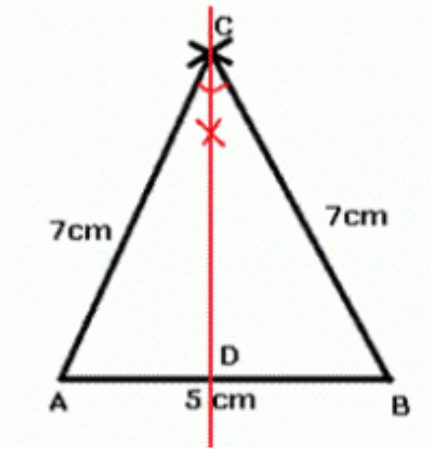
Chapter 14. Symmetry

Ex 14.1

Answer 1.



Steps of construction:

(i) Draw a line segment AB = 5 cm

(ii) With A as centre, cut an arc of 7 cm on one side of line segment AB.

(iii) With B as centre, cut an arc of 7 cm on same side of line segment AB. Let the point be C.

(iv) Join AC and BC. ABC is the required triangle.

(v) Draw angle bisector of angle C meeting AB at D.

(vi) CD is perpendicular bisector of AB and AC=BC. Hence CD is the line of symmetry.

Isosceles triangle has only one line of symmetry.

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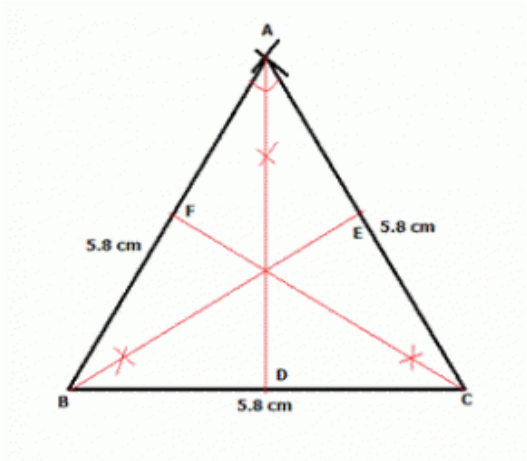
Answer 2.



Steps of construction:

(i) Draw a line segment BC = 5.8 cm.

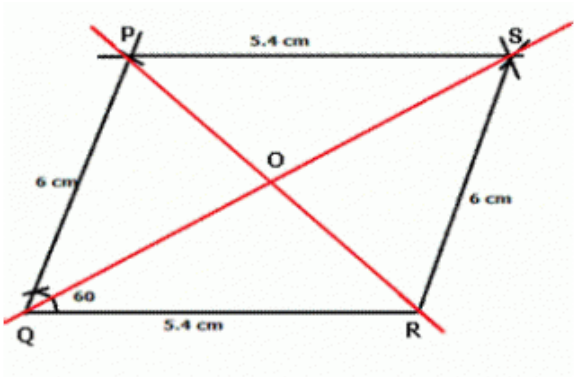
(ii) With B and C as centre and radius = 5.8 cm, draw two arcs which intersect each other at A.

(iii) Join AB and AC. ABC is the required triangle.

(iv) Draw the bisectors AD, BE and CF of ∠A, ∠B and ∠C respectively.

Hence, AD, BE and CF are the lines of symmetry of triangle ABC.

Answer 3.



Steps of construction:

(i) Draw a line segment QR = 5.4 cm

(ii) At Q , draw a ray making an angle of 60 degrees with QR and cut QP = SR = 6 cm

(III) P as centre draw an arc equal to 5.4 cm

(iv) R as centre draw an arc equal to 6 cm which intersects the first arc at S.

(v) Join RS and PS. PQRS is the required parallelogram.

(vi) Join QS and PR which intersect each other at O.

There is no line of symmetry of parallelogram PQRS but it has one point symmetry which is O, the point of intersection of its diagonals.

