OPEN QUESTIONNAIRE AND *MULTIPLE CHOICE QUESTIONNAIRE* VALIDATED PSICOMETRICALLY

These new assessment instruments were developed within the framework of the projects "Study of the Requirements for Admission to Primary Education Teacher Degrees from the Perspective of Mathematical Knowledge" (EDU2017-82427-R) and "International Validation of Instruments for the Characterization of the School Mathematical Knowledge of Future Teachers of Mathematics in Primary Education" (INTERDISCIPLINA II180001),

They are the result of the study by Rojas et al. (2022), in which we psychometrically validated the FUNDAMENTAL MATHEMATICAL KNOWLEDGE TEST and SCHOOL MATHEMATICS KNOWLEDGE TEST instruments, respectively renamed ***open questionnaire*** (item Ox_OQ_Original) and ***multiple choice questionnaire*** (items Cx_MChQ_Original) and presented in this same repository. Taking data from two samples, one at the Universitat Autònoma de Barcelona (UAB) and the other at the Pontificia Universidad Católica de Chile (PUC), we psychometrically validated both questionnaires and analysed whether the theoretically established thematic grouping when defining Fundamental Mathematical Knowledge (Gorgorió et al. 2017; Gorgorió and Albarracín , 2020) corresponds with the structure of mathematical knowledge exhibited by student teachers at the beginning of their teacher education.

Gorgorió, N., y Albarracín, L. (2020). El conocimiento matemático previo a la formación inicial de los maestros: necesidad y concreción de una prueba para su evaluación. En E. Badillo, N. Climent, C. Fernández & M. González-Astudillo (Eds.), *RED8-Educación Matemática y Formación de Profesores, (pp. 111-132).* Ediciones Universidad de Salamanca.

Gorgorió, N., Albarracín, L., & Villareal, A. (2017). Examen de competència logicomatemàtica en la nova prova d'accés als graus de mestre. *Noubiaix, 39*, 58-64.

Rojas, F., Albarracín, L., Chandía, E., Ubilla, F.M., Gorgorió, N. (enviado). Explorando instrumentos para evaluar el conocimiento matemático inicial en la formación de maestros de primaria.

OPEN QUESTIONNAIRE

(O1_OQ_original)

Which of the following numbers is the largest?

- 0,625 - 4/10 - 0,375 $\frac{-1}{2}$

Answer: _____

(O2_OQ_original)

How many 4.5 MB pictures can be stored on a 1 GB disc? (1 GB = 1024 MB)

Answer: _____

(O3_OQ_original)

A kilogram of cheese costs 15.50 €/Kg. How much does 700 g of cheese cost?

Answer: _____

(O4_OQ_original)

A product is on sale. According to the label, the normal price is 125 €. The sale price is 100 €. What percentage of discount has been applied?

Answer: _____

(O5_OQ_original)

A cookie contains 20 % butter. Write as a fraction the part of the cookie that is not butter. Your answer should be expressed in its simplest form.

Answer: _____

(O6_OQ_original)

The cost of a product is 36 €. There is a special offer on at the store: "Buy two and you get the second at half-price". If you did buy two, what would be the cost of each product?

Answer: _____

(O8_OQ_original)

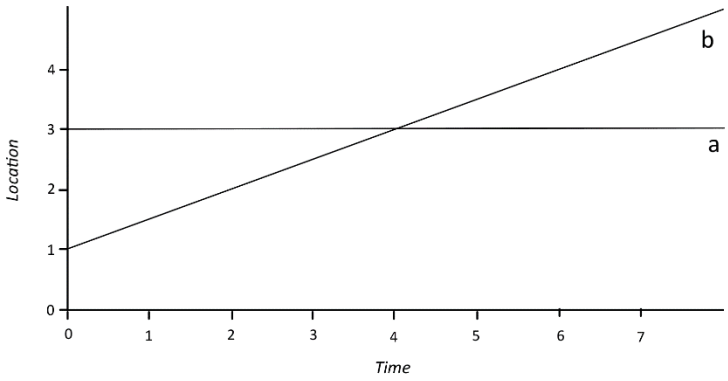
For the following expression to be correct, which number should replace ★?

