



RESERVE BANK OF AUSTRALIA

# Productivity

From the Classroom: Chris Burrows  
(Educators Advisory Panel)

Education



# RBA Education page - Resources!



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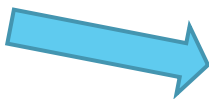
Contact Us

## Resources

The Reserve Bank's public education program has developed resources for educators, students and the general public. The resources have been developed with education specialists and professionals to support an array of learning experiences.



# RBA Education page - Explainers!



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## Explainers

The 'Explainers' series provides explanation of key economic concepts, the Australian economy and the role of the Reserve Bank.

### What is Monetary Policy?

Explains what monetary policy is, what it aims to achieve and how monetary policy decisions are both made and implemented.

Download [PDF](#) 387KB



### The Transmission of Monetary Policy

Describes how changes made by the Reserve Bank to the cash rate – the 'instrument' of monetary policy – flow through to economic activity and inflation.

Download [PDF](#) 109KB



### How the Reserve Bank Implements Monetary Policy

Describes the Australian cash market and explains how the Reserve Bank ensures that the cash rate is as close as possible to its target.

Download [PDF](#) 100KB



## Productivity

Explains what productivity is, how it is measured, its drivers and the benefits of productivity growth.

Download [PDF](#) 154KB



# Productivity

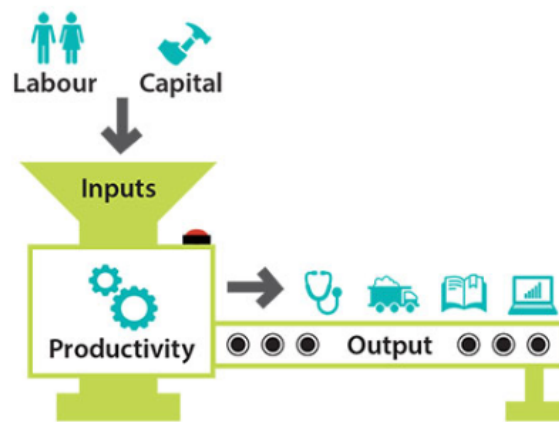
Download the complete [Explainer PDF](#) 154KB

In economics, productivity refers to how much output can be produced with a given set of inputs. Productivity increases when more output is produced with the same amount of inputs or when the same amount of output is produced with less inputs.

There are two widely used productivity concepts.

1. **Labour productivity** is defined as output per worker or per hour worked. Factors that can affect labour productivity include workers' skills, technological change, management practices and changes in other inputs (such as capital).
2. **Multifactor productivity (MFP)** is defined as output per unit of combined inputs. Combined inputs typically include labour and capital, but can be expanded to include energy, materials and services. Changes in MFP reflect changes in output that cannot be explained by changes in inputs.

This Explainer outlines how productivity is measured, what drives productivity growth and how productivity growth contributes to the economic prosperity and welfare of all Australians.



*Productivity isn't everything, but in the long-run, it is almost everything.*

*A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker.*

**PAUL  
KRUGMAN**

*The Age of Diminishing  
expectations, 1994*





Reproducing knowledge

A hand in a dark suit jacket and white shirt cuff is shown holding a glowing, translucent circuit board. The board is filled with intricate white circuit traces and numerous bright, glowing white nodes. The background is a solid teal color. The text 'Creating knowledge' is written in white, and 'Think for yourself and work with others' is written in dark blue below it.

**Creating knowledge**

**Think for yourself and work with others**

# Wages and Productivity

The idea is to have students develop their own data sets and to understand how productivity can affect wages through an inquiry approach.

To start with students are given two basic maths tests. The first without a calculator and the second with. They have 2 minutes to complete each test.

## ROUND 1 TEST NO CALCULATOR

$$\begin{array}{r} 75 \\ \times 23 \\ \hline \end{array}$$

$$\begin{array}{r} 91 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 8,209 \\ - 77 \\ \hline \end{array}$$

etc



## ROUND 2 TEST WITH CALCULATOR

$$\begin{array}{r} 200 \\ \div 8 \\ \hline \end{array}$$

$$\begin{array}{r} 3252 \\ \times 5 \\ \hline \end{array}$$

$$\begin{array}{r} 11,397 \\ - 466 \\ \hline \end{array}$$

etc





Use the data that we have generated to investigate productivity and its effect on wages.

