

Unit 2

*The equations
And
The inequalities*

Exercise 1

The equation and inequality of first degree

Determine which of the following represents an equation or an inequality and give reasons :

- a** $2x + 1 = 5$ () **b** $3x + 2 = 11$ () **c** $2x > 9$ ()
d $x = 7 + 2$ () **e** $x > 7 - 5$ () **f** $x < -25$ ()
g $2x = 24$ () **h** $2y + 3 \leq 5$ () **i** $5x \geq 30$ ()

Determine the degree of each of the following :

- a** $x - 7 = 1$ () **b** $4b - 3 = 5$ () **c** $3x - 9 = 2$ ()
d $3x^2 - 6 = 14$ () **e** $3x^3 + x + 4 = 0$ () **f** $5x + 2 > 7$ ()
g $x - 2y = 5$ () **h** $3x - 2 < -2$ () **i** $3x^4 - 5 \leq 7$ ()

Find the solution set of each of the following equations :

- a** $x + 7 = 10$ if the substitution set is $\{1, 3, 5\}$

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- b** $2x + 1 = 5$ if the substitution set is $\{-1, -2, 0, 2\}$

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c $3x - 4 = 8$ if the substitution set is $\{3, 5, 6\}$

d $-2 + 3x = 7$ if the substitution set is $\{0, 1, 2\}$

e $3x + 7 = 4$ if the substitution set is $\{0, 1, 2, 5\}$

4 Find the solution set of each of the following inequalities :

a $x + 3 < 5$ if the substitution set is $\{4, 3, 2, 1, 0\}$

b $3x - 1 > -2$ if the substitution set is $\{-2, -1, 0, 1, 2\}$



e $3x + 4 \leq -2$

if the substitution set is $\{-1, 0, 1, 2, 3\}$

f $-x + 1 < 4$

if the substitution set is $\{-3, -2, 0, 2, 3\}$

Choose the correct answer from those given :

- a** Which of the following represents an equation ?
 [a] $x - 17$ [b] $22 - 7 = 15$ [c] $x > -11$ [d] $2x + 3 = 7$
- b** The equation $x^2 + 3 = 4$ is of degree.
 [a] first [b] second [c] third [d] fourth
- c** Which of the following numbers represents a solution to the equation $x + 3 = 7$, where the substitution set is $\{0, 1, 2, 3, 4, 5\}$?
 [a] 6 [b] 4 [c] 3 [d] 2
- d** If the substitution set is $\{3, 5, 7, 9\}$, which of the following numbers is a solution to the equation $3x + 6 = x + 20$?
 [a] 3 [b] 5 [c] 7 [d] 9
- e** The number -5 is a solution to the equation where the substitution set is \mathbb{Z}
 [a] $x - 3 = 2$ [b] $2x - 1 = 9$
 [c] $-2x + 3 = 13$ [d] $x + 3 = 2x + 12$
- f** If 3 is a solution to the equation : $2x - 4 = a$, then $a =$
 [a] 3 [b] 2 [c] -2 [d] -3
- g** If the substitution set is $\{2, -1, 3, 4\}$, then the solution set of the equation : $2x + 3 = 3$ is
 [a] $\{0\}$ [b] $\{-1\}$ [c] $\{3\}$ [d] \emptyset



Exercise 2

Solving first degree equations in one unknown

Find the solution set of each of the following equations in \mathbb{N} :

a $x + 3 = 7$

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b $x + 11 = -2$

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c $x - 9 = -5$

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d $-4 + y = 13$

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e $5x = 20$

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f $\frac{n}{3} = 5$

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g $2x - 1 = 5$

h $8 - 2x = -2$

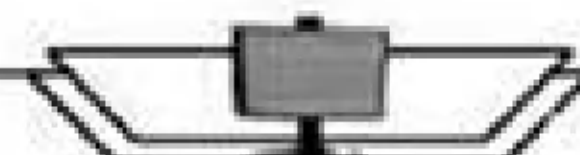
i $\frac{x}{2} - 4 = 7$

j $2y + 16 = 2^4$

k $3x - 2 = -19$



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Find the solution set of each of the following equations in \mathbb{Z} :

a $x - 3 = -7$

b $x + 8 = 0$

c $n + 17 = |-13|$

d $m - (-3) = 1$

e $-4 + x = -8$

f $-4x = -24$

g $5y = -35$



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g $8x + 12 = 4$

h $3x - 13 = 26$

i $3x - 2 = -19$

j $\frac{y}{5} + 2 = -4$

k $3x - 14 = |-16|$



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Find the S.S. of each of the following equations :

$$2x + 3x + 25 = 5 \text{ where } x \in \mathbb{Z}$$

$$3x + 2 = x + 18 \text{ where } x \in \mathbb{N}$$

$$\frac{3x - 4}{5} = 7 \text{ where } x \in \mathbb{N}$$

$$3(2x - 5) = 3(x + 20) \text{ where } x \in \mathbb{Z}$$



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Complete :

- a If $x + 5 = 7$, then $x = \dots\dots\dots$ b If $4x = 20$, then $x = \dots\dots\dots$
 c If $2x - 1 = 5$, then $x = \dots\dots\dots$ d If $3y = 6$, then $5y = \dots\dots\dots$
 e If $4x = 24$, then $\frac{x}{3} = \dots\dots\dots$ f If $x + 9 = 11$, then $7x = \dots\dots\dots$
 g If $2a + 3 = 15$, then $\frac{1}{3}a = \dots\dots\dots$ h If $2x = 5$, then $4x = \dots\dots\dots$
 i The S.S. of the equation $x - 5 = 2^4$ in \mathbb{Z}^- is $\dots\dots\dots$
 j The S.S. of the equation $x - 3 = (6)^0$ in \mathbb{Z} is $\dots\dots\dots$

Choose the correct answer from those given :

- a ☐ If $x + 2 = |-4|$, then $x = \dots\dots\dots$
 [a] - 2 [b] 2 [c] - 6 [d] 6
 b ☐ The solution set for the equation $2x - 1 = -5$ in \mathbb{Z} is $\dots\dots\dots$
 [a] $\{-3\}$ [b] $\frac{-1}{2}$ [c] $\{3\}$ [d] $\{-2\}$
 c ☐ If $x + 3 = 5$, $x \in \mathbb{Z}^-$, then the solution set is $\dots\dots\dots$
 [a] $\{-3\}$ [b] $\{5\}$ [c] $\{-5\}$ [d] \emptyset
 d If $2x = 2$, then $3x - 1 = \dots\dots\dots$
 [a] 2 [b] 3 [c] 4 [d] 5
 e If $2x = 0$, then $x = \dots\dots\dots$
 [a] 2 [b] 3 [c] 5 [d] zero
 f If $2ab = 10$, then $3ab = \dots\dots\dots$
 [a] 5 [b] 6 [c] 15 [d] 30
 g If $5x + 8x + 2x + 4x = 114$, then $5x + 3 = \dots\dots\dots$
 [a] 33 [b] 35 [c] 47 [d] $8x$
 h The solution set of the equation : $x + 3 = 12$ is equal to the solution set of the equation :
 [a] $x - 3 = -12$ [b] $x + (-3) = 12$
 [c] $x - (-3) = 12$ [d] $x - (-3) = -12$



Exercise 3

Applications on solving first degree equations in \mathbb{Z}

An integer which we add to it 7 , the result will be 12 , find the number.

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If 9 is added to twice a number , the result is 55 , find the number.

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Two natural numbers , one of them is twice the other and their sum is 108 , find the two numbers.

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The difference between two natural numbers is 5 and their sum is 21
What are the two numbers ?

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Two consecutive integers whose sum is -27 , find them.

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Find three consecutive even numbers if their sum is 966

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The sum of two integers is zero. The three times of the greater number equals the smaller number plus 32 , what are the two numbers ?

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The length of a rectangle is three times its width and its perimeter is 24 cm. , find its area.

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The age of a man now is three times the age of his son. After three years , the sum of ages of them will be 66 years. Find the age of each of them.

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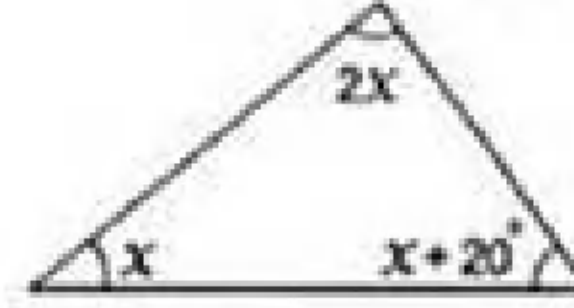
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Find the measure of each angle in the opposite triangle :



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If the number of illiterate people in a village is 3200 and the number of females of them is three times the number of males. Calculate the number of both males and females.

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A man wants to distribute 90 000 pounds among his sons (a girl and two boys). If the share of the boy is twice that of the girl, find the share of each of the boy and the girl.

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Choose the correct answer from those given :

- a** Two consecutive natural numbers , the smaller one is x , then the geater one is
- [a] $2x$ [b] $x + 1$ [c] $2x + 1$ [d] $x - 1$
- b** Two consecutive integers , the greater one is $x - 1$, then the smaller one is
- [a] x [b] $x - 2$ [c] $x + 2$ [d] $2x - 1$
- c** Two consecutive natural odd numbers , the smaller one is x , then the greater one is
- [a] $x + 1$ [b] $x + 2$ [c] $x + 3$ [d] $3x$
- d** Two consecutive even numbers , the smaller one is $x + 1$, then the greater one is
- [a] x [b] $x + 2$ [c] $x + 3$ [d] $x + 4$
- e** If x is a natural odd number , then the next even number directly is
- [a] $x + 1$ [b] $x - 1$ [c] $2x$ [d] x^2
- f** Two natural numbers , one of them is three times the other. If the smaller one is $2x$, then the greater one is
- [a] $2x + 3$ [b] $3x$ [c] $5x$ [d] $6x$

The sum of the three dimensions of a cuboids is 18 cm. If the length of its base is three times its width and its height is twice its width, calculate the lengths of its dimensions.

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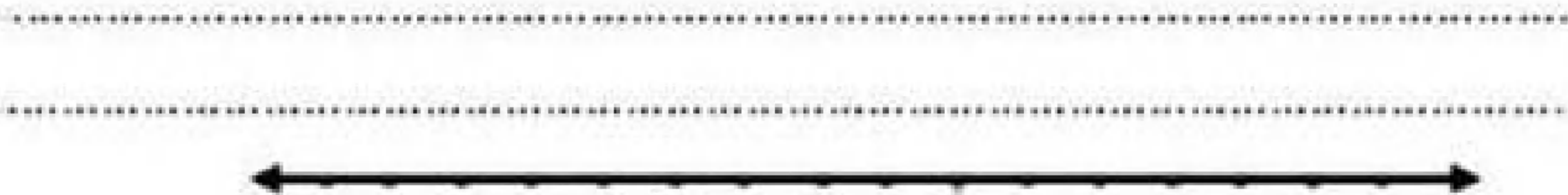
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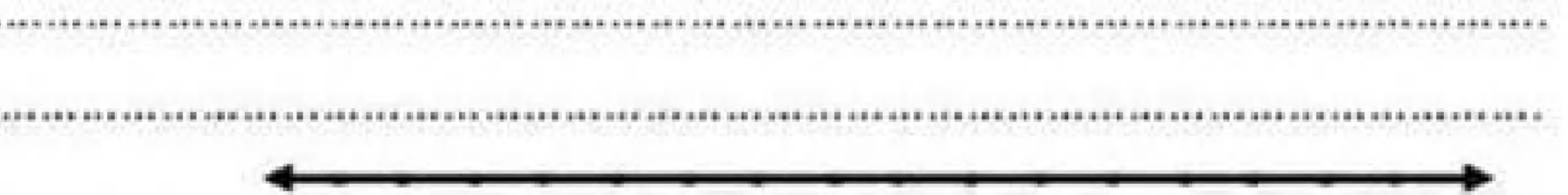
Exercise 2 Solving first degree inequality in one unknown

Find the S.S. of each of the following inequalities , then represent the S.S. on the number line :

