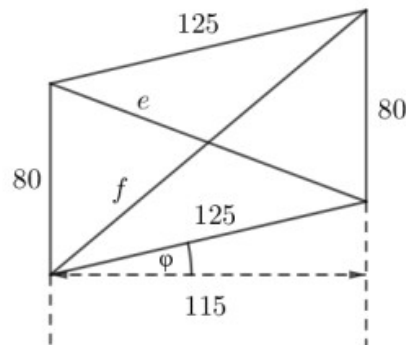
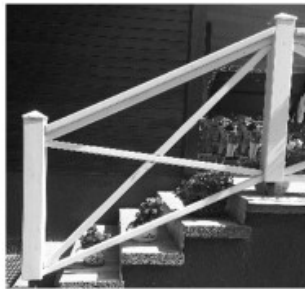


Exercise 1

Calc. : ✓

The side view of the ramp represented by the image below is of a parallelogram shape. The vertical sides are 80 cm, their distance is 115 cm. The length of the other two sides is 125 cm. (We use the notation in the figure.)



1. The angle ϕ is the angle formed by the horizontal and the lower side of the parallelogram. **Prove** with a calculation that $\phi = 23^\circ$ (rounded to the nearest integer). 1.5 marks
2. **Calculate** the length of the diagonal e of the parallelogram. 2 marks
3. A reed windbreak is installed on the ramp. **Calculate** the area of the reed breakthrough covering the parallelogram-shaped part. **Discuss** whether the area of the reed windbreak is less than 1 m^2 . 2.5 marks

Exercise 2

Calc. : ✓

40% of a dentist's patients are men. The agenda of this dentist shows that 20% of men and 10% of women who make an appointment do not come to this appointment. A person makes an appointment.

1. **Determine** the probability:
 - (a) that person is a woman present at the appointment; 2 marks
 - (b) that person comes to the appointment; 2 marks
 - (c) that person is a man given that this person does not come to the appointment. 2 marks

53% patients of another dental practice are under 18 years old, 71% of patients wear glasses of which 47% are 18 years of age or older.

The following events are considered:

A: "The patient is 18 years of age or older"

L: "The patient wears glasses"

2. **Determine** whether events A and L are independent. **Justify** your answer. 2 marks

Exercise 3

Calc. : ✓

On the social media Twitter, we study the likes of three tweets during a period of time. At the beginning of the study, the first tweet has 210 likes, and then, the number of its likes grows by 25% per hour.

1. **Explain** why the increase is exponential and why it can be modelled by the formula:

$$T_1(t) = 210 \cdot 1.25^t$$

where t indicates number of hours after the starting time.

2. **Compute** the number of likes that the tweet has after 24 hours.
3. On the millimeter paper provided, **draw** the graph of the function T_1 for the first twenty hours after the tweet has been written.
4. According to the model, **compute** the number of hours it takes for the tweet to reach 10 000 likes.

The number of likes for a second tweet, t hours after the starting time. is given by the formula:

$$T_2(t) = 1\,240 \cdot 1.025^t$$

5. **Determine** when the first tweet overtakes the second tweet, in number of likes.

A third tweet has at the same starting time 421 likes, and its number of likes increases by 8% per hour.

6. **Find** the expression of the number of likes for this third tweet as a function of t , the number of hours after the starting time.

Exercise 4

Calc. : ✓

Let k be a real number. We consider the vectors:

$$\vec{u} = \begin{pmatrix} 1 \\ 2k-3 \end{pmatrix} \text{ and } \vec{v} = \begin{pmatrix} k-1 \\ 3 \end{pmatrix}.$$

1. **Find** the parameter k , so the vectors \vec{u} and \vec{v} are colinear.
2. **Find** the parameter k , so the vectors \vec{u} and \vec{v} are orthogonal.

From now on, we take $k = 5$.

3. **Find** the measure of the angle between the vectors \vec{u} and \vec{v} .
4. **Express** vector $\vec{w} = \begin{pmatrix} -10 \\ 5 \end{pmatrix}$ as a linear combination of vectors \vec{u} and \vec{v} .
5. **Find** the coordinates of the vertices of the parallelogram ABCD, knowing $A = (-2; 1)$, $\vec{AB} = \vec{u}$, and $\vec{AD} = \vec{w}$.

Exercise 5

Calc. : ✓

Consider a triangle ABC whose points have the coordinates: A(0; 0), B(-2; 4) and C(4; 5).

1. **Calculate** the coordinates of the vectors \vec{BA} and \vec{BC} .
2. **Show that** the angle at the vertex B of the triangle ABC is 72.9° rounded to the nearest tenth.
3. **Calculate** the area of the triangle ABC.

Exercise 6

Calc. : ✓

1. **Solve** the equation $\log_5 x + \log_5 3 = \log_5 6$.
2. **Solve** the equation $\log_2 x + \log_2(x-1) = 2 \log_2 x$.