This is how wages are calculated:

- Minimum wage of \$8 is offered to all workers in Round 1.
- The company earns \$2 per Round 1 maths test score.
- From this wages are deducted and profit for the firm remains.

## Inputs

| Variables                             | Round 1 |
|---------------------------------------|---------|
| Wage rate                             | \$8.00  |
| Capital                               | \$0.00  |
| Company earnings per maths test point | \$2.00  |

## Results

| ROUND 1      |                  |                  |                |               |                |
|--------------|------------------|------------------|----------------|---------------|----------------|
| Employee     | Maths test score | Company earnings | Wage           | Capital       | Profit         |
| John         | 8                | \$16.00          | \$8.00         | \$0.00        | \$8.00         |
| Wendy        | 7                | \$14.00          | \$8.00         | \$0.00        | \$6.00         |
| Chris        | 4                | \$8.00           | \$8.00         | \$0.00        | \$0.00         |
| <b>Total</b> | <b>19</b>        | <b>\$38.00</b>   | <b>\$24.00</b> | <b>\$0.00</b> | <b>\$14.00</b> |

In Round 2 the wage offer is based on the increase in productivity as a result of the introduction of Capital (the calculator) for each worker.

However that capital also has a cost of \$5 per unit.

So the Round 2 wage offer is based on the following:

Round 1 wage + a quarter of the increase in company earnings.

So for John that's an increase of  $(\$20 - \$16)/4 = \$1$ , for Wendy it's an increase of  $(\$20 - \$14)/4 = \$1.50$  etc.

## Inputs

| Variables                             | Round 1 | Round 2   |
|---------------------------------------|---------|---|
| Wage rate                             | \$8.00  | Round 1 wage +<br>(Round 2 company earnings - Round 1 company earnings)/4 |
| Capital                               | \$0.00  | \$5.00  |
| Company earnings per maths test point | \$2.00  | \$2.00  |

## Results

| ROUND 2      |                  |                  |                |                |                |
|--------------|------------------|------------------|----------------|----------------|----------------|
| Employee     | Maths test score | Company earnings | Wage           | Capital        | Profit         |
| John         | 10               | \$20.00          | \$9.00         | \$5.00         | \$6.00         |
| Wendy        | 10               | \$20.00          | \$9.50         | \$5.00         | \$5.50         |
| Chris        | 10               | \$20.00          | \$11.00        | \$5.00         | \$4.00         |
| <b>Total</b> | <b>30</b>        | <b>\$60.00</b>   | <b>\$29.50</b> | <b>\$15.00</b> | <b>\$15.50</b> |

## Round 3

All students are given a basic hand-eye coordination test. They are given 10 ping pong balls that they need to get into 10 cups. They may bounce or throw the ball into the cups.



In Round 3 the wage offer is based on the increase in productivity as a result of the introduction of another skill (beer pong) for each worker. So the Round 3 wage offer is based on the following:  
 Round 2 wage + a quarter the increase in company earnings.  
 So for John the increase is  $(\$30 - \$20)/4 = \$2.50$  etc.

## Inputs

| Variables                                    | Round 1 | Round 2  | Round 3  |
|--|---------|--|--|
| <b>Wage rate</b>                             | \$8.00  | Round 1 wage + (Round 2 company earnings - Round 1 company earnings)/4 | Round 2 wage + (Round 3 company earnings - Round 2 company earnings)/4 |
| <b>Capital</b>                               | \$0.00  | \$5.00   | \$5.00   |
| <b>Company earnings per maths test point</b> | \$2.00  | \$2.00   | \$2.00   |
| <b>Company earnings per beer pong point</b>  | \$0.00  | \$0.00   | \$2.00   |

## Inputs

| Variables                                    | Round 3   |
|--|---|
| <b>Wage rate</b>                             | Round 2 wage +<br>(Round 3 company earnings - Round 2 company earnings)/4 |
| <b>Capital</b>                               | \$5.00  |
| <b>Company earnings per maths test point</b> | \$2.00  |
| <b>Company earnings per beer pong point</b>  | \$2.00  |