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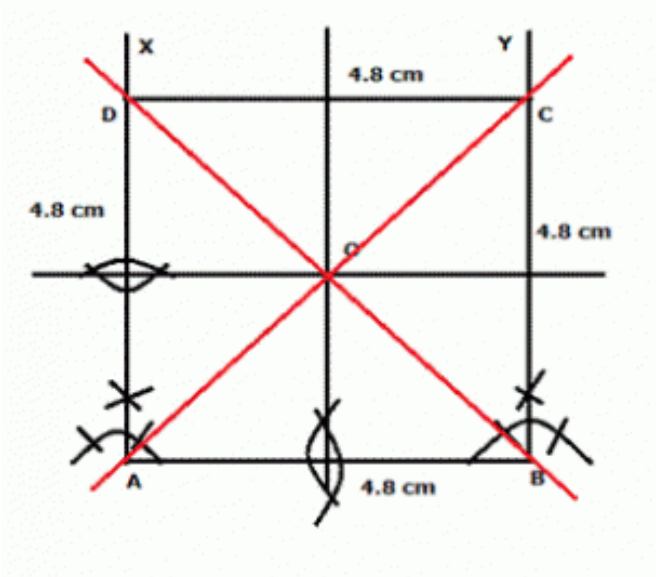
Answer 4.



:eps of construction:

) Draw a line segment AB = 4.8 cm.

) At A and B, draw perpendiculars AX and BY

i) From AX and BY, cut off AD = BC = 4.8 cm

v) Join DC. ABCD is the required square.

) Now draw perpendicular bisectors of AB and AD.

i) Also join the diagonals AC and BD.

The perpendicular bisectors and the diagonals are the lines of symmetry.

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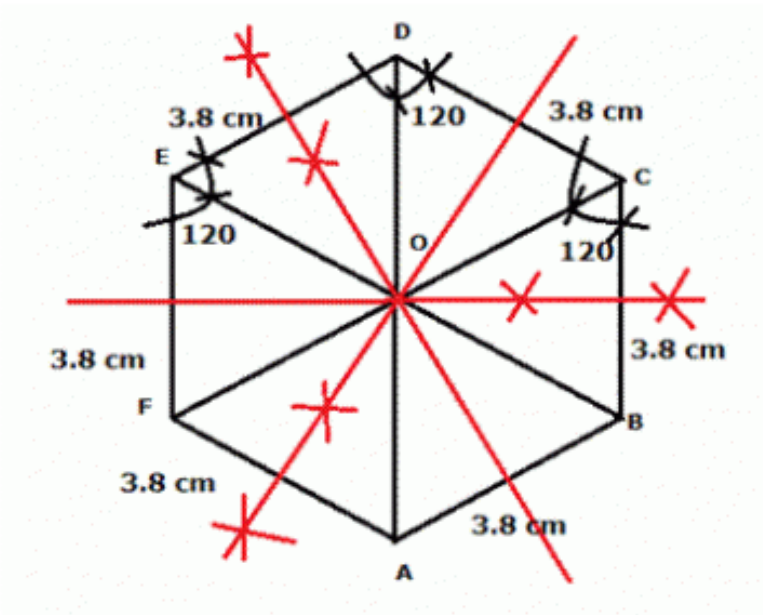
Answer 5.



Steps of construction:

(i) Draw a line segment AB = 3.8 cm

(ii) At A and B, draw rays making an angle of 120° each and cut off AF = BC = 3.8 cm

(iii) Again at F and C, draw rays making an angle of 120° each and cut off CD = FE = 3.8 cm

(iv) Join DE. ABCDEF is the required hexagon.

(v) Draw perpendicular bisectors of each of the opposite sides and also join AD, BE and CF. These six lines are the lines of symmetry .

