

**ONLINE MATHEMATICS ENTRANCE EXAMINATION**

**DATE: 18<sup>th</sup> JUNE 2020**

**TIME: 16.00-17.30**

- 1. You have 1 hour and 30 minutes for the exam.**
- 2. You must answer all questions.**
- 3. No calculators are allowed.**
- 4. Type your answers in the spaces below the questions.**
- 5. Answers with no evidence of calculations will not score any marks. Workings and answers written on any other page will not be considered.**
- 6. You will need a computer connected to high speed Internet and stable electricity (You cannot take online math entrance exam on mobile phone).**

**Please note additional requirements:**

7. Applicant will be automatically disqualified from the examination and will receive a score of 0 for the exam and exam administration fee payment will not be reimbursed:
  - a) If he/she leaves the room during the examination.
  - b) If he/she talks, whispers, or turns around.
  - c) If he/she found to have any unauthorized materials during the examination
  - d) If he/she caught cheating in the examination.
  - e) If he /she fails to show contents of his/her pockets or any other containers to the invigilators.
  - f) If he/she is found to have a mobile phone or other electronic device (switched on or off) on his/her room/table during the exam.
8. During the examination period, any technical problems including poor internet connection from applicant's side that may cause an applicant to leave the examination environment is under the applicant's responsibility.
9. Applicant cannot re-join the exam and continue the examination process. Once you leave the examination or you disconnect, you cannot continue the exam.
10. Invigilator may conduct room security checks at any point during your exam. You must perform all requested security checks. Loss of time during these security checks cannot be made up.
11. Please follow detailed exam instruction sent to applicant's personal account via admission system.
12. Applicant has to follow the instruction strictly during the examination.

**Applicant ID:**

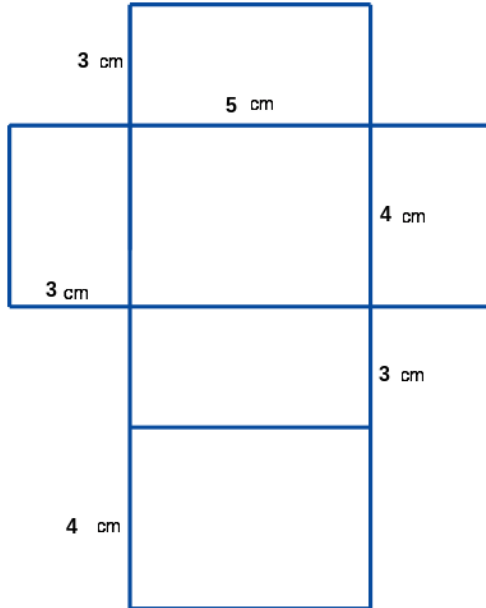
All questions on this paper must be answered.

Write the answers in the space below each question.

Working must be shown for **all stages** of the questions.

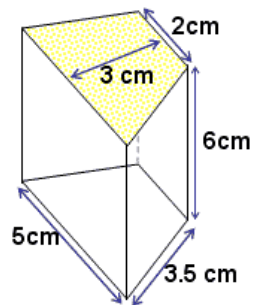
1.

- a) Work out the volume of the cuboid made by the net shown below.



.....  
2 marks

- b) Calculate the surface area of this trapezium prism



.....  
3 marks

2. A sequence has the first four terms

$$x, 2x + y, 3x + 2y, 4x + 3y$$

- a) What is the 6<sup>th</sup> term of this sequence?

.....

2 marks

The sum of the first four terms is 5 and the fifth term has the value of 1.

- b) Find the values of  $x$  and  $y$ .

$$x = \dots\dots\dots$$

2 marks

$$y = \dots\dots\dots$$

2 marks

3. Use trial and improvement to solve this equation to 1 decimal place.

$$x^3 - 4x - 1 = 30$$

$$x = \dots\dots\dots$$

3 marks

4.

- a) The area of the world is approximately 135 085 000 km<sup>2</sup>

Express this number in standard form

.....

2 marks



The area of Africa is approximately 30 132 000 km<sup>2</sup>

- b) Calculate the area of Africa as a percentage of the area of the world.

Give your answer to 1 decimal place.

.....

3 marks

5. Given that  $x = 64$ , work out

$$x^{\frac{1}{2}} + x^{\frac{2}{3}}$$

.....  
2 marks

6. a) What is the value of  $x - 0.05$  as a fraction?

.....  
2 marks

b) How many integers satisfy both of these inequalities?

$$\begin{aligned} 5x &> 4 \\ 3x - 4 &< 32 \end{aligned}$$

.....  
2 marks

7. a) The perimeter of a square is 49 cm. What is its area?

.....  
2 marks

b) A cube has a total surface area of  $726 \text{ cm}^2$

What is the length of one edge of the cube?

