

Simultaneous Equation

Simultaneous equation is methodology to solve 2 or more equations using simple substitution.

Simple Simultaneous Equation

Let's solve the following simultaneous equations

$$y = 2x + 4$$

$$x + y = 3$$

Answer:

Base on the two equations above, we can denote the first equation as (1) and the second equation as (2)

$$y = 2x + 4 \dots\dots\dots (1)$$

$$x + y = 3 \dots\dots\dots (2)$$

Substitute (1) into (2)

$$x + 2x + 4 = 3$$

$$3x = -1$$

$$x = -\frac{1}{3}$$

When $x = -\frac{1}{3}$,

$$y = 2\left(-\frac{1}{3}\right) + 4 = -\frac{2}{3} + 4$$

$$= 3\frac{1}{3}$$

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

Complex Simultaneous Equation

Let's solve the following simultaneous equations

$$2y = 2x + 4$$

$$x + y^2 = 3$$

Answer:

$$2y = 2x + 4 \dots\dots\dots(1)$$

$$x + y^2 = 3 \dots\dots\dots(2)$$

From (1)

$$y = \frac{2x + 4}{2}$$

$$y = x + 2 \dots\dots\dots(3)$$

Substitute (3) into (2)

$$x + (x + 2)^2 = 3$$

$$x + x^2 + 4x + 4 - 3 = 0$$

$$x^2 + 5x + 1 = 0$$

$$x = \frac{-5 \pm \sqrt{(25 - 4(1)(1))}}{2}$$

$$x = \frac{-5 \pm \sqrt{5}}{2}$$

$$x = \frac{-5 \pm 2.24}{2}$$

$$x = -3.62 \text{ and } -1.38$$

When $x = -3.62$

$$\therefore y = -3.32 + 2 = -1.32$$

When $x = -1.38$

$$\therefore y = -1.38 + 2 = 0.62$$

In this case, we would have two answers

$$\therefore y = -3.32 + 2 = -1.32$$

$$\therefore y = -1.38 + 2 = 0.62$$

PRACTICE 1

1. Solve each of the simultaneous equations

a) $2x = y + 3$
 $3x - y = 3$

b) $4x + 3 - y = 0$
 $-2x + 4 = -y$

c) $3x + 5y = 5$
 $-2y + x = 4$

d) $5p + 3q = 20$
 $p + q = 1$

e) $x + 2x + 2y = \frac{3x + 2}{4}$
 $2x + 3y = 5$

f) $\frac{2}{x} + \frac{y}{2} = 3$
 $x = y$

2. Solve each of the simultaneous equations

a) $2x = y + 3$
 $x^2 - y = 3$

b) $4x + 3 - y = 0$
 $-2x + 3 = -y^2$

c) $3x + 5y = 5$
 $-2y^2 + x = 4$

d) $\frac{2}{x} + \frac{y}{2} = 3$
 $x = y^2$

e) $y = x^2$
 $y = x + 3$

3. The Diagram 1 shows straight lines intersect each at co-ordinate (a, b). Find the value of a,b

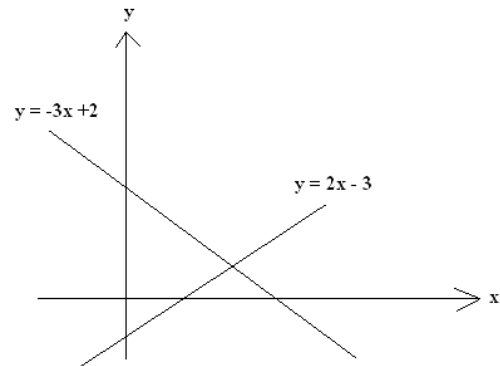


Diagram 1

4. Diagram 2 shows a straight line intersect at the x-axis at (a, 0). Find the value of 'a'

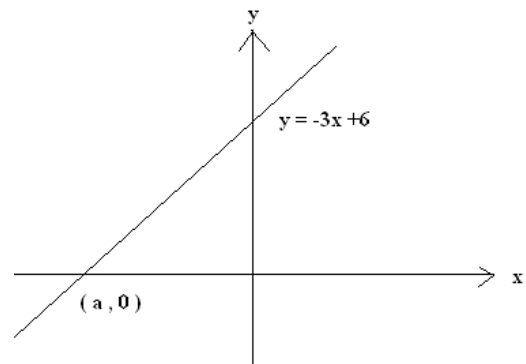


Diagram 2

5. The quadratic equation $y = x^2 + 5$ intersects a straight line $y = 3x + 4$ at two points. Find the co-ordinates.

PRACTICE 2

1. A quadratic equation $f(x) = 2x^2 + 5$ intersects with a straight line $f(x) = kx + 4$ at two different points. Find the possible value of 'k'.

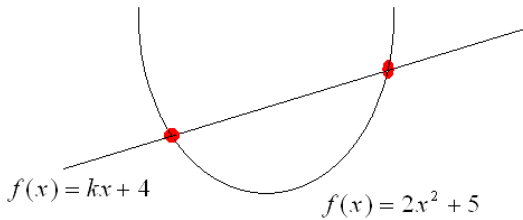


Diagram 3

2. The Diagram 4 below shows a rectangular with the area of 32cm^2 and the perimeter of 24cm ..

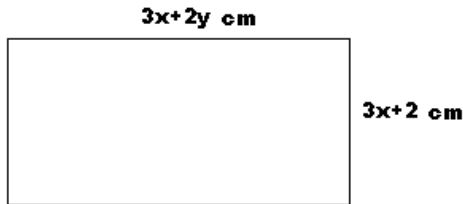


Diagram 4

Find

- a) x
- b) y

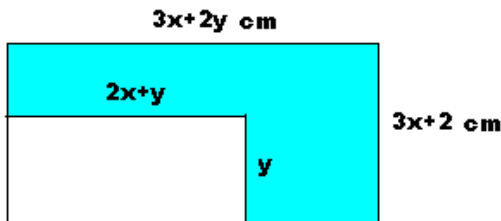


Diagram 5

4. A circle has the radius of $(x + 2y)\text{cm}$. The circumference of the circle is 30cm while the area for $\frac{1}{3}$ of the circle is 40cm^2 .

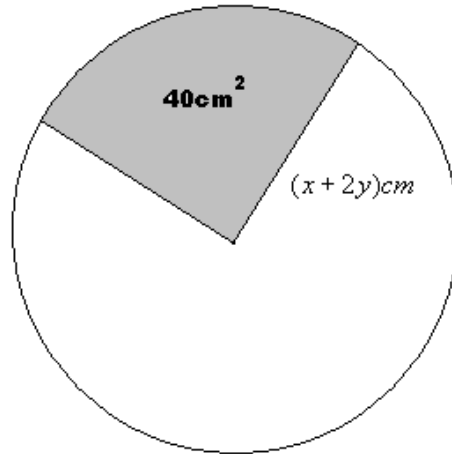


Diagram 6

Determine the length of

- a) x
- b) y
- c) area of the complete circle

5. Factory A is able to produce the number of chocolates following a quadratic function $f(x) = 3x^2 + 2x + 7$. Factory B is capable to produce the number of chocolates given the equation $f(x) = 2x + 3$. If Factory A and Factory B managed to produce the same number of chocolates on a particular day, how many staff is required to work on that day? (x is the number of staff)

PUSAT TUISYEN SKOR MINDA