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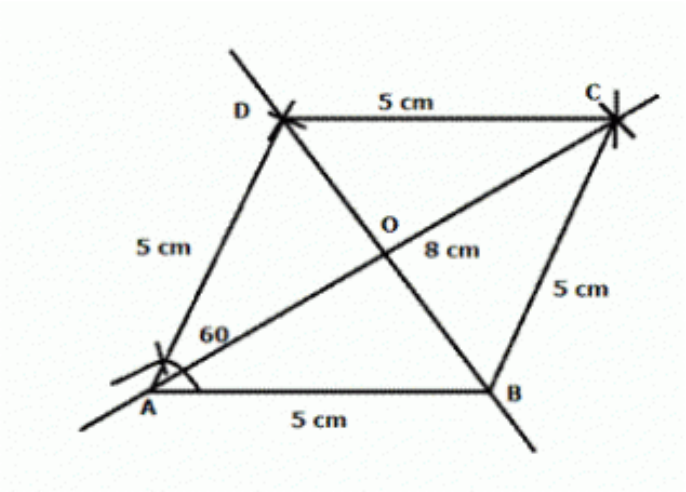
Answer 6.



Steps of construction:

(i) Draw a line segment AB = 5 cm

(ii) With A as centre and radius 8 cm, and B as centre and radius 5 cm , draw arcs which intersect each other at C.

(iii) Join AC and BC.

(iv) Again with centre A and C and radius 5 cm, draw arcs which intersect each other at D

(v) Join AD and CD. ABCD is the required rhombus.

(vi) Join BD.

Two diagonals AC and BD are the lines of symmetry .

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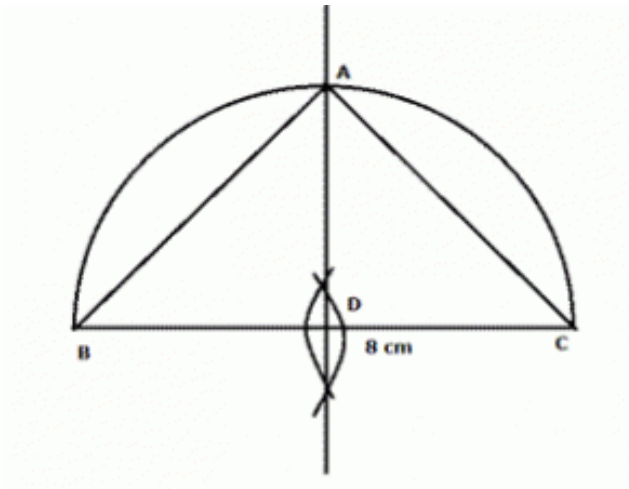
Answer 7.



Steps of construction:

(i) Draw a line segment BC = 8 cm

(ii) Draw its perpendicular bisector which intersects BC at D. With D as centre and BD or CD as radius, draw a semi-circle.

(iii) Produce the perpendicular bisector of BC which intersects the circle at A.

(iv) Join AB and AC. Triangle ABC is the required isosceles right-angled triangle.

The perpendicular bisector of hypotenuse BC is the line of symmetry.

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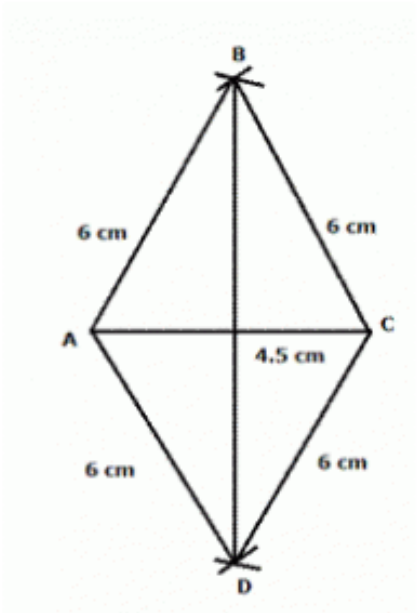
Answer 8.



Steps of construction:

(i) Draw a line segment AC = 4.5 cm

(ii) With B and C as centres and 6 cm as radius , draw arcs which intersect each other at B.

(iii) Join AB and BC. ΔABC is the required triangle.

(iv) Again with B and C as centres and 6 cm as radius , draw arcs which intersect each other at D.