## Results

| ROUND 3      |                  |                 |                  |                |                |                |
|--------------|------------------|-----------------|------------------|----------------|----------------|----------------|
| Employee     | Maths test score | Beer pong score | Company earnings | Wage           | Capital        | Profit         |
| John         | 10               | 5               | \$30.00          | \$11.50        | \$5.00         | \$13.50        |
| Wendy        | 10               | 4               | \$28.00          | \$11.50        | \$5.00         | \$11.50        |
| Chris        | 10               | 3               | \$26.00          | \$12.50        | \$5.00         | \$8.50         |
| <b>Total</b> | <b>30</b>        | <b>12</b>       | <b>\$84.00</b>   | <b>\$35.50</b> | <b>\$15.00</b> | <b>\$33.50</b> |

# Your Task

1. Using the excel spreadsheet provided, add in your data and the formulas that make it work.

What does your data tell you about productivity in the workplace?

2. Come up with 3 things that you can see in the data with regards to wages, productivity and profits for firms.
3. Come up with 2 questions about productivity as a concept that you would like to pose to other groups.



## Other types of activities

# PC PRODUCTIVITY BULLETIN

MAY 2019 | ISSN 2652-1407

### Features

Recent productivity trends

The mining boom  
and investment cycle

Labour productivity  
and wages

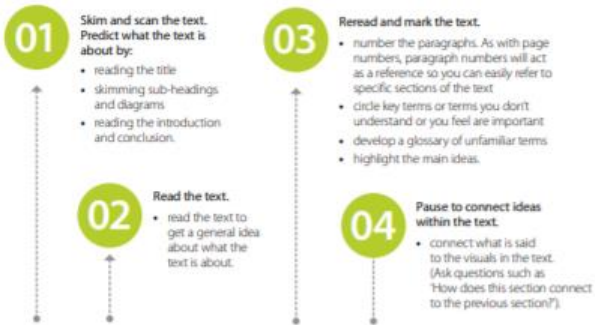
International perspective

<https://www.pc.gov.au/research/ongoing/productivity-bulletin/2019/productivity-bulletin-2019.pdf>

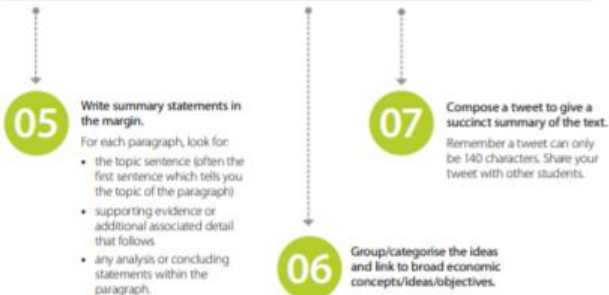
## Activity Read and Rehash



### A reading strategy for RBA publications



The RBA releases many publications that are up-to-date and useful for students. Some of them, however, have complex concepts. This infographic is designed to guide you through the process of how to make meaning from the range of publications released by the RBA. Use this process to read any publication on the RBA website.





## Recommended reading/listening:

- D'Arcy P and L Gustafsson (2012), 'Australia's Productivity Performance and Real Incomes', RBA Bulletin, June, pp 23–36.
- Lai S, Poole E and T Rosewall (2018), 'Firm-level Insights into IT Use', RBA Bulletin, September.
- Lowe P (2018), 'Productivity, Wages and Prosperity', Address to Australian Industry Group, Melbourne, 13 June.
- Martin P and Foster G (2019), 'The Economists – Productive ideas for the new government' [Audio podcast]. Available from <https://www.abc.net.au/radionational/programs/the-economists/>.
- Productivity Commission (2017), 'Productivity and Income – The Australian Story, Shifting the Dial: 5 Year Productivity Review, Supporting Paper No. 1'.

## Some shorter stimulus readings



EDITORIAL, THE AUSTRALIAN, JUNE 8, 2019

### **National productivity plan will raise living standards**

<https://www.theaustralian.com.au/commentary/editorials/national-productivity-plan-will-raise-living-standards/news-story/03a9f50b2d532f63baf6f09bba332dc0>

# ANZSOG

The Australia and New Zealand School of Government  
(ANZSOG)

### **PUBLIC INSTITUTIONS AND THE PRODUCTIVITY IMPERATIVE**

Gary Banks

**Published Date:** 24 February 2017

<https://www.anzsog.edu.au/resource-library/news-media/public-institutions-and-the-productivity-imperative>

**The Sydney Morning Herald**

Irvine J (2019), 'Forget interest rates, here's what the economy really needs'.