★ × ★ = 3 × 3 × 7 × 7

Answer: _____

(O12_OQ_original)

This graph shows the position of two objects (a and b) over the time. Are either of the objects stationary? If so, which one?



Answer: _____

(O13_OQ_original)

You have two boxes which contain the same amount of sweets. In one of the boxes there are 2 bags of sweets and 3 single sweets. In the other box there is 1 bag of sweets and 8 single sweets. The amount of sweets in each bag is the same. How many sweets are in each bag?

Answer: _____

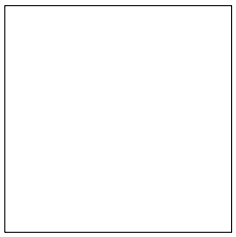
(O14_OQ_original)

What is the surface area of a square with a perimeter of 32 cm?

Answer: _____

(O15_OQ_original)

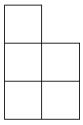
How much is a half of a half of a half? Draw it using the square below and then write the resulting fraction.

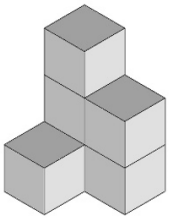


Answer: _____

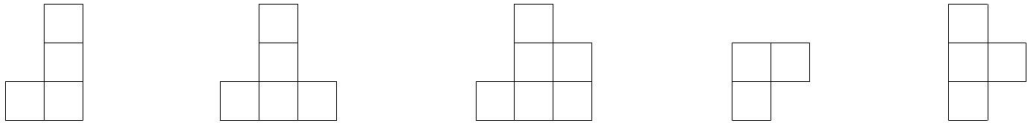
(O17_OQ_original)

The figure on the left is a plane view of the object on the right.





Knowing there are no hidden cubes, which of the following figures are also a plane view of the object?



A B C D E

Answer: _____

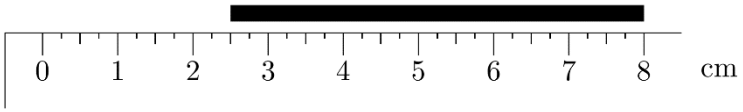
(O18_OQ_original)

How many cm are in 7.8 km?

Answer: _____

(O20_OQ_original)

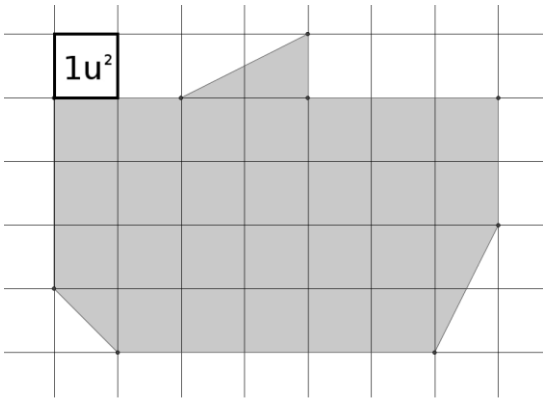
What is the length of the thick black line?



Answer: _____

(O21_OQ_original)

What is the area of the shape below?



Answer: _____

(O24_OQ_original)

What number would we add to the list below in order for the mean to equal 7?

{2, 6, 7, 7, 8, 8, 9}

Answer: _____

MULTIPLE CHOICE QUESTIONNAIRE

(C4_MChQ_original)

A quadrilateral has the following vertices given: (2;6), (3;4), (5;4), (6;6). What type of figure is generated?

