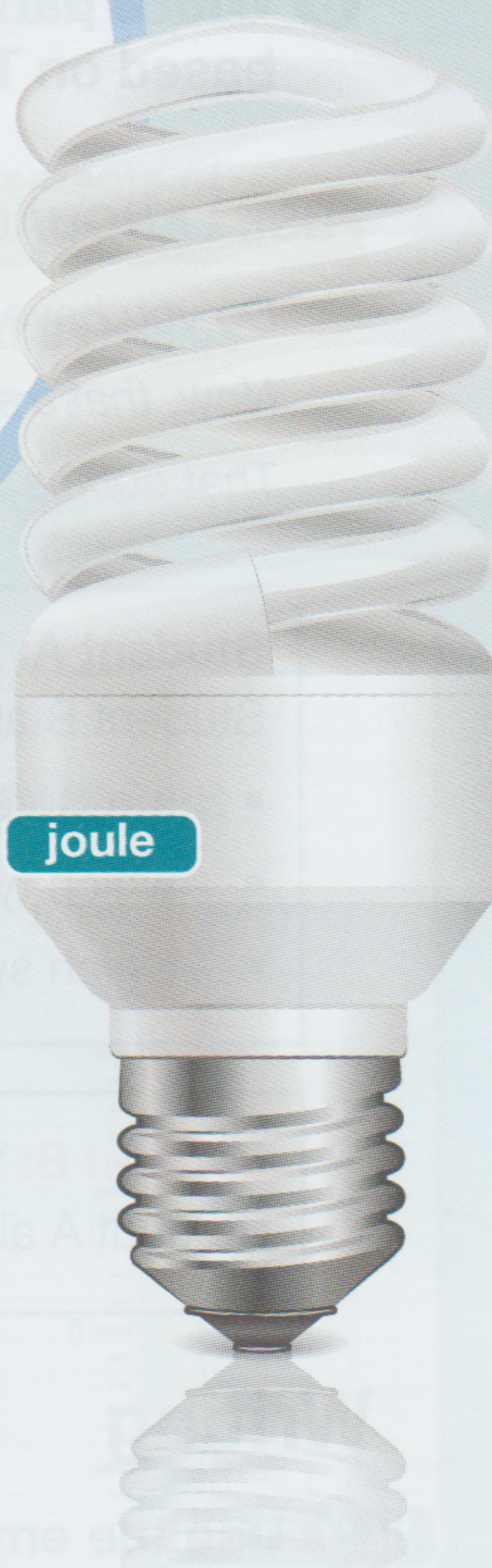