第4期

2版

12.1 全等三角形

1.解:对应边:EF和NM,EG和NH;
对应角:$\angle E$和$\angle N$,$\angle EGF$和$\angle NHM$.

2.B

3.B

4.解:(1)证明:$\because \triangle ABC\cong\triangle FED$,
$\therefore \angle A=\angle F$.
$\therefore AC\parallel DF$.
(2)$\because \triangle ABC\cong\triangle FED$,
$\therefore AB=EF$.
$\therefore AB-BE=EF-BE$.
$\therefore AE=BF$.
$\because AF=8,BE=2$,
$\therefore AE+BF=8-2=6$.
$\therefore AE=3$.
$\therefore AB=AE+BE=3+2=5$.

5.60°

12.2 三角形全等的判定(一)

第1课时

1.B

2.D

3.$AC=DB$

4.解:(1)证明:$\because CE=BF$,
$\therefore CE+EF=BF+EF$,即$BE=CF$.
在$\triangle ABE$和$\triangle DCF$中,
$\begin{cases}AB=DC,\\AE=DF,\\BE=CF,\end{cases}$
$\therefore \triangle ABE\cong\triangle DCF(SSS)$.
$\therefore \angle B=\angle C$.
(2)由(1),得$\triangle ABE\cong\triangle DCF$.
$\therefore \angle AEB=\angle DFC=30^\circ$.
$\therefore \angle BAE=180^\circ-\angle B-\angle AEB=180^\circ-40^\circ-30^\circ=110^\circ$.
$\because AF$平分$\angle BAE$,
$\therefore \angle BAF=\frac{1}{2}\angle BAE=\frac{1}{2}\times110^\circ=55^\circ$.

第2课时

1.证明:$\because EG=FH$,
$\therefore EG+GH=FH+GH$,
即$EH=FG$.
$\because AB\parallel CD$,
$\therefore \angle BHE=\angle EGD$.
$\because \angle EGD=\angle CGF$,
$\therefore \angle CGF=\angle BHE$.
在$\triangle CGF$和$\triangle BHE$中,
$\begin{cases}CG=BH,\\\angle CGF=\angle BHE,\\FG=EH,\end{cases}$
$\therefore \triangle CGF\cong\triangle BHE(SAS)$.
$\therefore \angle F=\angle E$.
$\therefore CF\parallel BE$.

2.解:(1)证明:$\because$点O是线段AB的中点,$\therefore AO=BO$.
$\because OD\parallel BC$,$\therefore \angle AOD=\angle OBC$.
在$\triangle AOD$和$\triangle OBC$中,
$\begin{cases}AO=BO,\\\angle AOD=\angle OBC,\\OD=BC,\end{cases}$
$\therefore \triangle AOD\cong\triangle OBC(SAS)$.
(2)由(1)知$\triangle AOD\cong\triangle OBC$.
$\therefore \angle ADO=\angle OCB=35^\circ$.
$\because OD\parallel BC$,
$\therefore \angle DOC=\angle OCB=35^\circ$.

3版

一、选择题

1~3.CDC　4~6.CCA

二、填空题

7.1　8.SSS

9.76°　10.40°

11.2

12.$(0,-4)$或$(3,4)$或$(3,-4)$

三、

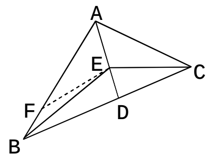
13.证明:$\because AD=BC$,
$\therefore AC=BD$.
在$\triangle ACE$和$\triangle BDF$中,
$\begin{cases}AC=BD,\\AE=BF,\\CE=DF,\end{cases}$
$\therefore \triangle ACE\cong\triangle BDF(SSS)$.
$\therefore \angle A=\angle B$.
$\therefore AE\parallel BF$.

14.证明:$\because AD\parallel BC$,
$\therefore \angle AEB=\angle EBC,\angle DEC=\angle ECB$.
$\because BE=CE$,
$\therefore \angle EBC=\angle ECB$.
$\therefore \angle AEB=\angle DEC$.
$\because$点E为AD的中点,
$\therefore AE=DE$.
在$\triangle AEB$和$\triangle DEC$中,
$\begin{cases}AE=DE,\\\angle AEB=\angle DEC,\\BE=CE,\end{cases}$
$\therefore \triangle AEB\cong\triangle DEC(SAS)$.
$\therefore \angle A=\angle D$.

