Intervals

Notation

We will use the following notation:

$[a, b]$ denotes all x such that $a \leqslant x \leqslant b$

Notation

We will use the following notation:

$[a, b]$ denotes all x such that $a \leqslant x \leqslant b$

$]a, b]$ denotes all x such that $a < x \leqslant b$

Notation

We will use the following notation:

$[a, b]$ denotes all x such that $a \leqslant x \leqslant b$

$]a, b]$ denotes all x such that $a < x \leqslant b$

$[a, b[$ denotes all x such that $a \leqslant x < b$

Notation

We will use the following notation:

$[a, b]$ denotes all x such that $a \leqslant x \leqslant b$

$]a, b]$ denotes all x such that $a < x \leqslant b$

$[a, b[$ denotes all x such that $a \leqslant x < b$

$]a, b[$ denotes all x such that $a < x < b$

Notation

We will use the following notation:

$[a, b]$ denotes all x such that $a \leqslant x \leqslant b$

$]a, b]$ denotes all x such that $a < x \leqslant b$

$[a, b[$ denotes all x such that $a \leqslant x < b$

$]a, b[$ denotes all x such that $a < x < b$

Some authors use different notation, for instance $(a, b]$ or $(a, b\rangle$ in the second case. We will use the above notation, as it is also used by the IB.

Notation

$[a, \infty[$ denotes all x such that $a \leqslant x$

Notation

$[a, \infty[$ denotes all x such that $a \leqslant x$

$]a, \infty[$ denotes all x such that $a < x$

Notation

$[a, \infty[$ denotes all x such that $a \leqslant x$

$]a, \infty[$ denotes all x such that $a < x$

$]-\infty, b]$ denotes all x such that $x \leqslant b$

Notation

$[a, \infty[$ denotes all x such that $a \leqslant x$

$]a, \infty[$ denotes all x such that $a < x$

$]-\infty, b]$ denotes all x such that $x \leqslant b$

$]-\infty, b[$ denotes all x such that $x < b$

Notation

$[a, \infty[$ denotes all x such that $a \leqslant x$

$]a, \infty[$ denotes all x such that $a < x$

$]-\infty, b]$ denotes all x such that $x \leqslant b$

$]-\infty, b[$ denotes all x such that $x < b$

Note that we never include ∞ (or $-\infty$) as it is not a number.

Remember that intervals are just sets of numbers (often infinite), so all the operations on sets can be used. We will practice those operations on the next slides.

Example 1

Let:

$$A =]1,4] \qquad B =]-\infty, 3[$$

Find $A \cup B$, $A \cap B$, $A - B$ oraz $B - A$.

Example 1

Let:

$$A =]1, 4] \qquad B =]-\infty, 3[$$

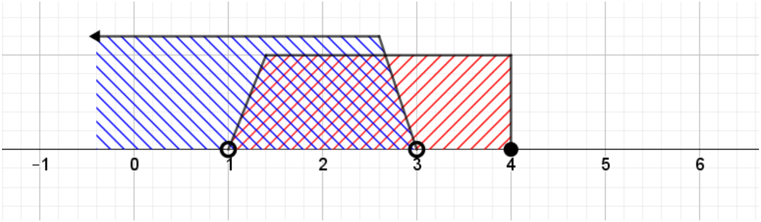
Find $A \cup B$, $A \cap B$, $A - B$ oraz $B - A$.

It is often helpful to mark both sets on a number line:

Example 1

$$A =]1, 4] \qquad B =]-\infty, 3[$$

A is marked with red, B with blue.



Example 1

- $A \cup B$ is the union of the sets, so it is the part coloured by at least one of the colours.

Example 1

- $A \cup B$ is the union of the sets, so it is the part coloured by at least one of the colours.
- $A \cap B$ is the intersection, so it is the part coloured by both colours.

Example 1

- $A \cup B$ is the union of the sets, so it is the part coloured by at least one of the colours.
- $A \cap B$ is the intersection, so it is the part coloured by both colours.
- $A - B$ is the difference between A and B, so it is the part coloured **only** in red.

