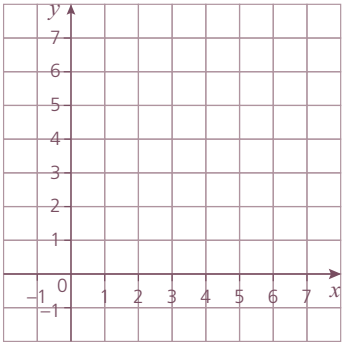
8 Straight line graphs

1 A(2, 3), B(6, 4) and C(5, 0) are the vertices of a triangle.

a) Draw the triangle ABC on the axes provided.



b) Show by calculation that ABC is an isosceles triangle and write down the two equal sides.

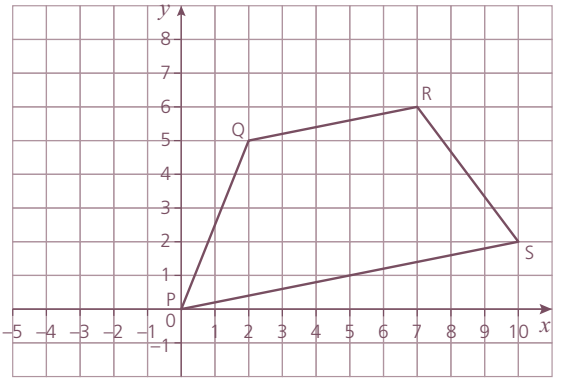
c) Find the coordinates of D, the midpoint of AC.

d) Prove that BD is perpendicular to AC.

e) Find the area of the triangle.

2 The graph shows a quadrilateral PQRS.

a) Prove, using suitable calculations, that PQRS is a trapezium.



b) PQRT is a parallelogram. Find the coordinates of T.

c) Prove that PQRT is not a rhombus.

3 In each of parts (a) and (b) you are given the equation of a line and the coordinates of a point. Find the equation of the line through the given point that is

(i) parallel to the given line

(ii) perpendicular to the given line.

a) $y = 3x - 2$; (3,1)

b) $2x + y = 2$; (–1,–2)

4 Find the equation of the perpendicular bisector of the line joining each pair of points.

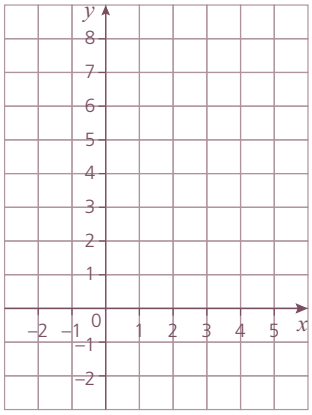
a) (1, 4) and (5, 2)

b) (–3, –4) and (2, 4)

5 A median of a triangle is a line joining one of the vertices to the midpoint of the opposite side. In a triangle ABC, A is the point (0, 6), B is (4, 8) and C is the point (2, –2).

a) Sketch the triangle on the axes provided.

b) Find the equations of the three medians of the triangle.



c) Show that the three medians are concurrent (i.e. all three intersect at the same point).

6 Match the equivalent relationships:

a) $\log y = \log b + x \log a$

b) $\log y = \log a + b \log x$

c) $\log y = \log x + b \log a$

d) $\log y = \log a + x \log b$

	Matches to
$y = ax^b$	
$y = xa^b$	
$y = ab^x$	
$y = ba^x$	

The relationship $p = qr^n$ can be written using logarithms as $p = \log q + \log r^n$ and so is equivalent to $\log p = \log q + n \log r$.

7 In this question k and a are constants. In each of the following cases:

i) write the equation with $\ln y$ as subject;

ii) given that $\ln y$ is on the vertical axis and the graph is a straight line, state the quantity on the horizontal axis;

iii) state the gradient of the line and its intercept with the vertical axis.

a) $y = ax^k$

i)

ii)

iii)

b) $y = kx^a$

i)

ii)

iii)

c) $y = ka^x$

i)

ii)

iii)

d) $y = ak^x$

i)

ii)

iii)

8 The results of an experiment are shown in the table:

p	2	4	6	8	10	12
q	7.1	10.0	12.2	14.1	15.8	17.3

The relationship between the two variables, p and q, is of the form $q = Ap^b$ where A and b are constants.

a) Show that the relationship may be written as $\lg q = b \lg p + \lg A$.

b) What graph must be plotted to test this model?

c) Plot the graph on the axes provided and use it to estimate the values of b and A.