ONLINE MATHEMATICS ENTRANCE EXAMINATION

DATE: 17th JUNE 2020

TIME: 11.00-12.30

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.

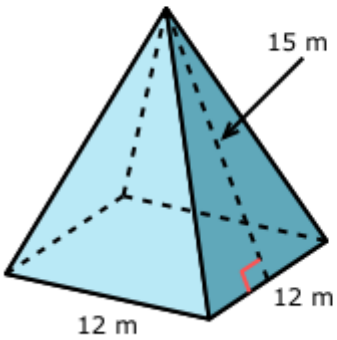
Working must be shown for **all stages** of the questions.

1. Ann, Bina and Cara share $66.
   The amount Ann and Bina get is in the ratio 9:5
   The amount Bina and Cara get is in the ratio 2:1
   How much does Ann get?

.....

4 Marks

2. Find the surface area of this pyramid.
   You must include the units in your answer.



.....

4 marks

3.

$$\boldsymbol{a}=\begin{pmatrix}4\\1\end{pmatrix} \text{ and } \boldsymbol{b}=\begin{pmatrix}3\\2\end{pmatrix}$$

Work out **a** - 2**b** as a column vector

.....

2 marks

4. a) Expand and simplify

$$(x + 4)(x + 5)(x - 4)$$

……

2 marks

b) Simplify

$$\frac{x^2 - 3x - xy + 3y}{x^2 - 9}$$

……

3 marks

5. A rectangular soccer pitch has a length of 105 metres, to the nearest 5 metres, and a width of 53 metres, to the nearest metre.

a) Work out the lower bound for the *perimeter* of the pitch

……

3 marks

b) Work out the upper bound for the *area* of the pitch

……

3 marks

6. $-3 < n \leq 1$

n is an integer

Write down all the possible values of n

.....

2 marks

7. Simplify

$$2w^3x^2 \times 3w^4x$$

.....

2 marks

8. Make t the subject of the formula

$$2(t - 5) = y$$

.....

3 marks

9.

A £20 (UK pounds) note is a rectangle 133 mm long and 72 mm wide.
A £50 (UK pounds) note is a rectangle 160 mm long and 82 mm wide.

Show that the two rectangles are not mathematically similar.

.....

3 marks

10. Work out the value of $2 \times 10^{7} \times 8 \times 10^{-12}$

Give your answer in standard form.

.....

2 marks

11.

a) Expand and simplify

$$4(x - 3) - 2(1 - x)$$

.....

2 marks

b) Solve

$$\frac{8}{x+3} + \frac{3}{x+8} = 1$$

.....

3 marks

c) Find the *n*th term for this sequence

$\frac{1}{1}$ $\frac{2}{8}$ $\frac{3}{27}$ $\frac{4}{64}$ $\frac{5}{125}$

.....

4 marks

Paul says that $\frac{10}{10000}$ is in this sequence. Is he right? Give a reason for your answer.

.....

.....1 mark

12. Solve this simultaneous equation

$$3x - y = 17$$
$$\frac{x}{5} + \frac{y}{2} = 0$$

x = ...

y= .....

4 marks

13. z is proportional to m. If $z = 20$ when $m = 4$, calculate the value of z when $m = 7$.

……

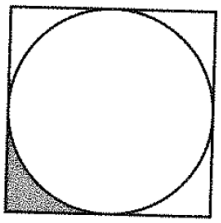
2 marks

14. Three years ago a teacher was paid \$60 per day. She is now paid \$150 per day. Assuming an average annual rate of inflation (price rises) of 20%, has her pay kept up with inflation? Approximately how does it compare to the rate of inflation?

