EXAM UNIT 10 (TRANSFORMATIONS)
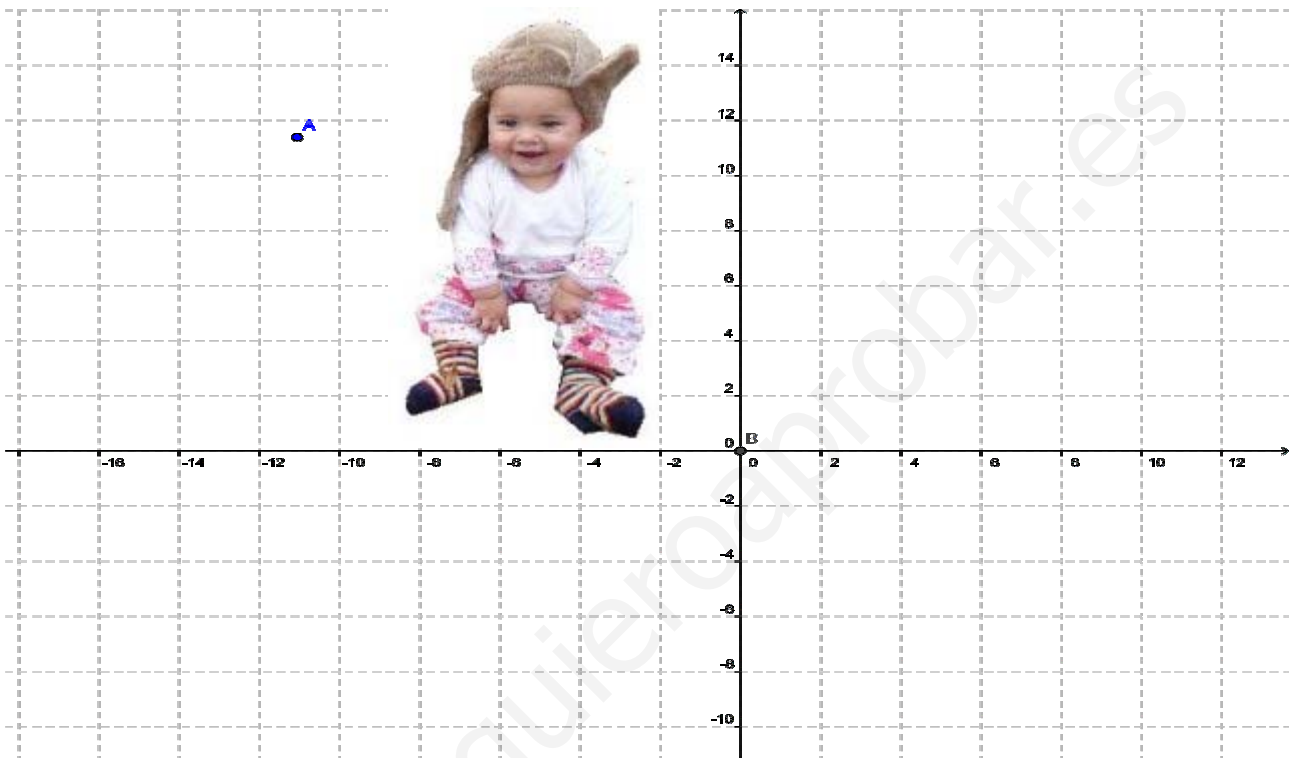
1. Look at the baby's picture and answer
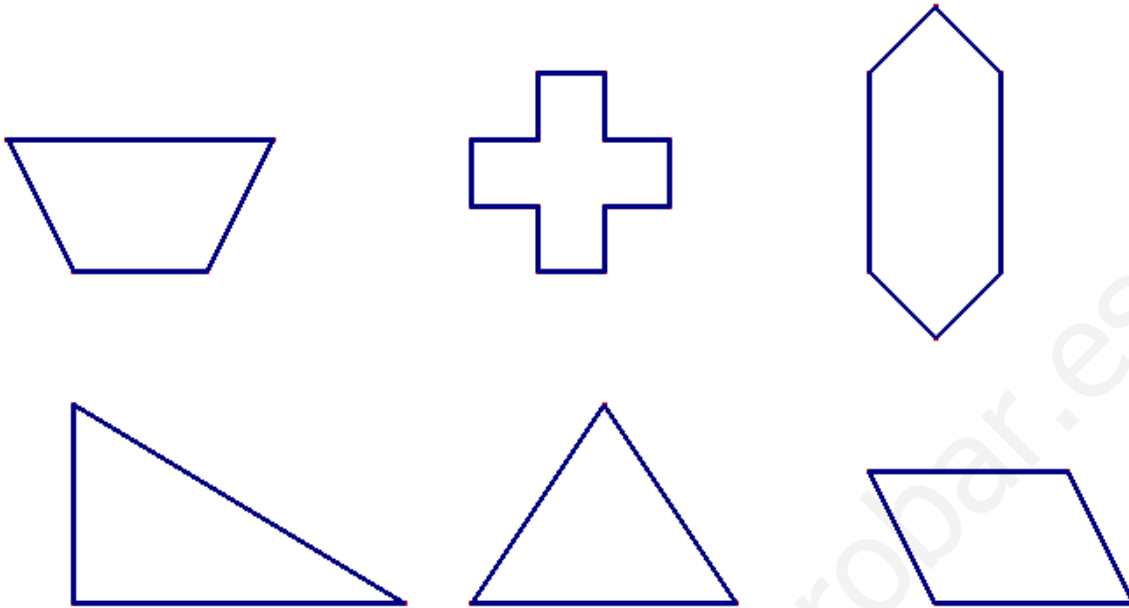