(v) Join AD and DC. ΔADC is the triangle which is the reflection of ΔABC.

ABCD is the required quadrilateral and it is a rhombus.

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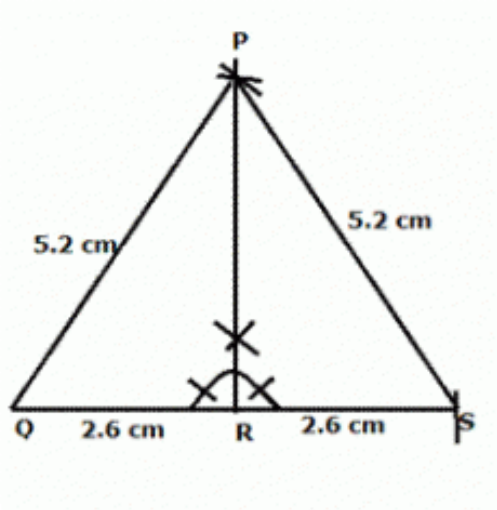
Answer 9.



Steps of construction:

(i) Draw a line segment QR = 2.6 cm

(ii) At R draw a perpendicular to QR.

(iii) With Q as centre and radius 5.2 cm cut an arc on perpendicular to R at P.

(iv) Join PQ. ΔPQR is the required triangle.

(v) Produce QR to S such that RS = 2.6 cm

(vi) With S as centre and radius 5.2 cm cut an arc on perpendicular to R at P.

(vii) Join PS. ΔPSR is the triangle which is the reflection of ΔPQR.

ΔPQS is the required triangle and is an equilateral triangle.

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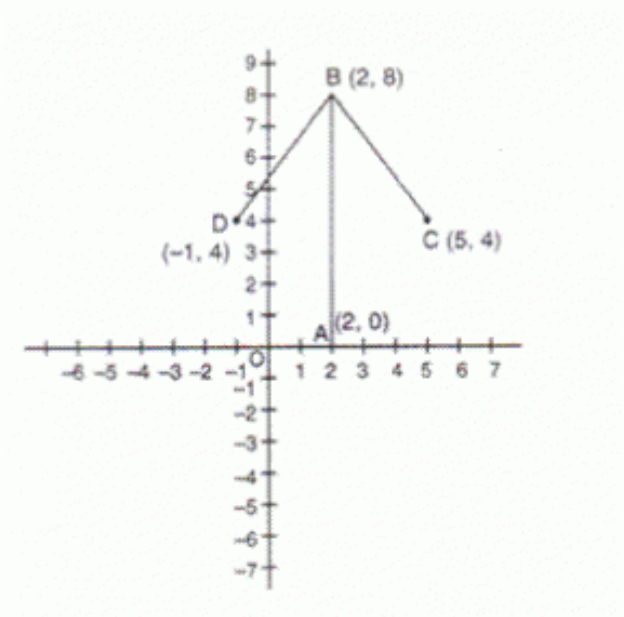
Answer 10.



Steps of construction:

(i) Plot the points A, B and C as per given data.

(ii) Point D symmetrical about AB is a point with vertices x= -1 and y = 4 i.e. 3 units left of line AB.

(iii) Plot D(-1,4)

(iv) Join BC, AB, BD

The figure is an arrow

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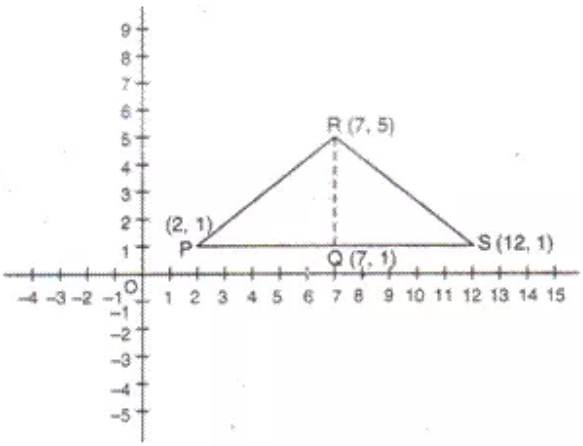
Answer 11.