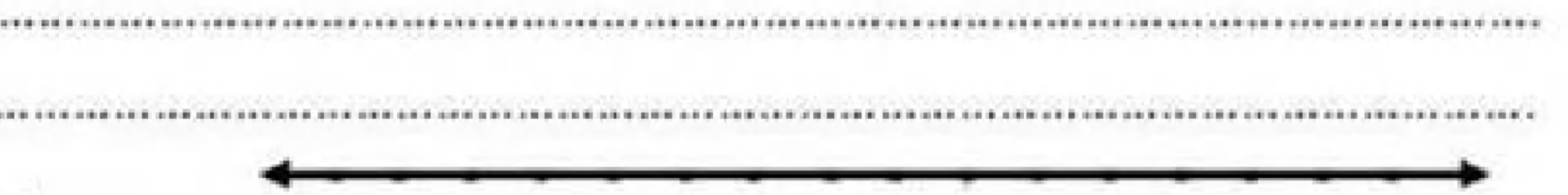
a $x - 3 < 1$ where $x \in \mathbb{N}$



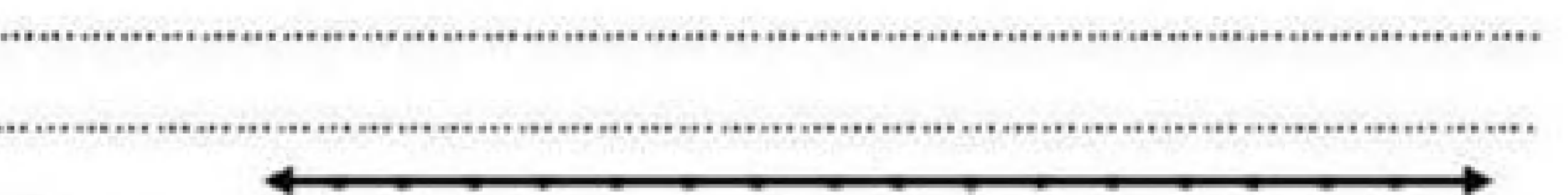
b $x + 2 > 5$ where $x \in \mathbb{N}$



c $19 < a + 14$ where $a \in \mathbb{N}$



d $4k \geq -16$ where $k \in \mathbb{N}$



e $3 < x + 2 \leq 6$ where $x \in \mathbb{N}$



f $1 - 3x > 7$ where $x \in \mathbb{N}$



$$x - 4 > 1 \text{ where } x \in \mathbb{Z}$$



$$-2y < 14 \text{ where } y \in \mathbb{Z}$$



$$x + 6 \geq 3 \text{ where } x \in \mathbb{Z}$$



$$m + 7 \geq |-5| \text{ where } x \in \mathbb{Z}$$



$$9 - 6x < 15 \text{ where } x \in \mathbb{Z}$$



$$4x + 2 \geq -10 \text{ where } x \in \mathbb{Z}$$



$$3 < x + 2 \leq 6 \text{ where } x \in \mathbb{N}$$

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$$-5 \leq x + 3 < 6 \text{ where } x \in \mathbb{N}$$

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$$-3 \leq 1 + x < 3 \text{ where } x \in \mathbb{Z}$$

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$$1 < 5 - x \leq |-3| \text{ where } x \in \mathbb{Z}$$

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Complete :

- a The S.S. of the inequality : $4x < 8$ in \mathbb{N} is
- b The S.S. of the inequality : $0 \leq x - 1 < 3$ is
- c If $x > y$, then $x + z$ $y + z$
- d If $x > y$, then $x - z$ $y - z$
- e If $a - 3 < 0$, then $>$
- f If $b < 0$, then $b + 3$ 3
- g The S.S. of the inequality : $-5 < -x \leq 2$ in \mathbb{Z}^+ is
- h The S.S. of the inequality : $1 - x > 4$ in \mathbb{N} is
- i If $x > y$ and z is positive , then xz yz
- j If $x < y$ and z is negative , then xz yz
- k The S.S. of the inequality : $4x - 1 \geq 5$ in \mathbb{Z} is
- l The S.S. of the inequality : $-2 < 2x < 2$ in \mathbb{Z} is

Choose the correct answer :

- a ☐ The number that satisfies the inequality : $x - 2 > 3$ is
[a] 3 [b] 4 [c] 5 [d] 6
- b ☐ The number which satisfies the inequality : $x > -2$ is
[a] -1 [b] -4 [c] -3 [d] -2
- c The S.S. of the inequality : $2x + 1 \leq 5$ in \mathbb{N} is
[a] {2 , 1 , 0 , -1 , -2 ,} [b] {2 , 1 , 0}
[c] {1 , 0 , -1 , -2 ,} [d] {1 , 0}
- d The S.S. of the inequality : $4 - x > 3$ in \mathbb{Z}^+ is
[a] {0 , -1 , -2 , -3 ,} [b] {0 , 1 , 2 , 3 ,}
[c] {0} [d] \emptyset
- e ☐ If $2x + 5 > 3$ and $x \in \mathbb{Z}$, then the solution set =
[a] \mathbb{N} [b] $\mathbb{N} - \{0\}$ [c] \mathbb{Z}^- [d] \mathbb{Z}^+
- f The S.S. of the inequality : $-2x < 0$ in \mathbb{Z} is
[a] \emptyset [b] \mathbb{N} [c] \mathbb{Z}^- [d] \mathbb{Z}^+
- g If $x \in \mathbb{N}$, then the S.S. of the inequality : $-x > 3$ is
[a] {4 , 5 ,} [b] {-4 , -5 , -6 ,} [c] {-3} [d] \emptyset



Unit 3



Geometry And Measurement

The distance between two points in the coordinate plane

In the opposite figure :

If the points A , B , C and D represent the numbers -6 , -1 , 0 and 3 respectively , then complete :

AB =

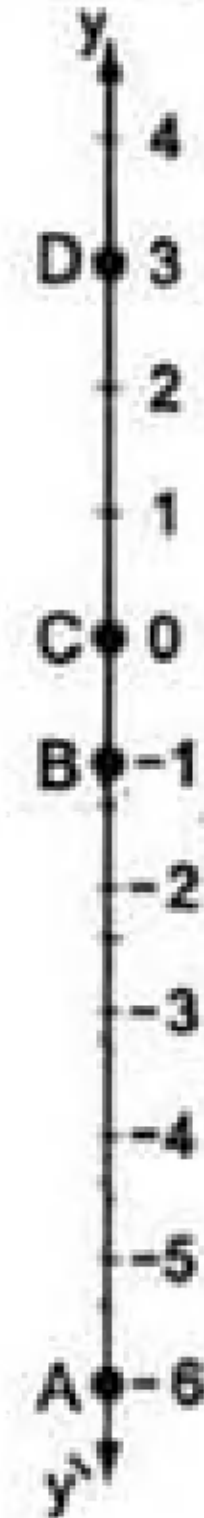
AC =

BC =

BD =

AD =

CD =



From the following figure complete :



EF =

EK =

FK =

EG =

FG =

GK =

EH =

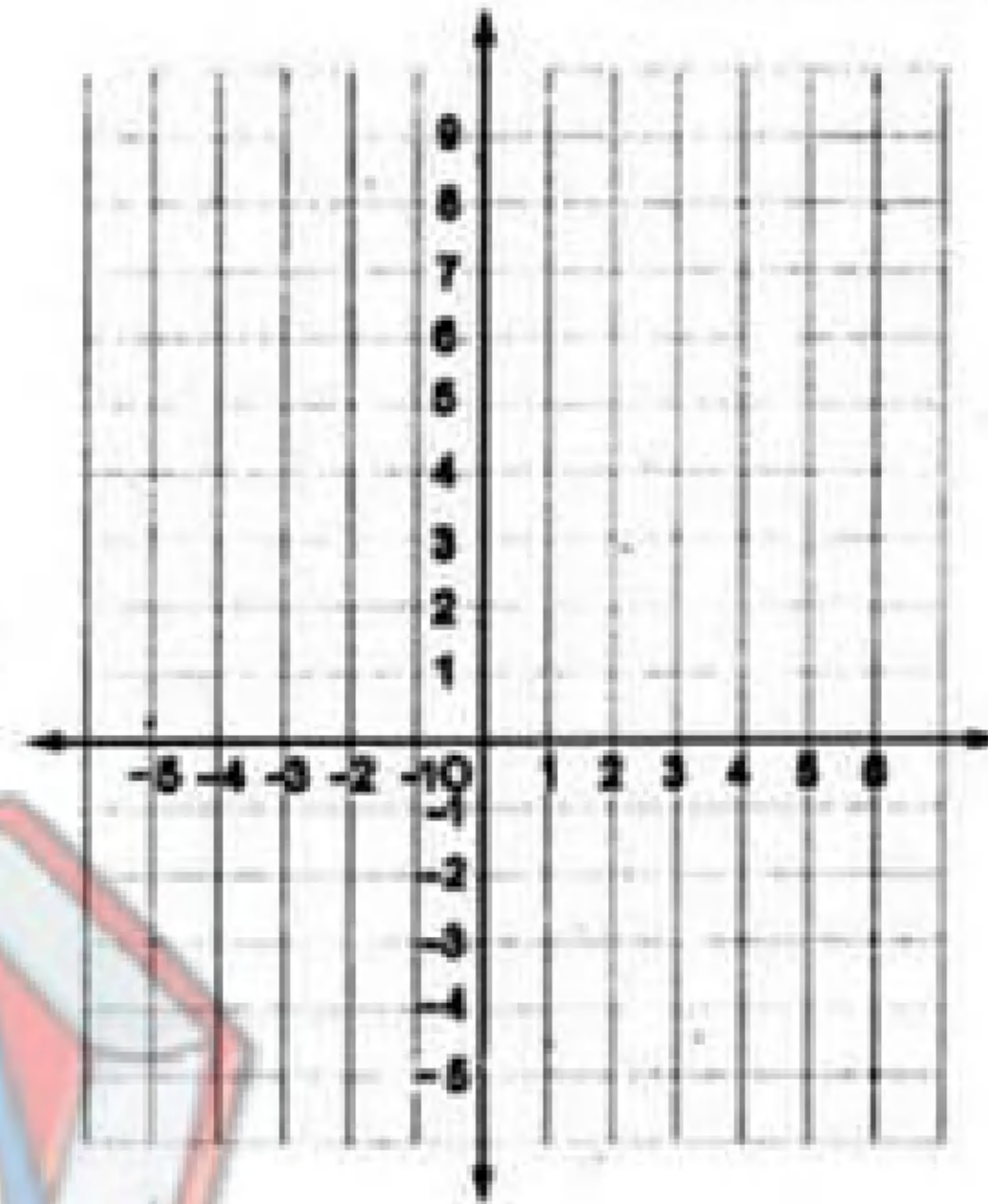
FH =

HK =



In the opposite coordinate plane :

- a** Determine the position of the following points : A (- 3 , - 3) , B (- 3 , 2) , C (5 , 2) and D (5 , - 3) and mention the name of the shape ABCD

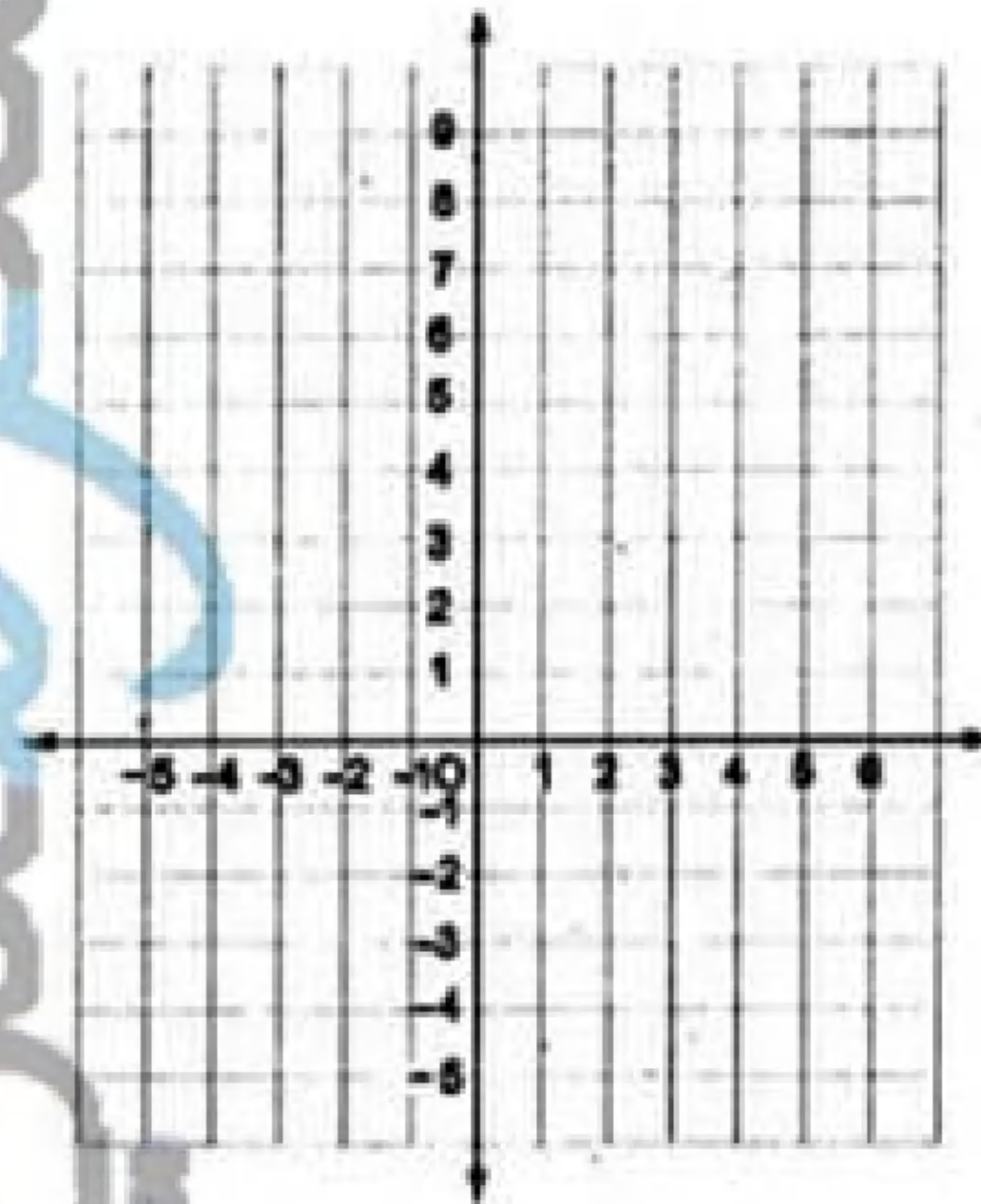


- b** Find the perimeter and the area of the shape ABCD

In the opposite coordinate plane :

