

Straight-line graphs

(Past Year Topical Questions 2012-2017)

May/June 2012 (12)

11.

The point P lies on the line joining $A(-1, -5)$ and $B(11, 13)$ such that $AP = \frac{1}{3}AB$.

- (i) Find the equation of the line perpendicular to AB and passing through P . [5]

The line perpendicular to AB passing through P and the line parallel to the x -axis passing through B intersect at the point Q .

- (ii) Find the coordinates of the point Q . [2]

- (iii) Find the area of the triangle PBQ . [2]

Oct/Nov 2012 (11)

8.

The points $A(-3, 6)$, $B(5, 2)$ and C lie on a straight line such that B is the mid-point of AC .

(i) Find the coordinates of C .

[2]

The point D lies on the y -axis and the line CD is perpendicular to AC .

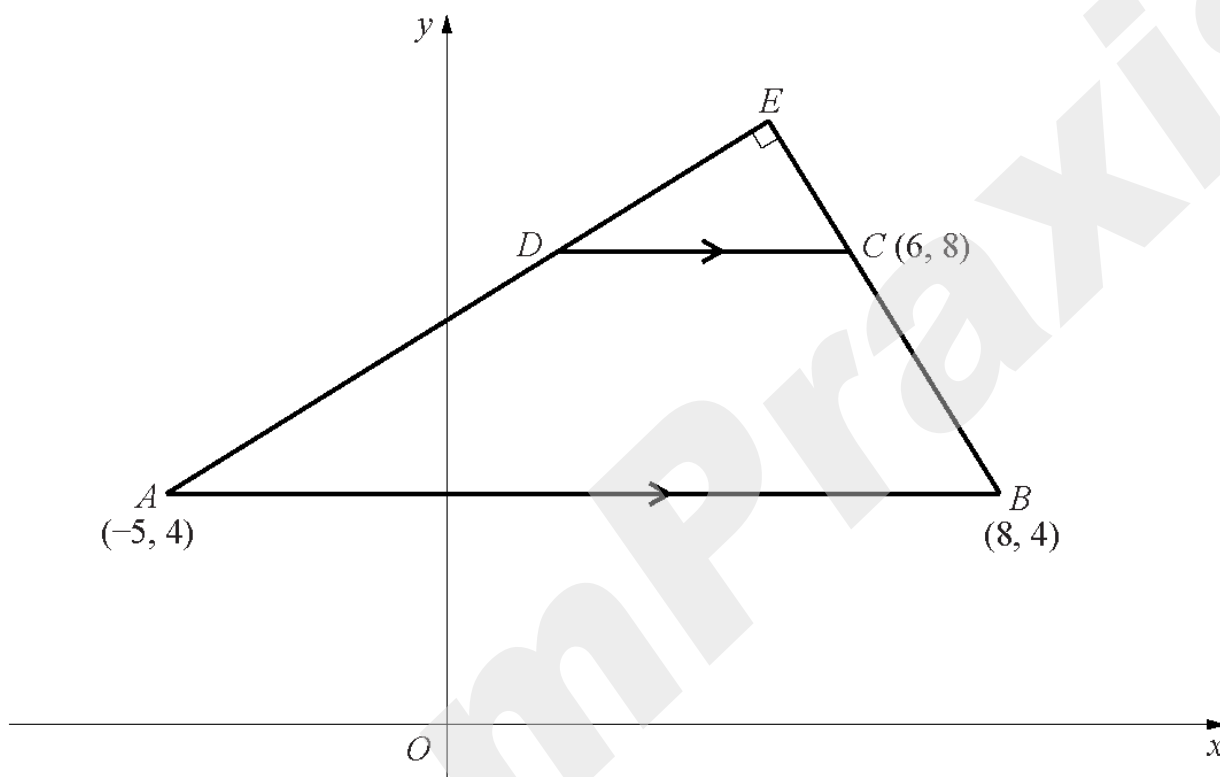
(ii) Find the area of the triangle ACD .

[5]

Oct/Nov 2012 (12)

7.

