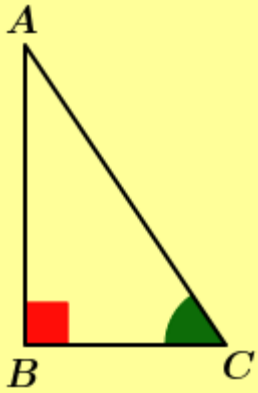
ONLINE MATHS CLASS - X – 59 (13 / 11 /2020)

5 . TRIGNOMETRY - Class 11

What did we learn in the previous classes ?

$$\sin C = \frac{\text{opposite side of } \angle C}{\text{hypotenuse}}$$

$$\cos C = \frac{\text{adjacent side of } \angle C}{\text{hypotenuse}}$$

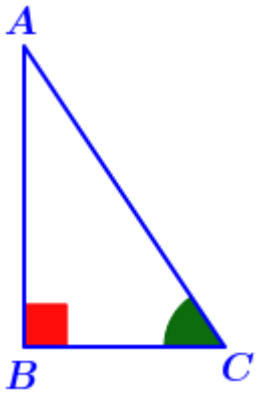


Another measure

The number got by dividing the opposite side of an angle by the adjacent side in right triangles is a called the tangent of the angle and is shorted as tan

In triangle ABC , $\angle B = 90^0$.

$$\tan C = \frac{\text{opposite side of } \angle C}{\text{adjacent side of } \angle C} = \frac{AB}{BC}$$

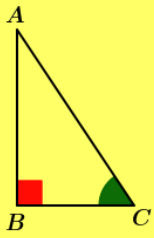


,

NOTE :

In other words , the tan of an angle in a right triangle shows how much times the adjacent side is the opposite side .

$$\tan C = \frac{\text{opposite side of } \angle C}{\text{adjacent side of } \angle C}$$

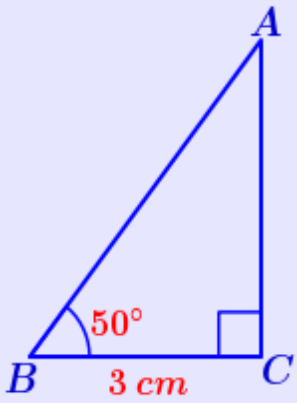


Let's solve some problems related to this idea

(1) ***In triangle ABC , BC = 3 cm , < C = 90 °***

< B = 50 °

What is the length of AC ?



Answer

$$\tan 50^0 = \frac{\text{opposite side of } 50^\circ}{\text{adjacent side of } 50^\circ} = \frac{AC}{BC}$$

$$\tan 50^0 = \frac{AC}{3}$$

$$3 \times \tan 50^\circ = AC$$

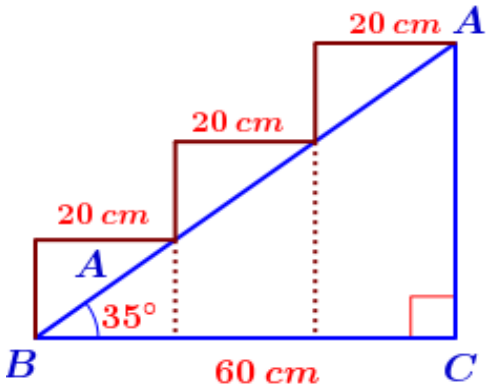
$$AC = 3 \times 1.1918 = 3.5754 \ cm$$

(2) ***In the figure a man is standing on the third step of a stair . The width of each step is 20 cm . The slant of the stair makes an angle 35⁰ with the floor . How high is the man standing from the floor ?***

Answer

In triangle ABC , < C = 90⁰ , < B = 35 ⁰

BC = 20 + 20 + 20 = 60 cm



$$\tan 35^0 = \frac{\text{opposite side of } 35^\circ}{\text{adjacent side of } 35^\circ} = \frac{AC}{BC}$$

$$\tan 35^0 = \frac{AC}{60}$$

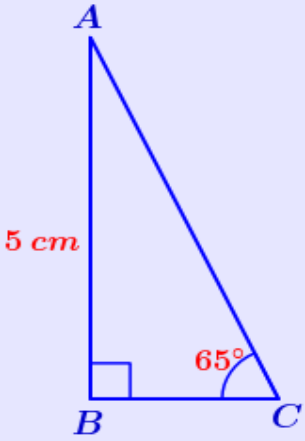
$$60 \times \tan 35^\circ = AC$$

$$AC = 60 \times 0.7002 = 42.012\ cm$$

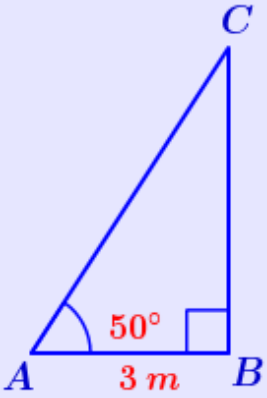
More activities

(1) ***In right triangle ABC , AB = 5 cm , < C = 65 °***

Find the length of BC ?



(2) ***From the top of a vertical post , a rope is stretched and tied to the ground 3 metres away from the post .The rope makes an angle of 50 ⁰ with the ground . Find the the height of the post ?***

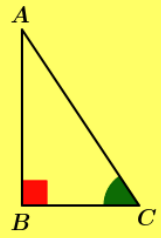


ONLINE MATHS CLASS - X – 60 (16 / 11 /2020)

5 . TRIGNOMETRY - Class 12

What did we learn in the class ?

$$\tan C = \frac{\text{opposite side of } \angle C}{\text{adjacent side of } \angle C}$$



Let's solve some problems related to this idea

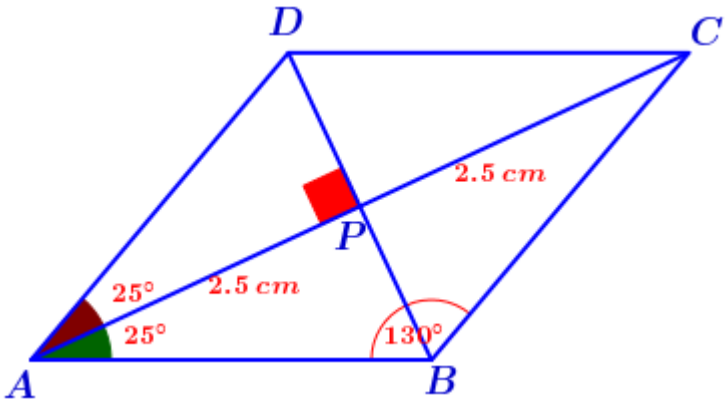
(1) ***One angle of a rhombus is*** 50^0 ***and the larger diagonal is*** 5 ***cm . What is its area ?***

Answer .