- a** Determine the position of the following points : L (- 1 , 1) , M (1 , 1) , N (1 , 8) and E (- 1 , 8)

- b** Find the perimeter and the area of the shape LMNE



- c** Determine whether the shape is symmetric or not ?



Complete each of the following :

- a** The image of the point $(2, 5)$ by translation

$(x, y) \longrightarrow (x + 2, y + 1)$ is

- b** The image of the point $(3, 2)$ by translation

$(x, y) \longrightarrow (x + 3, y - 2)$ is

- c** The image of the point $(-5, 4)$ by translation

$(x, y) \longrightarrow (x + 4, y - 5)$ is

- d** The image of the point $(-1, 3)$ by translation $(2, -3)$ is

- e** The image of the point $(0, 5)$ by translation $(-2, 1)$ is

- f** The image of the point $(-2, -5)$ by translation

$(x, y) \longrightarrow (x - 2, y)$ is

- g** The image of the point $(3, -2)$ by translation

$(x, y) \longrightarrow (x, y + 3)$ is

- h** The image of the point _____ by the translation

$(x, y) \longrightarrow (x - 2, y + 3)$ is $(7, 4)$

- i** If the image of the point $(3, 2)$ is the point $(6, 1)$, then the translation rule is $(x, y) \longrightarrow (\text{.....}, \text{.....})$

- j** The image of the point A $(3, 6)$ by translation 3 units in the negative direction of x-axis is

Choose the correct answer :

- a** The image of the point A $(1, 2)$ by translation $(1, -1)$ is

[a] $(2, 1)$ [b] $(2, 3)$ [c] $(1, 1)$ [d] $(1, 3)$

- b** The image of the point A $(-4, 3)$ by translation $(-1, -4)$ is

[a] $(-5, -7)$ [b] $(-5, -1)$ [c] $(-7, 3)$ [d] $(-3, -1)$

- c** The image of the point $(5, 0)$ by translation $(1, -5)$ is

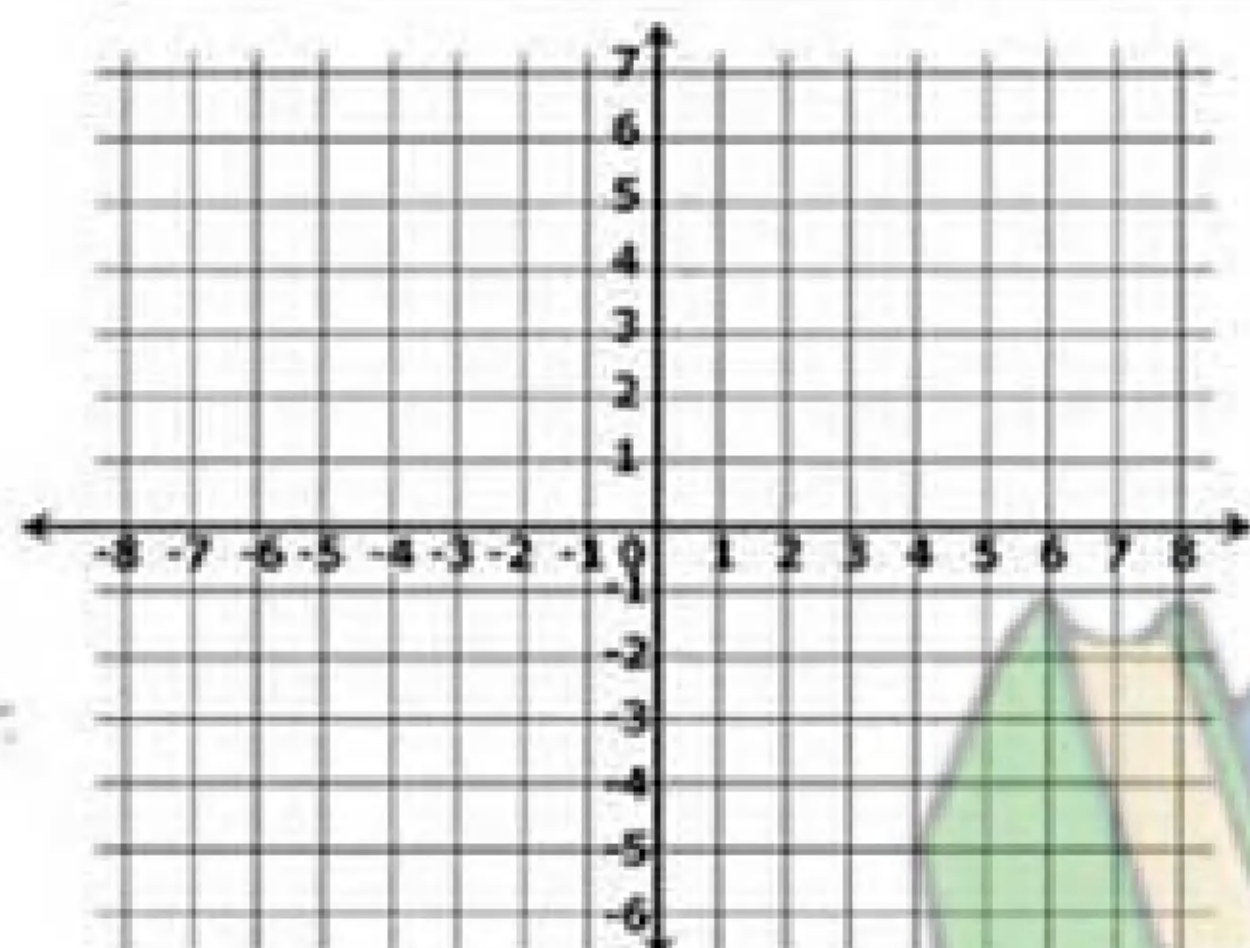
[a] $(-5, 6)$ [b] $(6, -5)$ [c] $(0, 1)$ [d] $(1, 0)$



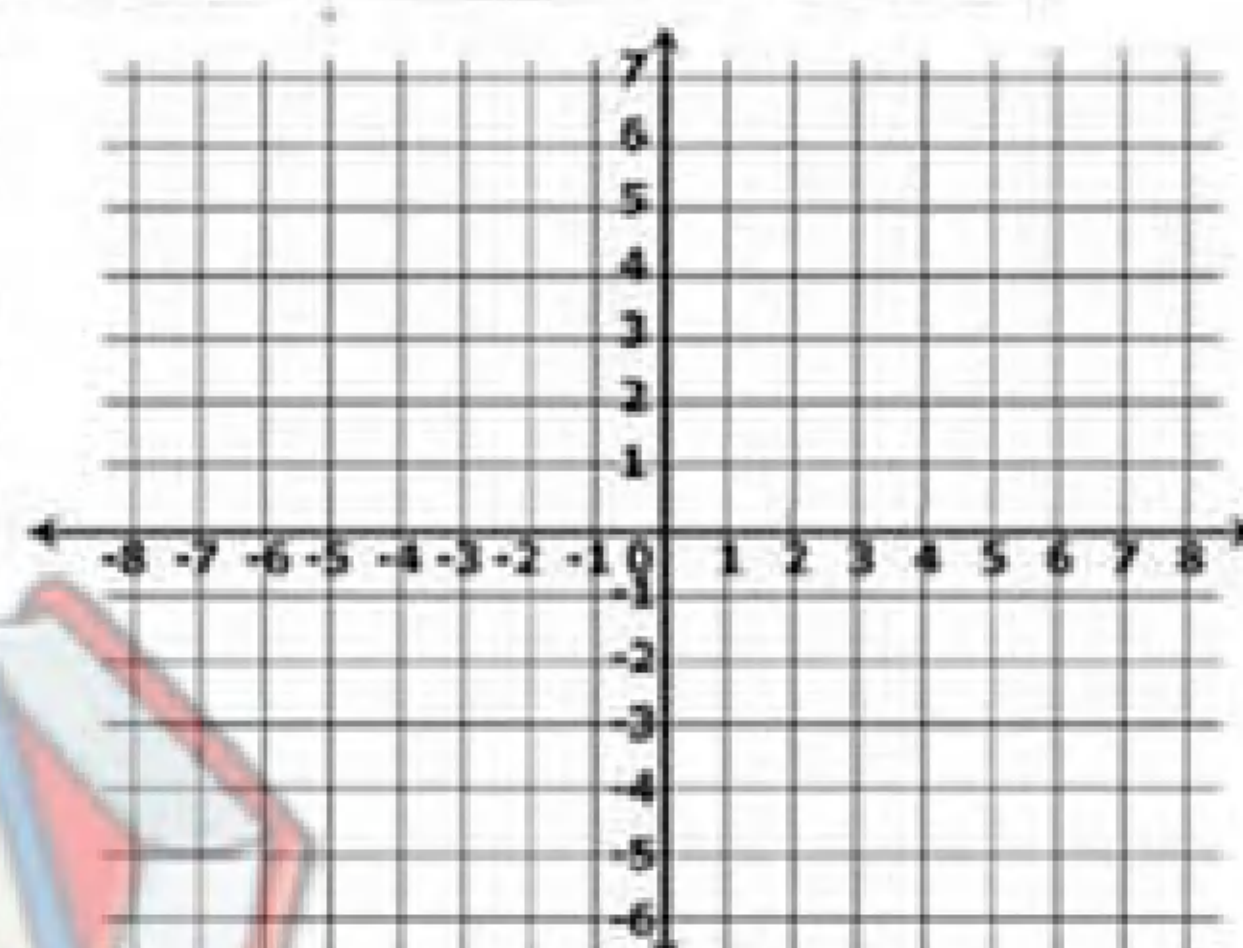
- d** The image of the point $(3, -2)$ by translation $(-3, 2)$ is
 [a] $(0, 0)$ [b] $(2, 0)$ [c] $(3, 0)$ [d] $(6, 4)$
- e** The image of the point $(3, -2)$ by translation $(4, 2)$ is
 [a] $(-7, 0)$ [b] $(7, 0)$ [c] $(-1, 4)$ [d] $(1, 7)$
- f** If (x, y) is the image of the point $(3, -2)$ by translation $(1, 3)$, then the point $(x, y) =$
 [a] $(2, 1)$ [b] $(2, 4)$ [c] $(1, 4)$ [d] $(4, 1)$
- g** The image of the point $(4, 7)$ by the translation $(x, y) \longrightarrow (x + 1, y - 2)$ is the point
 [a] $(5, 9)$ [b] $(3, 5)$ [c] $(5, 5)$ [d] $(5, 7)$
- h** The image of the point $(-1, 2)$ by translation of magnitude of 3 units in the positive direction of the x-axis is
 [a] $(-1, 5)$ [b] $(2, 2)$ [c] $(-2, 2)$ [d] $(-1, 3)$
- i** The image of the point $(-3, 4)$ by translation of magnitude of 4 units in the negative direction of the y-axis is
 [a] $(-3, 0)$ [b] $(-7, 4)$ [c] $(-3, 8)$ [d] $(-1, 4)$
- j** If $A(3, -3)$ is the image of A by translation $(x, y) \longrightarrow (x - 1, y - 4)$, then the point A is
 [a] $(2, -7)$ [b] $(4, 1)$ [c] $(-4, -1)$ [d] $(2, 1)$
- k** The image of the point $(2, -1)$ by translation of magnitude 3 units in the positive direction of y-axis is
 [a] $(2, 2)$ [b] $(5, -1)$ [c] $(5, 2)$ [d] $(2, -4)$
- l** The image of the point $(3, 0)$ by translation of magnitude 3 units in the negative direction of x-axis is
 [a] $(0, 0)$ [b] $(3, 3)$ [c] $(3, -3)$ [d] $(0, -3)$



