

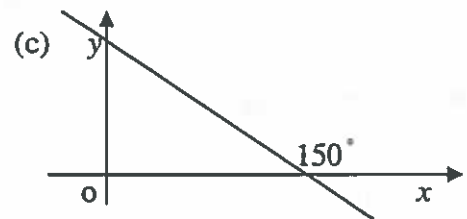
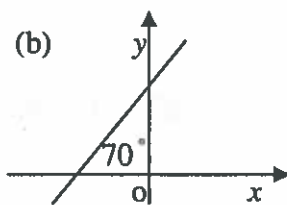
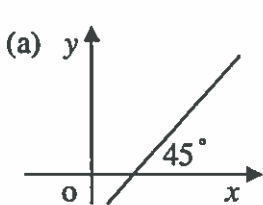
Higher Homework 2

Section 1: Straight Lines

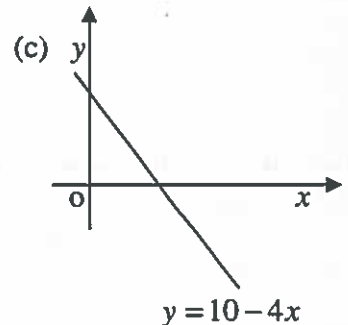
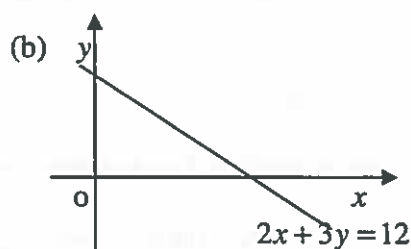
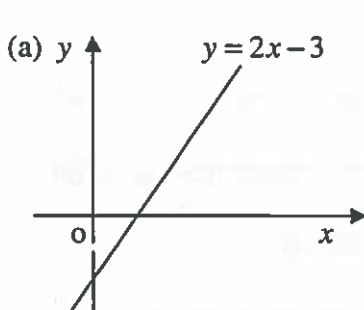
- Find the equation of the lines perpendicular to the line $y = 3x$, which pass through the following points: (a) (2,1) (b) (3,-1) (c) (-4,-4)
- Find the equation of the lines passing through the origin, perpendicular to:
(a) $2x - 4y + 1 = 0$ (b) $6x + 5y - 10 = 0$

3. A is the point (-3,-1), B(-2,2), C(2,3) and D(2,-3). Show that AC is perpendicular to BD.

4. Find the gradient of each of these straight lines:



5. Calculate the size of the angle that each of these straight lines makes with the positive direction of the x-axis.



6. Find the coordinates of the points of intersection of the lines $3x - y = 7$ and $x + 2y = 0$. Illustrate your answer with a sketch graph.

7. Find the equation of the line through (3,-5), which is parallel to the line $3x + 2y - 5 = 0$.

8. A is the point (1,2), B(3,8) and C(5,14). Show that A, B and C are collinear.

9. P(1,-2), Q(6,3) and R(9,14) are the vertices of a kite PQRS.

- (a) Find the equations of the diagonals of this kite and the coordinates of the point where they intersect.

- (b) Find the coordinates of S.

Section 2: General Revision

1. $f(x) = 5 - 3x$. Find the value of $f(a) + f(-a)$.

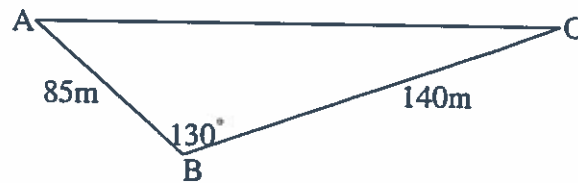
2. Solve these equations ($0 \leq x \leq 360$):

(a) $7 \tan x^\circ - 4 = 0$

(b) $4 \sin^2 x^\circ - 1 = 0$

(c) $\cos^2 x^\circ = 1$

3. Find the length of AC, correct to 3 significant figures.



4. Given that $1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{1}{6}n(n+1)(2n+1)$, find

(a) $1^2 + 2^2 + 3^2 + \dots + 20^2$

(b) $11^2 + 12^2 + 13^2 + \dots + 20^2$

(c) $2^2 + 4^2 + 6^2 + \dots + 20^2$

5. Given that $1^3 + 2^3 + 3^3 + \dots + n^3 = \left[\frac{1}{2}n(n+1) \right]^2$, find

(a) $1^3 + 2^3 + 3^3 + \dots + 10^3$

(b) $11^3 + 12^3 + 13^3 + \dots + 20^3$

6. The average rate of flow of the river Tay at Perth is about 160 cubic metres per second.

(a) How many ml of water flow under Perth bridge in a century?

(b) If all this water is poured into a cubic container, calculate the length of the edge of the container, given that the container is filled.

(Remember to round your answers sensibly.)

7. $K = \sqrt{\frac{m-n}{m+n}}$. Change the subject of this formula to m .