Will the baby's head be up or down according to the following movements:

a. an axial symmetry over OX axis

b. an axial symmetry over OY axis

c. a 120º clockwise rotation (-120º) about (2, -2) (centre).

d. a translation by the vector $\vec{u} = (-10,5)$

e. a 180º rotation about (-6,0)   (1.5 points)

2. Look at the pictures:

How many symmetry axes have each one of them? Draw them.   (1.5 points)

3. T is the triangle with vertexes A(0,-2), B(0,2), C(3,0).   (2 points)

   a) Reflect the triangle T over axe $y = x + 3$ (call it T1). Translate T1 by the vector (-1,-2) (call it T2).

   b) Translate T by the vector (-1,-2) (call it TR1). Reflect TR1 over axe $y = x + 3$ (call it TR2).

   c) Do you obtain the same triangle (T2 and TR2)? Why (not)?

4. Find the sum of the first 25 terms of the arithmetic progression -10, -7, -4,........
                                                                                (1 p)

5. Consider a geometric progression whose first three terms are 12, 6 and 3. Find the sum of the first eight terms and the sum to infinity.   (1 p)

4. Draw the square S, with vertexes A(-1,-2), B(3,-2), C(3,2), D(-1,2).   (3 points)

   a) Translate S by the vector AB.   b) Translate S by the vector AC.

   b) Rotate S 90° about A (centre)   c) Are there any invariant points?

