

$$2\sqrt{(x-2)^2 + y^2} = \sqrt{(x-5)^2 + y^2}$$

$$4[(x-2)^2 + y^2] = (x-5)^2 + y^2$$

$$4(x-2)^2 + 4y^2 = (x-5)^2 + y^2$$

$$4(x^2 - 4x + 4) + 4y^2 = x^2 - 10x + 25 + y^2$$

$$4x^2 - 16x + 16 + 4y^2 = x^2 - 10x + 25 + y^2$$

$$3x^2 - 6x + 3y^2 - 9 = 0$$

$$x^2 - 2x + y^2 - 3 = 0$$

$$x^2 + y^2 - 2x - 3 = 0$$

Completing the square,

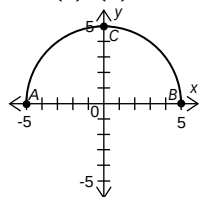
$$x^2 - 2x + 1 - 1 + y^2 - 3 = 0$$

$$(x-1)^2 + y^2 = 4$$

∴ its path is a circle with centre (1, 0), radius 2, and equation

$$(x-1)^2 + y^2 = 4.$$

19. (a) (b)



(c) In $\triangle AOC$,

$$|AO| = |CO| = 5 \text{ (given)}$$

From this, we can conclude that $\triangle AOC$ is an isosceles triangle. Thus, $\angle OCA = 45^\circ$.

Similarly, in $\triangle BOC$,

$$|BO| = |CO| = 5 \text{ (given)},$$

$$\therefore \angle OCB = 45^\circ.$$

Hence, $\angle ACB = 90^\circ$ and $\triangle ABC$ is a right triangle.

20. This problem can be solved graphically or algebraically.

The algebraic solution will be shown here:

$$\therefore (x+4)^2 + (y-1)^2 = 25 \text{ ----- ①}$$

$$\text{and } (x-2)^2 + (y-3)^2 = 25 \text{ ----- ②}$$

$$\therefore (x+4)^2 + (y-1)^2 = (x-2)^2 + (y-3)^2$$

$$x^2 + 8x + 16 + y^2 - 2y + 1 = x^2 - 4x + 4 + y^2 - 6y + 9$$

$$8x - 2y + 17 = -4x - 6y + 13$$

$$12x + 4y + 4 = 0$$

$$3x + y + 1 = 0$$

$$\therefore y = -3x - 1 \text{ ----- ③}$$

Substitute ③ into ①,

$$(x+4)^2 + (-3x-1-1)^2 = 25$$

$$x^2 + 8x + 16 + (-3x-2)^2 = 25$$

$$x^2 + 8x + 16 + 9x^2 + 12x + 4 = 25$$

$$10x^2 + 20x + 20 = 25$$

$$10x^2 + 20x - 5 = 0$$

Solve for x using the quadratic formula,

$$x = \frac{-20 \pm \sqrt{20^2 - 4(10)(-5)}}{2(10)}$$

$$x = \frac{-20 \pm \sqrt{400 + 200}}{20}$$

$$x = \frac{-20 \pm \sqrt{600}}{20}$$

$$x = 0.22 \text{ or } x = -2.22$$

Substitute $x = 0.22$ and $x = -2.22$ into ③,

$$y = -3(0.22) - 1$$

$$y = -1.66$$

$$y = -3(-2.22) - 1$$

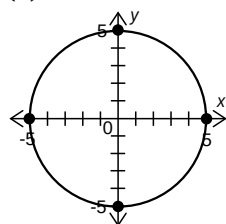
$$y = 5.66$$

∴ the points of intersection are (0.22, -1.66) and (-2.22, 5.66).

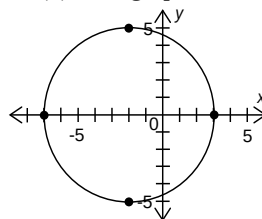
Practice 7.3U, page 584

1. (a) $y = \sqrt{25 - x^2}$ and $y = -\sqrt{25 - x^2}$

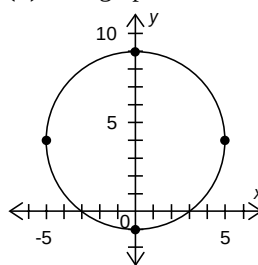
(b)



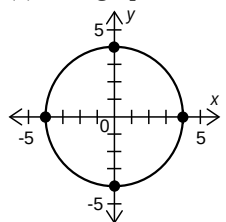
2. (a) The graph will move 2 spaces to the left.



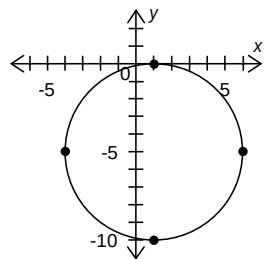
(b) The graph will move 4 units up.



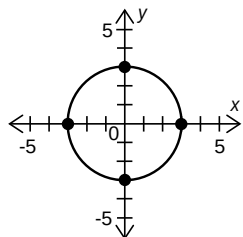
(c) The graph will be centred at the origin with radius 4 units.



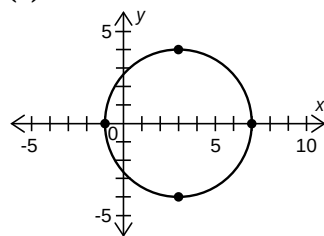
(d) The graph will move 1 unit right and 5 units down.



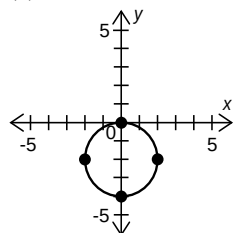
3. (a)



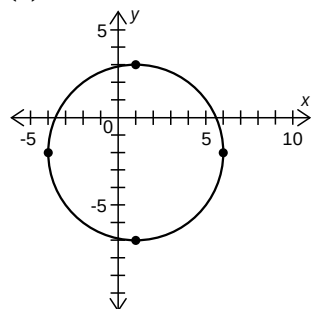
(b)



(c)



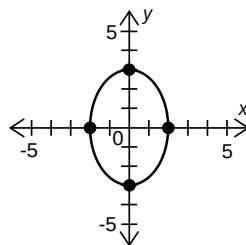
(d)



Practise, Apply, Solve 7.4U page 591

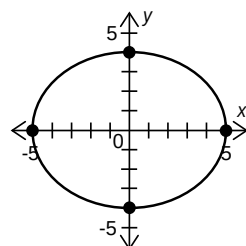
1. (a) $\frac{x^2}{4} + \frac{y^2}{9} = 1$

The length of the major axis is 6. The length of the minor axis is 4.



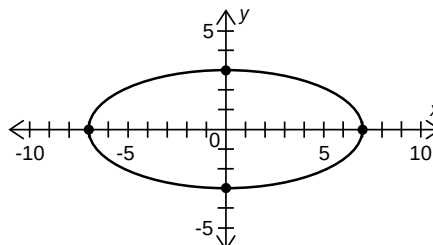
(b) $\frac{x^2}{25} + \frac{y^2}{16} = 1$

The length of the major axis is 10. The length of the minor axis is 8.



(c) $\frac{x^2}{49} + \frac{y^2}{9} = 1$

The length of the major axis is 14. The length of the minor axis is 6.



(d) $\frac{x^2}{49} + \frac{y^2}{16} = 1$

The length of the major axis is 14. The length of the minor axis is 8.