Example 1

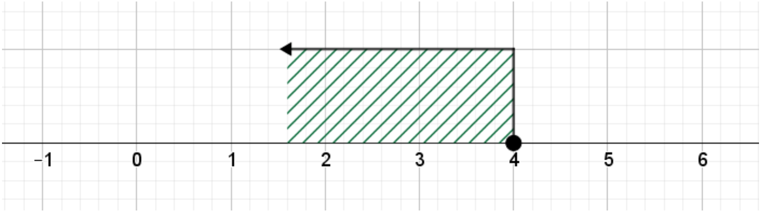
- $A \cup B$ is the union of the sets, so it is the part coloured by at least one of the colours.
- $A \cap B$ is the intersection, so it is the part coloured by both colours.
- $A - B$ is the difference between A and B, so it is the part coloured **only** in red.
- $B - A$ is the difference between B and A, so it is the part coloured **only** in blue.

Example 1

$$A \cup B =]-\infty, 4]$$

Example 1

$$A \cup B =]-\infty, 4]$$

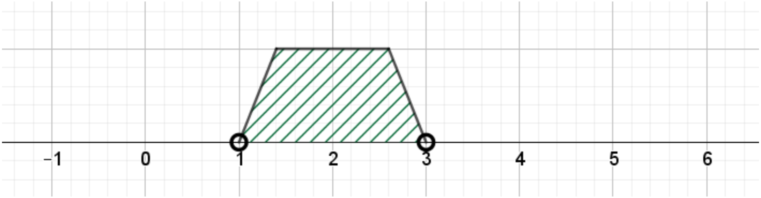


Example 1

$$A \cap B =]1, 3[$$

Example 1

$$A \cap B =]1, 3[$$

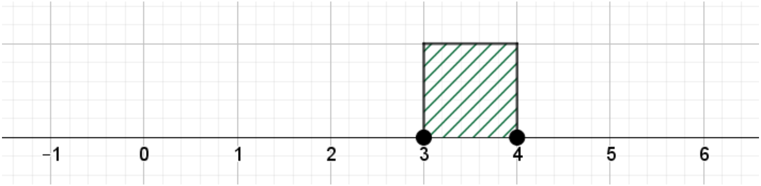


Example 1

$$A - B = [3, 4]$$

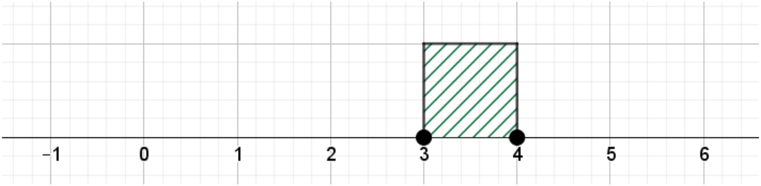
Example 1

$$A - B = [3, 4]$$



Example 1

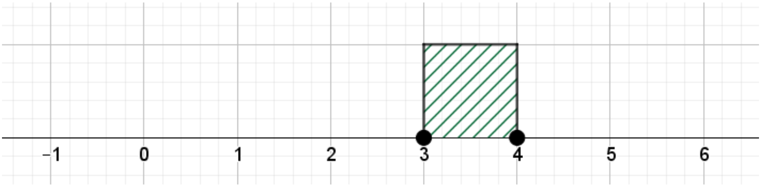
$$A - B = [3, 4]$$



Why is 3 in this set?

Example 1

$$A - B = [3, 4]$$



Why is 3 in this set? 3 belongs to $A - B$, since it belongs to A and doesn't belong to B. $B =]-\infty, 3[$, so 3 is outside of B.

Example 1

$$B - A =]-\infty, 1]$$

Example 1

$$B - A =]-\infty, 1]$$

Example 2

Let:

$$A =]0,5] \qquad B = [1,3[$$

Find $A \cup B$, $A \cap B$, $A - B$ oraz $B - A$.

Example 2

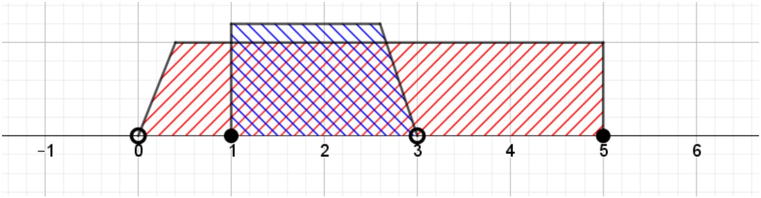
Let:

$$A =]0,5] \qquad B = [1,3[$$

Find $A \cup B$, $A \cap B$, $A - B$ oraz $B - A$.