<https://www.smh.com.au/business/banking-and-finance/forget-interest-rates-here-s-what-the-economy-really-needs-20190605-p51uu5.html>

The logo for ABC News, featuring the text 'ABC NEWS' in a bold, white, sans-serif font. Below it, the website address 'abc.net.au/news' is written in a smaller, white, sans-serif font. The entire logo is set against a solid black rectangular background.

**ABC NEWS**  
abc.net.au/news

Jericho G (2012), 'Productivity in a nutshell'.

<https://www.abc.net.au/news/2012-03-14/jericho-productivity-in-a-nutshell/3887922>

Use the Productivity Explainer to produce the following:

Mind map the ideas contained in the explainer.

Use sticky notes to come up with questions about productivity that you would like to ask.

Collate the questions and divide into group to research answers to those questions.



Have students read or listen to the speech by Dr Phillip Lowe.



The screenshot shows the Reserve Bank of Australia website. At the top left is the RBA logo and the text "RESERVE BANK OF AUSTRALIA". To the right is a navigation menu with links for Careers, Education, Media, Q&A, Glossary, and Contacts. Below this is a search bar labeled "Search RBA website" with a magnifying glass icon. A secondary navigation bar contains links for Media Releases, Speeches, Publications, Research, Statistics, and Chart Pack. A third navigation bar lists: About Us, Monetary Policy, Market Operations, Financial Stability, Payments & Infrastructure, Financial Services, and Banknotes. Below this is a breadcrumb trail: Home > Speeches > 2018 > Productivity, Wages and Prosperity.

On the left side, under "In Speeches", there is a dropdown menu for years from 2011-2019. The year 2018 is selected and highlighted in bold. Below the dropdown are the years 2019, 2018, 2017, 2016, 2015, 2014, and 2013.

The main content area is titled "Speech" and "Productivity, Wages and Prosperity". Below the title, it identifies the speaker as "Philip Lowe [\*]" and "Governor". The title of the speech is "Address to Australian Industry Group" and the date is "Melbourne – 13 June 2018". There are three options for accessing the speech: "Webcast" with a computer icon, "Audio" with a speaker icon, and "Download PDF" with a PDF icon and "376KB" next to it. To the right of the text is a portrait photograph of Phillip Lowe, a man with glasses wearing a suit and tie.

<https://www.rba.gov.au/speeches/2018/sp-gov-2018-06-13.html>

## Class reading

Students provided with the productivity reading and they read them in small groups.

They generate questions about the information which can be posted on post-it notes or something like Padlet if you are more IT focused.

Once the questions are up have the small groups see if they can answer or add to those questions

These can then serve as a great reference point during work on this topic.



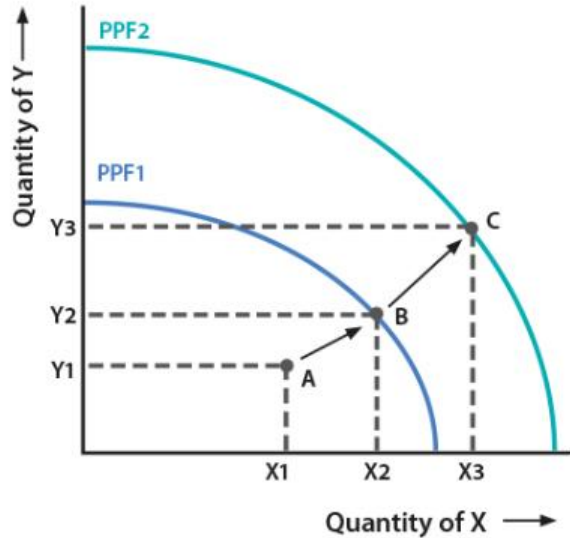


Some great questions might be:

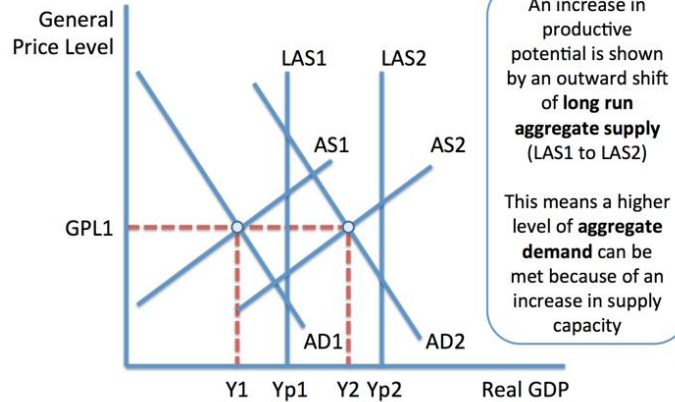
- Is productivity and efficiency the same thing?
- How can productivity be measured?
- If productivity is linked to wages how is productivity measured in non-factory type work, for example for a teacher?
- How can the government improve productivity?
- Are increases in productivity simply another way of telling workers to work harder?

Have students present the effects of productivity on a set of visual diagrams

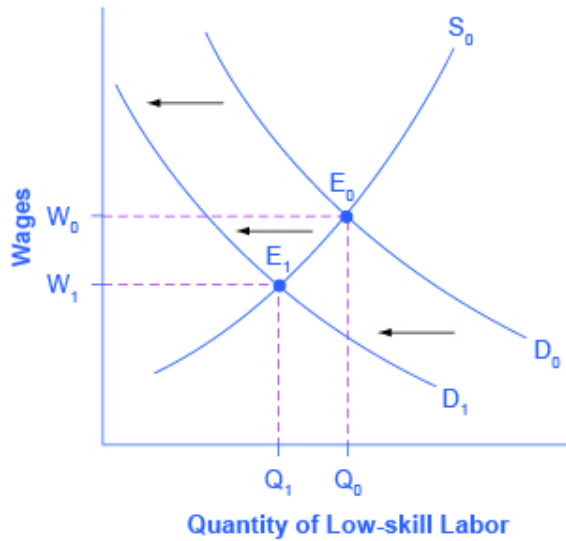
Production Possibility Frontiers



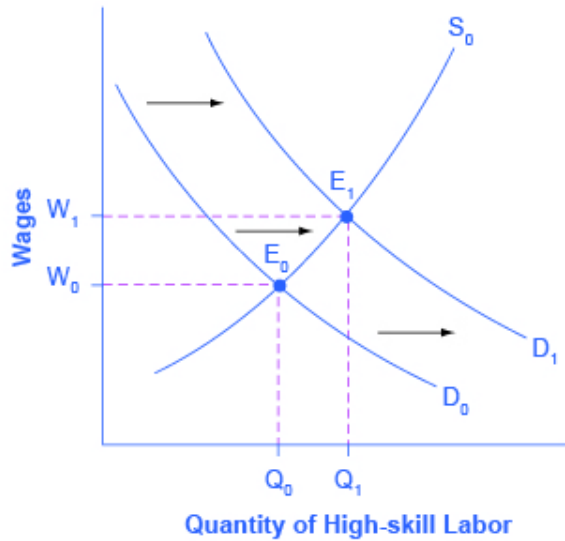
Analysis: Economic Growth using AD-AS







(a) Technological change and low-skill labor



(b) Technological change and high-skill labor

| Capital | Labour (L) | Total product (TP) | Marginal product (MP) | Average product (AP) |
|---------|------------|--------------------|-----------------------|----------------------|
|         |            |                    | $MP = TP_2 - TP_1$    | $AP = TP / L$        |
| 4       | 0          | 0                  | -                     | -                    |
| 4       | 1          | 5                  | 5                     | 5.0                  |
| 4       | 2          | 13                 | 8                     | 6.5                  |
| 4       | 3          | 23                 | 10                    | 7.7                  |
| 4       | 4          | 34                 | 11                    | 8.5                  |
| 4       | 5          | 44                 | 10                    | 8.8                  |
| 4       | 6          | 51                 | 7                     | 8.5                  |
| 4       | 7          | 55                 | 4                     | 7.9                  |
| 4       | 8          | 56                 | 1                     | 7.0                  |
| 4       | 9          | 54                 | -2                    | 6.0                  |