In rhombus ABCD , $\angle DAB = 50^0$

$AC = 5$ ***cm*** ($\angle ABC = 130^0$,

diagonal opposite to larger angle is larger)



$\angle APD = 90^0$

$$AP = BP = \frac{5}{2} = 2.5\ cm$$ (***The diagonals of a rhombus bisect each other at right angles***)

$\angle DAP = \angle BAP = 25°$ (***Diagonals of a rhombus bisect its angles***)

In right triangle APD ,

$$\tan 25^0 = \frac{\text{opposite side of } 25°}{\text{adjacent side of } 25°} = \frac{DP}{AP}$$

$$\tan 25^0 = \frac{DP}{2.5}$$

$$DP = 2.5 \times \tan 25^\circ = 2.5 \times 0.4663 \ cm$$

$$BD = 2 \times DP = 2 \times 2.5 \times 0.4663 \ cm$$

$$\text{Area of the rhombus} = \frac{1}{2} AC \times BD$$

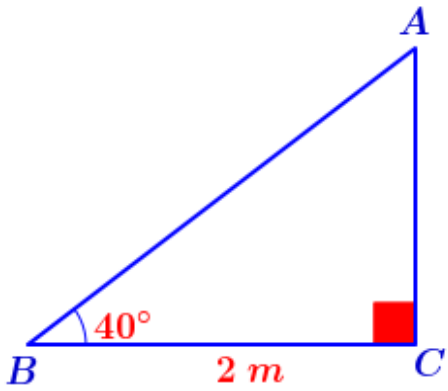
$$= \frac{1}{2} \times 5 \times 2 \times 2.5 \times 0.4663 \ cm^2$$

(2) ***A ladder leans against a wall , with its foot 2 metres away from the wall and the angle with the floor 40 ^{0} . How high is the top end of the ladder from the ground ?***

Answer .

In right triangle ACB ,

$$\tan 40^0 = \frac{\text{opposite side of } 40^\circ}{\text{adjacent side of } 40^\circ} = \frac{AC}{BC}$$



$$\tan 40^0 = \frac{AC}{2}$$

$$AC = 2 \times \tan 40^\circ = 2 \times 0.8391 = 1.6782 \ m$$

Height of the top end of the ladder from the ground = 1.6782 m

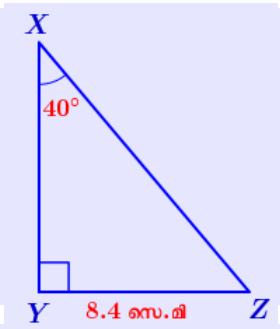
More activity

Find the values of tan 30 ^{0} , tan 45 ^{0} , tan 60 ^{0} without using the trignometric table ?

ONLINE MATHS CLASS - X – 60 (16 / 11 /2020)

WORKSHEET

(1) *In the figure* $YZ = 8.4\ cm$, $< Y = 90^0$, $< X = 40^0$



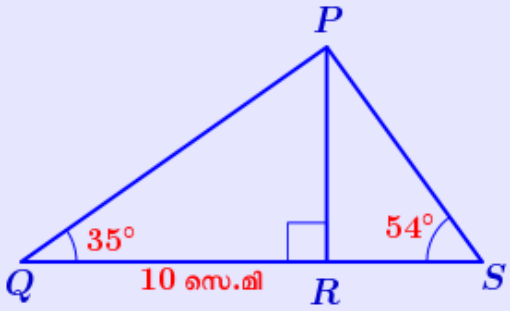
a) *What is the length of* XY ?

b) *What is the area of the triangle* XYZ ?

(*hint* : $\tan 40^0 = 0.84$)

(2) *In the figure* $QR = 10\ cm$, $< PRQ = 90^0$,

$< Q = 35^0$, $< S = 54^0$



a) *What is the length of* PR ?

b) *What is the length of* RS ?

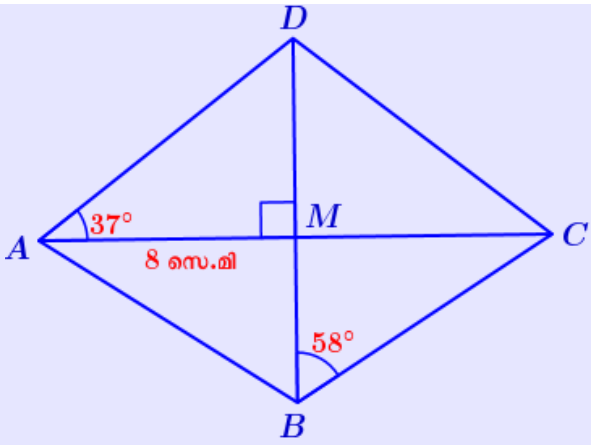
c) *What is the area of the triangle* PQS ?

(*hint* : $\tan 35^0 = 0.7$, $\tan 54^0 = 1.4$)

(3) *In the figure* M *is the mid point of* AC .

$AM = 8\ cm$, $<AMD = 90^0$, $< DAM = 37^0$

$< CBM = 58^0$



a) *What is the length of* DM ?

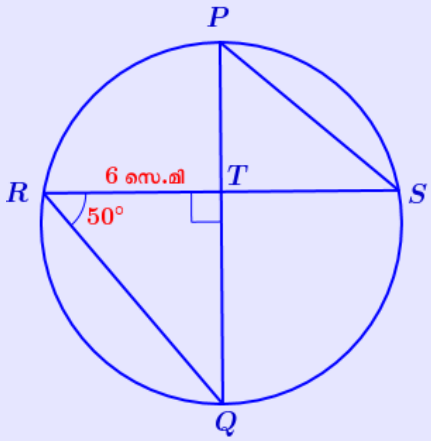
b) *What is the length of* BM ?

c) *What is the area of the triangle* ADC ?

d) *What is the area of the quadrilateral* ABCD ? (*hint* : $\tan 37^0 = 0.75$, $\tan 58^0 = 1.6$)

(4) *In the figure* PQ *is the diameter of the circle* .

$RT = 6\ cm$, $< QTR = 90^0$, $< QRT = 50^0$



a) *What is the length of* QT ?

b) *What is the measure of* $< QPS$?

c) *What is the length of* TS ?

d) *What is the length of* PQ ? (*hint* : $\tan 50^0 = 1.2$)

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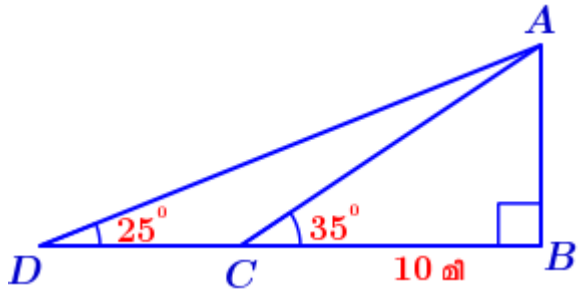
ONLINE MATHS CLASS - X – 64(23 / 11 /2020)

5 . TRIGNOMETRY - Class 16

1. ***When the sun is at an elevation of 35^0 , the shadow of a tree is 10 metres . What would be the length of the shadow of the same tree , when the sun is at an elevation of 25^0 ?***

