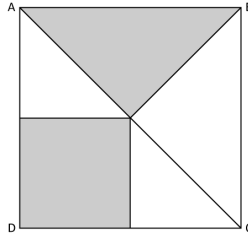
5. In the image below, which square can be removed to increase the total perimeter of the shape? Perimeter means the distance around the shape.



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

**B. 4 point questions**

6. The area of the square  $ABCD$  is  $40\text{cm}^2$ . What is the area of the shaded region in  $\text{cm}^2$ ?



- A) 10                  B) 15                  C) 20                  D) 25                  E) 30
7. The surface area of a cube is  $54\text{cm}^2$ . What is the volume of the cube in  $\text{cm}^3$ ?
- A) 27                  B) 64                  C) 100                  D) 125                  E) 1000
8. Sihle opens her favourite mathematics puzzle book and notes that the product of the page numbers facing her is 380. Find the sum of these two page numbers.
- A) 35                  B) 36                  C) 37                  D) 38                  E) 39
9. What is the minimum number of digits that must be removed from the number 12323314, so that the resulting number is the same when read from either left to right or right to left?
- A) 1                  B) 2                  C) 3                  D) 4                  E) 5
10. The Olympic committee printed numbered bibs for each of the athletes competing in the ski jump event, starting from the number 1. If 234 digits were printed overall, how many athletes competed?
- A) 90                  B) 114                  C) 123                  D) 172                  E) 234

## C. 5 point questions

11. Which of the following fractions is closest to  $\frac{1}{2}$ ?
- A)  $\frac{1}{3}$       B)  $\frac{2}{3}$       C)  $\frac{2}{5}$       D)  $\frac{4}{5}$       E)  $\frac{5}{6}$
12. A box containing four wits maths textbooks weighs 10 kg, the same box with six wits maths textbooks weighs 13 kg. How much does an empty box weigh (in kg) if all the books weigh the same?
- A) 2      B) 3      C) 4      D) 5      E) 6
13. The product of two positive integers is equal to twice their sum. The same product is also equal to six times the difference between the two integers. What is the sum of the integers?
- A) 3      B) 6      C) 9      D) 15      E) 18
14. Callan has 10 blue marbles, 6 green marbles and 5 red marbles in a bag. He draws one marble at a time and puts it aside. How many times should he draw to ensure that he has at least one marble of each colour?
- A) 4      B) 12      C) 15      D) 16      E) 17
15. A palindrome is a number that is the same when read backwards e.g 565 or 45754. What is the difference between the largest four digit palindrome and the smallest four digit palindrome? Initial zeros are not allowed so for example 0110 is not considered a four digit palindrome because it's not a four digit number.
- A) 8668      B) 8778      C) 8888      D) 8998      E) 9000

**D. 6 point questions**

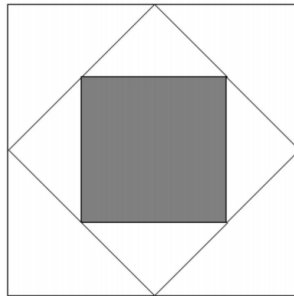
16. How many 3 digit numbers (whole numbers between 100 and 999) are multiples of 6, 10 and 15?

- A) 18                      B) 20                      C) 30                      D) 33                      E) 60

17. 30 students wrote a mathematics exam out of 100 marks. The average score was 50. The average score of those who passed was 60 and the average score of those who failed was 45. How many students passed?

- A) 10                      B) 12                      C) 14                      D) 16                      E) 18

18. The diagram below shows a shaded square in a square inside another square. What fraction of the diagram above is shaded?



- A)  $\frac{1}{8}$                       B)  $\frac{1}{6}$                       C)  $\frac{1}{4}$                       D)  $\frac{1}{2}$   
E) Impossible to determine

19. When 1 is subtracted from 5 times a number and the result is divided by 3 more than twice the original number we get  $\frac{4}{5}$ . Find the number.

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

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