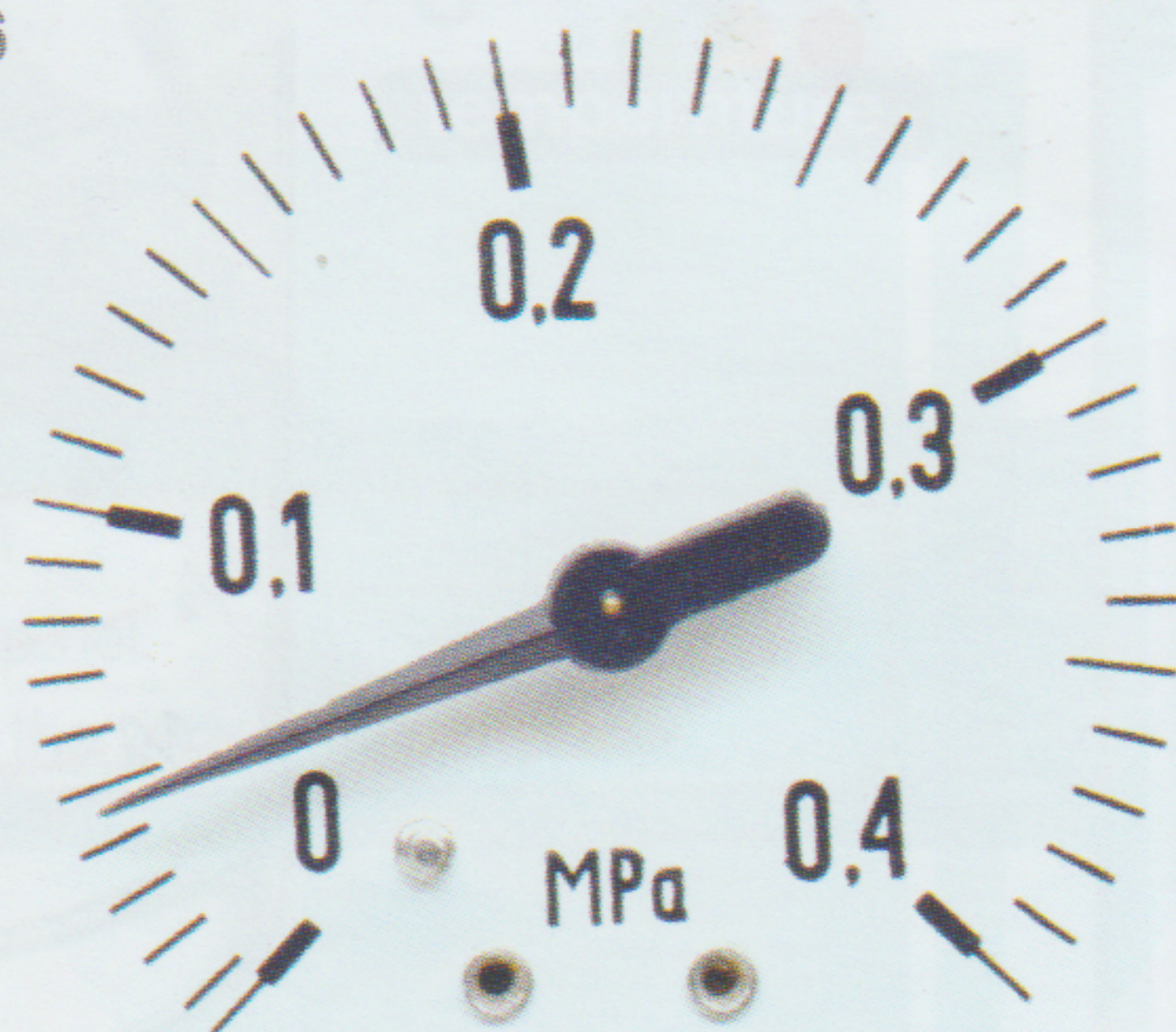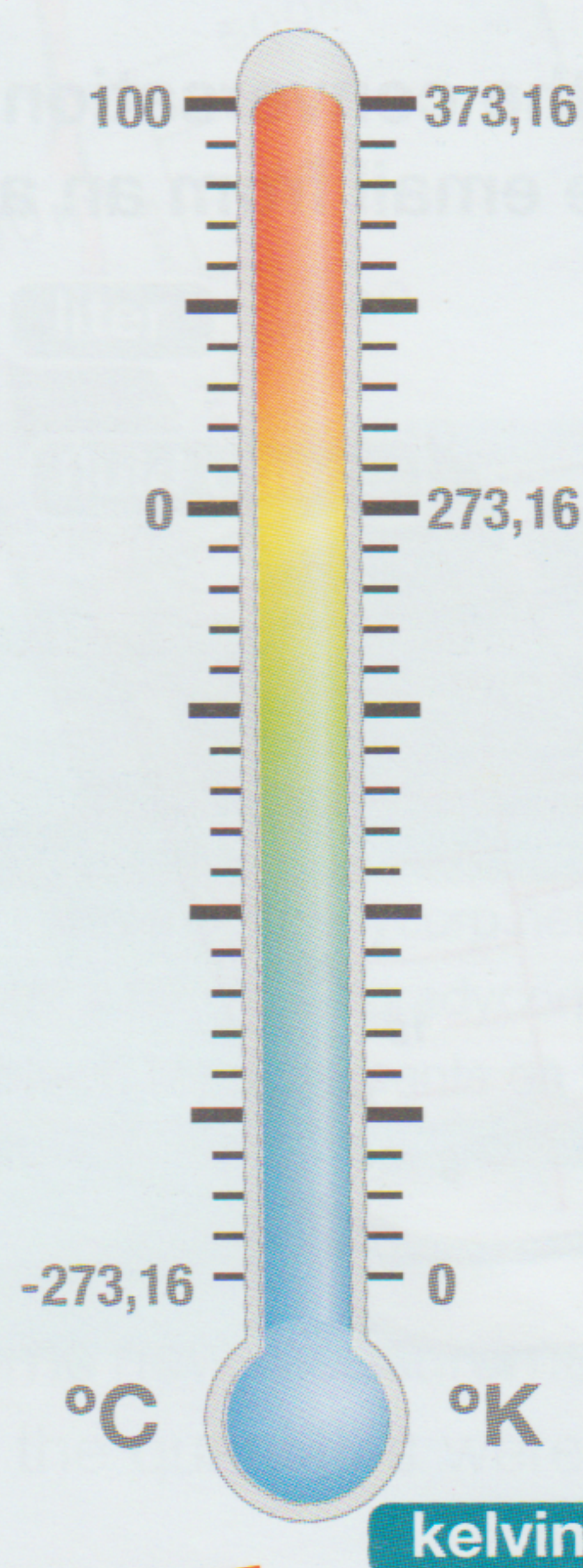