

Week 3

This week in a nutshell:

Some of this week's topics may seem challenging at a first glance. However, by using results from previous days, all the questions have attainable answers. There is a lot of insight to be gained this week in terms of how to approach the unfamiliar in a logical and efficient way. Some of the questions require a little more understanding of written text, so be aware that some students may need additional support with this.

Question 1: Vector arithmetic

Question 2: Combinations

Question 3: Finding the n^{th} term

Question 4: Population

Question 5: Graphs of quadratics

This week's ideas for class discussion include:

Question 1: **Vector arithmetic**

- What are the similarities and differences between vector arithmetic and our standard arithmetic?

Question 2: **Combinations**

- What counting methods can you come up with to make sure we include all combinations?

Question 3: **Finding the n^{th} term**

- Why might an algebraic rule governing the behaviour of numbers be useful?
- Is it possible to have more than one n^{th} term rule for a given sequence?

Question 4: **Population**

- Does the size of a population affect how we deal with it mathematically?

Question 5: **Graphs of quadratics**

- How would you describe the key features of a quadratic graph? How do these relate to the algebraic representations of a quadratic function?

Week 3: Day 1

1) $a = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$ and $b = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$. Calculate $a + b$.

- 2) Bill uses these cards to make different numbers. How many 3-digit numbers can he make?

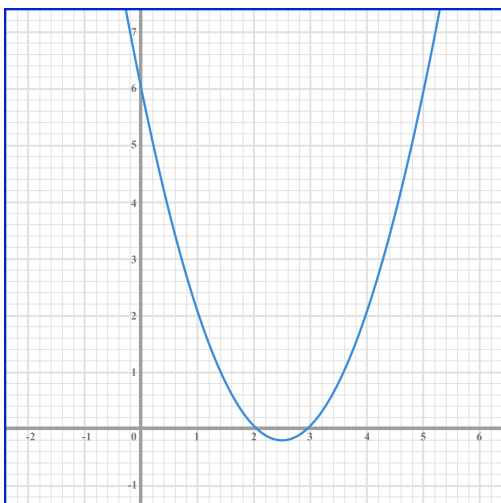


- 3) Find the n^{th} term of the sequence:

3, 6, 9, 12, 15, ...

- 4) A town's population in 2001 was 12000. By 2011, the population had increased by 15%. What was the population in 2011?

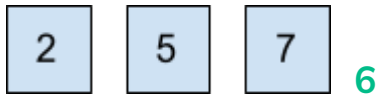
- 5) Use the graph to identify the roots of $f(x) = x^2 - 5x + 6$



Week 3: Day 1 Answers

1) $a = \begin{bmatrix} 3 \\ 2 \end{bmatrix}$ and $b = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$. Calculate $a + b$. $\begin{bmatrix} 8 \\ 3 \end{bmatrix}$

- 2) Bill uses these cards to make different numbers. How many 3-digit numbers can he make?

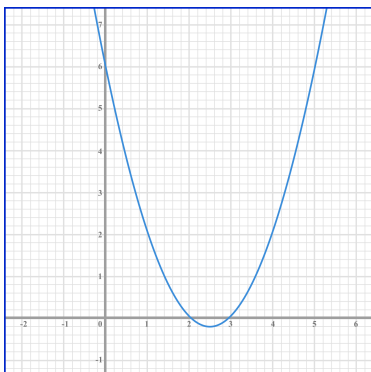


- 3) Find the n^{th} term of the sequence:

3, 6, 9, 12, 15, ... 3n

- 4) A town's population in 2001 was 12000. By 2011, the population had increased by 15%. What was the population in 2011? 13800

- 5) Use the graph to identify the roots of $f(x) = x^2 - 5x + 6$



2 and 3

Week 3: Day 2

1) $a = \begin{bmatrix} 8 \\ 2 \end{bmatrix}$ and $b = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$. Calculate $a - b$.