$$MP = TP_2 - TP_1$$

$$MP = 13 - 5$$

$$= 8$$

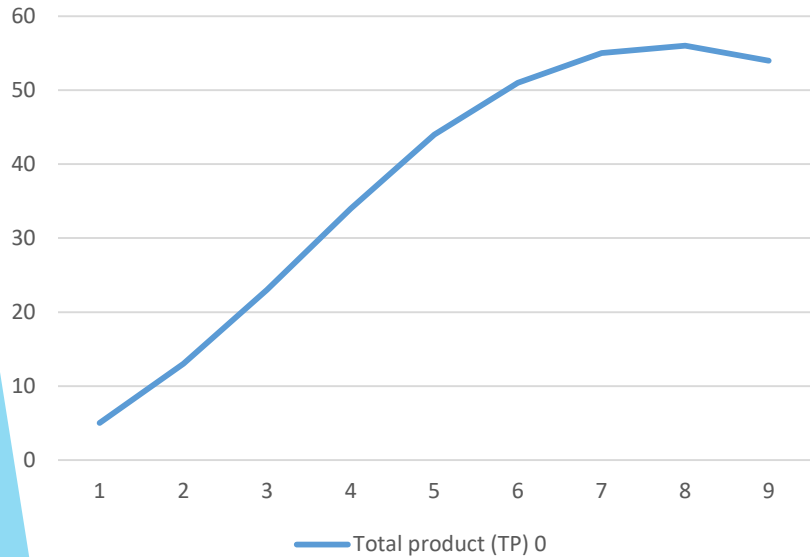
$$AP = TP / L$$

$$= 13 / 2$$

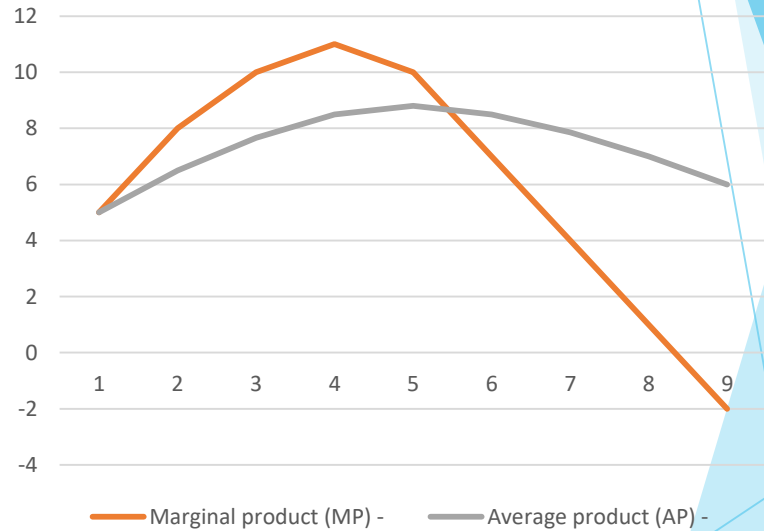
$$= 6.5$$

Here we have fixed capital

### Total Product



### Marginal and Average Product



AP (labour productivity) rises when  $MP > AP$ , then falls when  $MP < AP$ .

So students could play with the data and work out that increasing capital will increase output and therefore cause an increase in MP before it again declines.

They could then discuss the impact of capital on productivity.



Don't forget that there are excellent videos on the RBA website

## Videos

Our videos bring to life interesting topics such as what economics is, why it is important and what economists do.

### What is Economics?

Meet some of our economists. Hear about what they think economics is, what they do in their job, and why you might choose a career in economics.



### What does the Reserve Bank do?

Find out what the Reserve Bank of Australia does in this short animated video.



[View transcript](#)

## The Future of Work

Watch Head of Economic Analysis Alex Heath talk about the changing nature of the Australian workforce and the skills that are likely to be valued in the future.



[View transcript](#)

## How the Reserve Bank Implements Monetary Policy

Watch Senior Analyst Katherine Leong talk about how the Reserve Bank implements monetary policy in this short lecture-style video.



[View transcript](#)

## Why Study Economics?

Four young economists talk about the skills they have gained from studying economics.



[View transcript](#)

# Email Service ... for everything!!

## E-mail Service

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Required fields are indicated by \*

Full name

E-mail\*

List to join/leave