SOLUTION

1.	Will the baby's head be up or down according to the following movements:

f.	an axial symmetry over OX axis → DOWN

g.	an axial symmetry over OY axis → UP

h.	a 120⁰ clockwise rotation (-120⁰) about (2, -2) (centre) → DOWN

i.	a translation by the vector $\vec{u} = (-10,5)$ → UP

j.	a 180⁰ rotation about (-6,0) → DOWN

2.
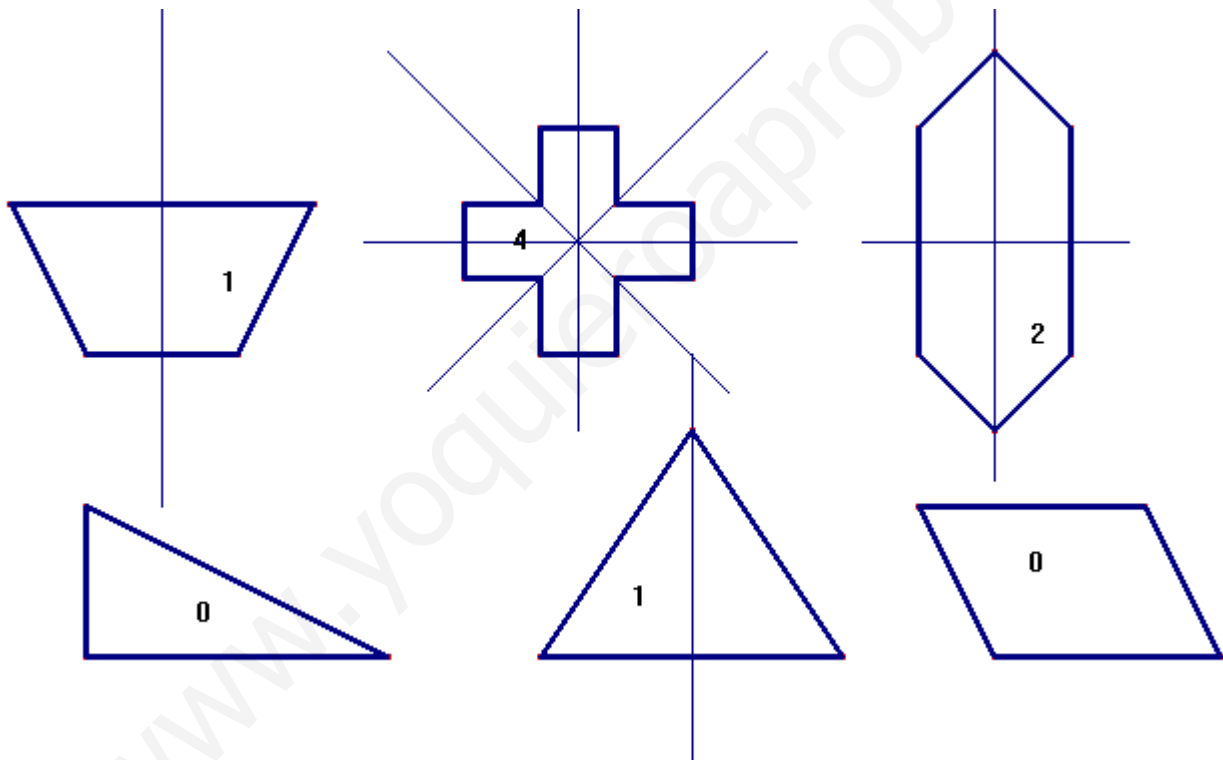
3. T is the triangle with vertexes A(0,-2), B(0,2), C(3,0).

a) Reflect the triangle T over axe $y = x + 3$ (call it T1). Translate T1 by the vector (-1,-2) (call it T2).

b) Translate T by the vector (-1,-2) (call it TR1). Reflect TR1 over axe $y = x + 3$ (call it TR2).

c) Do you obtain the same triangle (T2 and TR2)? Why (not)?