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



The vertices of the trapezium $ABCD$ are the points $A(-5, 4)$, $B(8, 4)$, $C(6, 8)$ and D . The line AB is parallel to the line DC . The lines AD and BC are extended to meet at E and angle $AEB = 90^\circ$.

- (i) Find the coordinates of D and of E . [6]
- (ii) Find the area of the trapezium $ABCD$. [2]

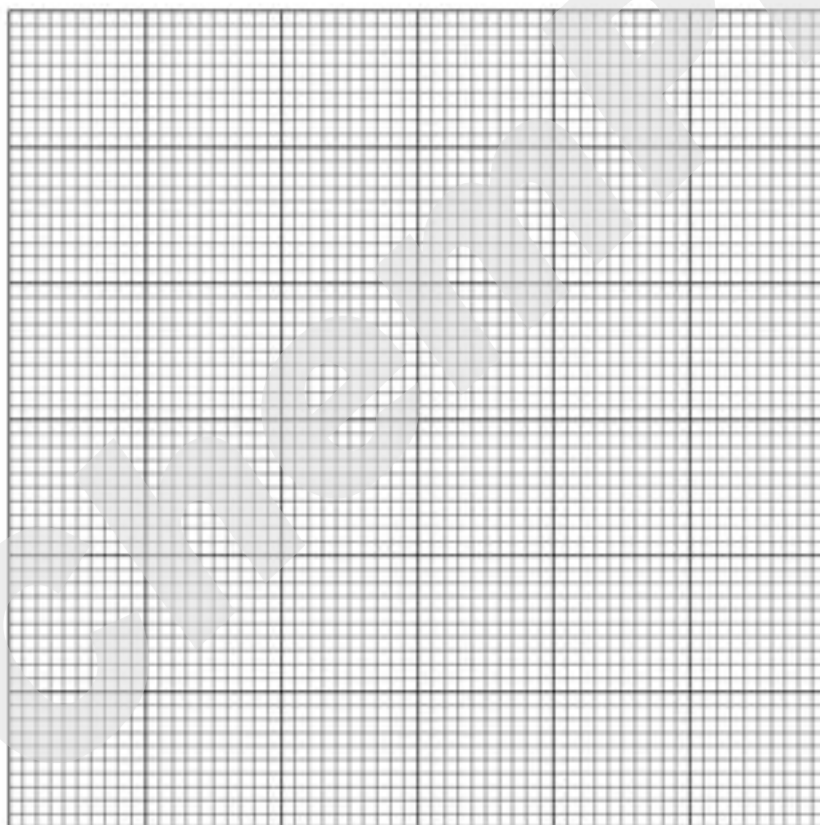
10.

 The table shows values of the variables x and y .

x	10°	30°	45°	60°	80°
y	11.2	16	19.5	22.4	24.7

- (i) Using the graph paper below, plot a suitable straight line graph to show that, for $10^\circ \leq x \leq 80^\circ$,

$$\sqrt{y} = A \sin x + B, \text{ where } A \text{ and } B \text{ are positive constants.} \quad [4]$$



(ii) Use your graph to find the value of A and of B .

[3]

(iii) Estimate the value of y when $x = 50$.

[2]

(iv) Estimate the value of x when $y = 12$.

[2]

May/June 2013 (13)

10.

The point A , whose x -coordinate is 2, lies on the curve with equation $y = x^3 - 4x^2 + x + 1$.

- (i) Find the equation of the tangent to the curve at A . [4]

This tangent meets the curve again at the point B .

- (ii) Find the coordinates of B . [4]
- (iii) Find the equation of the perpendicular bisector of the line AB . [4]

Oct/Nov 2013 (13)

10.

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

The points $A(-3, 2)$ and $B(1, 4)$ are vertices of an isosceles triangle ABC , where angle $B = 90^\circ$.

(i) Find the length of the line AB . [1]

(ii) Find the equation of the line BC . [3]

Find the coordinates of each of the two possible positions of C . [6]

11.

