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FORM 3
MATHS
END OF TERM EXAM - MARCH 2016

NAME
.CLASS $\qquad$ ADMIN NO............

## INSTRUCTIONS TO CANDIDATES

1. Write your Name, Adm. No and Class in the spaces provided on the top of this page.
2. This paper contains two sections: Section A and B. answer all questions in both sections.
3. All answers and workings must be written on the question paper in the spaces provided below each question.
4. Negligence and slovenly work will be penalized.
5. Electronic calculators and mathematical tables may be used.

## For Examiners Use Only.

## Section I

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Total |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## Section II

| 17 | 18 | 19 | 20 | 21 |  |
| :--- | :--- | :--- | :--- | :--- | :--- |
| Total |  |  |  |  |  |



1. Rationalize the denominator of
(3mks)

$$
\frac{3+\sqrt{5}}{2-\sqrt{5}}
$$

2. Work out $\frac{8 \div 2+12 \times 9-4 \times 6}{56 \div 7 \times 2}$
(3mks)
3. A quantity Q is partly constant and partly varies as the square root of S
a) Write down the law connecting Q and S
(1mk)
b) If $\mathrm{S}=16$ when $\mathrm{Q}=24$ and $\mathrm{S}=36$ and when $\mathrm{Q}=32$ find the value of constant of variations
4. The size of an interior angle of a regular polygon is $4 x$, while exterior angle ( $x-20)^{\circ}$, find the number of sides of the polygon
5. Find the value of $x$ that satisfies the equation
$\log )(x+5)=\log 4-\log (x+2)$
(3mks)
6. The third and fifth term of an arithmetic progression are 10 and -10 respectively
a) Determine the first term and the common difference
(2mks)
b) The sum of the first 15 terms
(1mk)
7. Make t the subject of the formula $P V^{t}=\mathrm{K}$
8. The equation of a line is $-3 / 5 x+3 y=6$

Find (a) the gradient of a line
(b) The equation of a line passing through $(1,2)$ and perpendicular to the given
9. Solve the equation

$$
\frac{2}{x-1}-\frac{1}{x+2}=\frac{1}{x}
$$

10. Factorise and simplify as far as possible

$$
\frac{15 x^{2}+11 x-12}{12 x^{2}+x-20}
$$

11. Solve the inequality and illustrate your solution on a number line (3mks) $4-3 \mathrm{x}<x+12 \leq-\frac{3 x+29}{2}$
12. Evaluate $\left[\frac{1^{1} / 2+3^{1 / 6}}{4^{1} / 3-3^{2} / 3}\right] \div 1^{2 / 3}$
13. The sum of three consecutive whole number is 84 . Find the numbers(3mks)
14. Solve for n in $\left(\frac{1}{49}\right)^{\mathrm{n}} \mathrm{x}(343)^{-1}=7$
(3mks)
15. A chord AB of a circle when extended meets a tangent at a point x outline the circle, if the lengths $A B$ and $B X$ are 5 cm and 4 cm respectively. Find the lengths for the tangent XT
16. Given that $8 \leq y \leq 12$ and $4 \leq x \leq 6$. Find the maximum possible value of $\frac{x+y}{y-x}$
(3mks)

## SECTION II

17. Draw the graph of the function $\mathrm{y}=x^{2}+4 \mathrm{x}-1$ for $-1 \leq x \leq 5$

On the same axes, draw the graph $\mathrm{y}=2 \mathrm{x}-3$
(1mk)
Use your graph to solve the following equations
(a) $x^{2}-4 \mathrm{x}+1=0$
(b) $x^{2}-2 x-2=0$
18. Two friends Jane and Tom live 40km a part. One day Jane left her house at 9.00 a.m and cycled towards Tom's house at an average speed of $15 \mathrm{~km} / \mathrm{h}$. Tom left his house at 10.30a.m on the same day and cycled towards Jane's at an average speed of $25 \mathrm{~km} / \mathrm{h}$.
a) Determine
i) The distance from Jane's house where the two friends met
(4mks)
ii) How far Jane was from Tom's house when they met
b) The two friends took 10 minutes at the meeting point and then cycled to tom's house at an average speed of $12 \mathrm{~km} / \mathrm{h}$. Find the time they arrived at Tom's house(2mks)
19. Two pulleys of radii 3.6 cm and 2.0 cm have their centre $\mathrm{O}_{1}$ and $\mathrm{O}_{2}, 10 \mathrm{~cm}$ a part a) Constant transverse common tangents AB and CD to the pulleys. Measure the tangent $A B$
b) A continuous belt is fitted ground the two pulleys in a transverse way. Calculate the length of the belt.
(4mks)
20. a) Determine the inverse, $\mathrm{T}^{-1}$ of the matrix
$T=\left(\begin{array}{cc}1 & 2 \\ 1 & -1\end{array}\right)$ hence find the co-ordinates to the point at which the two lines $x+2 y=7$ and $\mathrm{x}-\mathrm{y}=1$ intersect
(6mks)
c) Given that $\mathrm{A}=\left(\begin{array}{cc}1 & 0 \\ -2 & 3\end{array}\right), \mathrm{B}=\left(\begin{array}{ll}3 & O \\ 2 & 1\end{array}\right)$ and $\mathrm{C}=2 \mathrm{AB}-A^{2}$. Determine matrix C
21. The figure below shows a uniform cross-section of a swimming pool which is 4 m wide. The depth of the pool increases gently from 1.5 m to 3.0 m

a) How much water in liters does it hold when full
b) Calculate the total internal surface area of the pool
c) Find the angle at which the bottom of the pool inclines to the horizontal.