Again it is useful to mark the sets on the number line.

Example 2

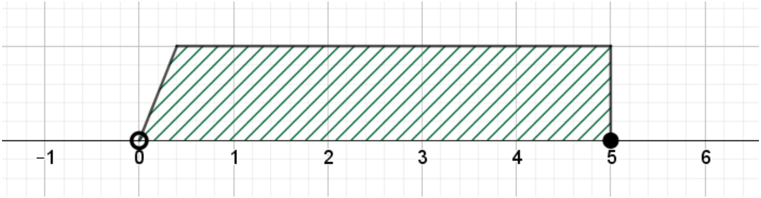


Example 2

$$A \cup B =]0, 5]$$

Example 2

$$A \cup B =]0, 5]$$

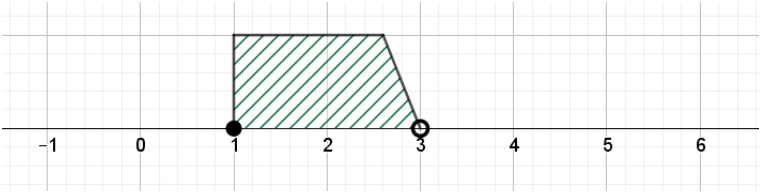


Example 2

$$A \cap B = [1, 3[$$

Example 2

$$A \cap B = [1, 3[$$

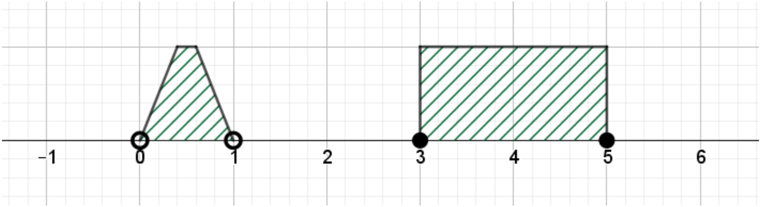


Example 2

$$A - B =]0, 1[\cup [3, 5]$$

Example 2

$$A - B =]0,1[\cup [3,5]$$



Example 2

$$B - A = \emptyset$$

Example 3

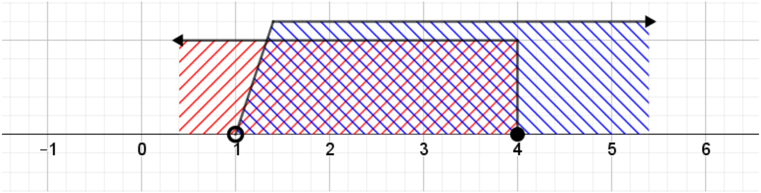
Let:

$$A =]-\infty, 4] \qquad B =]1, \infty[$$

Find the sets A', B'.

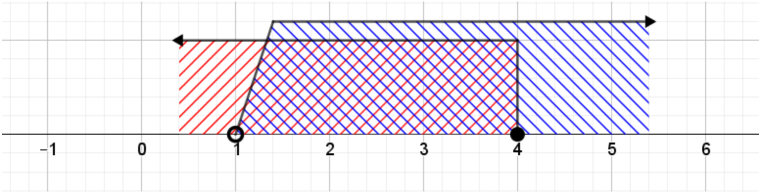
Example 3

We will use red for A and blue for B:



Example 3

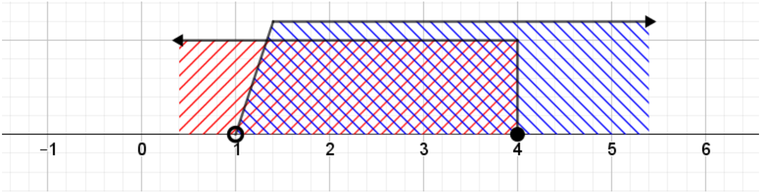
We will use red for A and blue for B:



- A' is the complement of A, so it is the part **not** coloured in red.

Example 3

We will use red for A and blue for B:



- A' is the complement of A, so it is the part **not** coloured in red.
- B' is the complement of B, so it is the part **not** coloured in blue.

Example 3

$$A' =]4, \infty[$$

Example 3

$$A' =]4, \infty[$$

Example 3

$$B' =]-\infty, 1]$$

Example 3

$$B' =]-\infty, 1]$$

The short test at the beginning of the class will be similar to the examples above.