Steps of construction:

(i) Plot the points P, Q and R as per given data.

(ii) Point S symmetrical about QR is a point with vertices x= 12 and y = 1 i.e. 5 unit right of line RQ.

(iii) Plot S(12,1)

(iv) Join PR, PS and RS

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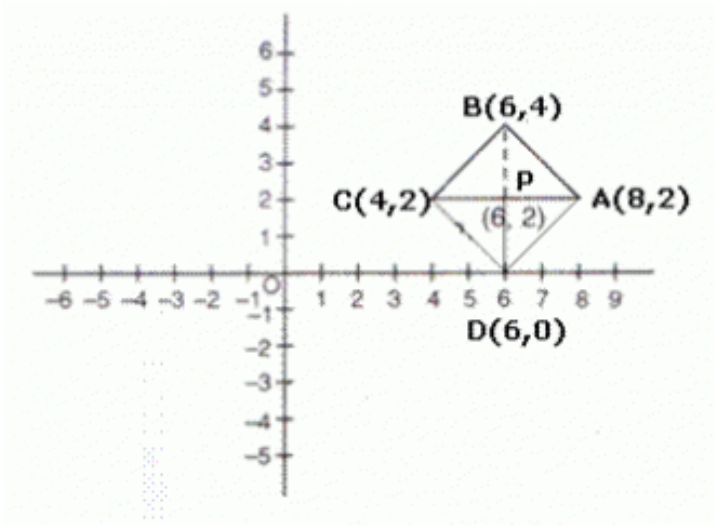
Answer 12.



Steps of construction:

(i) Plot the point A and B on the graph.

(ii) Plot point P whose vertices are x = 6 and y = 2. P is the point of symmetry.

(iii) Point symmetric to A(8,2) in the line x = 6 is C(4,2)

(iv) Point symmetric to B(6,4) in the line y = 2 is D(6,0)

(v) Join AP, PC, BP and PD.

Since BD = 4,

$$AD = \sqrt{(8-6)^2+(2-0)^2}$$
$$= \sqrt{2^2+2^2} = \sqrt{4+4} = \sqrt{8}$$

$$AB = \sqrt{(8-6)^2+(2-4)^2}$$
$$= \sqrt{2^2+(-2)^2} = \sqrt{4+4} = \sqrt{8}$$

$$\therefore BD^2 = AD^2 + AB^2$$
$$4^2 = (\sqrt{8})^2 + (\sqrt{8})^2$$
$$16 = 8+8$$
$$16 = 16$$
$$\therefore \angle BAD = 90^\circ$$

Clearly AB=BC=CD=DA , $\angle BAD = 90^\circ$ and AC and BD bisect each other at right angles . therefore ABCD is a square.

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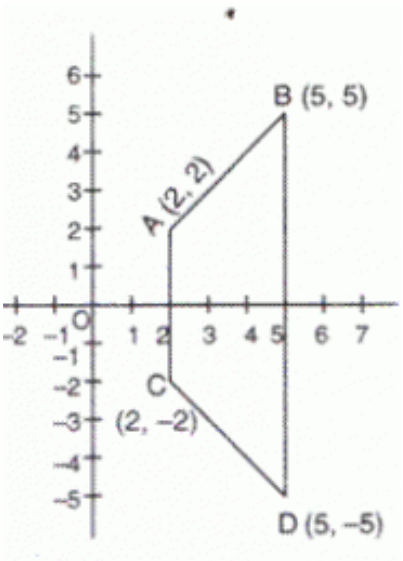
Answer 13.



struction:

oint A and B on the graph.

ımetric to A(2,2) about x-axis is C(2,-2)

nmetric to B(5,5) about x-axis is D(5,-5)

AC, CD, BD.

rmed is a trapezium.