.....  
2 marks

8.

a) Rearrange this formula to make  $X$  the subject

$$a = \sqrt{\left(\frac{m}{x}\right)}$$

$x =$  .....  
2 marks

b) Simplify as far as possible

$$\frac{5x + 2x^2}{3x}$$

.....  
2 marks

9. Find three pairs of equivalent expressions from the ones below.  
You must show all your workings.

**A**

$$\frac{x^2}{2x}$$

**B**

$$\frac{x(x+1)}{x^2}$$

**C**

$$\frac{x^2 + x}{x^2 - x}$$

**D**

$$\frac{3x + 6}{3x}$$

**E**

$$\frac{x + 1}{x}$$

**F**

$$\frac{x + 2}{x}$$

**G**

$$\frac{x + 1}{x - 1}$$

Pair 1.....

Pair 2.....

Pair 3.....

2 marks each (total 6 marks)

10. a) Find  $a$  and  $b$  so that

$$\frac{1}{a} + \frac{1}{b} = \frac{5}{8}$$

$a =$  .....

$b =$  .....

2 marks

- b) An oil tank weighs 250 kg when it is  $\frac{1}{4}$  full and 350 kg when it is  $\frac{3}{4}$  full.

What is the weight of the empty oil tank?



250 kg



350 kg

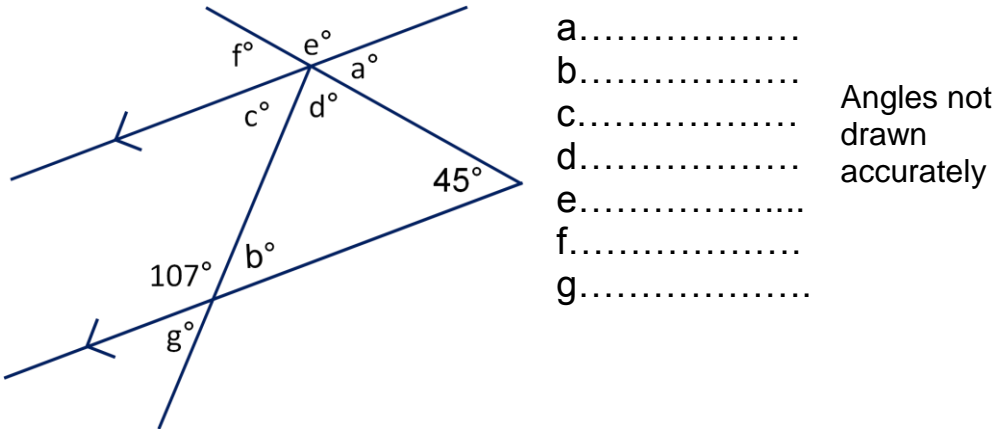
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3 Marks

11. Prove algebraically that the difference between the squares of any two consecutive integers is equal to the sum of these two integers

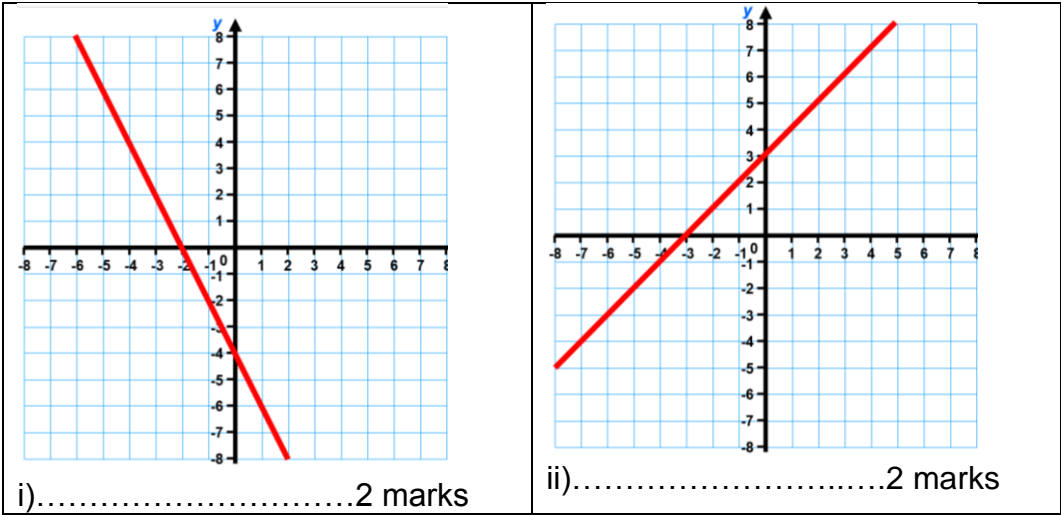
.....  
12.marks

12. From the diagram below find the values of the following angles



4 marks

13. a) Give the equation of each straight line in the form  $y = mx + c$ .



b) Complete the table for  $y = x^2 - 2x - 4$

$x$	-2	-1	0	1	2	3	4
$y$	4		-4	-5		-1	

2 marks

14. One hundred sailors are shipwrecked on a desert island with enough food for 24 days. After 16 days, 20 more sailors join them. How long will the food last if they each only eat half as much each day from now on? Give your answer to the nearest half day.



.....

4 marks

15. Given that A, B and C are three fractions  $\frac{1}{2}$ ,  $\frac{2}{3}$  and  $\frac{3}{4}$  write these fractions as a ratio in their simplest terms

.....

3 marks

16. If  $\tan \alpha + \cot \alpha = 4$  then calculate the value of  $\sin 2\alpha$ .

.....

(5 marks)