

Algebra 1 – Question Handout

Questions

1.

i. Solve for x :

$$2(4 - 3x) + 12 = 7x - 5(2x - 7).$$

ii. Verify your answer to (i) above.

2. Solve the simultaneous equations:

$$\begin{aligned} x + y &= 7 \\ x^2 + y^2 &= 25 \end{aligned}$$

3.

Simplify $\frac{x^2 - xy}{x^2 - y^2}$.

4.

Express the following as a single fraction in its simplest form:

$$\frac{6y}{x(x+4y)} - \frac{3}{2x}$$

5.

Solve the simultaneous equations:

$$\begin{aligned} x^2 + xy + 2y^2 &= 4 \\ 2x + 3y &= -1. \end{aligned}$$

6.

Express the following as a single fraction in its simplest form:

$$\frac{x^2 + 4}{x^2 - 4} - \frac{x}{x + 2}$$

Hint: $x^2 - 4$ is the difference between two squares i.e. $(x)^2 - (2)^2 = (x + 2)(x - 2)$

7.

Find the range of values of x for which $|x - 4| \geq 2$, where $x \in \mathbb{R}$.

8.

Algebra 1 – Question Handout

Find the set of all real values of x for which $2x^2 + x - 15 \geq 0$.

9.

Solve the equation $x = \sqrt{x+6}$ $x \in \mathbb{R}$

Hint: Try the method of guessing factors $(x + ?)(x + ?)$ but if this isn't working use the formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

10. Solve the following for x , y and z .

$$x + 2y - z = 1$$

$$2x + y + z = 4$$

$$x + 2y + z = 2$$

11. Solve the equation

$$|4x - 3| > 5$$

12. Solve the following equation and graph the solutions.

$$|3x + 2| < 4$$

13. Solve the following cubic equation and graph the results.

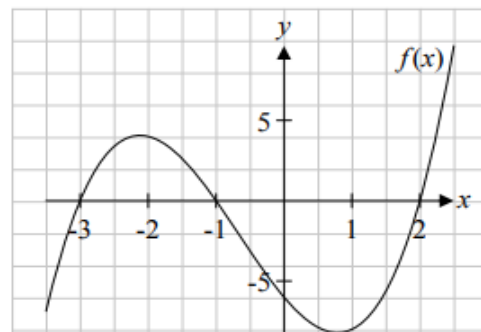
$$f(x) = 2x^3 - 4x^2 - 22x + 24$$

14.

- (a) The graph of a cubic function $f(x)$ cuts the x -axis at $x = -3$, $x = -1$ and $x = 2$, and the y -axis at $(0, -6)$, as shown.

Verify that $f(x)$ can be written as

$$f(x) = x^3 + 2x^2 - 5x - 6.$$



- (b) (i) The graph of the function $g(x) = -2x - 6$ intersects the graph of the function $f(x)$ above. Let $f(x) = g(x)$ and solve the resulting equation to find the co-ordinates of the points where the graphs of $f(x)$ and $g(x)$ intersect.
- (ii) Draw the graph of the function $g(x) = -2x - 6$ on the diagram above.

15.

- (i) Let $f(x) = x^3 + kx^2 - 4x - 12$, where k is a constant.

Given that $x + 3$ is a factor of $f(x)$, find the value of k .

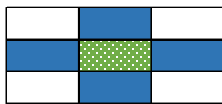
- (ii) Show that

$$\frac{3}{1+x^p} + \frac{3}{1+x^{-p}} \text{ simplifies to a constant.}$$

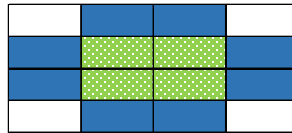
16.

Mary is interested in having the following tile pattern for her kitchen floor.

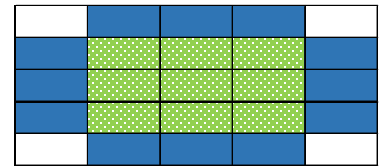
Stage 1





Stage 2



Stage 3



Green 

Blue 

White 

- Write an expression for the total number of tiles in the x^{th} stage of the pattern.
- If there are 324 tiles in total in a pattern, how many green tiles are there?
- Mary's kitchen area measures 6.76 m^2 . The side of each square tile is 20 cm long. Find the number of each colour of tile that needs to be ordered.

Link to SAI website for Maths Tutorial Material

<https://web.actuaries.ie/students/maths-tutorials-higher-level-leaving-certificate-20222023>

Link to SAI Instagram

<https://www.instagram.com/saimathstutorials?r=nametag>