

## More Equations of Lines and Circles Optional Practice

In 1-4, find an equation or set of equations of the given line in the given format:

1. Through (2,5) and (11,3) (parametric)
2. Through (2,5) with normal vector  $5\mathbf{i} + 6\mathbf{j}$  (general form)
3. Through (4,2) and parallel to  $4x + 6y = 11$  (general form)
4. Through (2,3,11) and (4,1,14) (parametric)
- 5a. Find the equation of a circle centered at (4,6) with radius 3.
- 5b. Find parametric equations for the same circle.
6. Find the equation of a plane through (1,1,5) normal to the vector  $\langle 3,5,8 \rangle$
7. Find the center and radius of each circle

a. 
$$\begin{cases} x = -1 + 4\cos\frac{1}{2}t \\ y = 3 + 4\cos\frac{1}{2}t \end{cases}$$

b.  $x^2 + 6x + y^2 - 10y + 17 = 0.$

8. A semicircular arch has radius 9 feet. Can a truck 8 feet wide and 7 feet high pass through it?

In 9-12, consider the graph of  $x^2 + y^2 = 1$  under each of the following sets of transformations; write the equation of the transformed graph in each case.

9. Stretched horizontally by 8 and vertically by  $\frac{1}{2}$ .
10. Translated left 5 and up 6.
11. Stretched horizontally and vertically by 3, then translated right 2 and down 2.
12. Translated right 2 and down 2, then stretched horizontally and vertically by 3.
13. Find a vector *normal* to the line  $4x + 3y = 11$ .
14. Rewrite as  $y = a(x - h)^2 + k$ :  $y = \frac{1}{2}x^2 + 5x + 6$
15. Find all points of intersection of the circles  $(x - 2)^2 + y^2 = 16$  and  $x^2 + (y + 3)^2 = 9$ . (It's okay to use your calculator to do this, but the algebra isn't that terrible either.)

Answers:

- |   |   |  |  |
|---|---|--|--|
| 1. $x = 2 + 9t, y = 5 - 2t$                     | 2. $5x + 6y = 40$   | 3. $4x + 6y = 28$                        | 4. $x = 2+2t; y = 3-2t; z = 11+3t$       |
| 5a. $(x - 4)^2 + (y - 6)^2 = 9$                 | b. $x = 4 + 3 \cos t; y = 6 + 3 \sin t$                                   | 6. $3x + 5y + 8z = 48$                   | 7a. $(-1,3) R 4$ b. $(-3,5) R \sqrt{17}$ |
| 8. Yes, because $4^2 + 7^2 = 65 < 9^2$ .        | 9. $(x/8)^2 + (2y)^2 = 1$   | 10. $(x + 5)^2 + (y - 6)^2 = 1$          |  |
| 11. $\frac{(x-2)^2}{9} + \frac{(y+2)^2}{9} = 1$ | 12. $\left(\frac{x}{3} - 2\right)^2 + \left(\frac{y}{3} + 2\right)^2 = 1$ | 13. $\langle -3,4 \rangle$ , for example |  |
| 14. $y = \frac{1}{2}(x + 5)^2 - 6\frac{1}{2}$   | 15. Solve the system.   |  |  |