

Coordinate Geometry Hard Worksheet

1. Find the equation of the line that passes through $(-1, 2)$ and $(2, -3)$ in the form $ax + by + c = 0$. $5x + 3y - 1 = 0$
2. Find the equation of the line that passes through $(p, 3p)$ and $(4p, -p)$ in the form $ax + by + c = 0$. $4x + 3y - 13p = 0$
3. Find the equation of the line that lies perpendicular to $x - 3y + 4 = 0$ and passes through the point $(\frac{1}{2}, -1)$ in the form $ax + by + c = 0$. $6x + 2y - 1 = 0$
4. Find the equation of the line that lies perpendicular to $x + ky + w = 0$ and passes through the point $(k, -1)$ in the form $ax + by + c = 0$. $kx - y - k^2 - 1 = 0$
5. Find the intersection of the lines $3x - 2y = 7$ and $x + 3y = 1$. $(\frac{23}{11}, -\frac{4}{11})$
6. Find the intersection of the lines $y = mx + c$ and $ax + by = 0$. $(-\frac{bc}{a+bm}, \frac{ac}{a+bm})$
7. Find the equation of the perpendicular bisector of the points $(2, 4)$ and $(4, 10)$ in the form $ax + by + c = 0$. $x + 3y - 24 = 0$
8. Find the equation of the perpendicular bisector of the points $(\frac{1}{2}, -\frac{2}{3})$ and $(-1, \frac{1}{4})$ in the form $ax + by + c = 0$. $432x - 264y + 53 = 0$
9. Find the equation of the perpendicular bisector of the points $(2q, 0)$ and $(2, -4)$ in the form $ax + by + c = 0$. $(q-1)x + 2y + 5 + q^2 = 0$
10. Find the point on the line $x + y = 4$ closest to the point $(3, 0)$. $(\frac{7}{2}, \frac{1}{2})$
11. Find the point on the line $3x + y + 7 = 0$ closest to the point $(2, 0)$. $(-\frac{19}{10}, -\frac{13}{10})$
12. Find the point on the line $x + 2y = 1$ closest to the point (a, b) . $(\frac{1+4a-2b}{5}, \frac{2-2a+b}{5})$
13. Find the shortest distance from the point $(1, 1)$ to the line $y = 2x + 3$. $\frac{4\sqrt{5}}{5}$
14. Find the shortest distance from the point $(4, 1)$ to the line $y = 2x$. $\frac{7\sqrt{5}}{5}$
15. Find the shortest distance from the point $(a, 2)$ to the line $y = mx + 1$. $\frac{\sqrt{a^2m^4 - 2am^3 + a^2m^2 + m^2 - 2am + 1}}{m^2 + 1}$
16. Find the shortest distance between the parallel lines $y = 2x$ and $y = 2x + 10$. $2\sqrt{5}$
17. Find the shortest distance between the parallel lines $y = mx$ and $y = mx + c$. $\frac{c\sqrt{m^2+1}}{m^2+1}$
18. Find the point which is equidistant from $(0, 0)$, $(2, 2)$ and $(3, -2)$. [Hint: Think about the perpendicular bisectors.] $(\frac{21}{10}, -\frac{1}{10})$
19. A triangle is bounded by the three lines

$$x + y + 1 = 0 \quad y = 2x - 1 \quad y = k$$
 where k is a positive integer. For what values of k is the area of the triangle less than 2008? [Hamilton] $1 \leq k \leq 50$
20. A quadrilateral is enclosed within the four lines

$$2y = x + 4 \quad y = 2x - 4 \quad 2y = x - 2 \quad y = 2x + 2.$$
 Find its area. [Maclaurin] 12