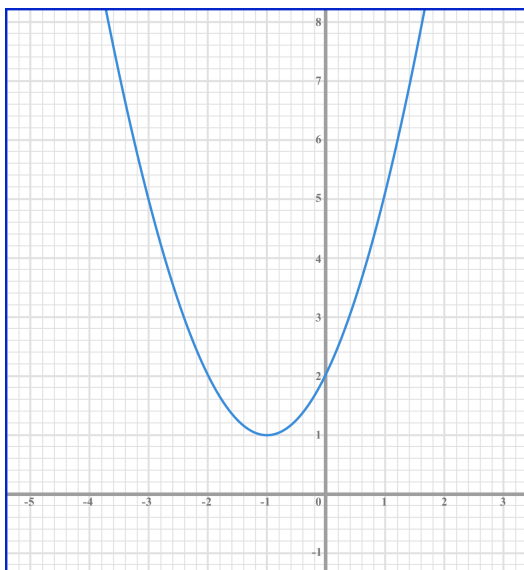
- 2) A coin is tossed and a 4-sided die is rolled. List the combinations that can occur.

- 3) Find the n^{th} term of the sequence:

1, 3, 5, 7, 9, ...

- 4) A nature reserve has a population of 14 rabbits. The rabbit population doubles every year. How many rabbits are there after 3 years?

- 5) Use the graph to identify the turning point of $f(x) = x^2 + 2x + 2$



Week 3: Day 2 Answers

1) $a = \begin{bmatrix} 8 \\ 2 \end{bmatrix}$ and $b = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$. Calculate $a - b$. $\begin{bmatrix} 3 \\ 1 \end{bmatrix}$

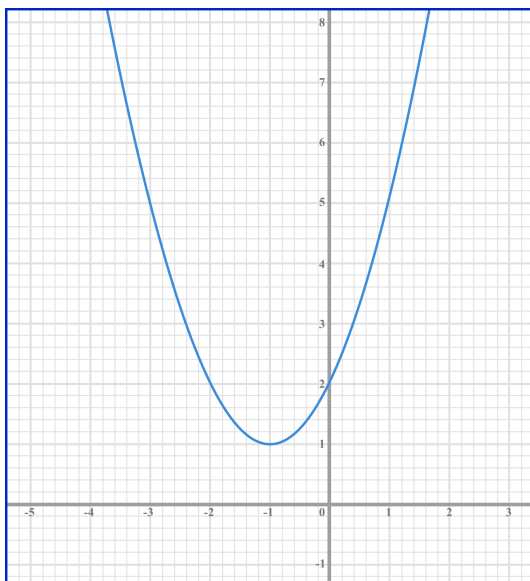
- 2) A coin is tossed and a 4-sided die is rolled. List the combinations that can occur. **1H, 2H, 3H, 4H, 1T, 2T, 3T, 4T**

- 3) Find the n^{th} term of the sequence:

1, 3, 5, 7, 9, ... $2n - 1$

- 4) A nature reserve has a population of 14 rabbits. The rabbit population doubles every year. How many rabbits are there after 3 years? **112**

- 5) Use the graph to identify the turning point of $f(x)=x^2+2x+2$



$(-1, 1)$

Week 3: Day 3

1) $a = \begin{bmatrix} -4 \\ 2 \end{bmatrix}$ and $b = \begin{bmatrix} 3 \\ -1 \end{bmatrix}$. Calculate $a + 2b$.

- 2) Kiely uses these cards to make different numbers. How many 4-digit numbers can she make?