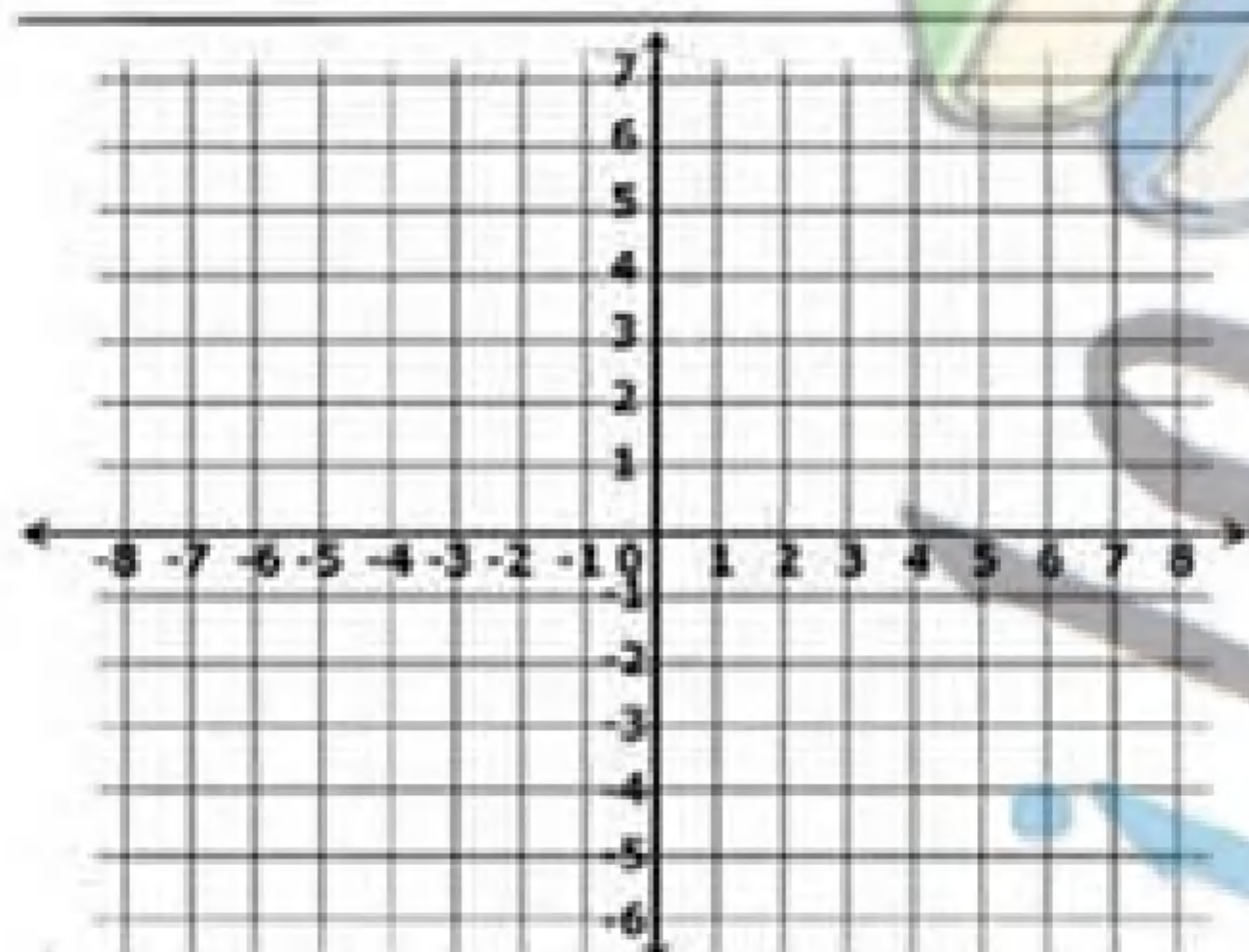
Find the image of each of the following figures by the shown translation under each figure :



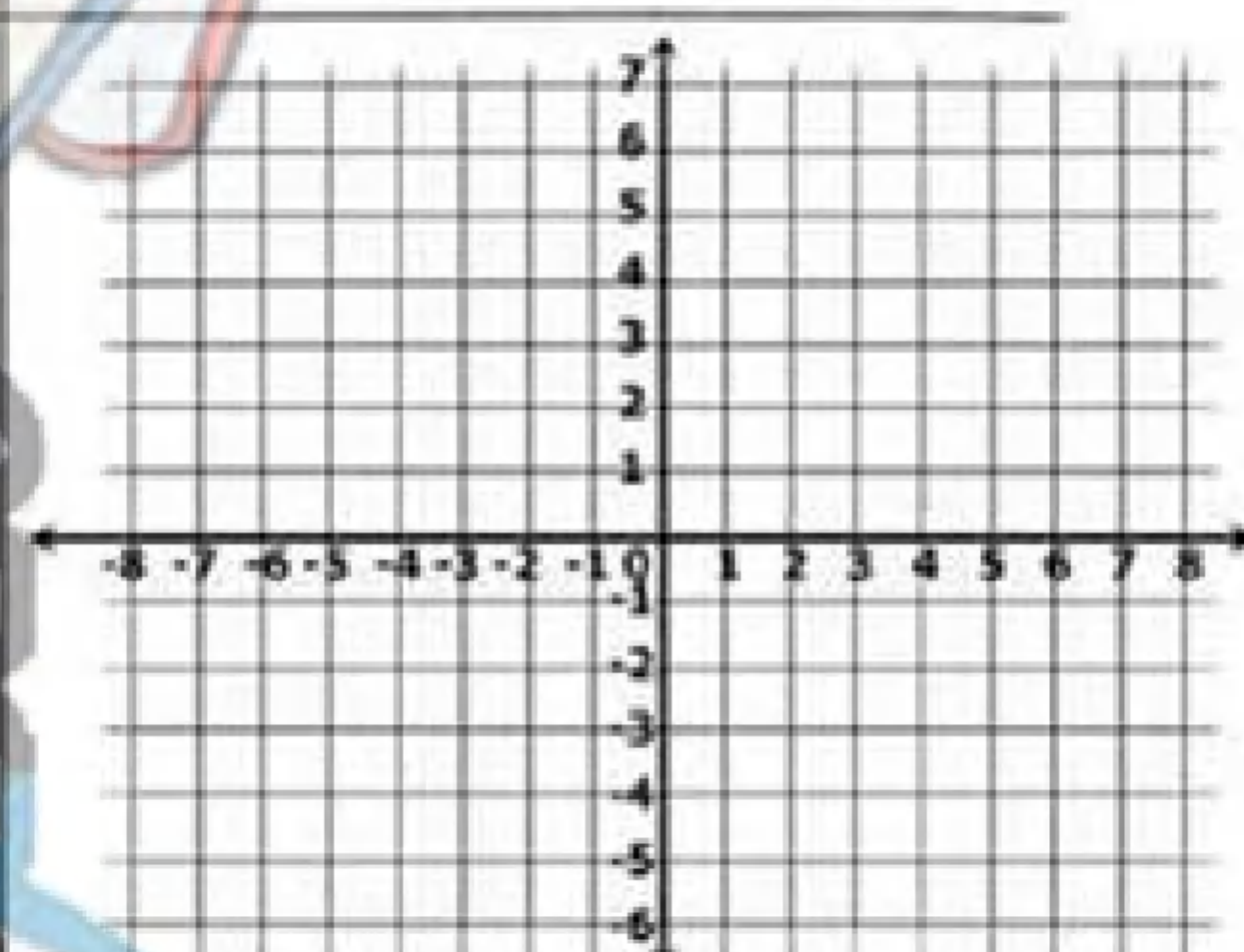
$$(x, y) \longrightarrow (x - 3, y - 4)$$



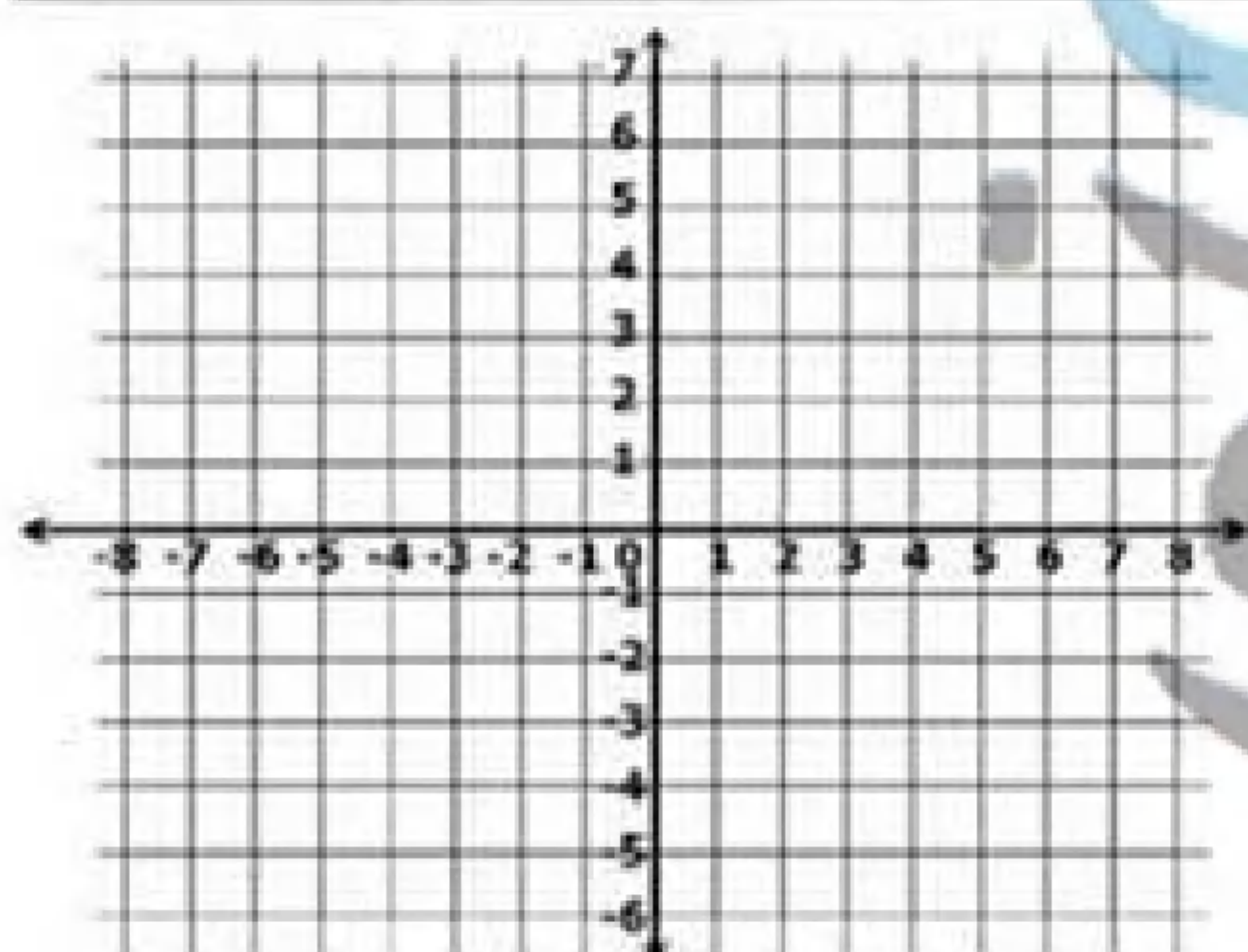
$$(x, y) \longrightarrow (x + 2, y + 3)$$