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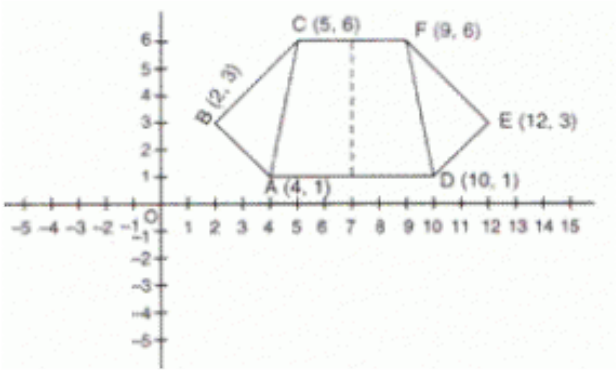
Answer 14.



Steps of construction:

(i) Plot the point A, B and C on the graph.

(ii) Point symmetric to A(4,1) about $x = 7$ is D(10, 1)

(iii) Point symmetric to B(2,3) about $x = 7$ is E(12,3)

(iv) Point symmetric to C(5,6) about $x = 7$ is F(9,6)

(v) Join AB, AC, BC, AD, DE, DF, EF and CF.

The figure formed is a trapezium ADCF with two equal scalene triangles (ABC and DEF) attached to it.

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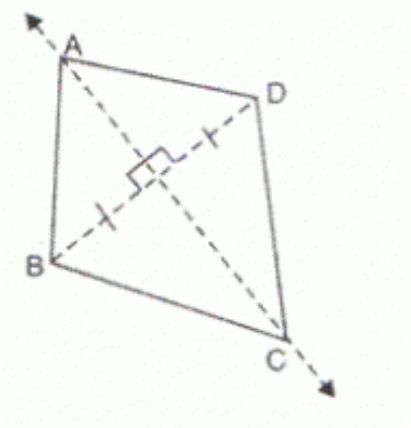
Answer 15.

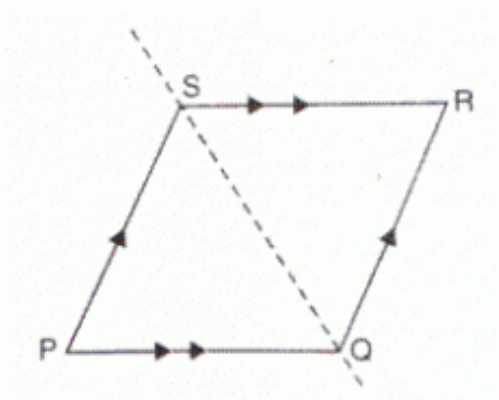


ı sides about line of symmetry :

BC = CD

ding angles about line of symmetry :

∠ADC



ı sides about line of symmetry :

. PQ = QR

ıding angles about line of symmetry :

∠SRQ

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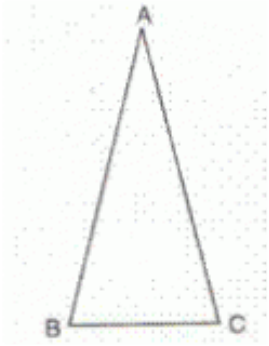
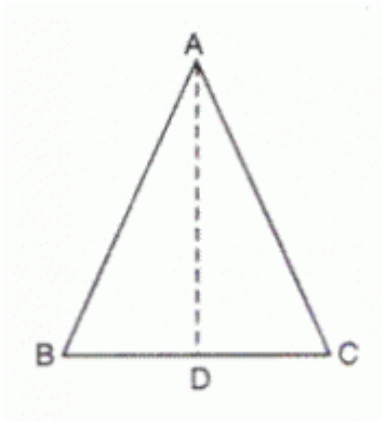
Answer 16.

