Article Title

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**Abstract**

The abstract serves both as a general introduction to the topic and as a brief, non-technical summary of the main results and their implications. Authors are advised to check the author instructions for the journal they are submitting to for word limits and if structural elements like subheadings, citations, or equations are permitted.

**Keywords:** keyword1, Keyword2, Keyword3, Keyword4

# Introduction

The Introduction section, of referenced text [[1](#_bookmark7)] expands on the background of the work (some overlap with the Abstract is acceptable). The introduction should not include subheadings.

Springer Nature does not impose a strict layout as standard however authors are advised to check the individual requirements for the journal they are planning to submit to as there may be journal-level preferences. When preparing your text please also be aware that some stylistic choices are not supported in full text XML (publication version), including coloured font. These will not be replicated in the typeset article if it is accepted.

# Results

Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text.

# This is an example for ﬁrst level head—section head

## This is an example for second level head—subsection head

* + 1. **This is an example for third level head---subsubsection head**

Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text.

# Equations

Equations can either be inline or on-a-line by itself (“display equations”). For inline equations use E.g.: the equation *Hψ* = *Eψ*

For display equations (with auto generated equation numbers) one can use the equation or align environments:

(1)

where,

(2)

(3)

# Tables

Tables can be inserted via the normal table and tabular environment. To put footnotes inside tables, the footnote appears just below the table itself (refer Tables [1](#_bookmark1) and [2](#_bookmark2)).

**Table 1** Caption text

|  |  |  |  |
| --- | --- | --- | --- |
| Column 1 | Column 2 | Column 3 | Column 4 |
| row 1 | data 1 | data 2 | data 3 |
| row 2 | data 4 | data 51 | data 6 |
| row 3 | data 7 | data 8 | data 92 |

Source: This is an example of table footnote. This is an example of table footnote.

1 Example for a ﬁrst table footnote. This is an example of table footnote.

2 Example for a second table footnote. This is an example of table footnote.

**Table 2** Example of a lengthy table which is set to full textwidth

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element 11 | | |  | Element 22 | | |
| Project | Energy | *σcalc* | *σexpt* |  | Energy | *σcalc* | *σexpt* |
| Element 3 | 990 A | 1168 | 1547 *±* 12 |  | 780 A | 1166 | 1239 *±* 100 |
| Element 4 | 500 A | 961 | 922 *±* 10 |  | 900 A | 1268 | 1092 *±* 40 |

Note: This is an example of table footnote. This is an example of table footnote this is an example of table footnote this is an example of table footnote this is an example of table footnote.

1 Example for a ﬁrst table footnote.

2 Example for a second table footnote.

In case of double column layout, tables which do not ﬁt in single column width should be set to full text width.

# Figures

Each image should be from a single input image ﬁle. Avoid using subﬁgures.

Immagine che contiene Rettangolo, schermata, bianco, quadrato

Descrizione generata automaticamente

**Fig. 1** This is a wideﬁg. This is an example of long caption this is an example of long caption this is an example of long caption this is an example of long caption.

# Algorithms, Program codes and Listings

Set algorithms using the following format.

A fast exponentiation procedure:

be g i n

for *i* := 1 to 10 st ep 1 do

exp t ( 2*,i* );

n e wlin e ( ) od Comments will be set ﬂush to the right margin

where

proc expt ( *x, n* ) ≡

*z* := 1 ;

do i f *n* = 0 then e x i t f i ;

do i f odd ( *n* ) th en e x i t f i ;

comment : This is a comment statement;

*n* := *n/*2 ; *x* := *x* ∗ *x* od ;

{ *n>* 0 };

*n* := *n* − 1 ; *z* := *z* ∗ *x* od ;

pr in t ( *z* ).

end

**Algorithm 1** Calculate *y* = *xn*

**Require:** *n* ≥ 0 ∨ *x* /= 0

**Ensure:** *y* = *xn*

1: *y* ⇐ 1

2: **if** *n<* 0 **then**

3: *X* ⇐ 1*/x*

4: *N* ⇐ −*n*

5: **else**

6: *X* ⇐ *x*

7: *N* ⇐ *n*

8: **end if**

9: **while** *N* /= 0 **do**

10: **if** *N* is even **then**

11: *X* ⇐ *X* × *X*

12: *N* ⇐ *N/*2

13: **else**[*N* is odd]

14: *y* ⇐ *y* × *X*

15: *N* ⇐ *N* − 1

16: **end if**

17: **end while**

**for** i := **maxint to** 0 **do**

**begin**

{ do nothing }

**end** ;

**Write** ( ’ Case in s e n s i t iv e ’) ;

**Write** ( ’ Pa s c a l keywords . ’ ) ;

# Cross referencing

Environments such as ﬁgure, table, equation and align can have a label to cross-reference them.

Line numbers in an algorithm can have a label to cross-reference them.