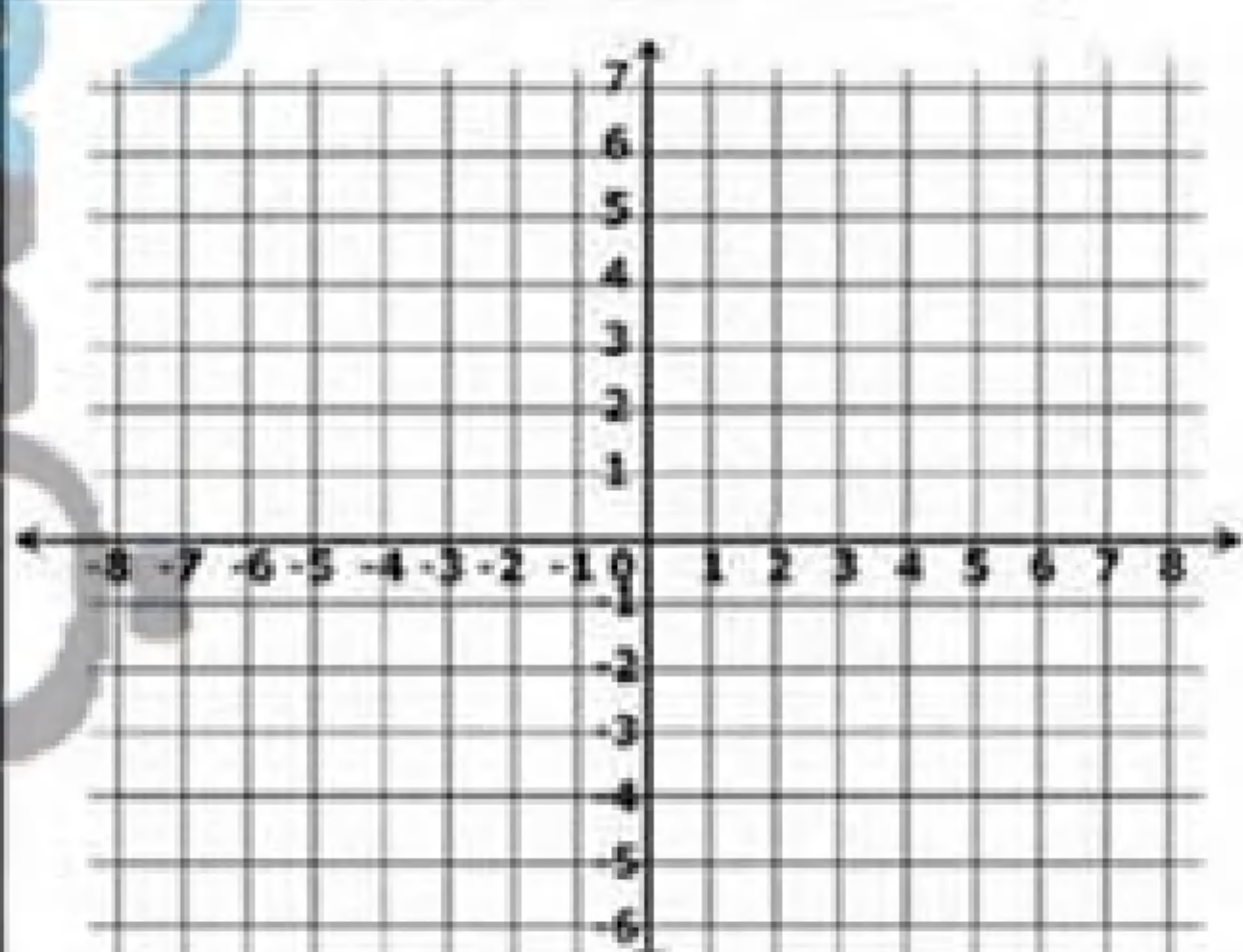
$$(x, y) \longrightarrow (x + 2, y)$$



$$(x, y) \longrightarrow (x + 3, y - 2)$$



by translation $(3, -4)$



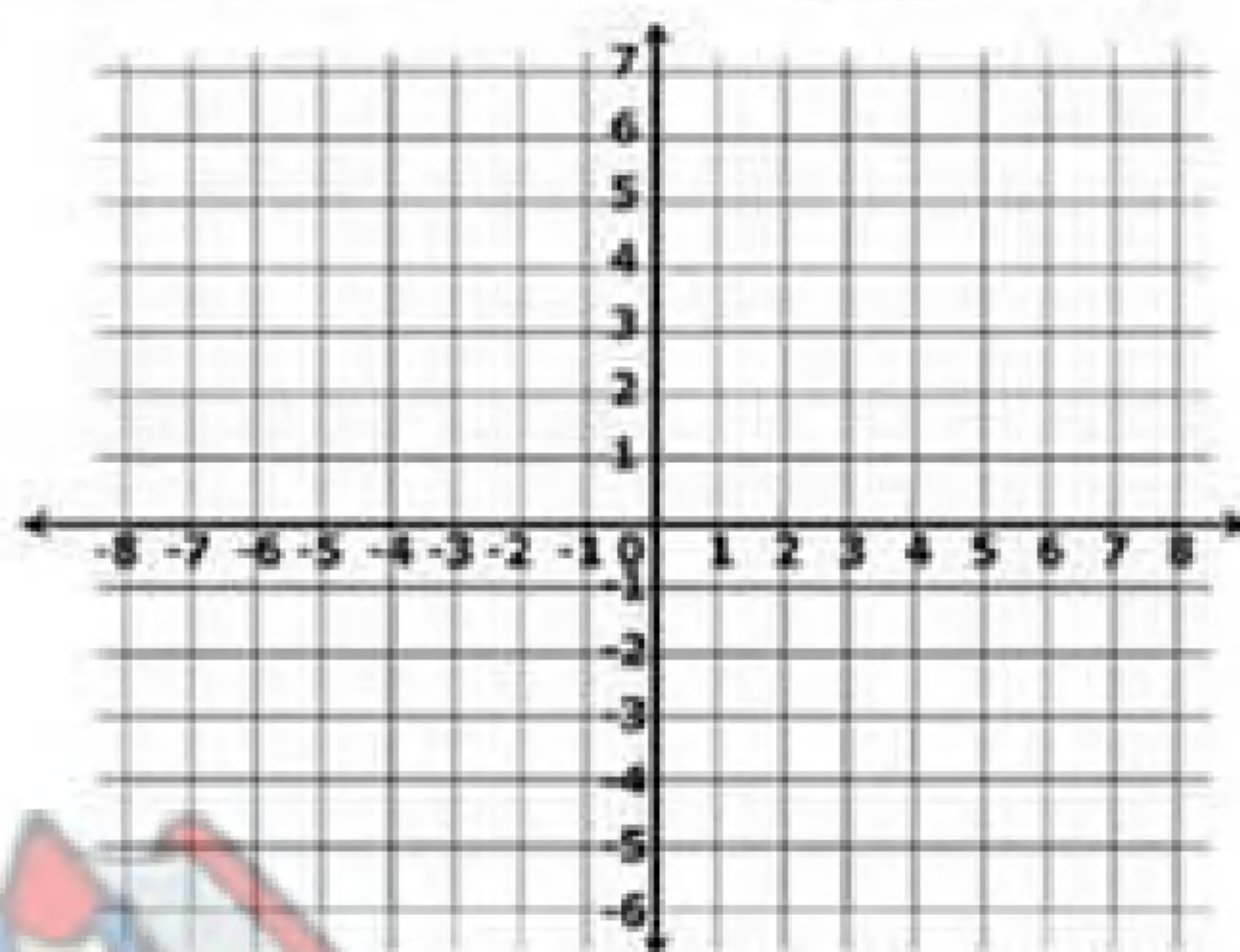
translate 1 unit to the right and 4 units down.



Copy the graph , then draw the image of the parallelogram ABCD un each of the following translations :

a $(x, y) \longrightarrow (x + 5, y + 2)$

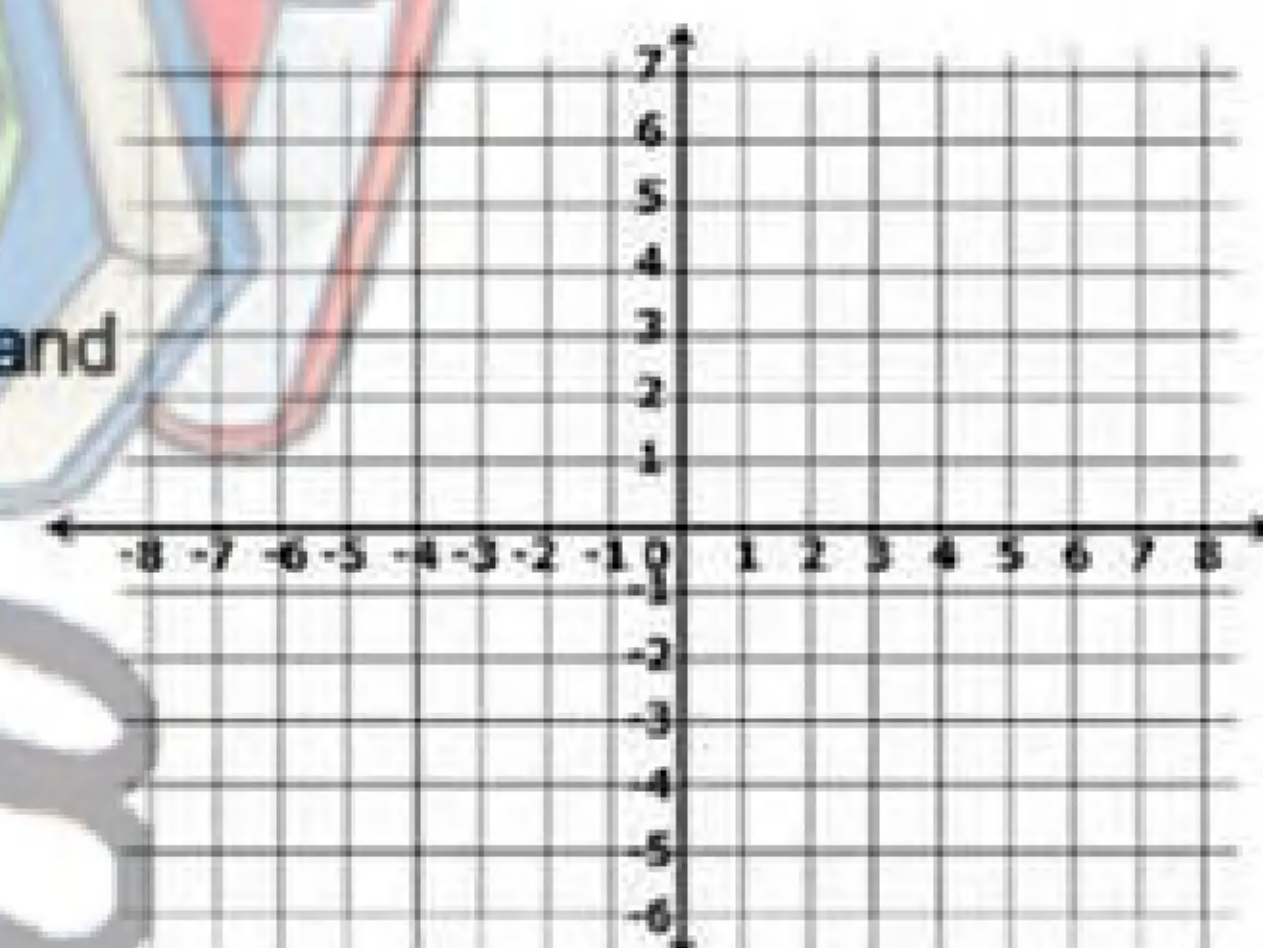
b $(x, y) \longrightarrow (x - 8, y - 1)$



In the opposite coordinate plane ,
Determine the following :

- a The image of \overline{DE} where D (2 , 0) and E (− 1 , 1) by translation
 $(x, y) \longrightarrow (x + 3, y + 2)$

- b What is the name of the shape DD'EE? Why ?



