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ELEVATE

MATH TOPICAL WORKSHEETS

IGCSE-Additional Mathematics (0606)

Indices,Surds,Logs,Circle,Linear law, Straight lines and simultaneous Equations.

Topic:	Indices,Surds,Logs,Circle,Linear law, Straight lines and simultaneous Equations.
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1

The coordinates of points A, B, C and D are as follows.

$$A(-4, 3) \quad B(6, -9) \quad C(15, 10) \quad D(14, -1)$$

The line L has equation $y = 11x - 75$.
The perpendicular bisector of the line AB meets L at the point E.

Find the area of triangle CDE. [7]

2

The straight line $y = 3x - 11$ and the curve $xy = 4 - 3x - 2x^2$ intersect at the points A and B. The point C, with coordinates $(a, -8)$ where a is a constant, lies on the perpendicular bisector of the line AB. Find the value of a. [8]

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3

When $\ln y$ is plotted against x^3, a straight line passing through the points $(2, 5)$ and $(-8, 25)$ is obtained.

(a) Find y in terms of x. [4]

(b) Find the value of x when $y = e^{25}$. [2]

4

Variables x and y are such that when $\sqrt{y}$ is plotted against $\log_2(x+1)$, where $x > -1$, a straight line is obtained which passes through $(2, 10.4)$ and $(4, 15.4)$.

(a) Find $\sqrt{y}$ in terms of $\log_2(x+1)$. [4]

(b) Find the value of y when $x = 15$. [1]

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5

(a) Given that $\dfrac{\sqrt[3]{xy}(zy)^2}{(xz)^{-3}\sqrt{z}} = x^a y^b z^c$, find the exact values of the constants a, b and c. [3]

(b) Solve the equation $5(2^{2p+1}) - 17(2^p) + 3 = 0$. [4]

6

Find the x-coordinates of the points of intersection of the curves $\frac{x^2}{4}+\frac{y^2}{9}=1$ and $y=\frac{3}{2x}$.
Give your answers correct to 3 decimal places. [5]

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7

Solve the following simultaneous equations, giving your answers in the form $a+b\sqrt{7}$ where a and b are integers.

$$x+3y=11$$

$$x-\sqrt{7}y=7$$

[5]

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8. Point A has coordinates $(3, -1)$.

A circle has equation $(x-4)^2+(y+3)^2 = 5$.

(a) Show that A lies on the circumference of the circle. [1]

(b) Given that AB is a diameter of the circle, find the coordinates of B. [2]

(c) Find the equation of the tangent to the circle at A. [3]

9. **Solutions by accurate drawing will not be accepted.**

A circle, C, has equation $(x-5)^2+(y-12)^2=100$.

(a) Find the equation of the tangent to C at the point (11, 4).
Give your answer in the form $ax+by=c$, where a, b and c are integers. [4]

(b) Show that C and the circle with equation $x^2+y^2=4$ do not intersect. [2]

10. **DO NOT USE A CALCULATOR IN THIS QUESTION.**

(a) Find the exact distance between the two points where the curve $9(x-1)^2+4(y-3)^2=36$ cuts the y-axis. [4]

(b) Find the coordinates of the points where the curve with equation $2x^2+83xy=x^3y-20x$ intersects the curve with equation $y=\frac{1}{x}$. Give each of your answers in the form $a+b\sqrt{c}$, where a and b are rational and c is the smallest integer possible. [6]

11. The first three terms of an arithmetic progression can be written as

$$2\ln(x^3),\quad 5\ln(x^2),\quad 2\ln(x^7).$$

(a) Given that $x > 1$, find the least number of terms for the sum of this progression to be greater than $43\ln(x^{24})$. [6]

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12. **(a)** Solve the equation $x^{\frac{1}{3}} - x^{\frac{1}{6}} = 2$. [4]

(b) Solve the simultaneous equations

$$\lg(x+2y) = 0$$
$$x^2 + 4xy + y = 1.$$

[5]

13. Solve the equation $3\left(2^{2x+1}\right)-11\left(2^{x}\right)+3=0$, giving your answers correct to 2 decimal places. [4]

14. Solve the following equations, giving your answers to 3 significant figures.

(a) $2^{3x+1}=5^{x-2}$ [3]

(b) $e^{2y+1}=1+\frac{6}{e^{2y+1}}$ [4]

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