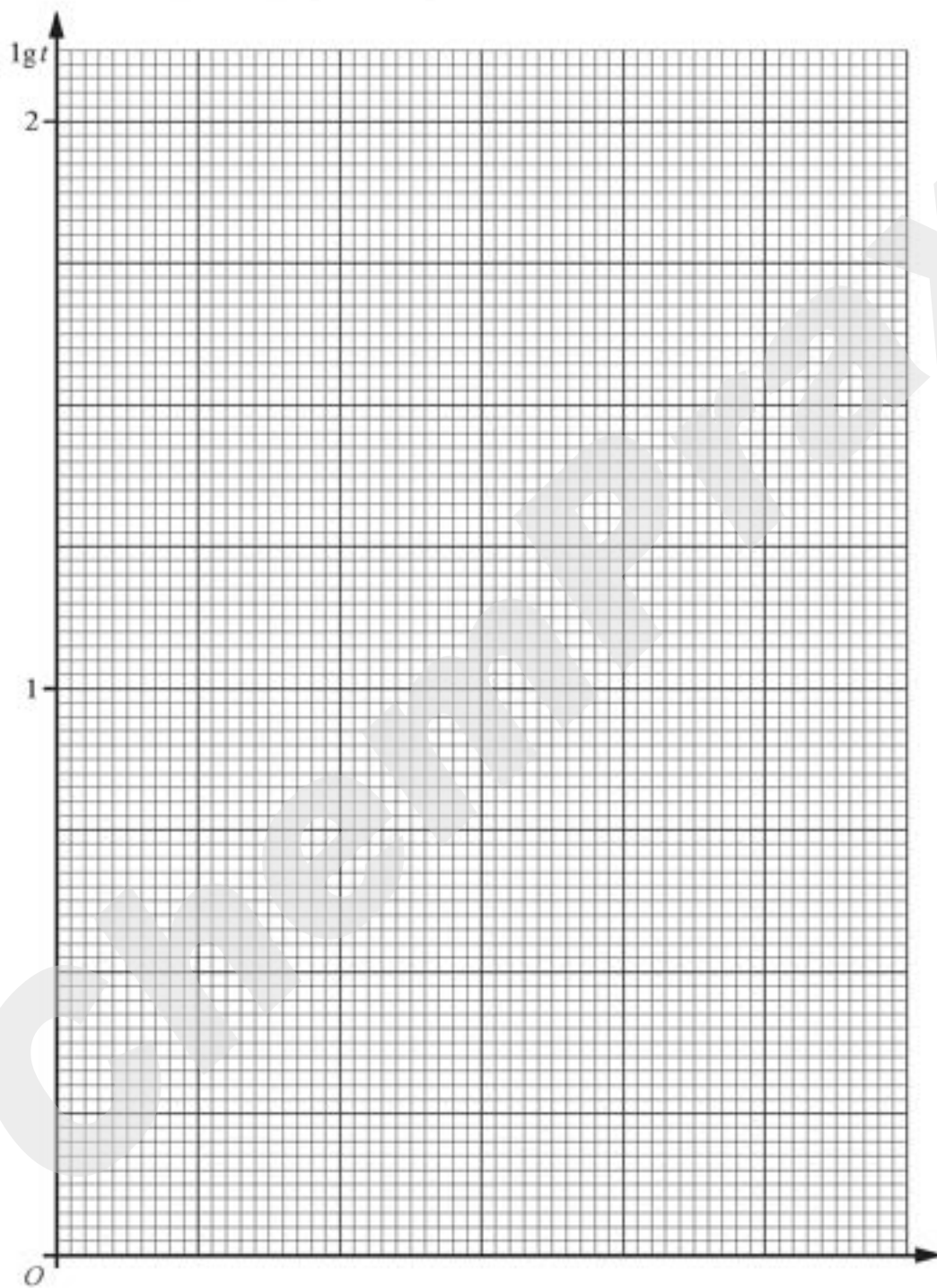
The variables s and t are related by the equation $t = ks^n$, where k and n are constants. The table below shows values of variables s and t .

s	2	4	6	8
t	25.00	6.25	2.78	1.56

- (i) A straight line graph is to be drawn for this information with $\lg t$ plotted on the vertical axis. State the variable which must be plotted on the horizontal axis. [1]

(ii) Draw this straight line graph on the grid below.

[3]



(iii) Use your graph to find the value of k and of n .

[4]

(iv) Estimate the value of s when $t = 4$.

