教科書P91

復習：次の図の点Pを通り、直線*l*に垂直な直線を作図せよ。

C

C

P

P

P

P

*l*

B

A

B

A

A

B

① 点Pを中心に，適当な半径の弧を描き，直線*l*との交点A，Bを求める。
② 点A，Bを中心に，等しい半径の弧を描き，交点Cを求める。
③ 点Cと点Pを直線で結ぶと，点Pを通る垂直な直線になる。

▽平行な直線の作図

次の図で，点Pを通り直線*l*と平行な直線を作図せよ。

①まず点Pを通り*l*に垂直な直線*m*を作図する

P

②点Pを中心とする円をかき，直線*m*との交点を

それぞれA，Bとする

③２点A，Bをそれぞれ中心として，等しい半径の

円をかき，それらの交点をCとする

④直線PCを引く。直線PCが求める直線である

*l*

▽線分の内分点，外分点の作図

例１）線分ABが与えられたとき，線分ABを3：2に内分する点を作図せよ

①Aを通り，直線ABと異なる直線*l* を引く。

②*l*上に，AC：CD＝3：2となるように点C，Dをとる。（ただしCは線分AD上）

③Cを通り，BDに平行な直線を引き，

　線分ABとの交点をEとする。点Eが求める点である。



▽いろいろな長さの線分の作図（教科書P93）

長さ1の線分ABと，長さ*a*，*b*の線分が与えられたとき，次の長さの線分を作図せよ。



（1）*a* + b

（2）b－*a*

（3）$\frac{b}{a}$

（4）*a* b

review：Constructing a perpendicular to a line through a point P.

C

C

P

P

P

P

*l*

B

A

B

A

A

B

① Draw an arc across the line on each side of P, making sure not to adjust the compasses' width in between.

 Label these points A and B.
② At this point, you can adjust the compasses' width. Recommended: leave it as is.

From each point A,B, draw an arc below the line so that the arcs cross. Label this point C.
③ Place a straightedge between P and the point where the arcs intersect. Draw the perpendicular line from P

to the line, or beyond if you wish.

▽Constructing a parallel through a point P.

①Draw a perpendicular to a line *l* through a point P.

②Set the compasses on P and any convenient width.

P

Scribe an arc on each side of P, creating the two points A and B.

③From each point A,B,draw an arc below the line so they cross.

Label this point C.

④Draw a line from P through C.

*l*

L

▽Dividing a segment into several equal parts.

Example1）Given a line segment AB. You are required to divide it internally in the ratio 3:2.

①Draw a line L making an acute angle with AB.

②Starting with A, mark off 5 points C1,C2,C3,C4,C5 at equal distances from the point A.

③Join C5 and B

④Through C3 (i.e. the third point), draw C3D parallel to C5B meeting AB in D.



Practice

Show that for given line segments of length *a*, b and 1, it is possible to construct line segments of length

*a* + b， b - *a* if b > *a*， $\frac{b}{a}$ if *a* > 0　，and　*a* b



（1）*a* + b

（2）b－*a*

（3）$\frac{b}{a}$



（4）*a* b

練習１　線分ABが与えられたとき，線分ABを一辺とする正方形を作図せよ



練習２　線分AFが与えられたとき，線分AFを一辺とする正六形を作図せよ



F

用語集

triangle：三角形

right triangle：直角三角形

isosceles triangle：二等辺三角形

equilateral triangle：正三角形

angle：角、角度 　　　　acute：鋭角

square：正方形

rectangle：長方形　※縦と横はlength,width もしくは long,wide で表す。lengthには長さという意味もあるので注意。

parallelogram：平行四辺形

circle：円　　　radius：半径

arc：弧　　　　chord：弦

ratio ：比　　　point　：点

line　：線　　　straight line　：直線

straight　：真っ直ぐな、直線の　　　line segment　：線分

parallel line　：平行線　　　　parallel　：平行な

vertical [perpendicular] line　：垂直線

vertical, perpendicular　：垂直な

例題6　長さ1の線分ABと，長さ*a*の線分が与えられたとき，長さ $\sqrt{a}$ の線分を作図せよ。

①　半直線ABのBを越える延長上に，B＝aとなる点Cをとる。

②　線分ACを直径とする円Oをかく。

③　Bを通り，直線ABに垂直な直線を引き，円Oとの交点を

　　D，Eとする。線分BDが求める線分である。





Practice1　Draw a square where the side is a given length AB.



Practice2　Draw a hexagon where the side is a given length AF.



F

Words

triangle：三角形 sankakkei

right triangle：直角三角形 chokkakusankakkei

isosceles triangle：二等辺三角形 nitouhensankakkei

equilateral triangle：正三角形 seisankakkei

angle：角、角度 kakudo

acute：鋭角 eikaku

square：正方形 seihoukei

rectangle：長方形　chohoukei

parallelogram：平行四辺形 heikoushihenkei

circle：円 en　　 　radius：半径 hankei

arc：弧 ko　　　 　chord：弦 gen

ratio ：比 hi　　 　point　：点 ten

line　：線 sen　 　straight line　：直線 chokusen

straight　：真っ直ぐな、直線の massuguna

line segment　：線分 senbun

parallel line　：平行線 heikousen

parallel　：平行な heikouna

vertical [perpendicular] line　：垂直線 suichokusen

vertical, perpendicular　：垂直な suichokuna

Practice3

Show that for given line segments of length *a*, and 1, it is possible to construct line segments of length $\sqrt{a}$





Practice1

We start with a given line segment AB> This will become one side of the square.

1. Extend the line AB to the right.

2. Set the compasses on B and any convenient width. Scribe an arc on each side of B, creating the two points F and G.

3. With the compasses on G and any convenient width, draw an arc above the point B.

4. Without changing the compasses' width, place the compasses on F and draw an arc above B, crossing the previous arc, and creating point H

5. Draw a line from B through H.

This line is perpendicular to AB, so the angle ABH is a right angle (90°);

This will become the second side of the square

We now create four sides of the square the same length as AB

6. Set the compasses on A and set its width to AB. This width will be held unchanged as we create the square's other three sides.

7. Draw an arc above point A.

8. Without changing the width, move the compasses to point B. Draw an arc across BH creating point C - a vertex of the square.

9. Without changing the width, move the compasses to C. Draw an arc to the left of C across the exiting arc, creating point D - a vertex of the square.

10. Draw the lines CD and AD

Done. ABCD is a square where each side has a length AB

Practice2

We start with a line segment AF. This will become one side of the hexagon. Because we are constructing a regular hexagon, the other five sides will have this length also.

1. Set the compasses' point on A, and set its width to F. the compasses must remain at this width for the remainder of the construction.

2. From points A and F, draw two arcs so that they intersect. Mark this as point O.

This is the center of the hexagon's circumcircle.

3. Move the compasses to O and draw a circle.

This is the hexagon's circumcircle - the circle that passes through all six vertices

4. Move the compasses on to A and draw an arc across the circle. This is the next vertex of the hexagon.

5. Move the compasses to this arc and draw an arc across the circle to create the next vertex.

6. Continue in this way until you have all six vertices. (Four new ones plus the points A and F you started with.)

7. Draw a line between each successive pairs of vertices.

8. Done. These lines form a regular hexagon where each side is equal in length to AF.