15.证明:在$\triangle BEF$和$\triangle CDA$中,
$\begin{cases}BE=CD,\\\angle B=\angle 1,\\BF=CA,\end{cases}$
$\therefore \triangle BEF\cong\triangle CDA(SAS)$.
$\therefore \angle D=\angle 2$.
(2)$\because EF\parallel AC$,
$\therefore \angle 2=\angle BAC=80^\circ$.
$\therefore \angle D=\angle 2=80^\circ$.

16.解:(1)证明:在$\triangle AOB$和$\triangle COD$中,
$\begin{cases}OA=OC,\\\angle AOB=\angle COD,\\OB=OD,\end{cases}$
$\therefore \triangle AOB\cong\triangle COD(SAS)$.
(2)由(1)知,$\triangle AOB\cong\triangle COD$,
$\therefore CD=AB=8$.
在$\triangle BCD$中,$BC-CD<BD<BC+CD$,
即$2<2OB<18$.
$\therefore 1<OB<9$.

17.证明:如图,在AB上截取$AF=AC$,连接EF.



(第17题图)

$\because AD$是$\triangle ABC$的角平分线,
$\therefore \angle FAE=\angle CAE$.
在$\triangle AEF$与$\triangle AEC$中,
$\begin{cases}AF=AC,\\\angle FAE=\angle CAE,\\AE=AE,\end{cases}$
$\therefore \triangle AEF\cong\triangle AEC(SAS)$.
$\therefore EF=EC$.
在$\triangle BEF$中,$EB-EF<BF$.
又$\because BF=AB-AF=AB-AC$,
$\therefore EB-EC<AB-AC$,即$AB-AC>EB-EC$.

四、

18.解:(1)当$t=1$时,$AP=BQ=1,BP=AC=3$.
在$\triangle ACP$和$\triangle BPQ$中,
$\begin{cases}AP=BQ,\\\angle A=\angle B=90^\circ,\\AC=BP,\end{cases}$
$\therefore \triangle ACP\cong\triangle BPQ(SAS)$.
$\therefore \angle ACP=\angle BPQ$.
$\therefore \angle APC+\angle BPQ=\angle APC+\angle ACP=90^\circ$.
$\therefore \angle CPQ=90^\circ$,即线段$PC$与$PQ$垂直.
(2)①若$\triangle ACP\cong\triangle BPQ$,
则$AC=BP,AP=BQ$,即$\begin{cases}3=4-t,\\t=xt.\end{cases}$
解得$\begin{cases}t=1,\\x=1.\end{cases}$
②若$\triangle ACP\cong\triangle BQP$,
则$AC=BQ,AP=BP$.
即$\begin{cases}3=xt,\\t=4-t.\end{cases}$
解得$\begin{cases}t=2,\\x=\frac{3}{2}.\end{cases}$
综上,存在$\begin{cases}t=1,\\x=1\end{cases}$或$\begin{cases}t=2,\\x=\frac{3}{2}\end{cases}$使得$\triangle ACP$与$\triangle BPQ$全等.

第1期

2版

11.1.1 三角形的边

1.C　2.B　3.C　4.B

11.1.2 三角形的高、中线与角平分线

1.B

2.A

3.C

11.1.3 三角形的稳定性

1.稳定性　2.B

11.2.1 三角形的内角

1.A　2.A

3.解:$\because BD\perp AC,\angle CBD=30^\circ$,
$\therefore \angle BCD=90^\circ-30^\circ=60^\circ$.
$\because CE$平分$\angle ACB$,
$\therefore \angle ACE=\frac{1}{2}\angle BCD=30^\circ$.
$\because \angle A=69^\circ$,
$\therefore \angle AEC=81^\circ$.
$\therefore \angle BEC=180^\circ-81^\circ=99^\circ$.

4.52°

5.C

3版

一、选择题

1~3.CBB　4~6.BBA

二、填空题

7.三角形的稳定性

8.22.5°

9.钝角

10.55°

11.$3a+b-3c$

12.2或10

三、

13.解:$\because a,b,c$是$\triangle ABC$的三边,$a=4,b=6$,
$\therefore 6-4<c<6+4$,即$2<c<10$.
$\because \triangle ABC$的周长是小于16的偶数,
$\therefore 2<c<6$.
$\therefore c=4$.
当$c=4$时,$\triangle ABC$的形状是等腰三角形.

14.解:$\because \angle C=30^\circ,\angle B=60^\circ$,
$\therefore \angle CAB=180^\circ-30^\circ-60^\circ=90^\circ$.
$\because AD$平分$\angle CAB$,
$\therefore \angle CAD=\angle BAD=\frac{1}{2}\angle CAB=45^\circ$.
$\therefore \angle 1=180^\circ-60^\circ-45^\circ=75^\circ$.