[2]

Oct/Nov 2014 (11)

8.
The point P lies on the line joining $A(-2, 3)$ and $B(10, 19)$ such that $AP:PB = 1:3$.

(i) Show that the x -coordinate of P is 1 and find the y -coordinate of P . [2]

(ii) Find the equation of the line through P which is perpendicular to AB . [3]

The line through P which is perpendicular to AB meets the y -axis at the point Q .

(iii) Find the area of the triangle AQB . [3]

May/June 2015 (13)

5.

The curve $y = xy + x^2 - 4$ intersects the line $y = 3x - 1$ at the points A and B . Find the equation of the perpendicular bisector of the line AB . [8]

Oct/Nov 2015(11)

7.

Two variables, x and y , are such that $y = Ax^b$, where A and b are constants. When $\ln y$ is plotted against $\ln x$, a straight line graph is obtained which passes through the points $(1.4, 5.8)$ and $(2.2, 6.0)$.

(i) Find the value of A and of b . [4]

(ii) Calculate the value of y when $x = 5$. [2]

May/June 2016 (11)

8.

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

Three points have coordinates $A(-8, 6)$, $B(4, 2)$ and $C(-1, 7)$. The line through C perpendicular to AB intersects AB at the point P .

(i) Find the equation of the line AB .

[2]

(ii) Find the equation of the line CP .

[2]

(iii) Show that P is the midpoint of AB .

[3]

(iv) Calculate the length of CP .

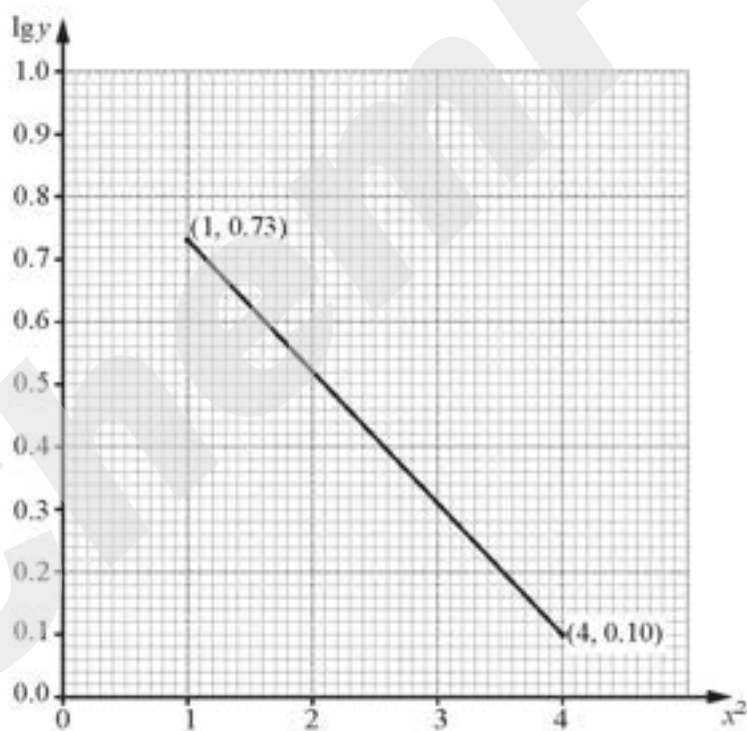
[1]

(v) Hence find the area of the triangle ABC .

[2]

May/June 2016 (12)

8.



Variables x and y are such that when $\lg y$ is plotted against x^2 , the straight line graph shown above is obtained.

