Thème Bases

Exemple de document inconnu

COFFEE

In the UK

In 2000, sales of coffee overtook tea in the UK for the first time, with more than 50% of the hot drinks market. Around 30 billion cups of coffee are drunk in the UK every year.
Coffee is sold in two main types in the UK – instant or beans (including ground).
In 2000, 76% of coffee sold was instant coffee.

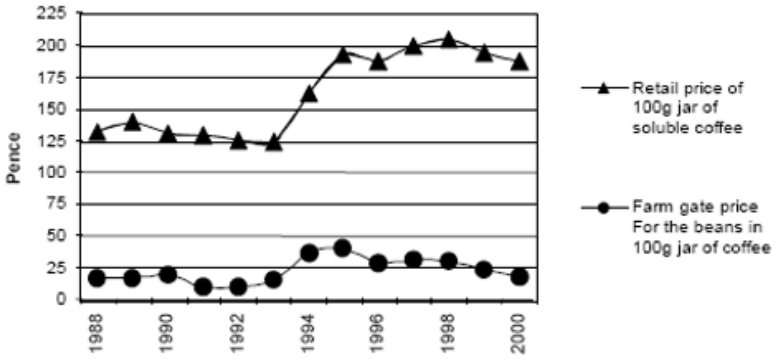
Across the world

Worldwide, coffee is grown in more than 50 countries and is the second most valuable commodity after crude oil. In fact, it is the most valuable agricultural commodity in world trade - in 2000, exports worldwide totalled £4.4 billion.
Altogether, approximately 100 million people worldwide are involved in the growing, processing, trading and retailing of coffee. This includes around 20 million farmers, two-thirds of whom are smallholders whose farms are less than 50,000 m^2 each.

The farmer's share

The final price of a cup of coffee in the UK includes the costs of insurance, taxes, transportation, processing, packaging, marketing, storage and much more.
It is claimed that of the £1.75 charged for a cappuccino in a coffee shop, the grower will receive at best the equivalent of 2p.
The graph below shows the gap between the price of a jar of instant coffee in a shop and what the farmers get paid for their coffee beans.

UK retail prices for instant coffee and the farmer's price



Questions

1.

- **a.** What fraction of those in the coffee industry (growing, processing, trading and retailing) are farmers?
- **b.** In the UK in 2000, what percentage of coffee sold was beans (including ground)?
- **c.** Estimate to the nearest million how many coffee growers have farms smaller than 50,000 m^2.
- **d.** According to the data sheet, what percentage of the cost of a £1.75 cappuccino coffee will the farmer receive, at best?

2. The population of the UK is approximately 60 million.
Use the data to estimate how many cups of coffee were drunk on average per person in a year.

3. The graph on the data sheet shows how shop and farm prices over the period 1988 to 2000 changed.

- **a.** Describe the two curves.
- **b.** Use the graph to describe how the farmer's proportion of the price has changed by comparing the figures for 1988 and 2000.

Thème Bases

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Limerick

Definition adapted from Collins dictionary:

Limerick (poetry):

"A form of comic verse consisting of five lines of which the first, second, and fifth have the same number of *metrical feet*[1] and rhyme together and the third and fourth have the same number of metrical feet and rhyme together (AABBA). The first, second and fifth lines are usually longer than the third and the fourth.

1. Can the following text be considered as a limerick?

"The sum of the quotient of twenty-four by x

and the quotient of x by six

is as small as it can be

with x bigger than three.

Will you guess the value of number x?"

2. A function f is involved in the text of question 1.
Choose the right one among the following propositions:

$$f: x \longmapsto f(x) = \frac{24 + x}{x + 6}$$

$$f: x \longmapsto f(x) = \frac{24}{x + \frac{x}{6}}$$

$$f: x \longmapsto f(x) = \frac{24 + \frac{x}{6}}{x}$$

$$f: x \longmapsto f(x) = \frac{24}{x} + \frac{x}{6}$$

3. Using a calculator, estimate the number x as described in the limerick.

1 : **metrical foot :** "A group of 2 or 3 syllables forming the basic unit of poetic rhythm."

Thème Bases

Exemple de document inconnu

Washing machine

A washing machine repair firm uses the following formula to work out the cost of the repairman's time:

$$c = 40h + 30$$

where c is the cost, in pounds, of the repairman's time and h is the number of hours the repair takes.

The cost of any parts of the washing machine changed in a repair is added to the final bill.

1. Calculate the cost of the repairman's time for a repair that takes two hours, without replacement of any part of the washing machine.
2. The repairman fits new parts that cost 75 pounds and the repair takes 1 hour and half.

   Calculate the total cost of the repair.
3. Each time the repairman spends one more hour at work, what's the increase of the repair cost?
4. Parts of a washing machine are changed by a repairman of this firm. The cost of these parts is £185. The total cost of this repair is £355. How long did it take to repair this machine?