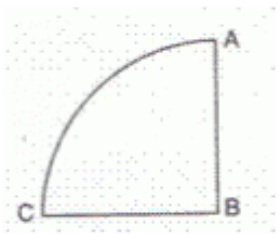
(i)

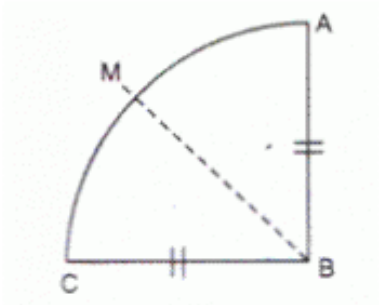




ABC is an isosceles triangle. Draw AD ⊥ BC. AD bisects ∠A. Here AD is the line of symmetry. There is no point of symmetry.

(ii)





Draw the angle bisector BM of ∠ABC. BM is the line of symmetry. There is no point of symmetry.

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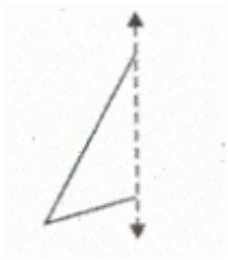
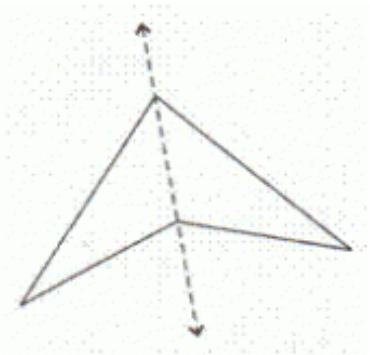
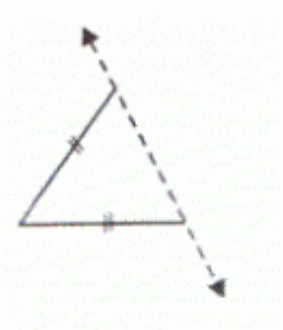
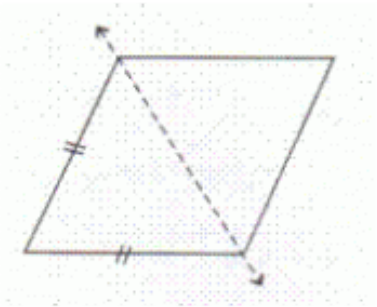
Answer 17.





On completing the figure which is symmetyrical about the given axis, it becomes an arrowhead.





On completing the figure which is symmetyrical about the given axis, it becomes a rhombus.

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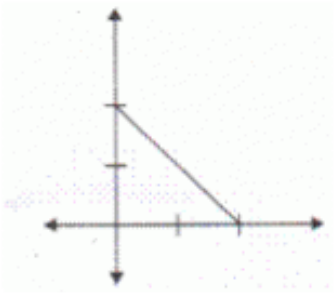
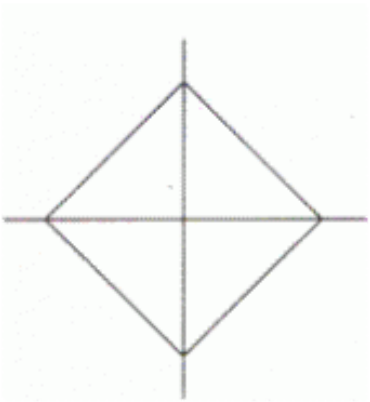
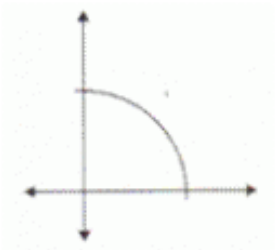
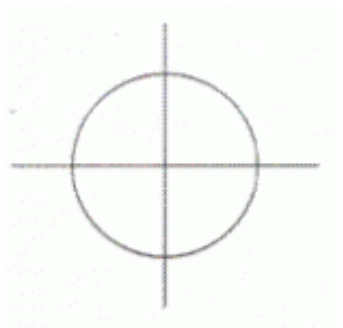
Answer 18.





ompleting the figure about both axes it becomes a square.





ompleteing the figure about both axes it becomes a circle.

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