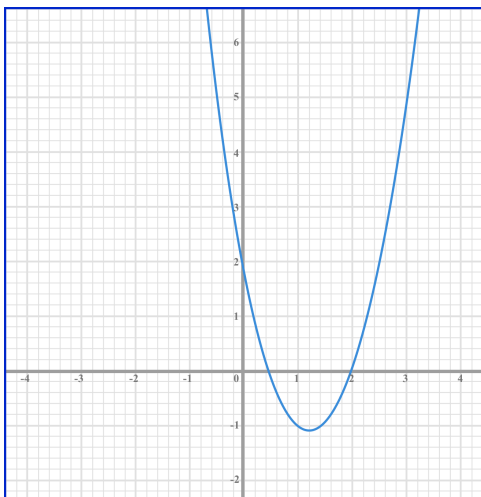


- 3) Find the n^{th} term of the sequence:

3, 8, 13, 18, 23, ...

- 4) The ratio of men to women on an island is 4:5. The total population of the island is 3600. How many women are on the island?

- 5) Use the graph to identify the y-intercept of $f(x) = 2(x - \frac{1}{2})(x - 2)$



Week 3: Day 3 Answers

1) $a = \begin{bmatrix} -4 \\ 2 \end{bmatrix}$ and $b = \begin{bmatrix} 3 \\ -1 \end{bmatrix}$. Calculate $a + 2b$. $\begin{bmatrix} 2 \\ 0 \end{bmatrix}$

- 2) Kiely uses these cards to make different numbers. How many 4-digit numbers can she make?





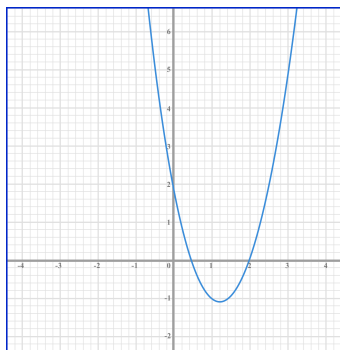
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- 3) Find the n^{th} term of the sequence:

3, 8, 13, 18, 23, ... $5n - 2$

- 4) The ratio of men to women on an island is 4:5. The total population of the island is 3600. How many women are on the island? 2000

- 5) Use the graph to identify the y-intercept of $f(x) = 2(x - \frac{1}{2})(x - 2)$



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Week 3: Day 4

1) $a = \begin{bmatrix} 3 \\ -2 \end{bmatrix}$ and $b = \begin{bmatrix} -2 \\ 1 \end{bmatrix}$. Calculate $a - b$.

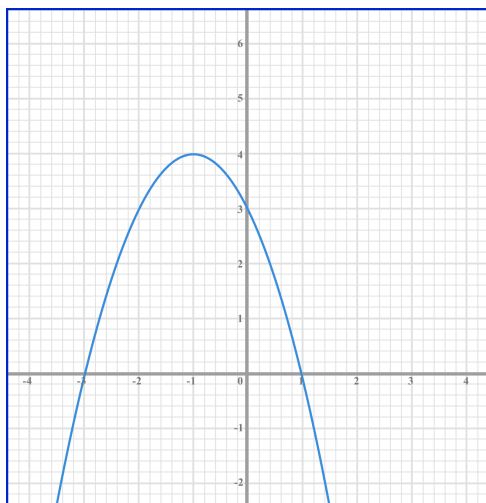
- 2) A restaurant offers a choice of 3 courses from starter, fish course, main and dessert. What combinations could a diner choose?

- 3) Find the n^{th} term of the sequence:

31, 27, 23, 19, 15, ...

- 4) The number of frogs in a population is recorded as 160. Next time the population is counted there are 120 frogs. What is the percentage decrease in the number of frogs?