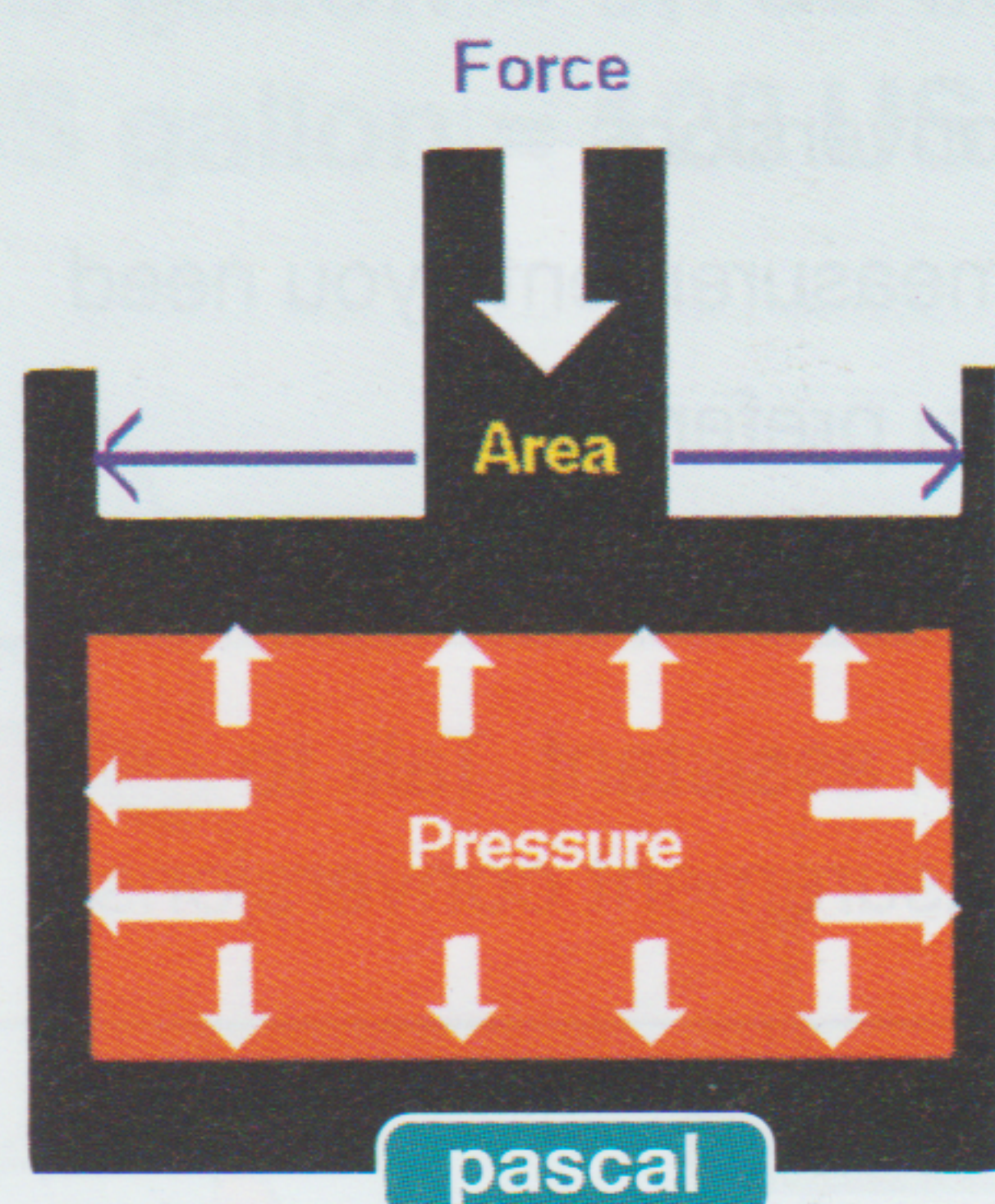## Get ready!