Answer



Height of the tree = AB

In right triangle ABC ,

$$\tan 35^0 = \frac{\text{opposite side of } 35^\circ}{\text{adjacent side of } 35^\circ} = \frac{AB}{BC}$$

$$\tan 35^0 = \frac{AB}{10}$$

$$10 \times \tan 35^0 = AB$$

$$AB = 10 \times 0.70 = 7 \text{ മീ}$$

In right triangle ABD ,

$$\tan 25^0 = \frac{\text{opposite side of } 25^\circ}{\text{adjacent side of } 25^\circ} = \frac{AB}{BD}$$

$$\tan 25^0 = \frac{7}{BD}$$

$$BD \times \tan 25^0 = 7$$

$$BD = \frac{7}{\tan 25^0} = \frac{7}{0.4663} \ m$$

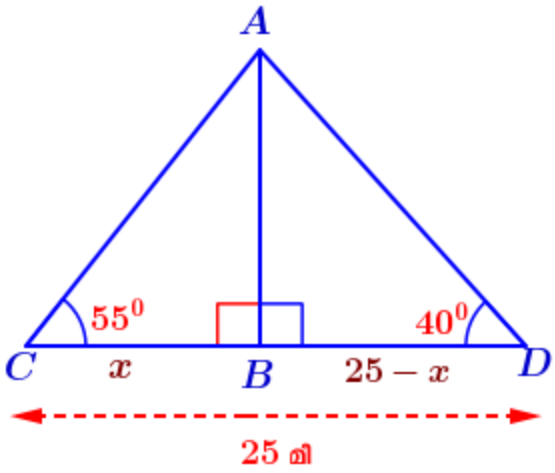
Length of the shadow of the tree when the sun is at an elevation of 25^0 = $\frac{7}{0.4663} \ m$

2. *From the top of an electric post , two wires are stretched to either side and fixed to the ground , 25 metres apart . The wires make angles* 55^0 *and* 40^0 *with the ground . What is the height of the post ?*

Answer

Height of the post = AB

In right triangle ABC ,



$$\tan 55^0 = \frac{\text{opposite side of } 55^\circ}{\text{adjacent side of } 55^\circ} = \frac{AB}{BC}$$

$$\tan 55^0 = \frac{AB}{x}$$

$$AB = x \times \tan 55^\circ = x \times 1.43 = 1.43\,x \qquad \text{(1)}$$

In right triangle ABD ,

$$\tan 40^0 = \frac{\text{opposite side of } 40^\circ}{\text{adjacent side of } 40^\circ} = \frac{AB}{BD}$$

$$\tan 40^0 = \frac{AB}{25 - x}$$

$$AB = (25 - x)\tan 40^\circ = 25 \times \tan 40^\circ - x \times \tan 40^\circ$$

$$= 25 \times 0.84 - x \times 0.84 = 21 - 0.84\,x \qquad \text{(2)}$$

Equating the values of AB from the equations 1 and 2 , we get

$$1.43\,x = 21 - 0.84\,x$$

$$1.43\,x + 0.84\,x = 21$$

$$2.27\,x = 21$$

$$x = \frac{21}{2.27}$$

Height of the post $= AB = 1.43\,x = 1.43 \times \frac{21}{2.27}\ m$

More activity

A 1.5 metre tall man , standing at the foot of a tower , sees the top of a hill 40 metres away at an elevation of 30^0 . The completed building was 10 metres higher and the boy saw its top at an elevation of 60^0 from the same spot .What is the height of the building ?

ONLINE MATHS CLASS - X – 64(23 / 11 /2020)

WORKSHEET

(1) ***Manu and Nandu stand on either side of a building . Manu sees the top of the building at an elevation of 45^0 and Nandu sees it an elevation of of 60^0 . The distance between the children is 100 metres .The building and the children are on the same line .***

a) ***Draw a rough figure based on the given details ?***

b) ***What is the height of the building ?***

(2) ***Two boys stand on either side of a hill . First boy sees the top of the hill at an elevation of 60^0 and the second boy sees it at an elevation of 30^0 .The distance between the boys is 400 metres .The hill and the boys are on the same line.***

a) ***Draw a rough figure based on the given details ?***

b) ***What is the height of the hill ?***

(3) ***Geetha and Radha stand on either side of a tower .Geetha sees the top of the tower at an elevation of 35^0 and Radha sees its top at an elevation of 55^0 .The distance between the children is 190 metres .The children and the tower are on the same line .***

a) ***Draw a rough figure based on the given details ?***

b) ***What is the height of the tower ?*** **(*hint* : $\tan 35^0 = 0.7$, $\tan 50^0 = 1.2$)**

(4) ***Two boys stand on either side of a hill . First boy sees its top at an elevation of 52^0 and the second boy sees its top at an elevation of 72^0 .The hill and the children are on the same line .The distance between the children is 440 metres.***

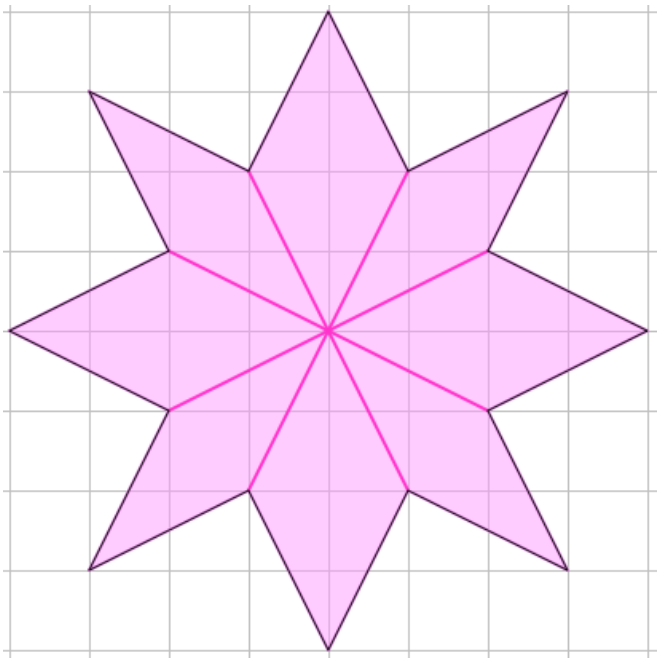
a) ***Draw a rough figure based on the given details ?***

b) ***What is the height of the hill ?*** **(*hint* : $\tan 52^0 = 1.3$, $\tan 72^0 = 3.1$)**

ONLINE MATHS CLASS - X – 66 (26 / 11 /2020)