y=x+3

T1

T2

B

1

1 T

C

A

y=x+3

TR2

B

1

1 T

C

A

TR1
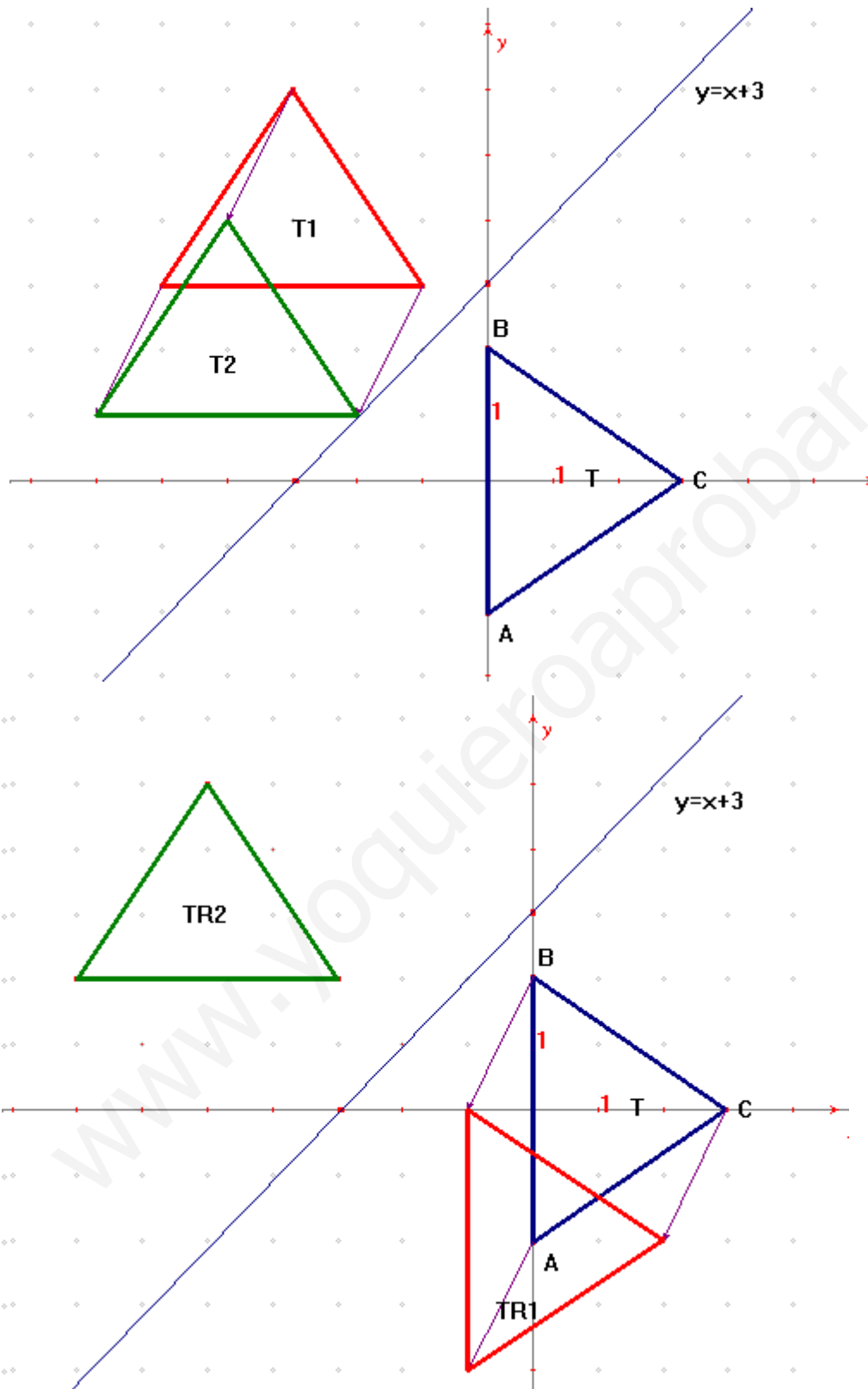
c) It is not the same triangle, because in a) we do de symmetry and after the translation and in b) we do the translation before the symmetry.

4. Find the sum of the first 25 terms of the arithmetic progression -10, -7, -4,.......

$a_1 = -10; \quad d = 3 \rightarrow \quad a_{25} = a_1 + 24d = -10 + 24 \cdot 3 = 62$

