Chapter 7+8   Straight Lines 1   Exam Questions

Jun_02 P1 q.12E

Answer only **one** of the following two alternatives.

EITHER

(a) The curve $y = ax^n$, where a and n are constants, passes through the points (2.25, 27), (4, 64) and (6.25, p). Calculate the value of a, of n and of p. [5]

(b) The mass, m grams, of a radioactive substance is given by the formula $m = m_0 e^{-kt}$, where t is the time in days after the mass was first recorded and m_0 and k are constants.

The table below gives experimental values of t and m.

| t (days)	10	20	30	40	50
m (grams)	40.2	27.0	18.0	12.2	8.1

Plot ln m against t and use your graph to estimate the value of m_0 and of k. [6]

Nov_02 P2 q.8

(i) Sketch the graph of $y = \ln x$. [2]

(ii) Determine the equation of the straight line which would need to be drawn on the graph of $y = \ln x$ in order to obtain a graphical solution of the equation $x^2 e^{x-2} = 1$. [4]

Jun_02 P1 q.12O

Solutions to this question by accurate drawing will not be accepted.
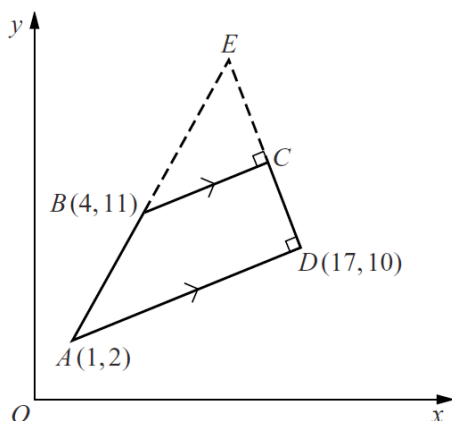
The diagram, which is not drawn to scale, shows a trapezium $ABCD$ in which BC is parallel to AD. The side AD is perpendicular to DC. Point A is (1, 2), B is (4, 11) and D is (17, 10). Find

(i) the coordinates of C.

The lines AB and DC are extended to meet at E. Find

(ii) the coordinates of E,

(iii) the ratio of the area of triangle EBC to the area of trapezium $ABCD$. [11]

The line $2y = 3x - 6$ intersects the curve $xy = 12$ at the points P and Q. Find the equation of the perpendicular bisector of PQ. [8]

A rectangle of area y m^2 has sides of length x m and $(Ax + B)$ m, where A and B are constants and x and y are variables. Values of x and y are given in the table below.

x	50	100	150	200	250
y	3700	11 000	21 600	36 000	53 500

(i) Use the data above in order to draw, on graph paper, the straight line graph of $\frac{y}{x}$ against x. [3]

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

(iii) On the same diagram, draw the straight line representing the equation $y = x^2$ and explain the significance of the value of x given by the point of intersection of the two lines. [3]

(iv) State the value approached by the ratio of the two sides of the rectangle as x becomes increasingly large. [1]

Find the distance between the points of intersection of the curve $y = 3 + \dfrac{4}{x}$ and the line $y = 4x + 9$. [6]

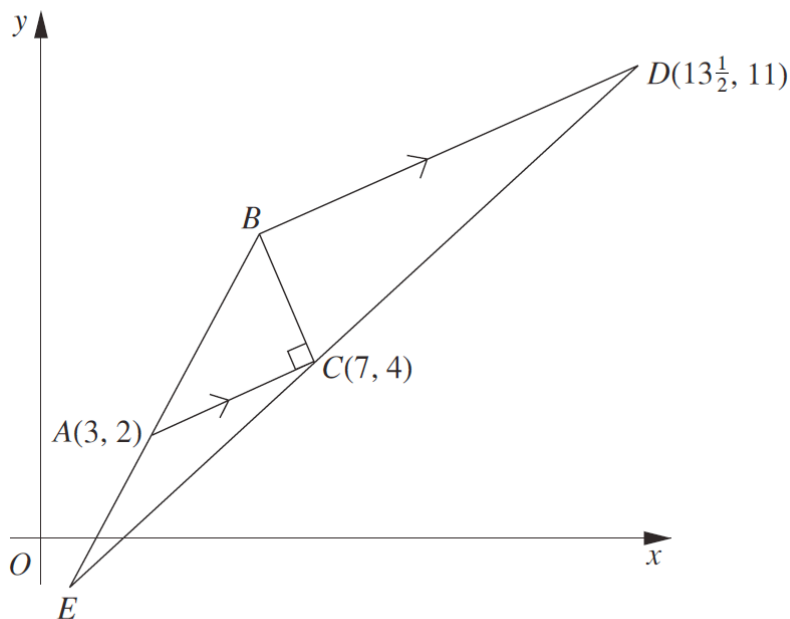| x	2	3	4	5	6
y	9.2	8.8	9.4	10.4	11.6

The table above shows experimental values of the variables x and y. On graph paper draw the graph of xy against x^2. [3]

Hence

(i) express y in terms of x, [4]

(ii) find the value of x for which $x = \dfrac{45}{y}$. [2]

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

The diagram shows a triangle ABC in which A is the point $(3, 2)$, C is the point $(7, 4)$ and angle $ACB = 90°$. The line BD is parallel to AC and D is the point $(13\frac{1}{2}, 11)$. The lines BA and DC are extended to meet at E. Find

(i) the coordinates of B, [7]

(ii) the ratio of the area of the quadrilateral $ABDC$ to the area of the triangle EBD. [3]

Solutions to this question by accurate drawing will not be accepted.
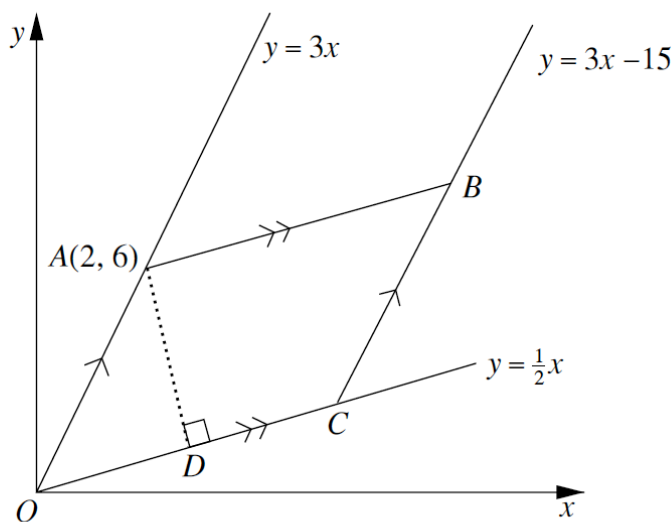
The diagram, which is not drawn to scale, shows a parallelogram $OABC$ where O is the origin and A is the point $(2, 6)$. The equations of OA, OC and CB are $y = 3x$, $y = \frac{1}{2}x$ and $y = 3x - 15$ respectively. The perpendicular from A to OC meets OC at the point D. Find

(i) the coordinates of C, B and D, [8]

(ii) the perimeter of the parallelogram $OABC$, correct to 1 decimal place. [3]

A particle, moving in a certain medium with speed v ms^{-1}, experiences a resistance to motion of R N. It is believed that R and v are related by the equation $R = kv^{\beta}$, where k and β are constants.

The table shows experimental values of the variables v and R.

v	5	10	15	20	25
R	32	96	180	290	410

(i) Using graph paper, plot lg R against lg v and draw a straight line graph. [3]

Use your graph to estimate

(ii) the value of k and of β, [5]

(iii) the speed for which the resistance is 75 N. [2]

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