6 . COORDINATES - Class 1

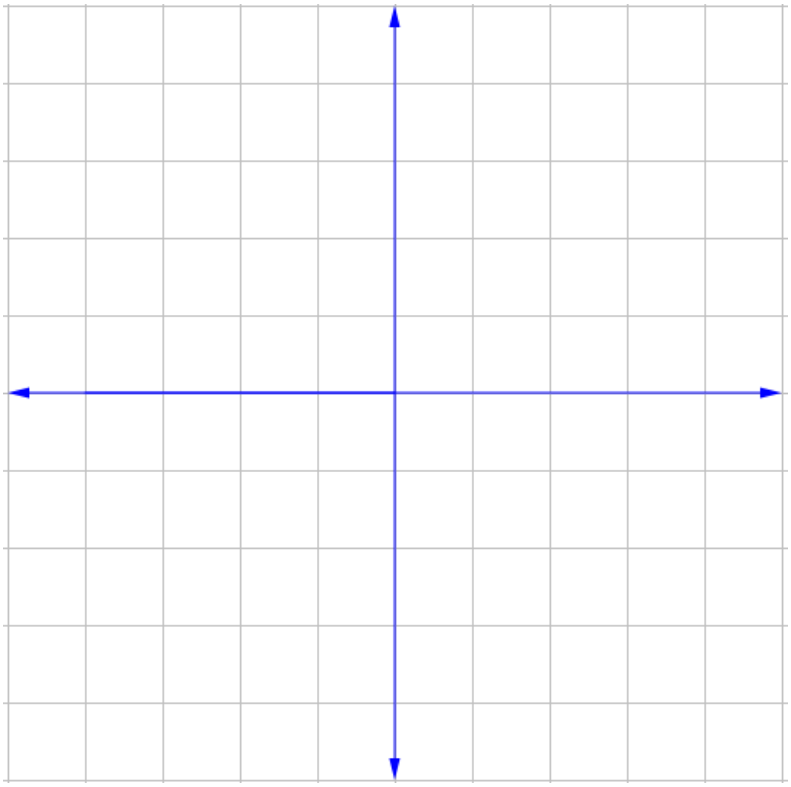
Activity 1



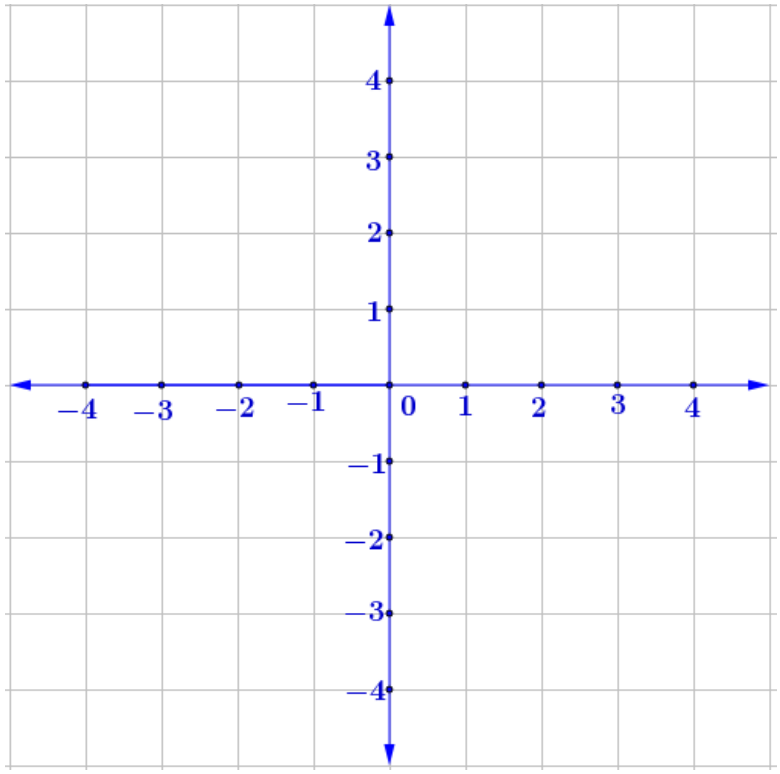
Draw this figure ?

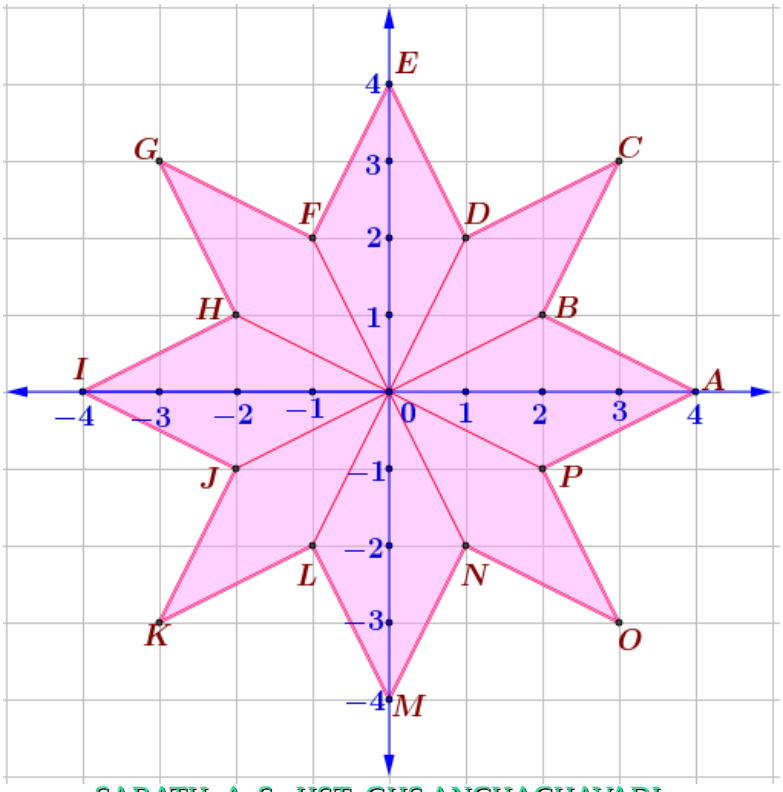
First we draw square cells and then join some of the corners to draw the figure .

For this , first we have to draw a line horizontally and then draw a line perpendicular to it .



- *The point of intersection of these perpendicular lines is denoted by zero .*
- *Distances to the right of zero are to be taken positive .*
- *Distances to the left of zero are to be taken negative .*
- *Upward distances from zero are to be taken positive .*
- *Downward distances from zero are to be taken negative .*





The corners of this figure are named as A, B ,C ,D , E , F , G ,H . I , J , K ,. L , M , N , O and P

Here , the corner B is reached from zero by moving 2 cells to the right and then 1 cell up . So B can be represented by the number pair (2 , 1) .