$S_{25} = \dfrac{(a_1 + a_{25}) \cdot 25}{2} = \dfrac{(-10 + 62) \cdot 25}{2} = 26 \cdot 25 = 650$ The sum is 650
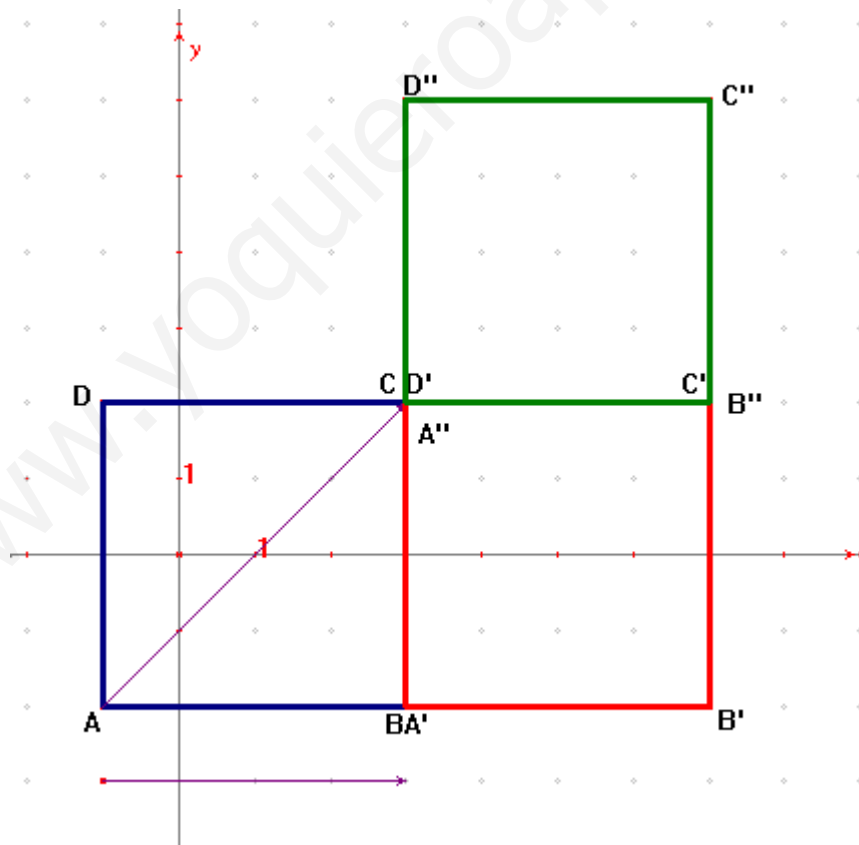
5. Consider a geometric progression whose first three terms are 12, 6 and 3. Find the sum of the first eight terms and the sum to infinity.

$a_1 = 12; \quad r = \dfrac{1}{2} \rightarrow a_8 = a_1 \cdot r^7 = 12 \cdot \left(\dfrac{1}{2}\right)^7 = \dfrac{3}{32}$
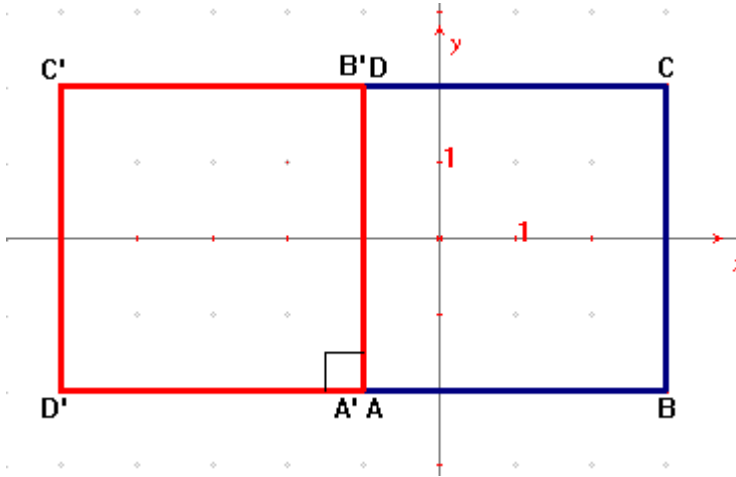
$S_8 = \dfrac{a_8 r - a_1}{r - 1} = \dfrac{\dfrac{3}{32} \cdot \dfrac{1}{2} - 12}{\dfrac{1}{2} - 1} = \dfrac{\dfrac{3}{64} - 12}{-\dfrac{1}{2}} = \dfrac{765}{32}; \quad S = \dfrac{a_1}{1 - r} = \dfrac{12}{1 - \dfrac{1}{2}} = 24$

4. Draw the square S, with vertexes A(-1,-2), B(3,-2), C(3,2), D(-1,2).

   a) Translate S by the vector AB. b) Translate S by the vector AC.

b) Rotate S 90° about A (centre)   c) Are there any invariant points?

A is an invariant point