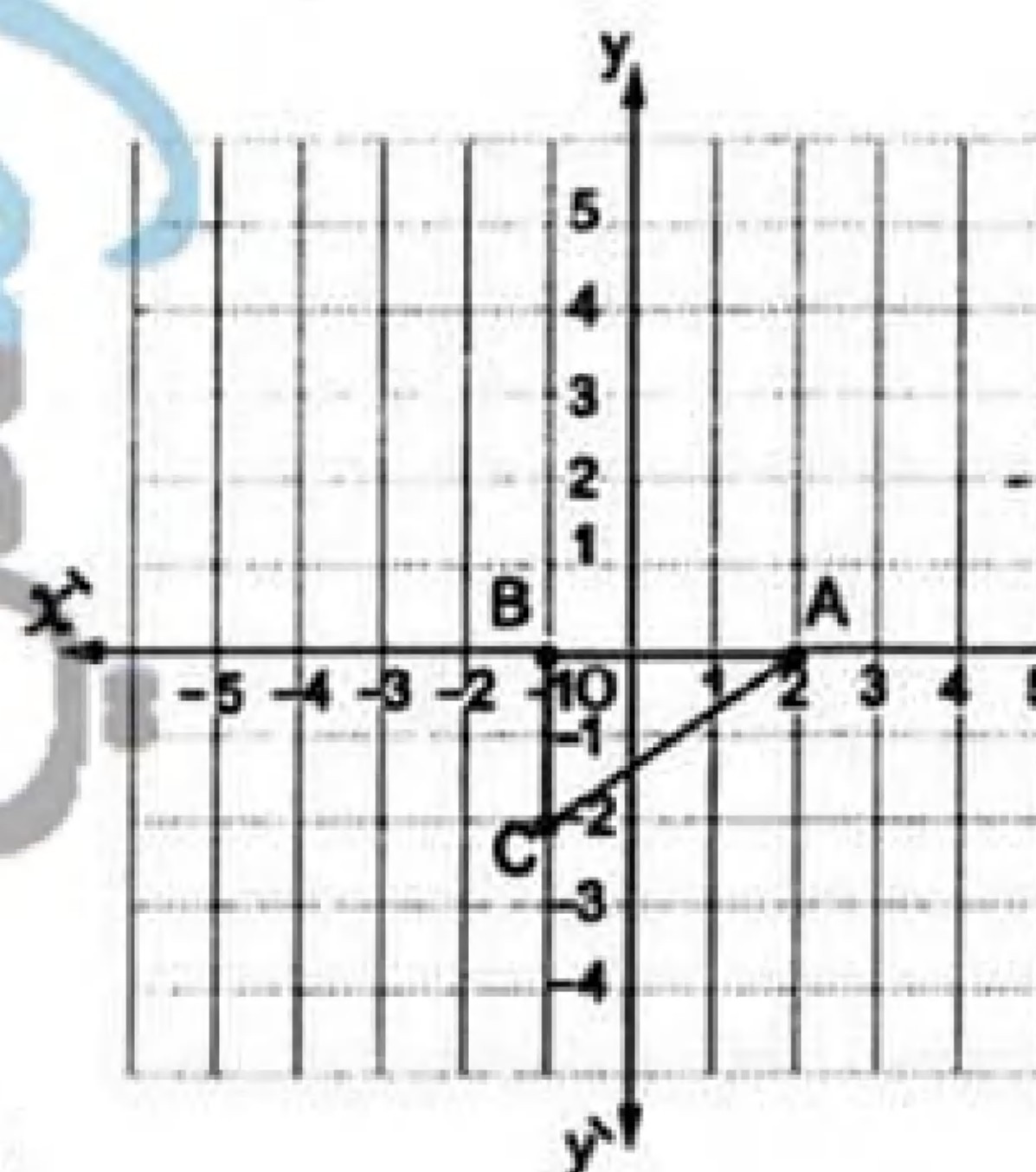
In the opposite figure :

- a Determine the coordinates of the following points :
A (..... ,), B (..... ,)
and C (..... ,)

- b Find the image of the $\triangle ABC$ by translation $(x, y) \longrightarrow (x + 2, y + 3)$

- c The length of \overline{BC} =
The length of \overline{AB} =

- d Is the $\triangle ABC$ symmetric or not? Why ?



On the opposite coordinate plane :

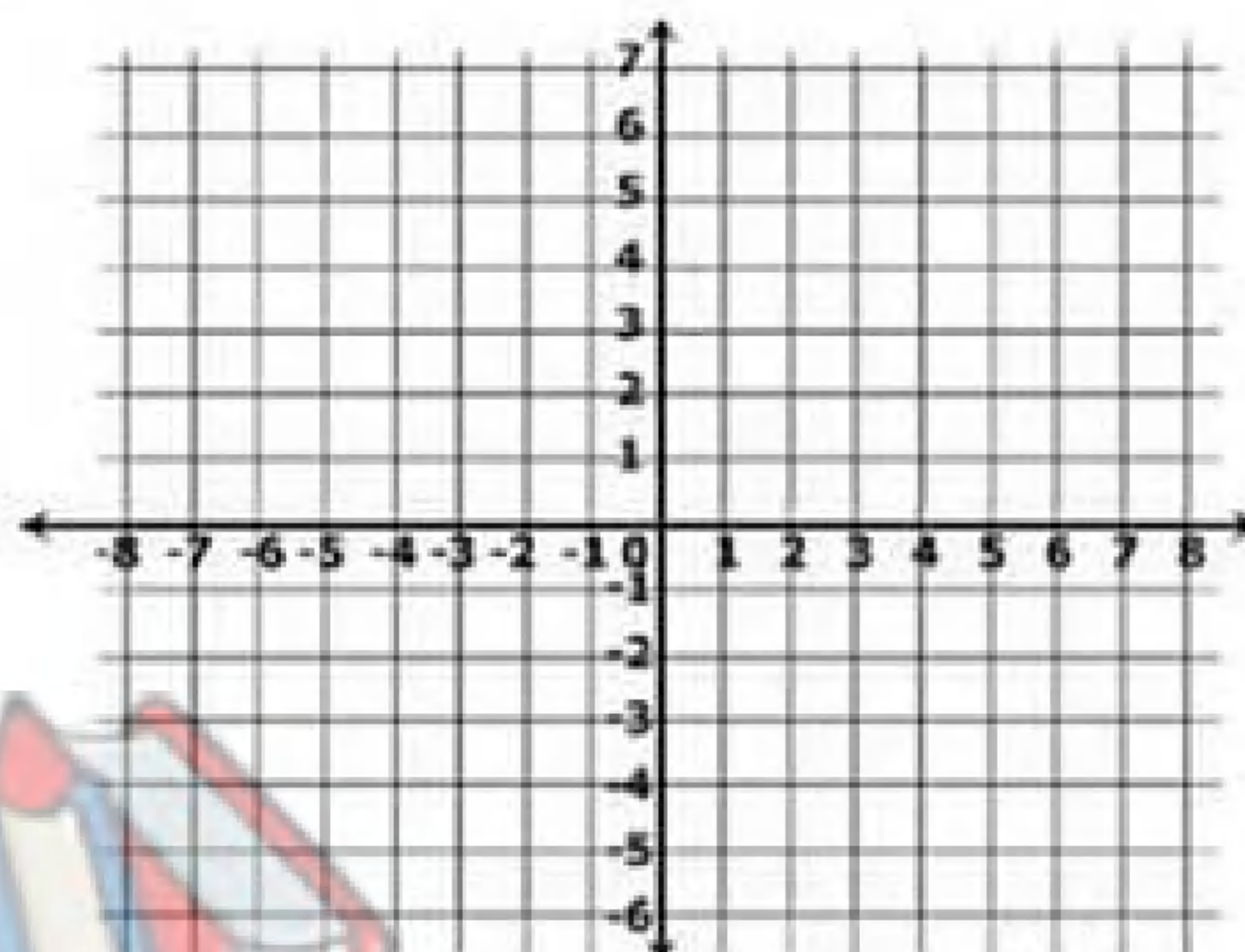
1 Determine the following points :
A (2 , - 2) , B (1 , 1) and C (1 , 6)

2 Find \hat{A} which is the image of the point A by translation (2 , - 1)

3 Find \hat{BC} which is the image of \overline{BC} by translation (3 , 0)

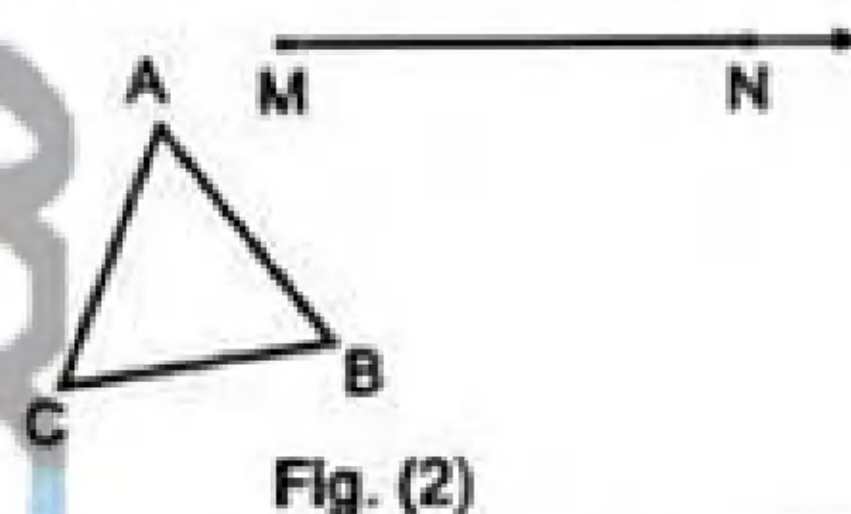
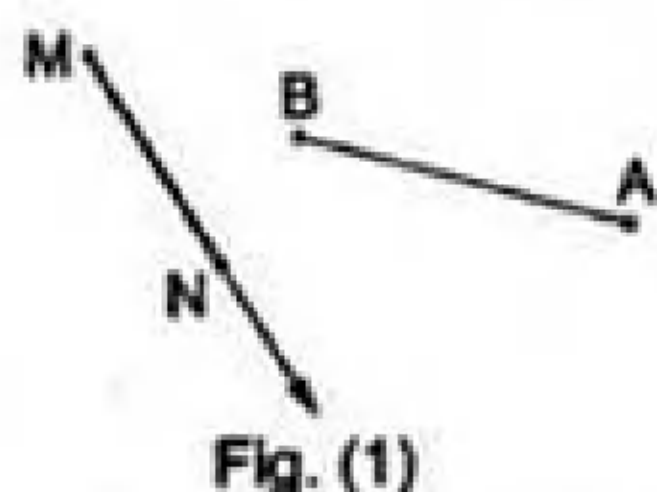
4 Find \hat{BC} and $\hat{B}\hat{B}$

5 Calculate the perimeter and the area for the shape $\hat{B}\hat{B}\hat{C}\hat{C}$

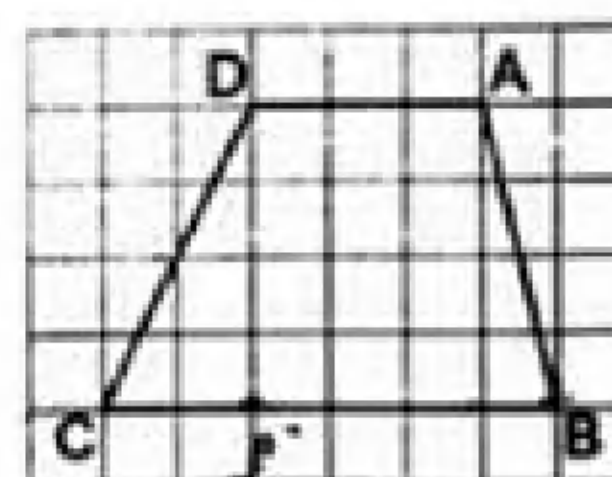


Using the geometric tools , draw the image of each of the following :