Similarly we can find the number pair associated with each corner of this figure as shown in the table given below

Point	Position of the point with respect to zero	Number pair associated with the point
B	2 cells to the right and then 1 cell up	(2 , 1)
C	3 cells to the right and then 3 cells up	(3 , 3)
D	1 cell to the right and then 2 cells up	(1 , 2)
F	1 cell to the left and then 2 cells up	(- 1 , 2)
G	3 cells to the left and then 3 cells up	(- 3 , 3)
H	2 cells to the left and then 1 cell up	(- 2 , 1)
J	2 cells to the left and then 1 cell down	(- 2 , - 1)
K	3 cells to the left and then 3 cells down	(- 3 , - 3)
L	1 cell to the left and then 2 cells down	(-1 , - 2)
N	1 cell to the right and then 2 cells down	(1 , - 2)
O	3 cells to the right and then 3cells down	(3 , - 3)
P	2 cells to the right and then 1 cell down	(2 , - 1)

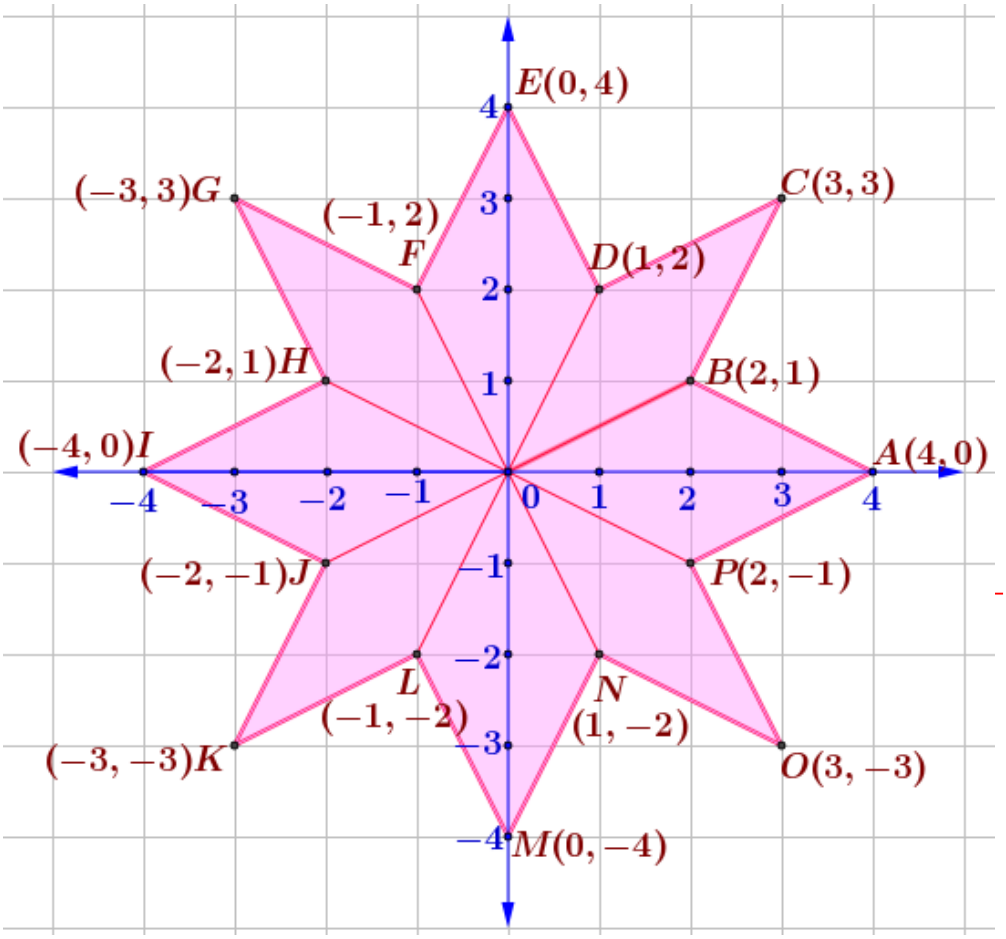
But , the corner A is 4 centimetres to the right of zero , neither up or down .

So the number pair of A is represented as (4 , 0) .

Also , the corner E is 4 centimetres straight up from zero , neither left or right .

So the number pair of E is represented as (0 , 4) .

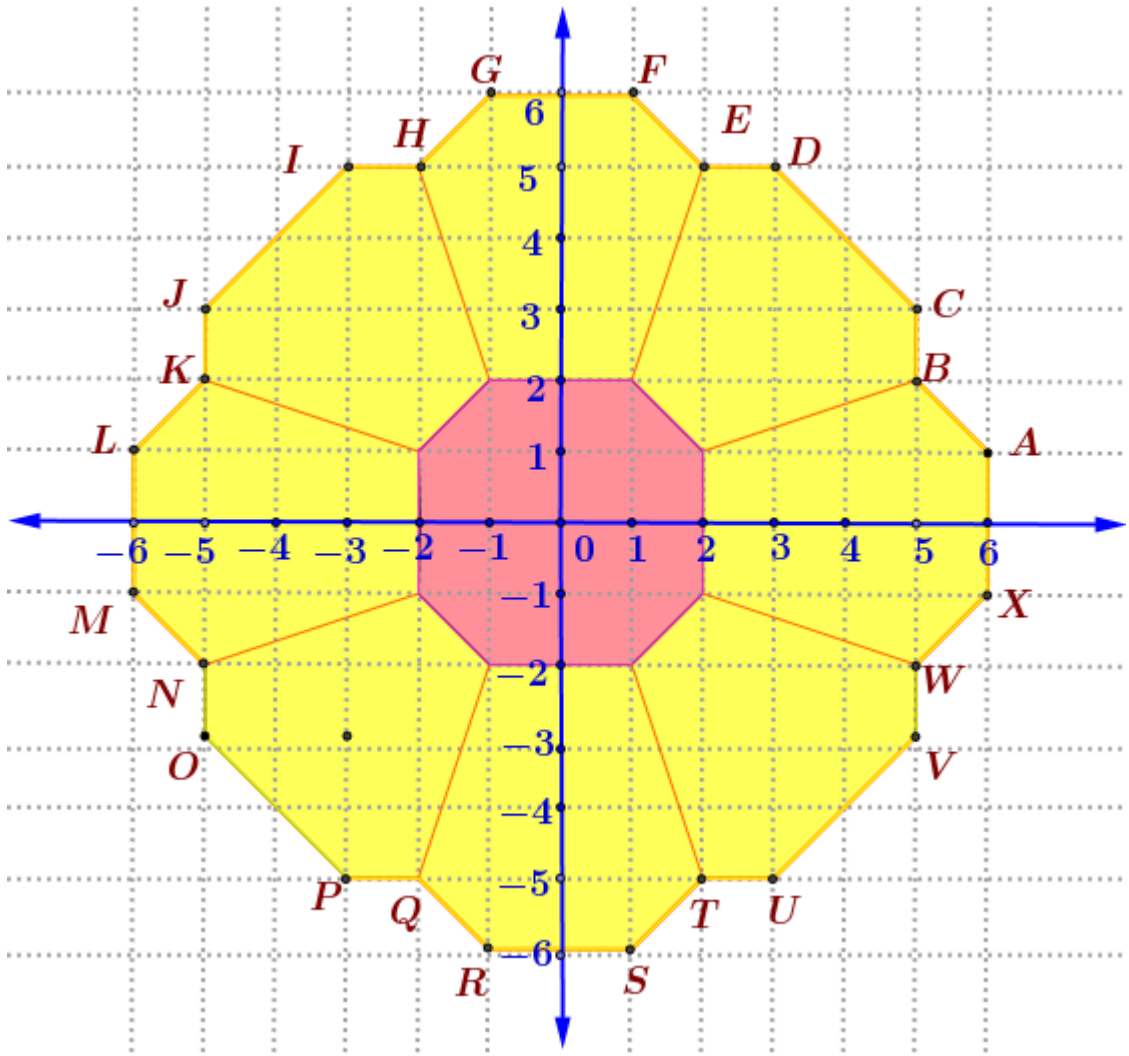
Point	*Position of the point with respect to zero*	*Number pair associated with the point*
A	*4 centimetres to the right of zero , neither up or down .*	**(4 , 0)**
I	*4 centimetres to the left of zero , neither up or down .*	**(- 4 , 0)**
E	*4 centimetres straight up from zero , neither left or right*	**(0 , 4)**
M	*4 centimetres straight down from zero , neither left or right*	**(0, - 4)**