Thème Bases

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Mister BUFFALO

Mister BUFFALO measured the milk *yields of his **herd of 250 cows, which are shown in the table below.

Milk yields (x in liters)	$5 \leq x < 10$	$10 \leq x < 15$	$15 \leq x < 20$	$20 \leq x < 25$	$25 \leq x < 30$
Percentage of cows	15	18	31	26	10

*Yield: rendement
**Herd: troupeau

1. Estimate the average milk yield of Mister BUFFALO's herd.
2. Estimate the median and the inter-quartile range of milk yields.
3. A neighboring farmer calculated the following results for his herd of cows:

   Median yield=22 liters; lower quartile= 9 liters; upper quartile= 28 liters.

   Compare and comment on the data for the two herds.
4. In the region, it's estimated that the proportion of cows producing a milk yield between 10 and 25 liters in a herd of size 250 is 0.8. Do you think there is a problem in Mister BUFFALO's herd of cows?

Thème Suites usuelles

Exemple de document inconnu

Improper fractions and mixed numbers

An improper fraction is a positive fraction that is expressed with a numerator and a denominator, the numerator being greater than the denominator. A mixed number is a number expressed as the sum of a whole number and a proper fraction, which is a positive fraction that is expressed with a numerator and a denominator, the numerator being smaller than the denominator.

Examples:

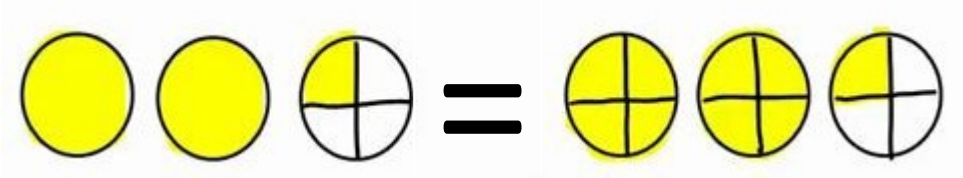
$\frac{12}{7}$ is an improper fraction.

A mixed number is usually written $2\frac{1}{3}$,

which is equal to $2 + \frac{1}{3}$, that is to say equal to the improper fraction $\frac{7}{3}$.

1. Give an example of proper fraction. Justify.

2. What improper fraction is involved in the sketch below ? What mixed number is concerned?



3. Write the fraction $\frac{29}{6}$ under the form of a mixed number.

4. A pupil says to the teacher: “An improper fraction or a mixed number, it’s the same thing.” What do you think of this assertion ?

5. Could you find:
   a. A decreasing sequence of proper fractions?
   b. An increasing sequence of proper fractions?
   c. A decreasing sequence of improper fractions?
   d. An increasing sequence of proper fractions?

Thème Fonctions usuelles

Exemple de document inconnu

Fish speed

The swimming speed of several species of fish is related to the size and to the frequency of the tail beat. The size is the length, measured from the tip of the snout to the most posterior extremity of the tail. Above a frequency of 5 tail beats per second, speed is directly dependent upon the length and the frequency up to the maximum values recorded. The recorded results may be adequately expressed by the formula:

$$V = \frac{1}{4}L(3f - 4)$$

where V is the speed of the fish in cm per second, f is the frequency in beats per second and L is the body length in cm.

From "The speed of swimming of fish as related to size and to the frequency and amplitude of the tail beat" RICHARD BAINBRIDGE - The Zoological Laboratory,

Cambridge (June 1957)

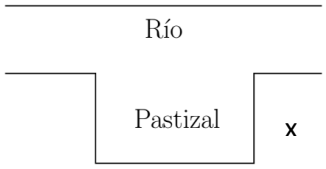
1. What does the speed of swimming depend on? Illustrate by choosing an example.
2. A 20 cm long fish swims at 85 cm/s. What's the frequency of its tail beat?
3. A fish has a speed of 2 km per hour and a frequency of 12 beats per second, how long is it?
4. Among fish whose frequency is 8 beats per second, describe the link between V and L.
5. For fishes that are 4 cm long, draw the graph giving the speed V in terms of the frequency f .

Thème Dérivation

Exemple de document inconnu

El granjero

Un granjero desea vallar un tereno rectangular de pasto adyacente a un río.
El pastizal debe tener 180000 metros cuadrados para producir suficiente forraje par su ganado.
Desea optimizar la cantidad de valla, que cuesta bastante, sabiendo que el lado que da al río no necesita ser vallado.
Llamamos x lo ancho del tereno e y lo largo en hm.
Sea P la función que da la cantidad de valla.