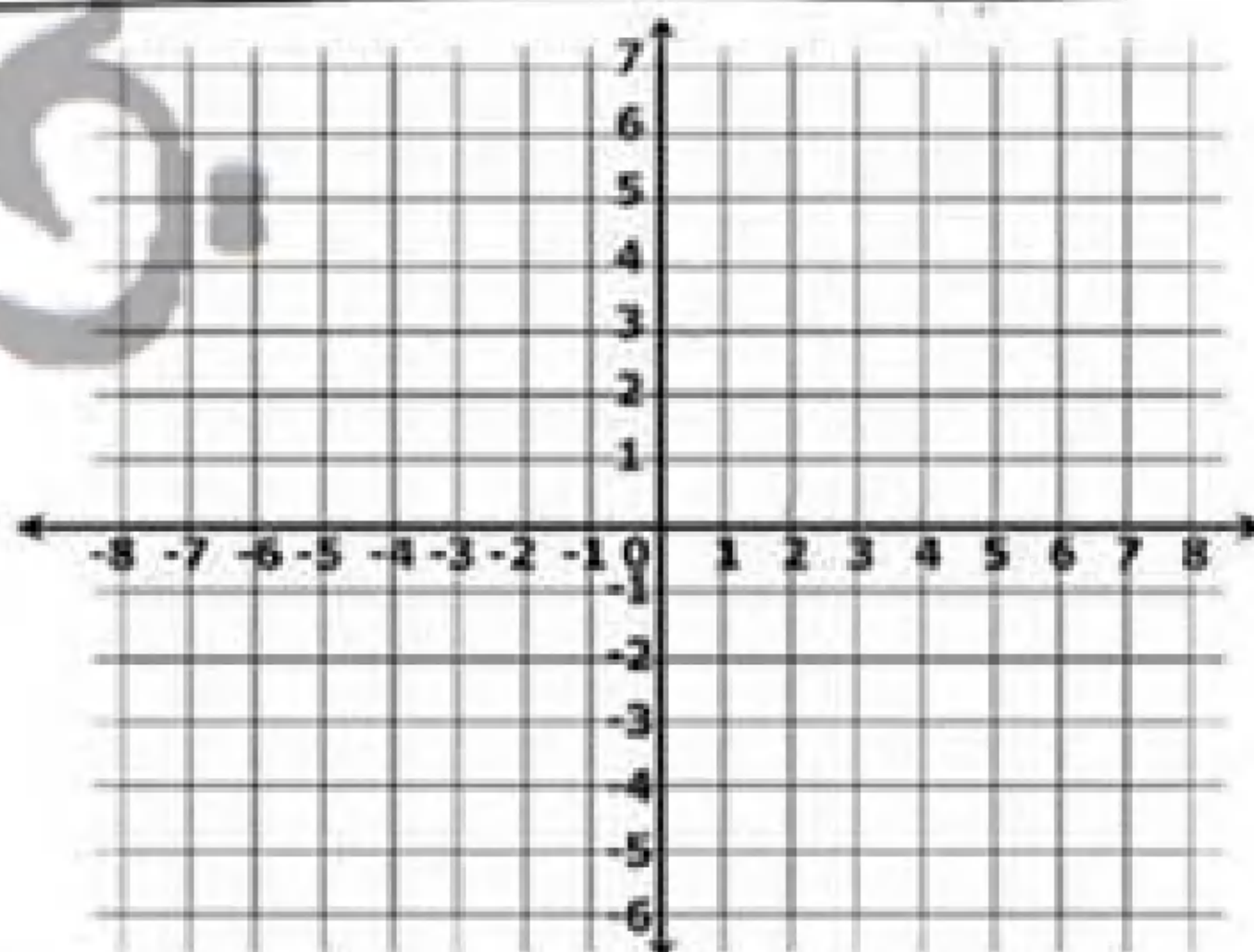
By translation MN in the direction of \overrightarrow{MN} as shown in each case.



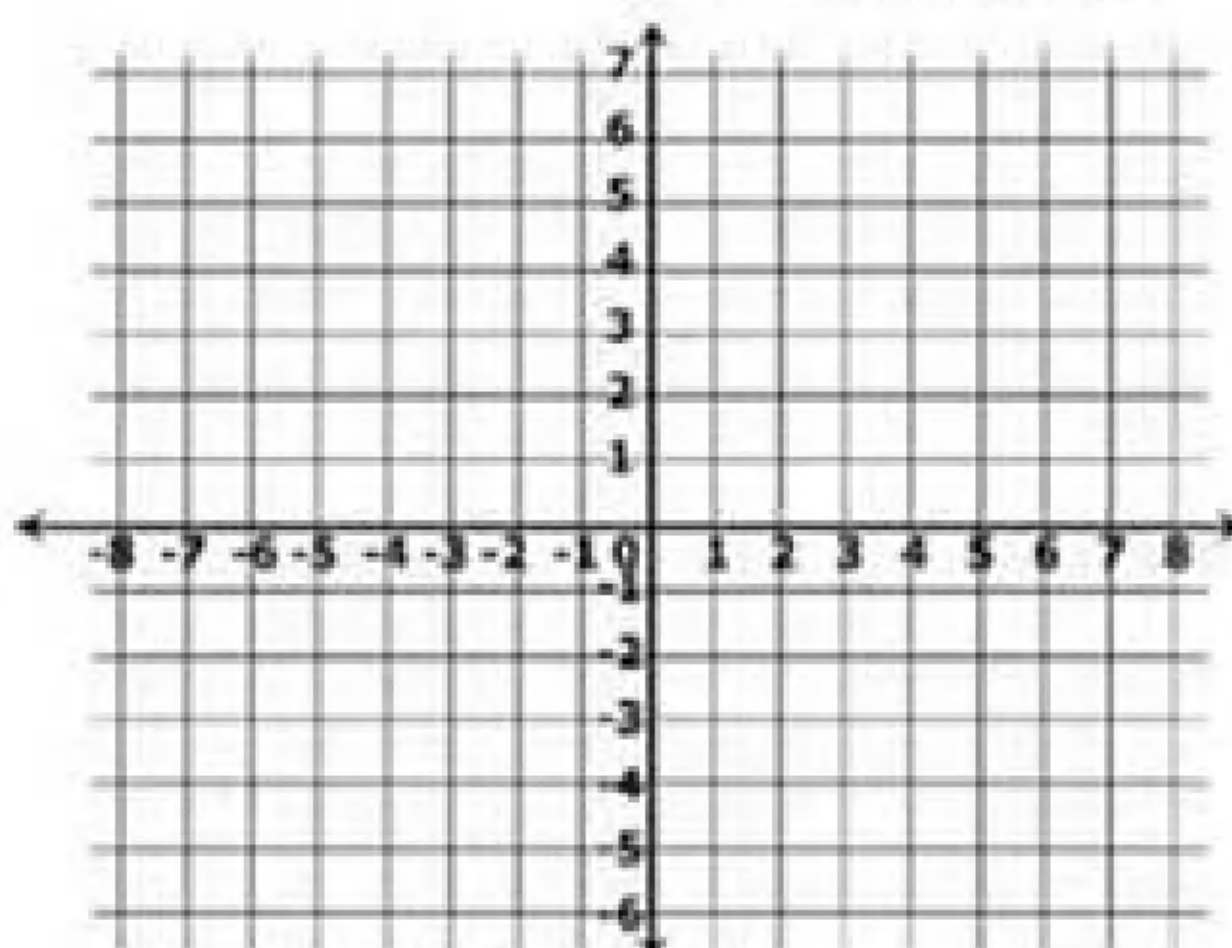
Using the grid , draw the image of the figure ABCD by the translation of 4 units in the direction of \overrightarrow{BC}



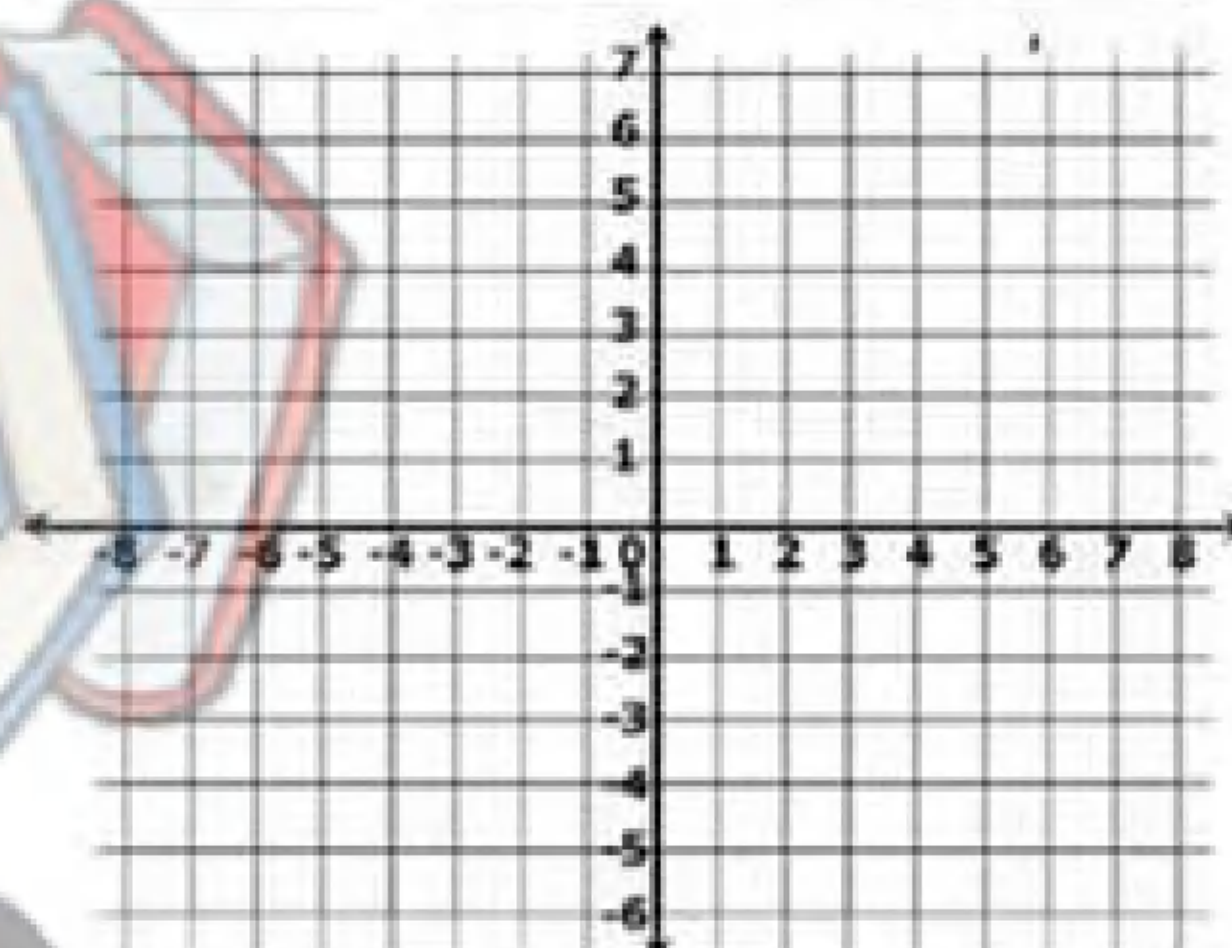
On a square lattice , draw \overline{AB} where A (2 , 3) and B (4 , 1) , then draw the image of \overline{AB} by the translation $(x , y) \longrightarrow (x + 3 , y + 2)$



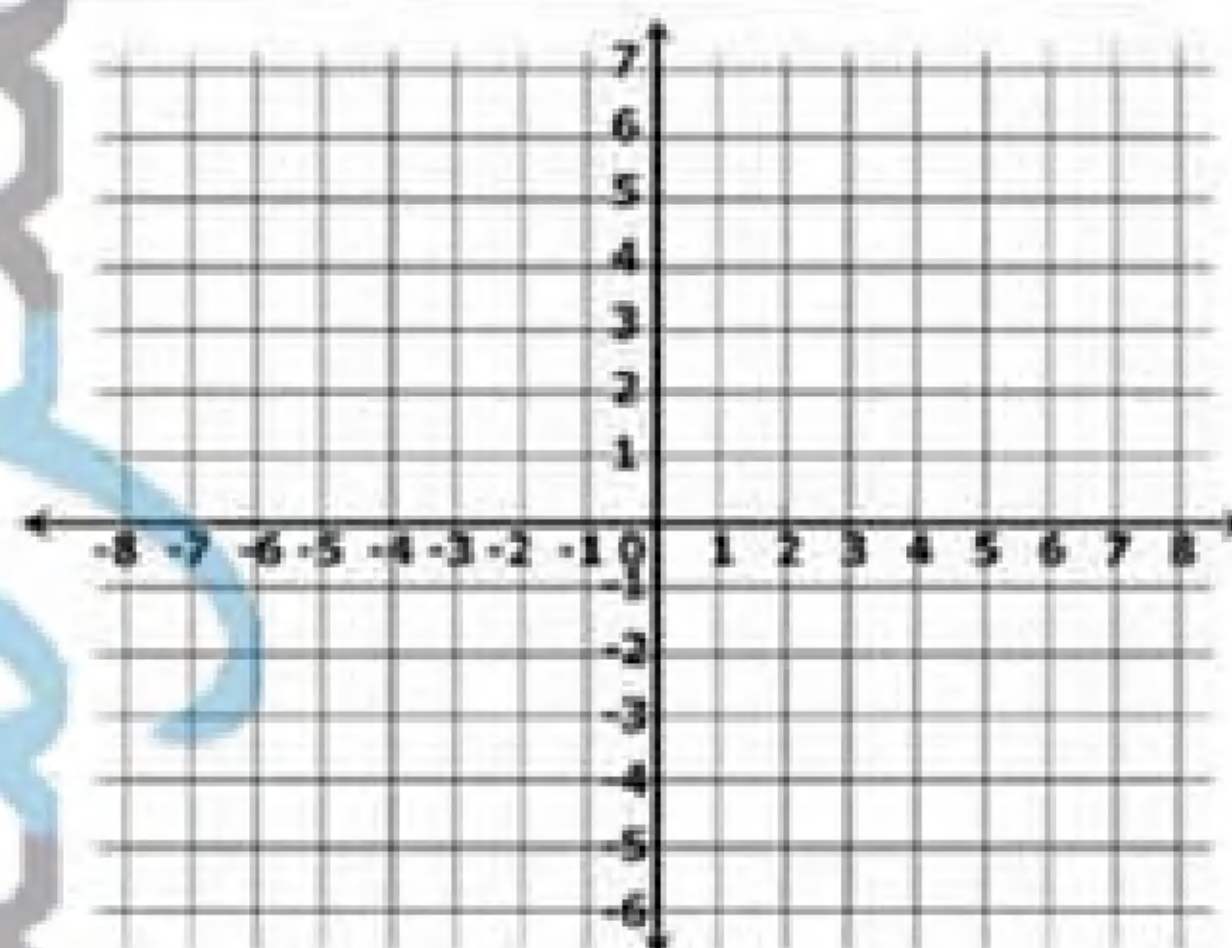
Draw $\triangle ABC$, where $A(1, 1)$,
 $B(-3, -1)$ and $C(0, -5)$ then
 determine graphically its
 image by translation $(5, 0)$