Findings

- *If we denote points by number pairs , the first number shows distance to the right or left from zero .*
- *If we denote points by number pairs , the second number shows distance to the up or down from zero .*
- *Upward distances from zero are to be taken positive .*
- *Downward distances from zero are to be taken negative .*

Write the number pairs of the corners marked in the figure .



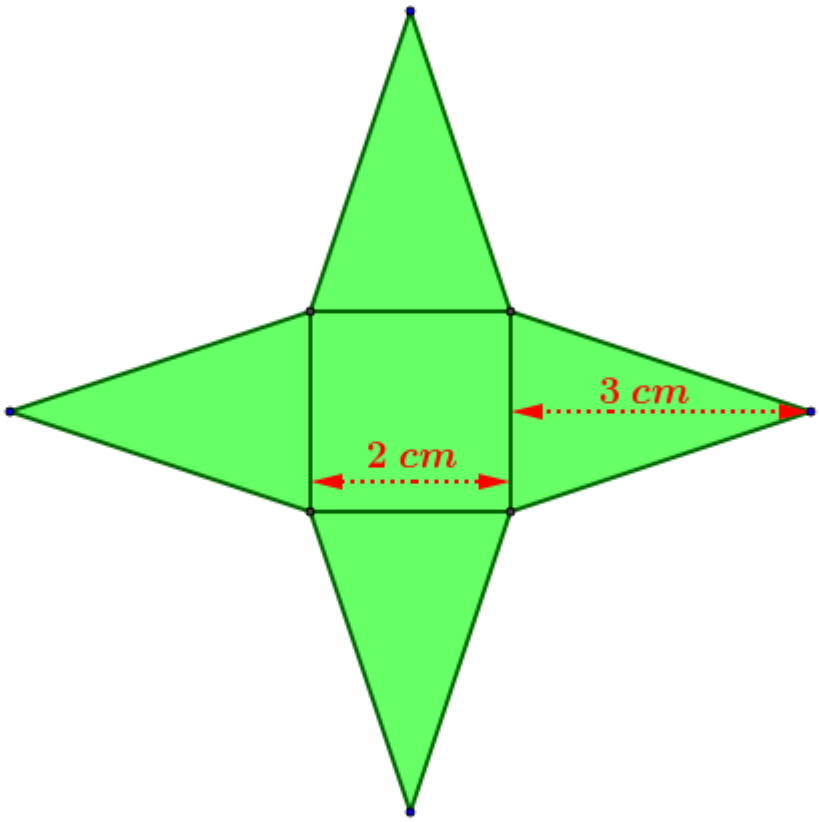
Answer

A	B	C	D	E	F	G	H	I	J
(6 ,1)	(5 ,2)	(5 ,3)	(3 ,5)	(2 ,5)	(1 ,6)	(-1 ,6)	(-2 ,5)	(-3 ,5)	(-5 ,3)

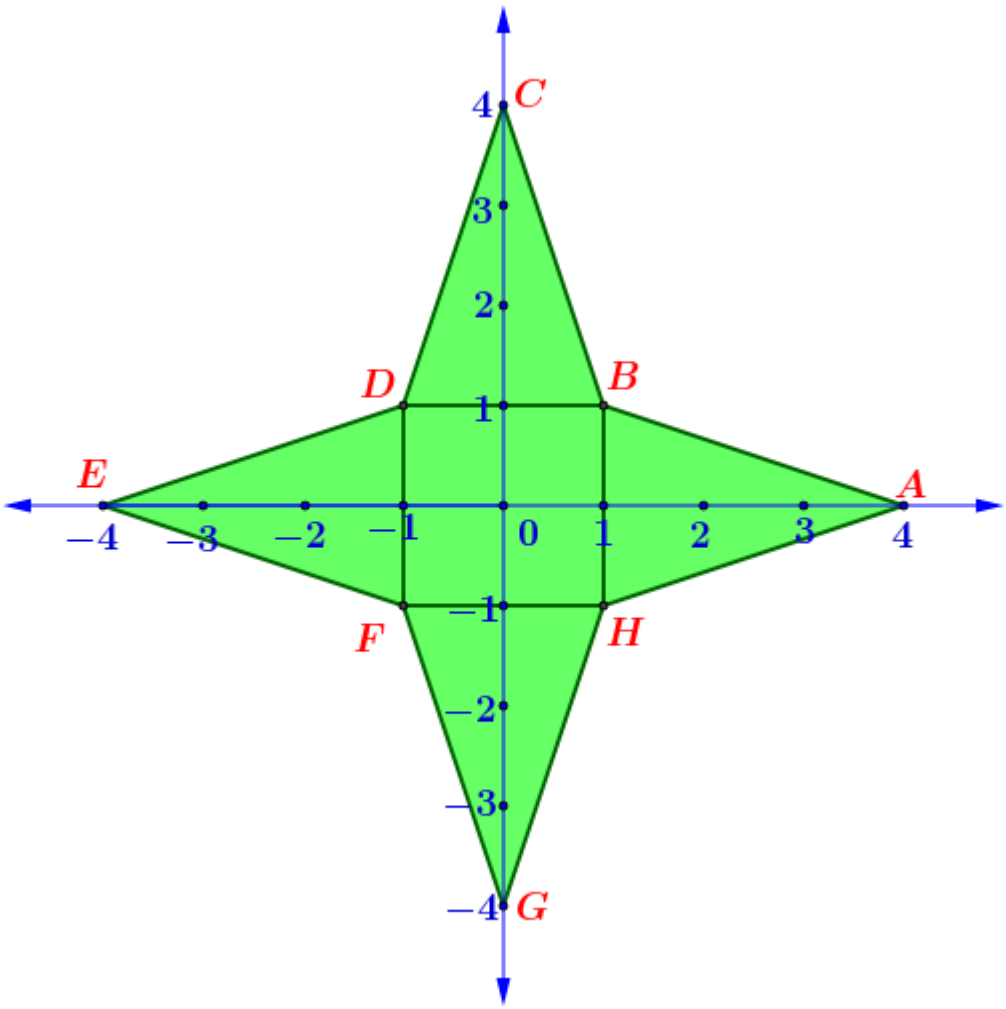
K	L	M	N	O	P	Q	R	S	T
(-5 ,2)	(-6 ,1)	(-6 ,-1)	(-5 ,-2)	(-5 ,-3)	(-3 ,-5)	(-2 ,-5)	(-1 ,-6)	(1 ,-6)	(2 ,-5)

U	V	W	X
(3 ,-5)	(5 ,-3)	(5 ,-2)	(6 ,-1)

Activity 2



Draw this figure and write the number pairs of the corners ?