## Details on reference citations

You can use both numerical and author-year citations.

For author-year citation mode, you can use either Jones et al. (1990) or (Jones et al., 1990).

For numerical citation mode, you can use: [[3](#_bookmark9)], [[4](#_bookmark10)].

# Examples for theorem like environments

For theorem like environments, there are three types of predeﬁned theorem styles:

|  |
| --- |
| Numbered, theorem head in bold font and theorem text in italic style |
| Numbered, theorem head in roman font and theorem text in italic style |
| Numbered, theorem head in bold font and theorem text in roman style |

For mathematics journals, theorem styles can be included as shown in the following examples:

**Theorem 1** (Theorem subhead)**.** *Example theorem text. Example theorem text. Exam- ple theorem text. Example theorem text. Example theorem text. Example theorem text. Example theorem text. Example theorem text. Example theorem text. Example theorem text. Example theorem text.*

Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text.

**Proposition 2.** *Example proposition text. Example proposition text. Example propo- sition text. Example proposition text. Example proposition text. Example proposition text. Example proposition text. Example proposition text. Example proposition text. Example proposition text.*

Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text.

**Example 1.** *Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem.*

Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text.

**Remark 1.** *Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem.*

Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text.

**Definition 1** (Deﬁnition sub head)**.** *Example definition text. Example definition text. Example definition text. Example definition text. Example definition text. Example definition text. Example definition text. Example definition text.*

*Proof.* Example for proof text. Example for proof text. Example for proof text. Exam- ple for proof text. Example for proof text. Example for proof text. Example for proof text. Example for proof text. Example for proof text. Example for proof text. □

Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text.

*Proof of Theorem 1.* Example for proof text. Example for proof text. Example for proof text. Example for proof text. Example for proof text. Example for proof text. Example for proof text. Example for proof text. Example for proof text. □

For a quote environment, use

Quoted text example. Aliquam porttitor quam a lacus. Praesent vel arcu ut tortor cursus volutpat. In vitae pede quis diam bibendum placerat. Fusce elementum convallis neque. Sed dolor orci, scelerisque ac, dapibus nec, ultricies ut, mi. Duis nec dui quis leo sagittis commodo.

Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text. Sample body text.

# Methods

Topical subheadings are allowed. Authors must ensure that their Methods section includes adequate experimental and characterization data necessary for others in the ﬁeld to reproduce their work. Authors are encouraged to include RIIDs where appropriate.

**Ethical approval declarations** (only required where applicable) Any article reporting experiment/s carried out on (i) live vertebrate (or higher invertebrates), (ii) humans or (iii) human samples must include an unambiguous statement within the methods section that meets the following requirements:

1. Approval: a statement which conﬁrms that all experimental protocols were approved by a named institutional and/or licensing committee. Please identify the approving body in the methods section
2. Accordance: a statement explicitly saying that the methods were carried out in accordance with the relevant guidelines and regulations
3. Informed consent (for experiments involving humans or human tissue samples): include a statement conﬁrming that informed consent was obtained from all participants and/or their legal guardian/s

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# Discussion

Discussions should be brief and focused. In some disciplines use of Discussion or ‘Con- clusion’ is interchangeable. It is not mandatory to use both. Some journals prefer a section ‘Results and Discussion’ followed by a section ‘Conclusion’. Please refer to Journal-level guidance for any speciﬁc requirements.

# Conclusion

Conclusions may be used to restate your hypothesis or research question, restate your major ﬁndings, explain the relevance and the added value of your work, highlight any limitations of your study, describe future directions for research and recommendations.

In some disciplines use of Discussion or ’Conclusion’ is interchangeable. It is not mandatory to use both. Please refer to Journal-level guidance for any speciﬁc requirements.

**Supplementary information.** If your article has accompanying supplementary ﬁle/s please state so here.

Authors reporting data from electrophoretic gels and blots should supply the full unprocessed scans for key as part of their Supplementary information. This may be requested by the editorial team/s if it is missing.

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**Acknowledgments.** Acknowledgments are not compulsory. Where included they should be brief. Grant or contribution numbers may be acknowledged.

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# Declarations

Some journals require declarations to be submitted in a standardised format. Please check the Instructions for Authors of the journal to which you are submitting to see if you need to complete this section. If yes, your manuscript must contain the following sections under the heading ‘Declarations’:

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* Conﬂict of interest/Competing interests (check journal-speciﬁc guidelines for which heading to use)
* Ethics approval
* Consent to participate
* Consent for publication
* Availability of data and materials
* Code availability
* Authors’ contributions

If any of the sections are not relevant to your manuscript, please include the heading and write ‘Not applicable’ for that section.

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# Appendix A Section title of ﬁrst appendix

An appendix contains supplementary information that is not an essential part of the text itself but which may be helpful in providing a more comprehensive understanding of the research problem or it is information that is too cumbersome to be included in the body of the paper.

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