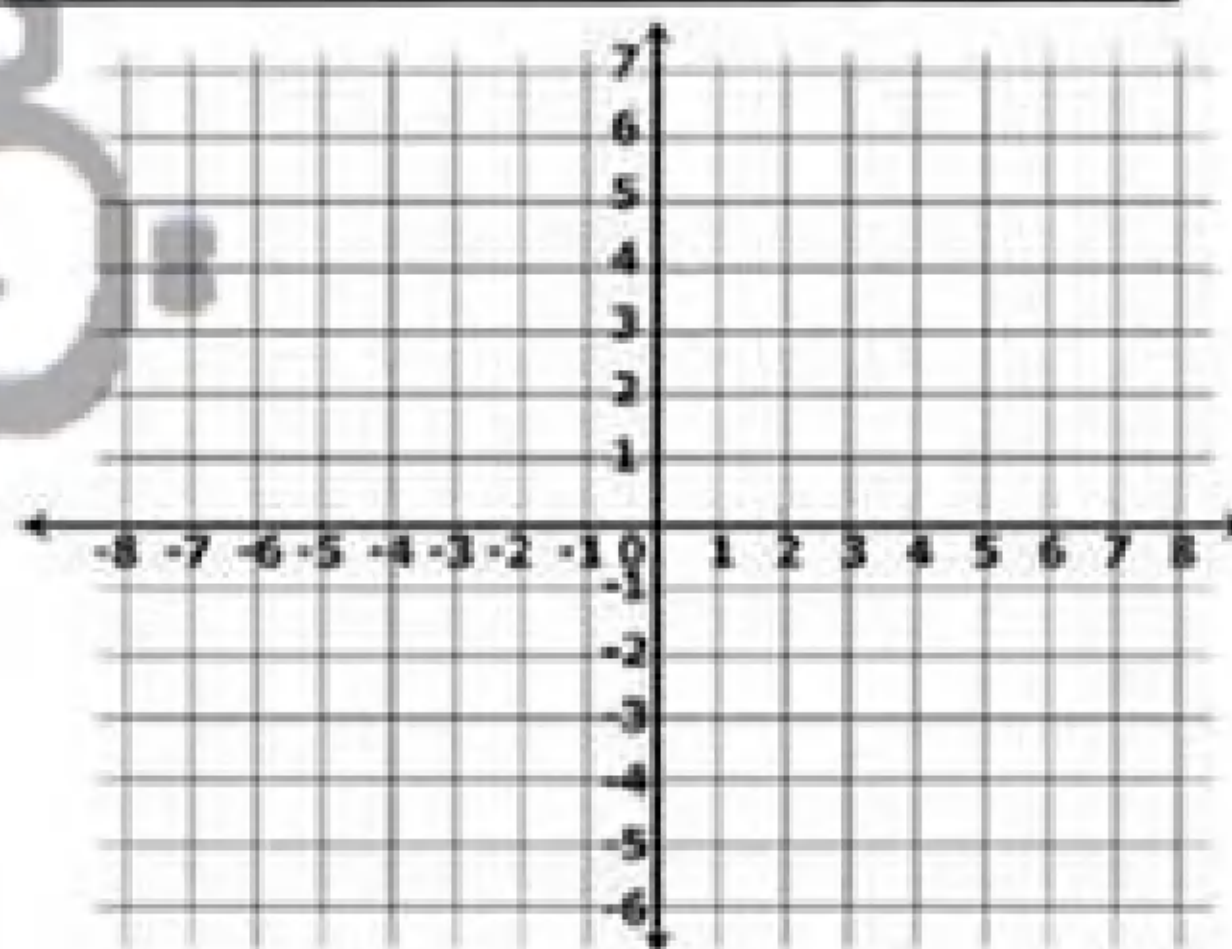
Determine in the coordinate plane
 the following points $A(-3, 4)$,
 $B(1, 4)$ and $C(1, 2)$, then find:
 (a) $AB = \dots\dots\dots$, $BC = \dots\dots\dots$
 (b) The image of $\triangle ABC$ by
 the translation $(0, -3)$



Represent the points $A(2, 3)$,
 $B(4, 3)$ and $C(4, 7)$ in the lattice,
 then find:
 (a) $BC = \dots\dots\dots$ length unit
 , $AB = \dots\dots\dots$ length unit
 (b) The image of $\triangle ABC$ by
 translation $(0, -4)$
 (c) The area of $\triangle ABC$



The point $A'(3, -3)$ is the image of
 the point A by the translation
 $(x, y) \longrightarrow (x-1, y-4)$ Locate A ,
 then by the same translation,
 draw the image of $\triangle ABC$ where
 $B(5, 0)$ and $C(-1, -2)$



Area of the circle

Find the area of the following circles where $\pi \approx 3.14$

a $r = 8 \text{ cm.}$ area =

b $d = 16 \text{ cm.}$ area =

c $r = 5 \text{ km.}$ area =

d $d = 21 \text{ m.}$ area =

e $r = 6.3 \text{ mm.}$ area =

f $d = 28 \text{ km.}$ area =

Find the area of a circle with a radius of length 21 cm. where $\pi \approx \frac{22}{7}$

area =

A circle its diameter is 12 cm. , calculate its area where ($\pi \approx \frac{22}{7}$ or 3.14)

area =



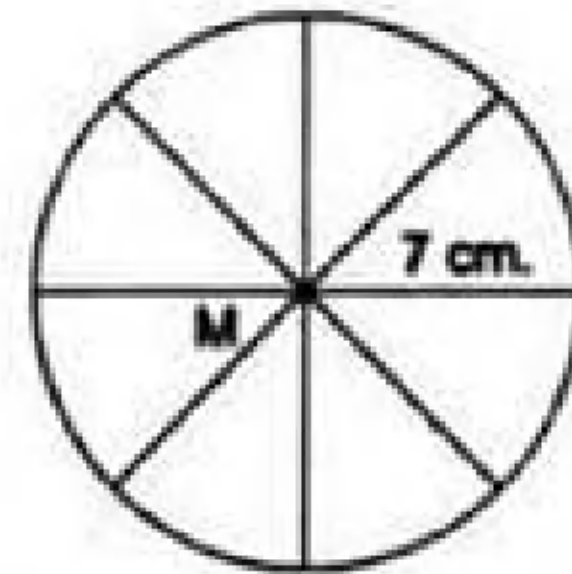
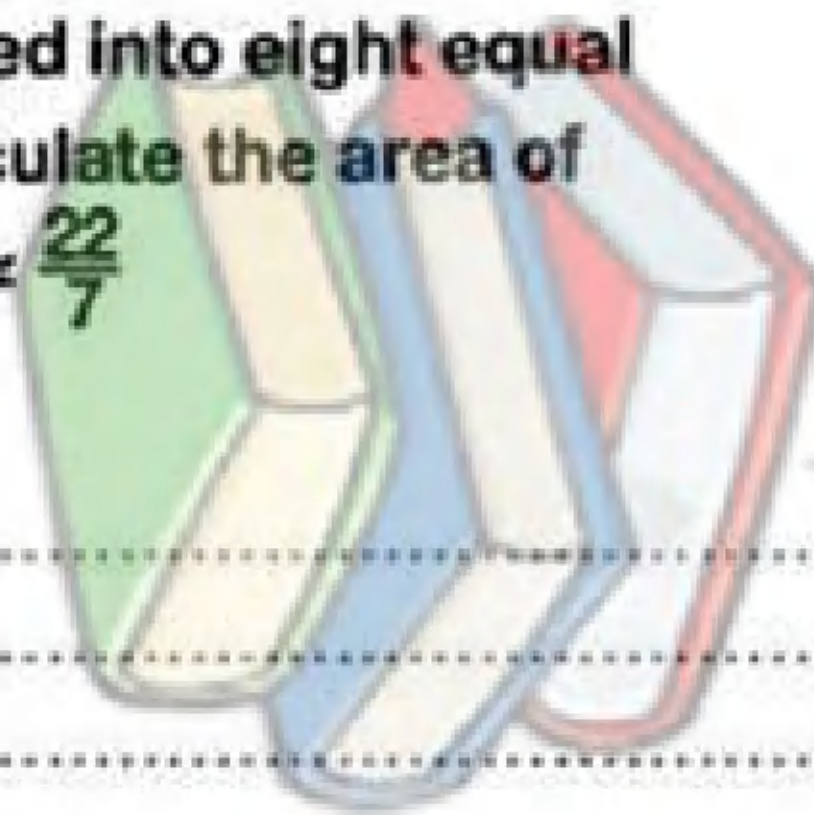
Find the area of a circle with diameter of length 17.5 cm. where $\pi = \frac{22}{7}$

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In the opposite figure , a circle M of radius 7 cm. , is divided into eight equal circular sectors , calculate the area of one sector where $\pi = \frac{22}{7}$



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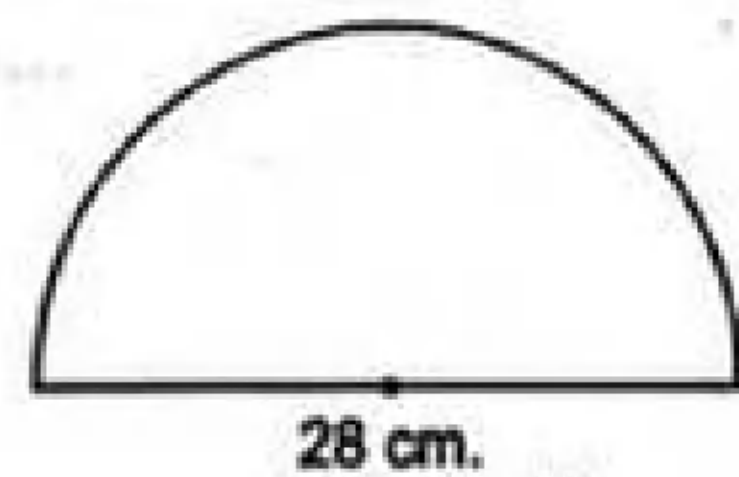
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Find the area of each of the following figures where $\pi = \frac{22}{7}$

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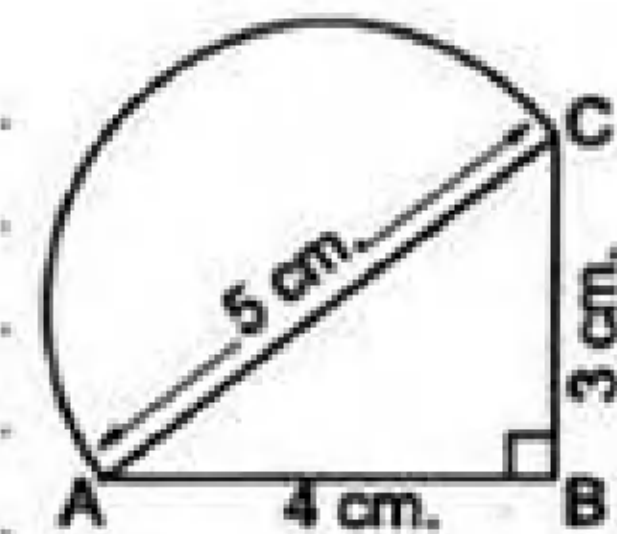
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Find the area of the coloured part of each of the following figures where $\pi = 3.14$

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