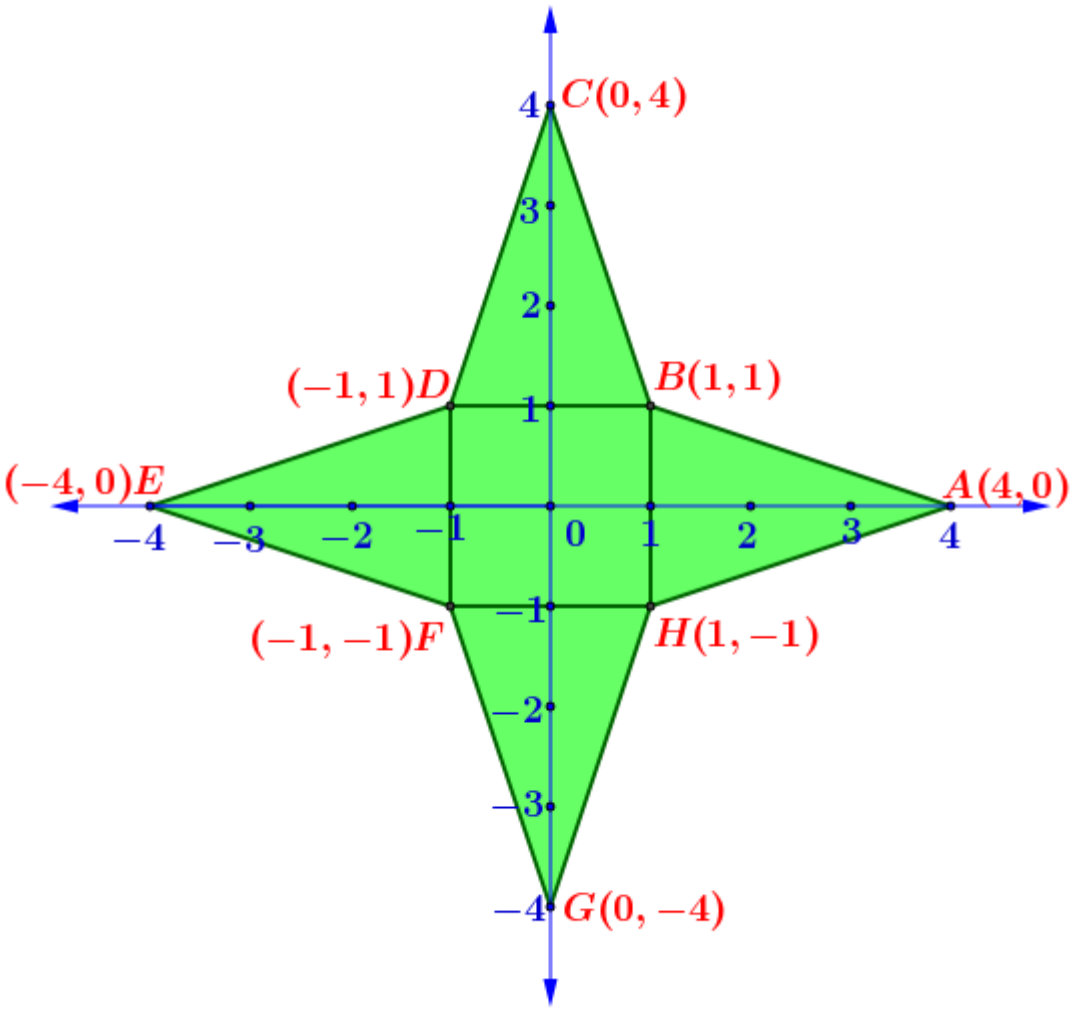
Here also , first we have to draw a line horizontally and then draw a line perpendicular to it as we have done in the last activity . We can find the number pairs of the corners without split the figure into small squares as described below .

Here the point B is 1 centimetre to the right and then 1 centimetre up from zero , so the number pair of B is (1 , 1)

The point A is 4 centimetres to the right of zero , neither up or down . So the number pair of A is (4 , 0)

Point	*Position of the point with respect to zero*	*Number pair associated with the point*
B	**1 *centimetre to the right and then* 1 *centimetre up***	**(1 , 1)**
D	**1 *centimetre to the left t and then* 1 *centimetre up***	**(- 1 , 1)**
F	**1 *centimetre to the left t and then* 1 *centimetre down***	**(- 1 , - 1)**
H	**1 *centimetre to the right and then* 1 *centimetre down***	**(1 , - 1)**

The number pairs of A , C , E and G are written in the same way we have done in the last activity .



Conclusion

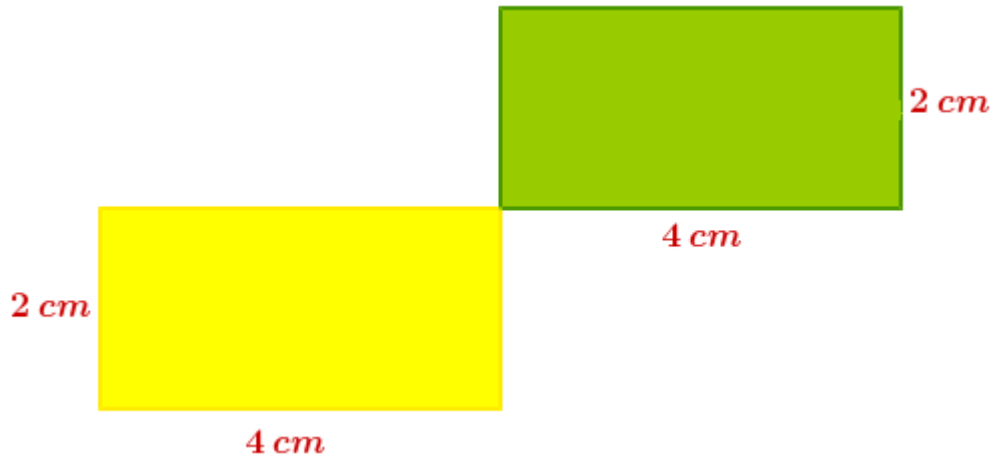
The perpendicular lines we draw to mark the position of the points are called the axes of coordinates .

The horizontal line is called the x axis and the vertical line is called the y axis .

Once axes are drawn , we can denote the position of any point using a pair of numbers .

These numbers are called the coordinates of the point .