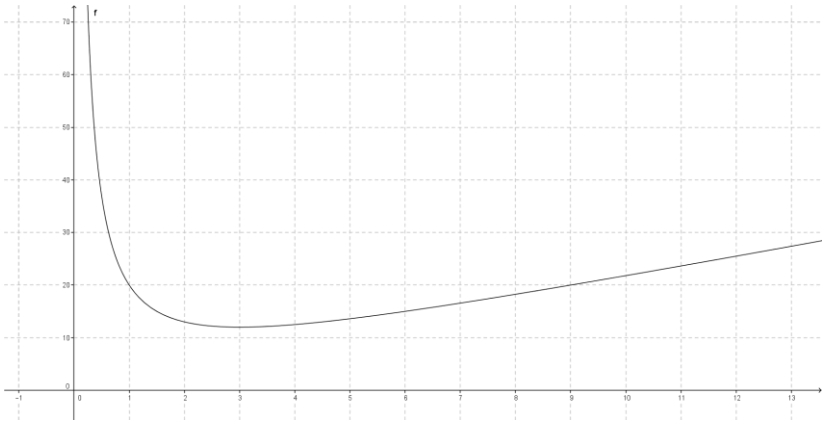


1. Justificar las siguientes relaciones :

$$xy = 18$$

$$P = 2x + y = 2x + \frac{18}{x}$$

2. La gráfica siguiente representa la función P



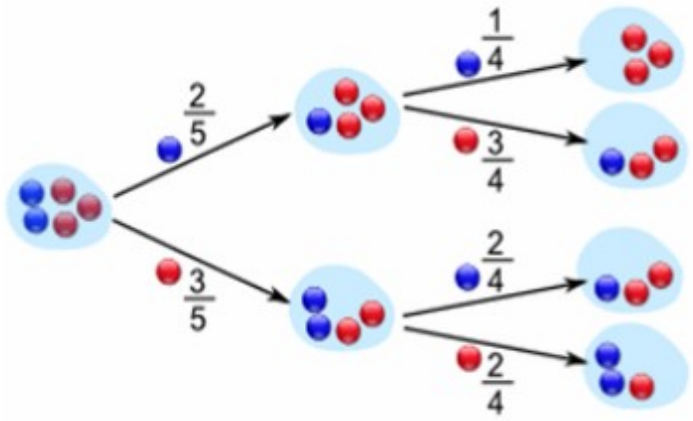
¿cuál es la cantidad de valla que tiene que comprar el granjero?
¿cuáles son las dimensiones del pastizal?

3. Presentar un método para calcular el mínimo de esta función y conocer los valores exactos de las dimensiones.

Thème Variables aléatoires

Exemple de document inconnu

A tree diagram



1. Describe an experiment linked to the tree diagram above.

2. Let X be the random variable equal to the number of blue balls at the end of this experiment.

- **a.** What are the possible values of X?
- **b.** Compute the probability of the event “X=2”.
- **c.** Give the probability distribution of X.

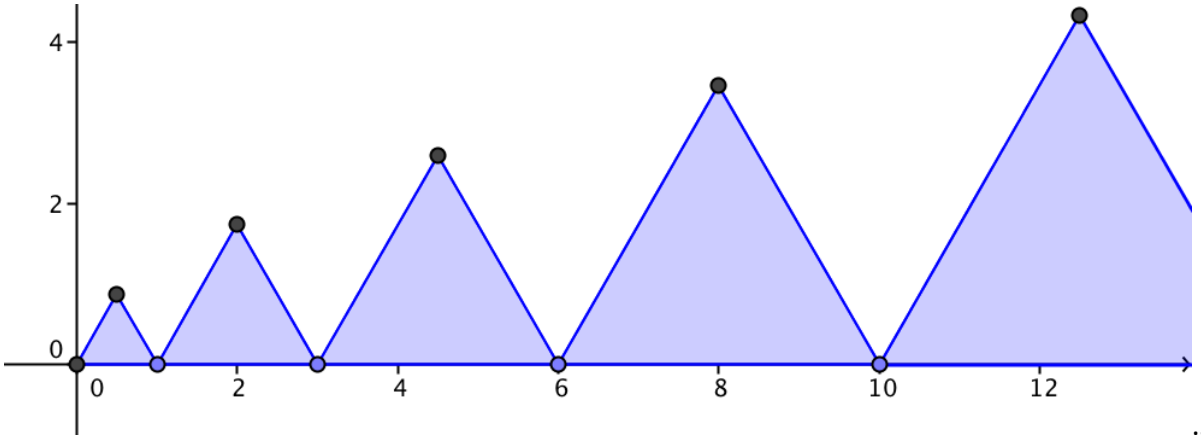
3. On average, how many blue balls can you expect if you repeat this experiment a great number of times?

Thème Géométrie

Exemple de document inconnu

A frieze

Let's consider the following frieze which basic elements are equilateral triangles. The sides of the first triangle are one unit long, while the sides of any other triangle are one unit longer than the ones of the previous triangle.



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1. What are the perimeters of the first four triangles?

2. Work out the perimeter of the n^{th} triangle of the frieze in terms of n.

3. Prove that the area of the n^{th} triangle is $n^2 \frac{\sqrt{3}}{4}$.

4. What's the smallest triangle of the frieze which has an area greater than 100 squared units?