AGA KHAN UNIVERSITY EXAMINATION BOARD

SECONDARY SCHOOL CERTIFICATE

CLASS X EXAMINATION

APRIL/ MAY 2019

General Mathematics Paper II

Time: 2 hours 15 minutes Marks: 45

INSTRUCTIONS

Please read the following instructions carefully.

1. Check your name and school information. Sign if it is accurate.

I agree that this is my name and school. **Candidate's Signature**

RUBRIC

2. There are TEN questions. Answer ALL Questions. Choices are specified inside the paper.

3. When answering the questions:

   Read each question carefully.
   Use a black pointer to write your answers. DO NOT write your answers in pencil.
   Use a black pencil for diagrams. DO NOT use coloured pencils.
   DO NOT use staples, paper clips, glue or correcting fluid.
   Complete your answer in the allocated space only. DO NOT write outside the answer box.

4. The marks for the questions are shown in brackets ( ).

5. You may use a simple calculator if you wish.

(ATTEMPT EITHER PART a OR PART b OF Q.1.)

Q.1. (Total 5 Marks)

a. Show, by simplification, the rational expression $1+\left\{1\div\left(1-\frac{1}{x}\right)\div\frac{16x}{4x-4}\right\}$ is free of x.

(ATTEMPT EITHER PART a OR PART b OF Q.1.)

b. It is given that $(m-n)^3 = 125$ and $m^3 - n^3 = 500$.

i. Show that $m - n = 5$. (2 Marks)

ii. Hence, find the value of *mn*. (3 Marks)

(ATTEMPT EITHER PART a OR PART b OF Q.2.)

Q.2. (Total 5 Marks)

a. Given that $P(x) = x^3 - m\left(x^2 - x\right) + 4$,

i. find the remainder when $P(x)$ is divided by $2x - 2$. (2 Marks)

ii. show that $m^2 + 2m = 3$, when $P(x)$ is divided by $1 + x$ which leaves a remainder of m^2. (3 Marks)

b. Factorise $2x^3 - 2y^2x - 2(x - y)\left(x^2 + 2xy + y^2\right)$ completely.

(ATTEMPT EITHER PART a OR PART b OF Q.3.)

Q.3. (Total 4 Marks)

a. Find the highest common factor (HCF) of $8a^3 - 1$, $4a^2 - 1$ and $(2a-1)(2a-1)$.

b. Simplify the expression $\frac{x^3-27}{(x-3)(x+3)} \div \frac{x^2+3x+9}{(x-3)^2}$.

Q.4. (Total 5 Marks)

Given that $m-1+2\sqrt{x-1} = 4\sqrt{x-1}$,

a. show, by working, that the above equation reduces to $x-1=\frac{(m-1)^2}{4}$. (3 Marks)

b. express x in terms of m. (1 Mark)

c. show that the value of x is 5, when $m=5$. (1 Mark)

(ATTEMPT EITHER PART a OR PART b OF Q.5.)

Q.5. (Total 5 Marks)

a. Given that the half of a negative number x and its square adds up to 18,

i. show that $2x^2 + x - 36 = 0$. (3 Marks)

ii. hence, find x with the help of factorisation method. (2 Marks)

(ATTEMPT EITHER PART a OR PART b OF Q.5.)

b.

i. Convert $(6x + 5) = \frac{1}{x}$ into $x^2 + \frac{5}{6}x = \frac{1}{6}$. (2 Marks)

ii. Hence, show that this equation can also be represented in completing the square form as $\left(x + \frac{5}{12}\right)^2 = \frac{49}{144}$. (3 Marks)

(ATTEMPT EITHER PART a OR PART b OF Q.6.)