More activity



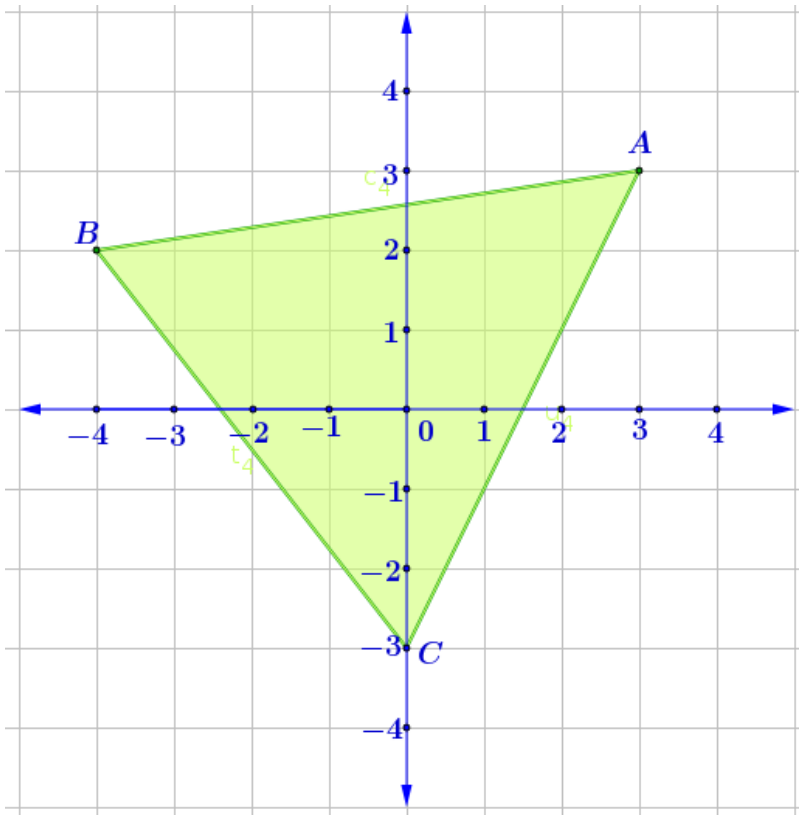
Draw the coordinate axes and find the coordinates of the corners of the two rectangles .

ONLINE MATHS CLASS - X – 66 (26 / 11 /2020)

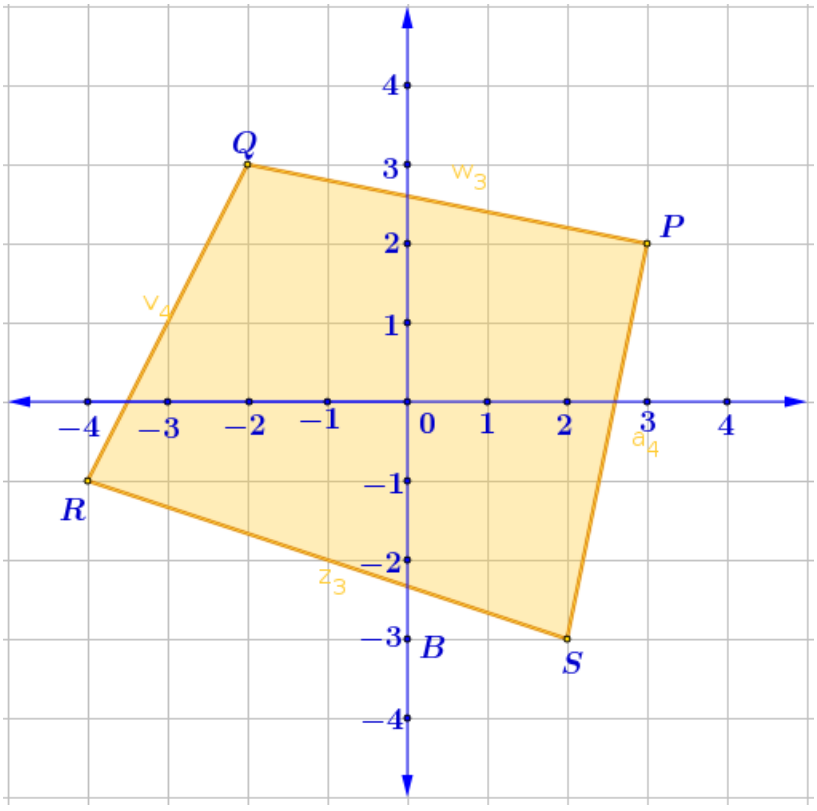
WORKSHEET

Write down the coordinates of the corners of the polygons given below ?

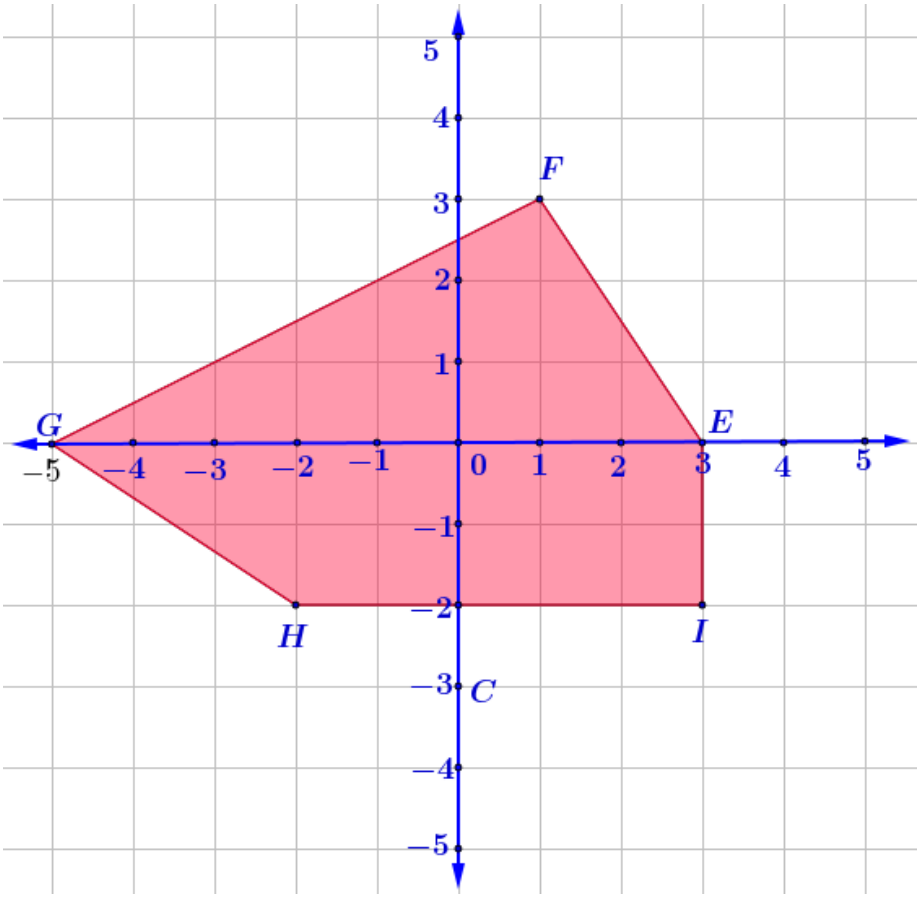
a)



b)



c)



d)