1 Before you read the passage, talk about these questions.

1 What is the difference between base units and derived units?

2 What derived units are calculated with just one base unit?

Force

Area

Pressure

pascal

100 — 373,16

0 — 273,16

-273,16 — 0

°C °K

kelvin

0.2

0.1 0.3

0 0.4

MPa

joule

Learn Your SI Units!

In the **SI**, a few **base units** make up many **derived units**. A kilogram is a base unit of **mass**. And a meter is a base unit of length. These and a few other units are used to calculate many properties.

For example, a **cubic meter** is a derived unit of volume. Only meters are required to calculate it. A cubic meter is equal to one meter cubed, or m^3.

Here are some other common derived units:

Name: **degree Celsius (°C)**
Measurement: **temperature**
Base units: **kelvin** (K)
Formula: °C = K − 273.15

Name: **pascal (Pa)**
Measurement: **pressure**
Base units: kilograms, meters, seconds
Formula: $Pa = kg / (m \times s^2)$

Name: **newton (N)**
Measurement: **force**
Base units: kilograms, meters, seconds
Formula: $N = kg \times m / s^2$

Name: **joule (J)**
Measurement: **energy**
Base units: kilograms, meters, seconds
Formula: $J = kg \times m^2 / s^2$

newton

Reading

2 Read the poster. Then, mark the following statements as true (T) or false (F).

1 ___ Each base unit is formed by one or more derived units.

2 ___ Three base units are needed to calculate cubic meters.

3 ___ Force and pressure are calculated with the same base units.

Vocabulary

3 Match the words (1-5) with the definitions (A-E).

1 ___ joule   4 ___ base unit
2 ___ pascal   5 ___ derived unit
4 ___ newton

A a unit that measures energy

B a unit that is calculated using other units

C a unit that measures force

D a unit that measures pressure

E a unit that is used as a foundation for other units

4 Place the words from the word bank under the correct headings.

WORD BANK

cubic meter   kelvin   SI   mass   force

Systems of Measurement	Units of Measurement	Properties that are Measured
_____	_____	_____
_____	_____	_____

5 🎧 Listen and read the poster again. How is force calculated in the SI?

Listening

6 🎧 Listen to a conversation between two students. Choose the correct answers.

1   What is the conversation mostly about?
   A   differentiating between base units and derived units
   B   measuring temperature in the SI
   C   identifying the formula for force calculations
   D   determining which units are part of the SI

2   Why is the man confused?
   A   The two formulas are similar.
   B   The assignment contains an error.
   C   The measurements are in a different system.
   D   The woman explains a concept incorrectly.

7 🎧 Listen again and complete the conversation.

Student 1:   I need to **1** _____ _____ _____ . That means I calculate it in newtons, right?

Student 2:   Yes. Do you remember the **2** _____ ?

Student 1:   It's **3** _____ _____ _____ squared over seconds squared.

Student 2:   No, that's the formula for joules. Those **4** _____ _____ , not force.

Student 1:   Really? All these formulas look **5** _____ _____ .

Student 2:   Yes, a lot of them use the same **6** _____ _____ . You want kilograms times meters over seconds squared.

Speaking

8 With a partner, act out the roles below based on Task 7. Then, switch roles.

USE LANGUAGE SUCH AS:
I need to determine ...
No, that's the formula for ...
They use the same ...

Student A: You are a student. Talk to Student B about:
•   his or her physics assignment
•   calculations that he or she needs to make
•   his or her confusion regarding the assignment

Student B: You are a student. Talk to Student A about your confusion regarding an assignment.

Writing

9 Use the poster and the conversation from Task 8 to fill out the physics assignment.

Physics 130: Assignment #3

1   Energy is calculated in joules. You need the following base units:
   _____ .
   Formula: _____

2   _____ is calculated in newtons. You need the following base units:
   _____ .
   Formula: _____

3   _____ is calculated in _____ . You need the following base units:
   _____
   Formula: _____