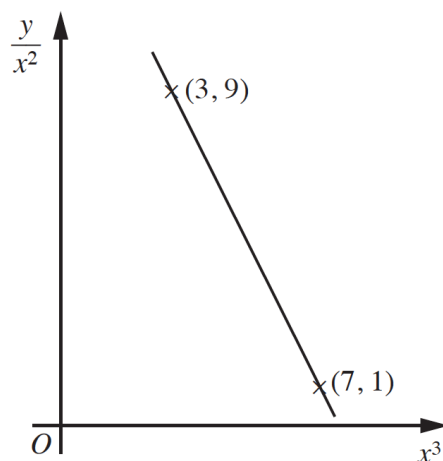


3E AMATH FTE Revision Package 2014

1



The variables x and y are related so that, when $\frac{y}{x^2}$ is plotted against x^3 , a straight line graph passing through $(3, 9)$ and $(7, 1)$ is obtained. Express y in terms of x . [4]

Ans: $y = -2x^5 + 15x^2$

2

The table shows experimental values of the variables x and y which are related by the equation

$y = \frac{a}{x^2} + \frac{b}{x}$, where a and b are constants.

x	2	4	6	8	10
y	6.24	2.82	1.79	1.33	1.05

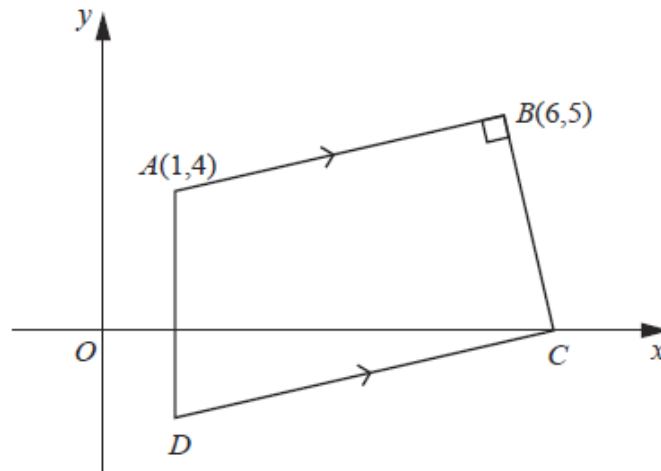
(i) Using graph paper, plot x^2y against x and draw a straight line graph. [3]

(ii) Use your graph to estimate the value of a and of b . [4]

Ans: (ii) $a = 5 \pm 2$ and $b = 10 \pm 0.4$.

3

Solutions to this question by accurate drawing will not be accepted.



The diagram shows a quadrilateral $ABCD$ in which A is the point $(1, 4)$ and B is the point $(6, 5)$. Angle ABC is a right angle and the point C lies on the x -axis. The line AD is parallel to the y -axis and the line CD is parallel to BA . Find

(i) the equation of the line CD , [5]

(ii) the area of the quadrilateral $ABCD$. [4]

Ans: (i) $x - 5y = 7$, (ii) 28.6 units^2

4

Solutions to this question by accurate drawing will not be accepted.

The points $A(1, 4)$, $B(3, 8)$, $C(13, 13)$ and D are the vertices of a trapezium in which AB is parallel to DC and angle BAD is 90° . Find the coordinates of D . [6]

Ans: $D(7, 1)$

5

Solve the equation

(i) $\lg(5x + 10) + 2\lg 3 = 1 + \lg(4x + 12)$, [4]

(ii) $\frac{9^{2y}}{3^{7-y}} = \frac{3^{4y+3}}{27^{y-2}}$. [3]

Ans: (i) $x = 6$ (ii) $y = 4$

6

Find the set of values of m for which the line $y = mx - 2$ cuts the curve $y = x^2 + 8x + 7$ in two distinct points. [6]

Ans: $m \leq 2, m \geq 14$.

7 Solve the equation $|2x + 10| = 7$. [3]

Ans: $x = -8.5$ or -1.5

8 (i) Sketch, on the same diagram, the graphs of $y = x - 3$ and $y = |2x - 9|$. [3]

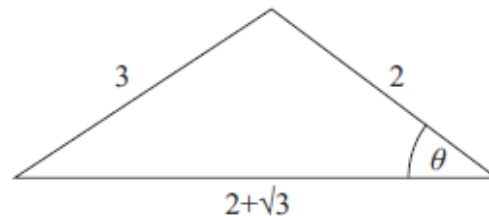
(ii) Solve the equation $|2x - 9| = x - 3$. [2]

Ans: (ii) $x = 4, 6$.

