Forwards Formulas

1 Review of Basic Formulae

1. $A(1,1)$, $B(5,4)$ and $C(-1,7)$ are points on the co-ordinate plane.
   (a) Find $|AB|$
   (b) What is the slope of the line BC?
   (c) Find the equation of the line BC?
   (d) Investigate if the point $(2,-1)$ is on the line BC.
   (e) Find the points where the line BC cuts the x and y axes.
   (f) What is the slope of any line perpendicular to BC?
   (g) Find the equation of the line k, which is perpendicular to BC, and contains the point A.
   (h) Find the point of intersection of the line BC and the line k.

2 Forwards Formulas

2.1 Point Dividing a Line into a Given Ratio

1. Find the point that divides $(1,1)$ and $(4,7)$ internally in the ratio $2:1$
2. Find the point that divides $(-2,5)$ and $(3,-5)$ internally in the ratio $3:2$
3. Find the point that divides $(-2,-5)$ and $(6,-1)$ internally in the ratio $1:3$
4. Find the point that divides $(2,3)$ and $(4,-3)$ externally in the ratio $2:1$
5. Find the point that divides $(-2,-4)$ and $(6,0)$ externally in the ratio $1:3$
6. Find the point that divides $(3,-2)$ and $(-1,4)$ externally in the ratio $3:5$

2.2 Area of a Triangle

7. Find the area of the triangle enclosed by the following points:
   (a) $(0,0)$ $(2,3)$ $(3,-1)$
   (b) $(0,0)$ $(-2,5)$ $(3,-2)$
   (c) $(1,1)$ $(3,5)$ $(-2,0)$
   (d) $(3,-2)$ $(-2,1)$ $(-4,-6)$
   (e) $(5,-2)$ $(-4,3)$ $(-3,-5)$

8. Find the area of the quadrilateral enclosed by the following four points;
   (a) $(0,0)$ $(3,5)$ $(2,-1)$ $(-4,-2)$
   (b) $(3,1)$ $(-2,5)$ $(-3,-2)$ $(4,-5)$

2.3 Perpendicular Distance from a Point to a Line

9. What is the shortest distance from the point $(2,3)$ to the line $3x+4y+2=0$?

10. Find the perpendicular distance from the point $(-2,4)$ to the line $5x+12y+1=0$.

11. Find the perpendicular distance from the point $(-3,-2)$ to the line $15x-8y-5=0$.

12. Show that the point $(1,1)$ is equidistant from the lines $3x-4y-9=0$ and $12x+5y+9=0$.

13. Show that the point $(-2,3)$ is equidistant from the lines $8x+15y-12=0$ and $12x+5y-4=0$

14. Find the distance between the parallel lines $3x+4y+8=0$ and $3x+4y-7=0$

15. Find the distance between the parallel lines $12x-5y+3=0$ and $12x-5y-10=0$

2.4 Angle Between 2 Lines

16. Find the acute angle between the following pairs of lines:
   (a) $2x-y+3=0$ and $3x+y-5=0$
   (b) $y=\frac{1}{3}x+7$ and $x+2y-6=0$
   (c) $y=3x+5$ and $4x-3y+2=0$
   (d) $y=\sqrt{3}x+14$ and $x-\sqrt{3}y+7=0$

17. Find the obtuse angle between the following pairs of lines:
   (a) $6x-2y+5=0$ and $x-2y+4=0$
   (b) $2x+5y-7=0$ and $y=-\frac{3}{4}x+9$
   (c) $\sqrt{3}x-y-11=0$ and $x-\sqrt{3}y-7=0$