……

5 marks

15. In the diagram below a circle is drawn inside a square of side 6 cm.



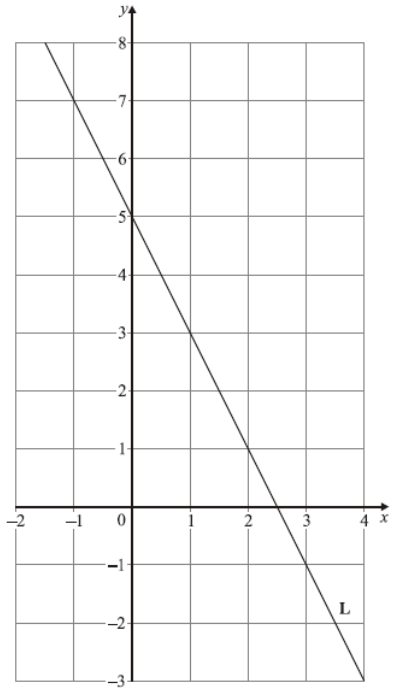
Using 3.14 as the value of π give the area of the shaded part to 2 decimal places.

……

4 marks

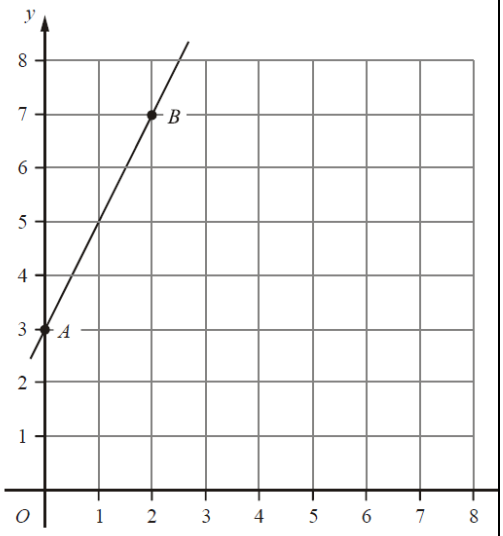
16. Find the equations of the following lines

a)



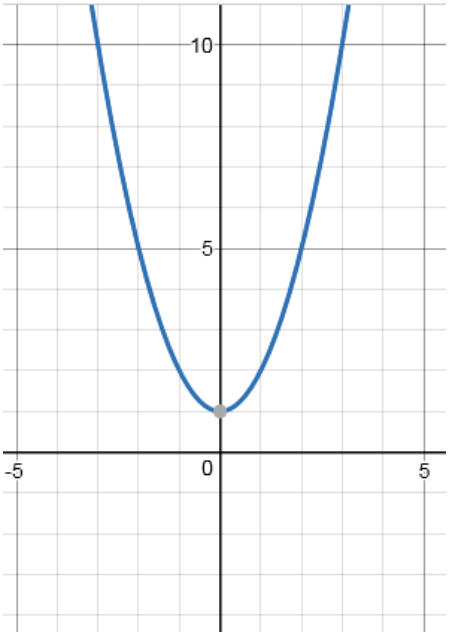
Equation……
2 marks

b)



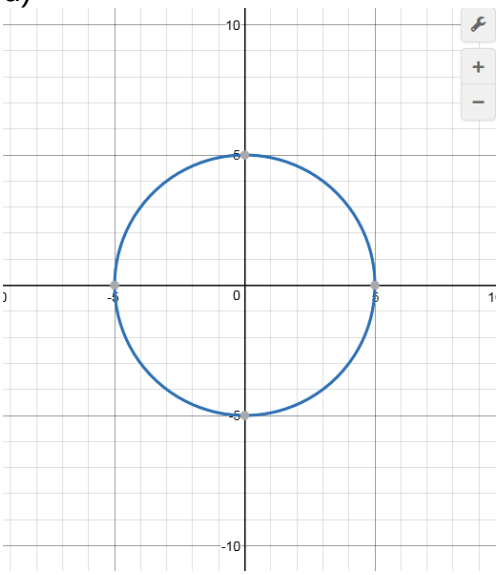
Equation……
1 mark

c)



Equation……
3 marks

d)



Equation……

3 marks

Total marks for page: 9 marks

17. Jama buys 5 kg of dried fruit to sell. He pays $10 for the fruit.

Jama puts all the dried fruit into bags. He puts 250 g of fruit into each bag.

He sells each bag of fruit for 65c ($0.65)

Jama sells all the bags of fruit. Work out his percentage profit.

…….

3 marks

END OF TEST