9 The expression $x^3 + ax^2 - 15x + b$ has a factor $x - 2$ and leaves a remainder of 75 when divided by $x + 3$. Find the value of a and of b . [5]

Ans: $a = 7, b = -6$.

10



Without using a calculator, find the value of $\cos\theta$, giving your answer in the form $\frac{a + b\sqrt{3}}{c}$, where a, b and c are integers. [5]

Ans: $\frac{-4 + 3\sqrt{3}}{2}$

11

(i) Find the coefficient of x^3 in the expansion of $\left(1 - \frac{x}{2}\right)^{12}$. [2]

(ii) Find the coefficient of x^3 in the expansion of $(1 + 4x)\left(1 - \frac{x}{2}\right)^{12}$. [3]

Ans: (i) -27.5 (ii) 38.5

12 The function f is defined, for $0 \leq x \leq 2\pi$, by

$$f(x) = 3 + 5 \sin 2x.$$

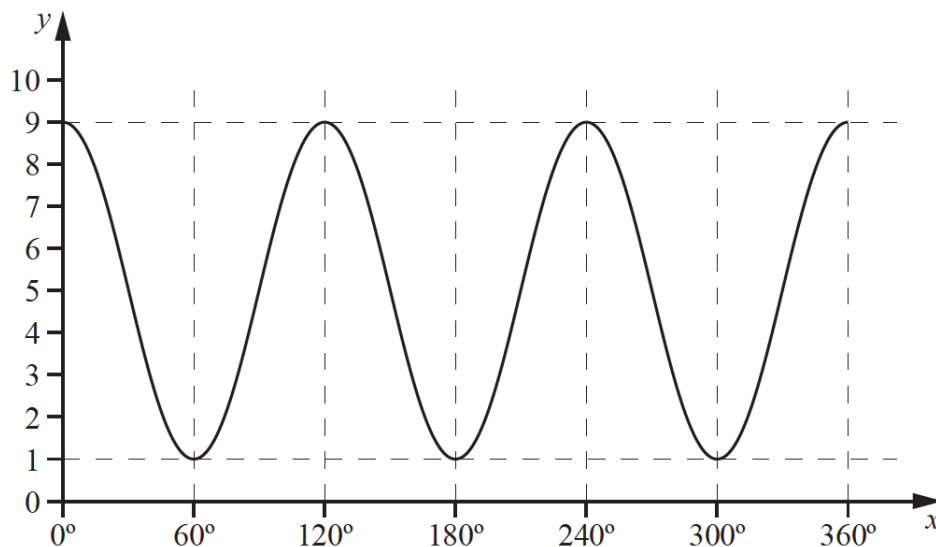
State

- (i) the amplitude of f , [1]
- (ii) the period of f , [1]
- (iii) the maximum and minimum values of f . [2]

Sketch the graph of $y = f(x)$. [3]

Ans: (i) 5 (ii) 180 degree or π (iii) 8 and -2 .

13 (a)



The diagram shows the curve $y = A \cos Bx + C$ for $0^\circ \leq x \leq 360^\circ$. Find the value of

- (i) A , (ii) B , (iii) C . [3]
- (b) Given that $f(x) = 6 \sin 2x + 7$, state
 - (i) the period of f , [1]
 - (ii) the amplitude of f . [1]

Ans: (a) $A = 4$, $B = 3$, $C = 5$ (b) (i) 180 degree or π (ii) 6.

14 The line $y = x + 4$ intersects the curve $2x^2 + 3xy - y^2 + 1 = 0$ at the points A and B . Find the length of the line AB . [7]

Ans: $4\sqrt{2}$ or 5.66

15 (i) Show that $(5 + 3\sqrt{2})^2 = 43 + 30\sqrt{2}$. [1]

Hence find, **without using a calculator**, the positive square root of

(ii) $86 + 60\sqrt{2}$, giving your answer in the form $a + b\sqrt{2}$, where a and b are integers, [2]

(iii) $43 - 30\sqrt{2}$, giving your answer in the form $c + d\sqrt{2}$, where c and d are integers, [1]

(iv) $\frac{1}{43 + 30\sqrt{2}}$, giving your answer in the form $\frac{f + g\sqrt{2}}{h}$, where f, g and h are integers. [3]

Ans: (i) $25 + 30\sqrt{2} + 18$

(ii) $6 + 5\sqrt{2}$

(iii) $5 - 3\sqrt{2}$

(iv) $\frac{5 - 3\sqrt{2}}{7}$

Please do questions from your TYS on chapters that are not covered in these questions or few questions are given in this revision package.