Q.6. (Total 5 Marks)

a. It is given that the adjoint of a matrix N is $\begin{bmatrix} 2 & -1 \\ 2 & 4 \end{bmatrix}$.

i. By finding matrix N, show that $|N| = 10$. (2 Marks)

ii. Hence, find the inverse of matrix N. (1 Mark)

iii. Find the transpose of matrix $\frac{1}{2}N$. (2 Marks)

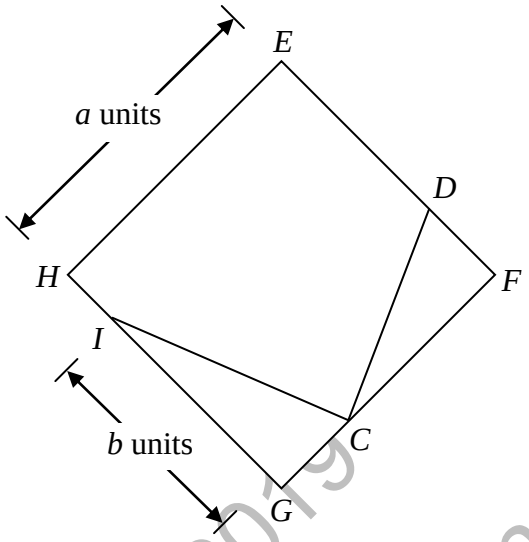
(ATTEMPT EITHER PART a OR PART b OF Q.6.)

b. If $\begin{bmatrix}1 & n\end{bmatrix}\begin{bmatrix}1 & 2\\ 2 & 1\end{bmatrix}\begin{bmatrix}5 & -1\end{bmatrix}^t = \begin{bmatrix}12\end{bmatrix}$, then find the value of *n*. (5 Marks)

Q.7. (Total 5 Marks)

In the given diagram, *EFGH* is a square, where $EH = a$ units and $IG = b$ units.

Points *C*, *I* and *D* lie on *GF*, *GH* and *EF* respectively such that $DE = FC = IG$.



a. State the length of *CG* in terms of *a* and *b*. (1 Mark)

b. Prove that triangle *FDC* is congruent to triangle *GCI* . Give all the reasons to support your proof. (2 Marks)

c. Hence, state the property of congruency that is used in the proof. (1 Mark)

d. Give a reason why triangle *FDC* is similar to triangle *GCI* . (1 Mark)

Q.8. (Total 4 Marks)

In the given space, draw a rectangle whose one of side is 6 cm and diagonal is 10 cm long**.**

Space for diagram

Q.9. (Total 4 Marks)

(**Formula**: Volume of cone $= \frac{1}{3}\pi r^2 h$)

It is given that the volume of a cone is 15 cubic units.

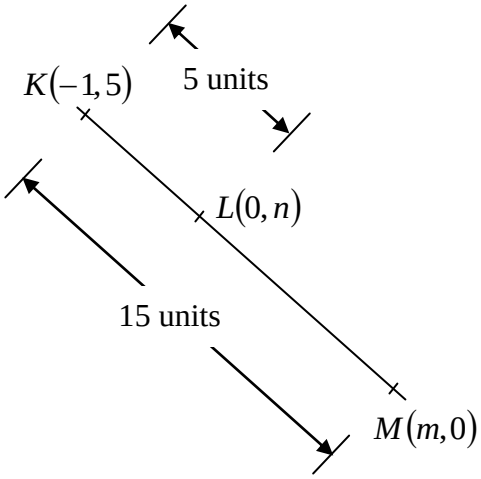
a. Find the volume of the cylinder whose radius and height are same as the cone. (2 Marks)

b. Hence, show that the square of radius of cone is $\frac{45}{11}$ units, when height is $\frac{7}{2}$ units. (2 Marks)

(**Note**: Take $\pi = \frac{22}{7}$)

Q.10. (Total 3 Marks)

Three points *K*, *L* and *M* lie on a straight line such that $KL = 5$ units and $MK = 15$ units.



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Show that the distance between two points *M* and *L* is given by the equation $m^2 + n^2 = 100$.

END OF PAPER

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