

**ONLINE MATHEMATICS ENTRANCE EXAMINATION**

**DATE: July 7, 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:**

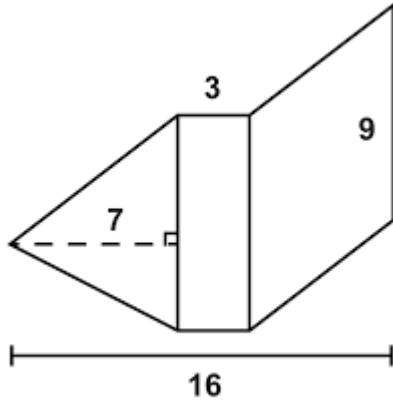
All questions on this paper must be answered.

Write the answers in the space below each question.

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

1.

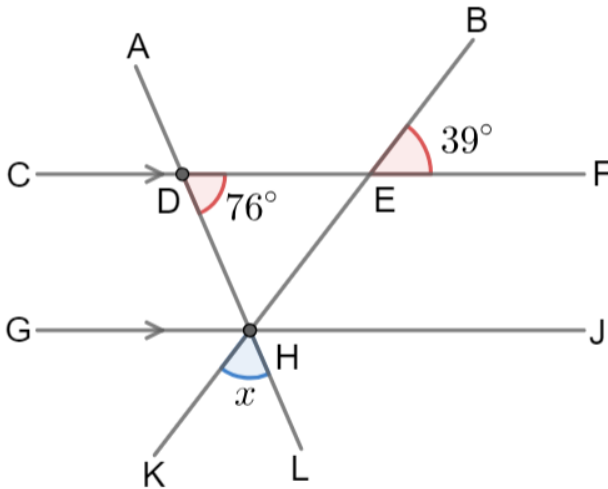
Find the area of this shape. (All sides are in centimetres)



(4 marks)

2.

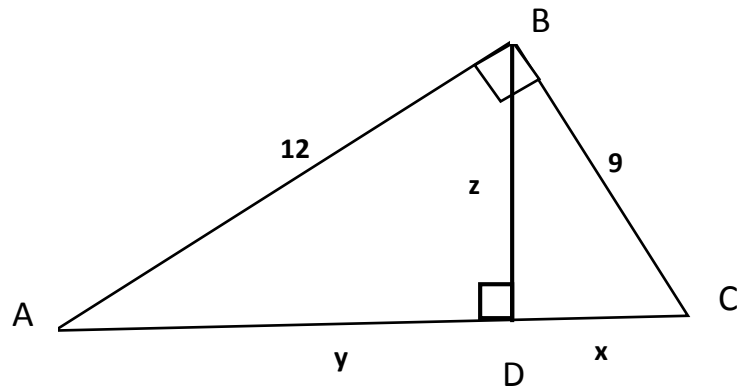
Find the angle  $x$



(3 marks)

3.

A right triangle is shown below. Find the lengths x, y and z.



(5 marks)

4.

a) Simplify

$$\frac{2^{3n-4} \cdot 2^{3+4n}}{2^{2+n}}$$

(3 marks)

b) Make z the subject of the formula

$$x = \frac{Az + 3}{7 - At}$$

(3 marks)

5.

Calculate

$$\frac{4 + \sqrt{8}}{4 - \sqrt{8}} - \frac{4 - \sqrt{8}}{4 + \sqrt{8}}$$

(4 marks)

6. Solve the simultaneous equations

$$\begin{cases} 3x - 5y = -9 \\ 4x + 9y = 82 \end{cases}$$

(4 marks)

7. Solve the equation

$$\frac{5x - 6}{7} = 1 - \frac{4 - 8x}{3}$$

(3 marks)

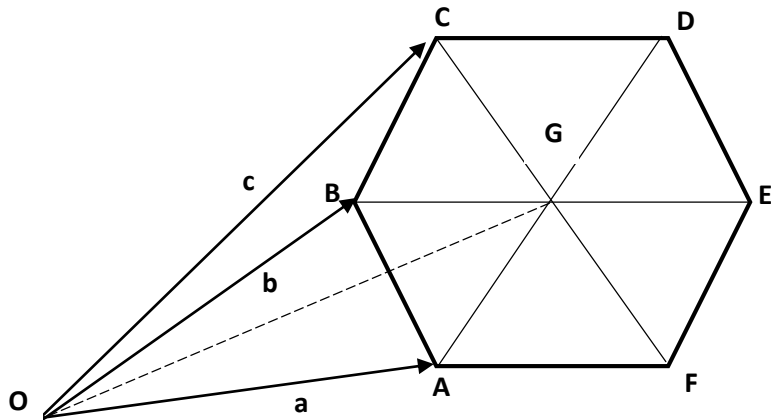
8. Solve the equation

$$2^{x+1} = 8 + 2^x$$

(3 marks)

9.

ABCDEF is a regular hexagon with centre G. The position vectors of A, B and C relative to an origin point O are **a**, **b** and **c** respectively.



a) Express OG in terms of vectors **a**, **b** and **c**.

(3 marks)

b) Express CD in terms of vectors **a**, **b** and **c**.

(2 marks)

10.

a) Identify which term is number 110 of given arithmetic progression

10, 14, 18, . . .

(4 marks)

b) Determine  $r$  (the ratio) and  $a_7$  (7<sup>th</sup> term) of the following geometric sequence:

81, -27, 9, ...

(4 marks)

11.

Share prices rise by 28 % during the first half of the year and rise by further 15 % during the second half. What is the overall percentage change?

(4 marks)

12.

A plank of wood 5 m long, 20 cm wide and 10 cm thick weighs 640 kg. What will be the weight of another plank of wood which is 8 m long, 20 cm wide and 5 cm thick?



(5 marks)

13. Using completing the square, solve the following quadratic equation

$$-x^2 - 4x + 2 = 0$$

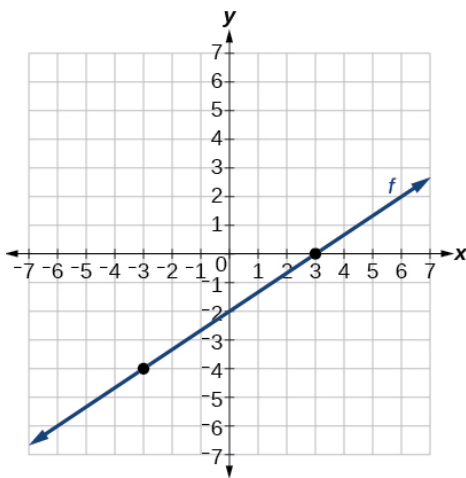
(6 marks)

14. Simplify

$$\frac{1 + \sin 2x}{\sin x + \cos x} - \cos x$$

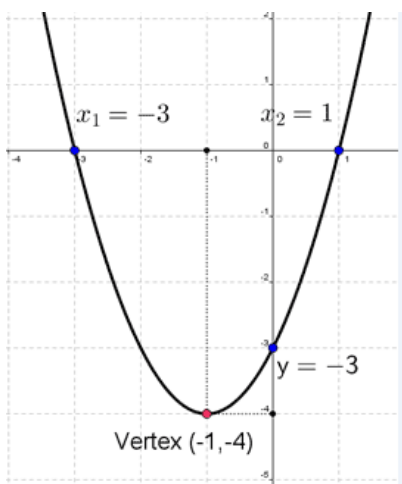
(5 marks)

15. a) Find the equations of the following line



2 marks

b) Find the equation of the following quadratic function



3 marks

**END OF TEST**