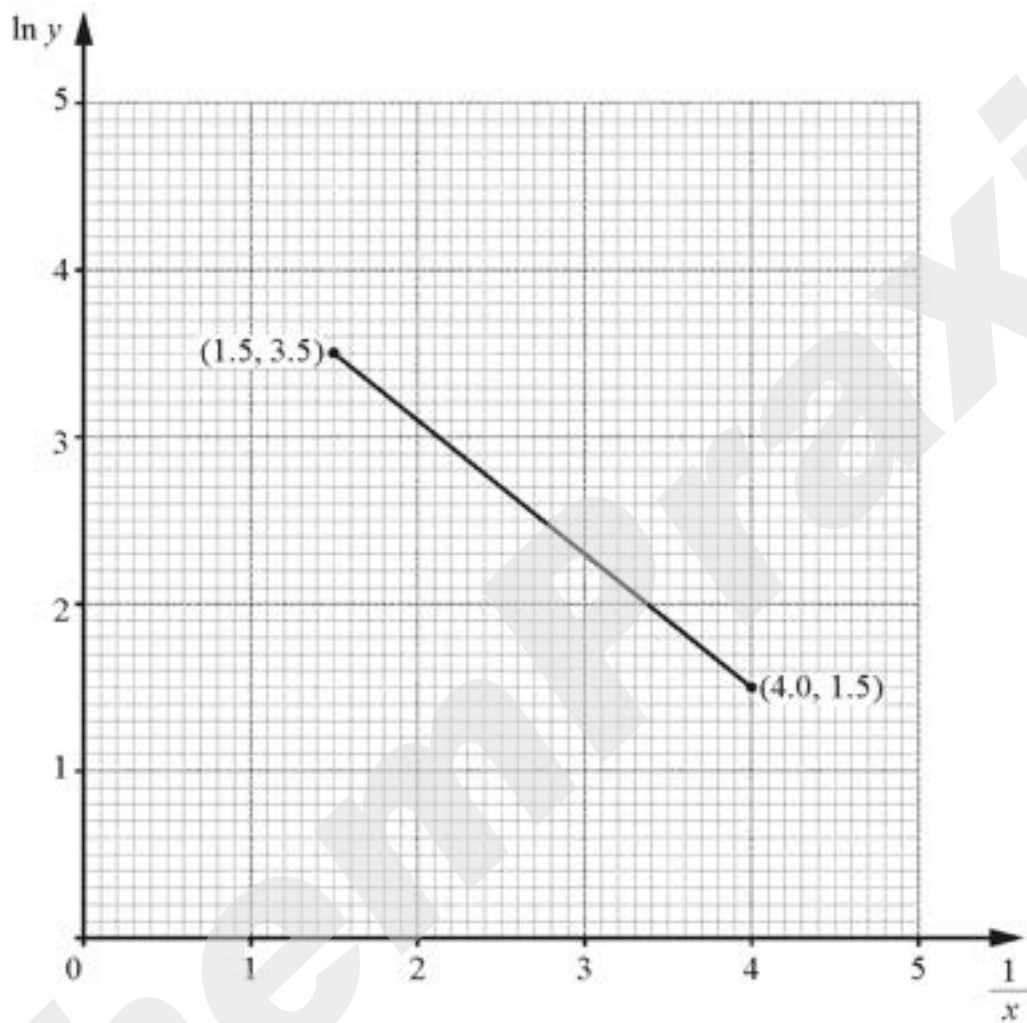
(i) Given that $y = Ab^{x^2}$, find the value of A and of b . [4]

(ii) Find the value of y when $x = 1.5$. [2]

(iii) Find the positive value of x when $y = 2$. [2]

Oct/Nov 2016 (13)

7.



The variables x and y are such that when $\ln y$ is plotted against $\frac{1}{x}$ the straight line graph shown above is obtained.

(i) Given that $y = Ae^{\frac{b}{x}}$, find the value of A and of b .

[4]

(ii) Find the value of y when $x = 0.32$.

[2]

(iii) Find the value of x when $y = 20$.

[2]

May/June 2017 (13)

5.

The normal to the curve $y = \sqrt{4x + 9}$, at the point where $x = 4$, meets the x - and y -axes at the points A and B . Find the coordinates of the mid-point of the line AB .

[7]

Oct/Nov 2017 (13)

12.

The line $y = 2x + 1$ intersects the curve $xy = 14 - 2y$ at the points P and Q . The midpoint of the line PQ is the point M .

(i) Show that the point $\left(-10, \frac{23}{8}\right)$ lies on the perpendicular bisector of PQ . [9]

The line PQ intersects the y -axis at the point R . The perpendicular bisector of PQ intersects the y -axis at the point S .

(ii) Find the area of the triangle RSM . [3]