ONLINE MATHEMATICS ENTRANCE EXAMINATION

DATE: 17th 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.

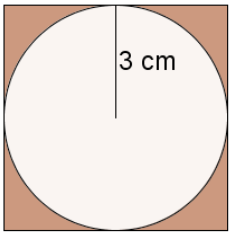
Working must be shown for **all stages** of the questions.

1. At a football match the ratio of adults to children is 3:1. The ratio of boys to girls is 3:2. What fraction of all the people at the football match are girls?

.....

3 marks

2. Find the area of the shaded part.

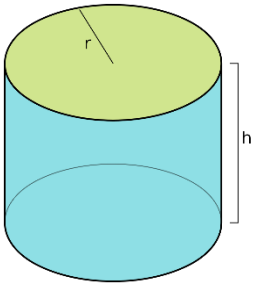


Use 3.14 as the value for π. Give your answer to 2 d.p. *Give the unit.*

.....

4 marks

3 a) The formula for the surface area, A, of a closed cylinder of radius r and height h is $A = 2\pi r(r + h)$. Make h the subject of the formula



.....

3 marks

b) The mass, m grams, of a radioactive chemical after t years is given by

$m = 80 \times 0.5^t$. Find the mass after 3 years

..... 3 marks

4. a) A train of length 180 m is going to go through a tunnel 620 m long. How long will it take the train to pass completely through the tunnel if it is travelling at 54 km/hour? Give your answer to 2 d.p.

…….

3 marks

b) A statue of a horse is made from metal with a density of 8 g/cm^3.

Find the weight of the statue if the volume is 30 cm^3.

Use appropriate unit

……

2 marks

5. Find the *n*th term for the following sequence

0 3 8 15 24 35

……

3 marks

6. Five machines produce 10 000 boxes in 10 hours. How many boxes would 8 machines produce in 6 hours?

……..

2 marks

7. a) Solve this simultaneous equation

$$2x - y = 5$$

$$\frac{x}{4} + \frac{y}{3} = 2$$

x= ……

y = ……

4 marks

b) A rectangle has a perimeter of 34 cm

Find the value of the longest side of the rectangle

……

3 marks

c) The width of a different rectangle is one third of the length. If the perimeter is 96 cm, find the width.

……..

3 marks

8. a) If a = -2 , b = 3 and c = -3 , work out the value of the following

i) $(b^2 - a)$

……..

(1 mark)

ii) $\underline{2a(b^2 - a)}$

(answer to 1 d.p.)

……

(2 marks)

b) Factorise $y^2 + 3y - 108$

……..

(2 marks)

c) Solve $x^2 + (x + 1)^2 = (2x - 1)(x + 4)$

……

(3 marks)

9. Write down ***one*** inequality to show the values of x which satisfy all three of the following inequalities

$x < 5$
$0 < x < 6$
$3 \leq x < 10$

……
(1 mark)

10. a) Write as a single fraction

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

……
(2 marks)

b) Simplify

$$\frac{x-1}{3} + \frac{x+2}{4}$$

……
(2 marks)

11. Find three equivalent expression from the expressions **A-H** below.

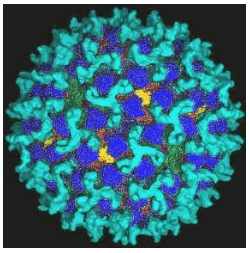
A $\frac{x^2}{3x}$ B $\frac{x}{2} \times \frac{x}{2}$ C $\frac{12x+6}{6}$ D $\frac{x}{5} - \frac{2}{5}$

E $\frac{2x^2+x}{x}$ F $\frac{x(x+1)}{3x+3}$ G $\frac{x-2}{5}$ H $\frac{ax^2}{4a}$

Pair 1……..
Pair 2……
Pair 3……..

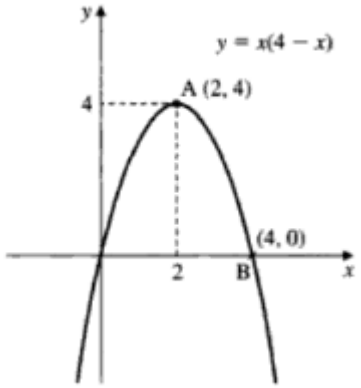
2 marks for each pair

12. A patient in hospital is very ill. Between 08.00 and 12.00 one day the number of viruses in his body goes up from 2.9×10^8 to 5.7×10^{11}. Work out the increase in the number of viruses, giving your answer in standard form.



……
3 marks

13.



a) Find the domain of the function represented in graph above

Equation……

3 marks

b) Find the range of the function

Equation……

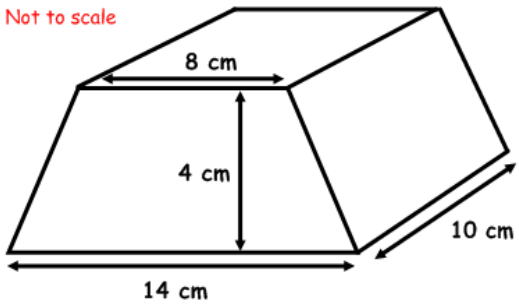
3 marks

c) Give the equation of the line which is perpendicular (at right angles) to $y = x - 2$

……..

2 marks

14. a) Calculate the *volume* of the prism shown below



……

3 marks

b) The prism is a solid. Calculate its *surface* area. Clearly show the area of *each* face (side).

……..

4 marks