- 5) Use the graph to identify the maximum of $f(x) = -x^2 - 2x + 3$



Week 3: Day 4 Answers

1) $a = \begin{bmatrix} 3 \\ -2 \end{bmatrix}$ and $b = \begin{bmatrix} -2 \\ 1 \end{bmatrix}$. Calculate $a - b$. $\begin{bmatrix} 5 \\ -3 \end{bmatrix}$

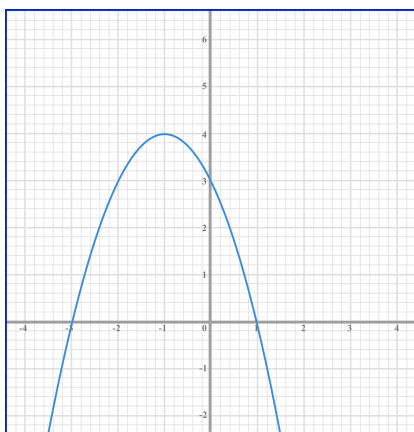
- 2) A restaurant offers a choice of 3 courses from starter, fish course, main and dessert. What combinations could a diner choose? **SFM, SFD, SMD, FMD**

- 3) Find the n^{th} term of the sequence:

31, 27, 23, 19, 15, ... **$35 - 4n$**

- 4) The number of frogs in a population is recorded as 160. Next time the population is counted there are 120 frogs. What is the percentage decrease in the number of frogs? **25%**

- 5) Use the graph to identify the maximum of $f(x) = -x^2 - 2x + 3$

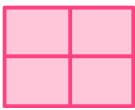


$(-1, 4)$

Week 3: Day 5

1) $\mathbf{a} = \begin{bmatrix} 2 \\ 4 \end{bmatrix}$ and $\mathbf{b} = \begin{bmatrix} -3 \\ 1 \end{bmatrix}$. Calculate $2\mathbf{a} - 3\mathbf{b}$.

- 2) Each of these four tiles is to be coloured black or white. In how many ways can this be done?

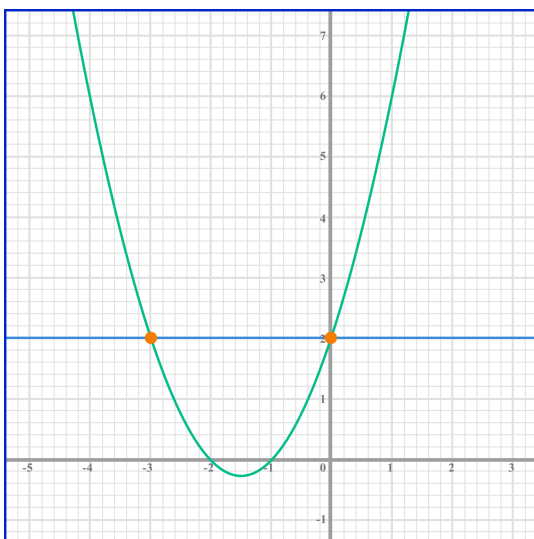


- 3) Find the n^{th} term of the sequence:

2, 5, 10, 17, 26, 37, 50, ...

- 4) On a cruise ship the ratio of men to women to children in the population is 2:2:3. There are 497 people on the ship. How many children are there?

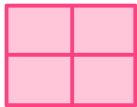
- 5) Use the graph to identify the solutions of $2 = x^2 + 3x + 2$



Week 3: Day 5 Answers

1) $a = \begin{bmatrix} 2 \\ 4 \end{bmatrix}$ and $b = \begin{bmatrix} -3 \\ 1 \end{bmatrix}$. Calculate $2a - 3b$. $\begin{bmatrix} 13 \\ 5 \end{bmatrix}$

- 2) Each of these four tiles is to be coloured black or white. In how many ways can this be done?



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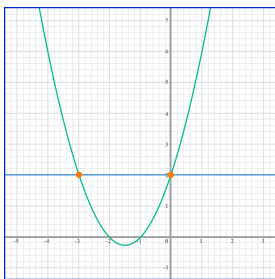
- 3) Find the n^{th} term of the sequence:

2, 5, 10, 17, 26, 37, 50, ... $n^2 + 1$

- 4) On a cruise ship the ratio of men to women to children in the population is 2:2:3. There are 497 people on the ship. How many children are there?

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- 5) Use the graph to identify the solutions of $2 = x^2 + 3x + 2$



$x = -3$ or 0

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