A) Rhombus

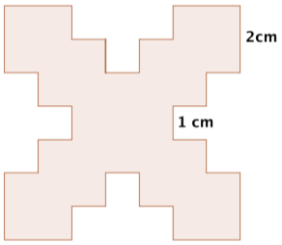
B) Trapezium

C) Square

D) Rectangle

(C5_MChQ_original)

In the following figure, the segments are only 1 or 2 centimetres long. Also, the segments only intersect at right angles. How long is the perimeter of the figure?



A) 28 cm

B) 33 cm

C) 36 cm

D) 44 cm

(C6_MChQ_original)

A teacher asks his students to look at the following table showing the number of children per family in a community.

Nº of Children	0	1	2	3	4	5
Nº of Families	20	30	20	15	10	5

The teacher asks them to describe a procedure for calculating the average number of children per family. Which of the following answers given by the students is correct?

A) I add up the number of families, which is 100, and then I divide by 5 and obtain the average number of children, which is 25.

B) I add up the number of children, which is 0+1+2+3+4+5, obtaining 15, and then I divide this number by 5, obtaining an average of 3 children per family.

C) I add up the number of families, which is 100, and then I divide this number by the total number of children, 15, and I obtain an average of 6.6 children.

D) I multiply the number of families by the respective number of children, add the totals together, and then divide by 100, and obtain an average of 1.8 children per family.

(C10_MChQ_original)

What is the value of $90 - 20 \cdot (12 - 8) + 200 : 20$?

A) 20

B) 24

C) 290

D) 390

(C12_MChQ_original)

How much is 20% of 20% of 25?

A) 10

B) 1

C) 100

D) 5

(C13_MChQ_original)

What is the answer to $3.95 - 1.99 + 5.04$?

A) 7.00

B) 7.08

C) 7.10

D) 6.90

(C14_MChQ_original)

What is the value of $\frac{10}{3} - \frac{3}{2}$?

A) $\frac{7}{1}$

B) $\frac{11}{6}$

C) $\frac{7}{6}$

D) $\frac{29}{6}$

(C18_MChQ_original)

Which of the following statements is correct?

A) $\frac{1}{2} < \frac{1}{3} < \frac{3}{4} < \frac{4}{3}$

B) $\frac{4}{3} < \frac{3}{4} < \frac{1}{2} < \frac{1}{3}$

C) $\frac{1}{3} < \frac{1}{2} < \frac{3}{4} < \frac{4}{3}$

D) $\frac{1}{3} < \frac{3}{4} < \frac{1}{2} < \frac{4}{3}$

(C19_MChQ_original)

Using 0.75 litre bottles you have to fill a 5.25 litre drum. How many 0.75 litre bottles are required to fill a 5.25 litre drum?

A) 7

B) Nearly 4

C) Between 1 and 2

D) Nearly 1

(C20_MChQ_original)

Natalia bought two spare parts for her car, one costing $191.990 and the other $399.990. What is the closest approximation to the money spent by Natalia?

A) $500.000

B) $592.000

C) $600.000

D) $692.000

(C22_MChQ_original)

How many minutes are there in three and a half days?

A) 4,320 minutes

B) 5,040 minutes

C) 720 minutes

D) 1,440 minutes

(C23_MChQ_original)

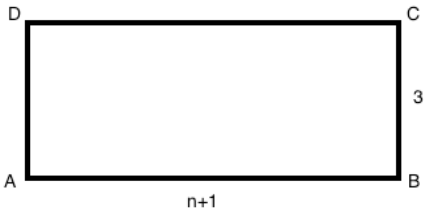
The figure below shows an ABCD rectangle with sides measuring 3 and $n + 1$. What is the total length of the perimeter of ABCD rectangle?

A) $4 + n$

B) $7 + 2n$

C) $7 + n$

D) $8 + 2n$



(C24_MChQ_original)

The solution to the equation $4 + 2(\mathrm{x} - 1) = 2 + 4\mathrm{x}$ is:

A) $\mathrm{x} = 0$

B) $\mathrm{x} = 2$

C) $\mathrm{x} = \frac{1}{2}$

D) $\mathrm{x} = \frac{4}{6}$