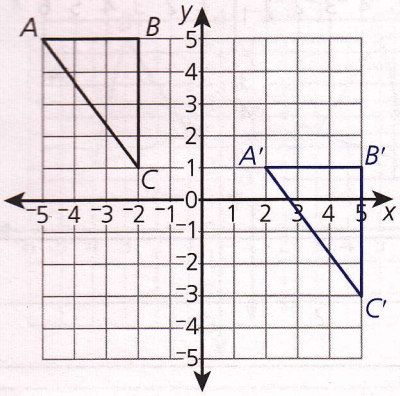
Transformations: Translations

A **translation** (or **slide**) is a movement of a geometric figure along a straight line. The resulting congruent figure is called the **image** of the first figure **under a translation.**



This translation can be written as $T_{7,\,-4}(\triangle ABC) = \triangle A'B'C'$. Each vertex of $\triangle ABC$ moves 7 units to the right and 4 units down to become the corresponding vertex of $\triangle A'B'C'$.

Translation notation:

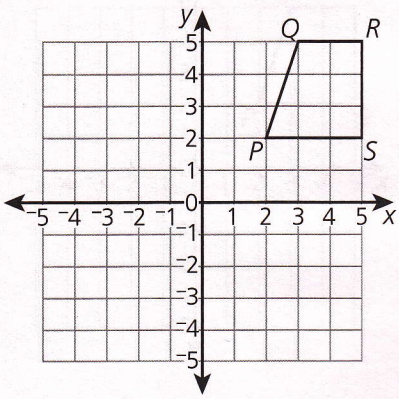
$$T_{h,\,k}(F) = F'$$

Figure F is translated h units to the right and k units up. (If h is negative, the translation is to the left. If k is negative, the translation is down.)

Translation changes coordinates of points like this: $T_{h,\,k}(x, y) = (x + h, y + k)$.

Read each problem. Circle the letter of the best answer.

Use this diagram to answer questions 1 and 2.



1 If $T_{-5,\,1}(PQRS) = P'Q'R'S'$, what are the coordinates of point P'?

A (-3, 1)
B (-3, 3)
C (1, -3)
D (3, -3)

The translation notation says that $P'Q'R'S'$ is the image of $PQRS$ under a translation 5 units to the left and 1 unit up. So P' is 5 units to the left and 1 unit up from P. The correct answer is B.

2 Which translation of $PQRS$ would result in point R' being located at (-4, 2)?

A $T_{-6,\,0}(PQRS) = P'Q'R'S'$
B $T_{-6,\,-3}(PQRS) = P'Q'R'S'$
C $T_{-9,\,0}(PQRS) = P'Q'R'S'$
D $T_{-9,\,-3}(PQRS) = P'Q'R'S'$

$\triangle JKL$ has vertices J (-3, 0), K (2, 5), and L (5, 2). $\triangle JKL$ will be translated 2 units right and 6 units down to produce $\triangle J'K'L'$. Use this information to answer questions 3 and 4.

3 What will be the coordinates of K'?

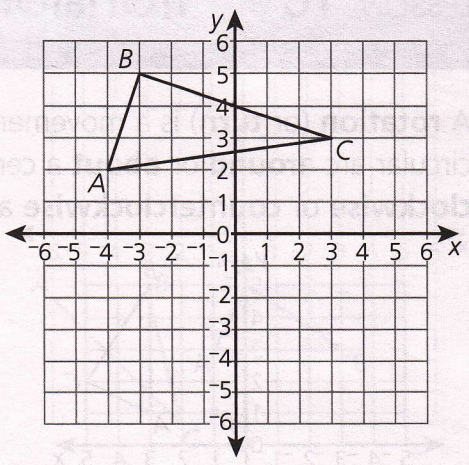
A (0, -2)
B (0, -1)
C (4, -2)
D (4, -1)

4 Which statement is ***not*** true?

A J' will have coordinates (-1, -6).
B $\triangle JKL$ and $\triangle J'K'L'$ will be congruent.
C $\overline{KL}$ and $\overline{K'L'}$ will have equal lengths.
D K and K' will have the same x-coordinates.

Read each problem. Write your answers.

5 Look at $\triangle ABC$ on the coordinate plane at right.



A On the plane, draw $\triangle A'B'C'$, the image of $\triangle ABC$ under a translation 1 unit to the left and 7 units down.

B Explain how you knew where to draw $\triangle A'B'C'$.

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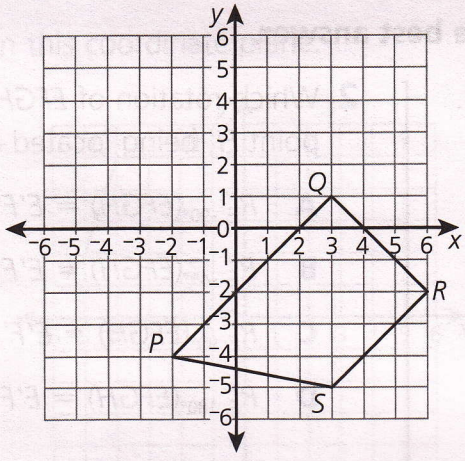
_____

6 Look at *PQRS* on this coordinate plane.



A Markus translated *PQRS* to produce *P'Q'R'S'*. If the coordinates of *P'* are (-6, 1), describe how Markus translated *PQRS*.

Answer: _____

B Describe the translation from part A in translation notation.

Answer: _____

C On the plane, draw *P'Q'R'S'*, the image of *PQRS* under the translation described in parts A and B.