15.解:(1)$\because AB=\frac{3}{2}AC,AC=10cm$,
$\therefore AB=15cm$.
又$\because \triangle ABC$的周长是33cm,
$\therefore BC=8cm$.
$\because AD$是BC边上的中线,
$\therefore BD=\frac{1}{2}BC=4cm$.
(2)不能.
理由:$\because AB=\frac{3}{2}AC,AC=12cm$,
$\therefore AB=18cm$.
又$\because \triangle ABC$的周长是33cm,
$\therefore BC=3cm$.
$\because AC+BC=15<18$,
$\therefore$不能构成三角形,即AC的长不能为12cm.

16.解:(1)是,90°.
(2)$\because$一个“智慧三角形”的“智慧角”为108°,即$\angle\alpha=108^\circ$.
$\therefore$这个三角形的另一个内角为$\frac{\angle\alpha}{3}=36^\circ$.
$\because 180^\circ-108^\circ-36^\circ=36^\circ$,
$\therefore$这个三角形的三个内角分别为36°,36°,108°.

17.解:(1)$\because \angle BAC=90^\circ$,$AD$是边$BC$上的高,
$\therefore \frac{1}{2}AB\cdot AC=\frac{1}{2}BC\cdot AD$.
$\therefore AD=\frac{AB\cdot AC}{BC}=\frac{6\times8}{10}=4.8(cm)$,即$AD$的长度为4.8cm.
(2)$\because AE$是$\triangle ABC$的中线,
$\therefore BE=\frac{1}{2}BC=5$.
由(1)知$AD=4.8$,
$\therefore S_{\triangle ABE}=\frac{1}{2}BE\cdot AD=\frac{1}{2}\times5\times4.8=12(cm^2)$.
$\therefore \triangle ABE$的面积是$12cm^2$.
(3)$\because AE$为BC边上的中线,
$\therefore BE=CE$.
$\therefore \triangle ACE$的周长$-\triangle ABE$的周长$=AC+AE+CE-(AB+BE+AE)=AC-AB=8-6=2(cm)$,即$\triangle ACE$和$\triangle ABE$的周长的差是2cm.

四、

18.解:(1)$\angle A+\angle B=\angle C+\angle D$.
(2)$\because AP,CP$分别平分$\angle BAD,\angle BCD$,
$\therefore \angle BAP=\angle DAP,\angle BCP=\angle DCP$.
由(1)可得:$\angle BAP+\angle B=\angle BCP+\angle P,\angle DAP+\angle P=\angle DCP+\angle D$,
$\therefore \angle B-\angle P=\angle P-\angle D$,即$2\angle P=\angle B+\angle D$.
$\because \angle B=36^\circ,\angle D=14^\circ$,
$\therefore \angle P=25^\circ$.
(3)$2\angle P=\angle B+\angle D$.
理由:$\because CP,AG$分别平分$\angle BCE$、$\angle FAD$,
$\therefore \angle ECP=\angle PCB,\angle FAG=\angle GAD$.
$\because \angle PAB=\angle FAG$,
$\therefore \angle GAD=\angle PAB$.
$\because \angle P+\angle PAB=\angle B+\angle PCB$,
$\therefore \angle P+\angle GAD=\angle B+\angle PCB$.①
$\because \angle P+\angle PAD=\angle D+\angle PCD$,
$\therefore \angle P+(180^\circ-\angle GAD)=\angle D+(180^\circ-\angle ECP)$.②
①+②,得$2\angle P=\angle B+\angle D$.

①

第 2 期

2 版

11.2.2 三角形的外角

1.C　2.A

3.15°

4.解:(1)证明:∵CE 平分∠ACD,

$\therefore\angle ECD=\angle ACE$.

$\because\angle ABC=\angle ACE$,

$\therefore\angle ABC=\angle ECD$.

∴AB∥CE.

(2)∵∠ACD 是△ABC 的一个外角,

$\therefore\angle ACD=\angle ABC+\angle A$.

∵BE 平分∠ABC,

$\therefore\angle ABE=\angle EBC$.

$\therefore\angle E=\angle ECD-\angle EBC=\frac{1}{2}\angle ACD-\frac{1}{2}\angle ABC=\frac{1}{2}(\angle ACD-\angle ABC)=\frac{1}{2}\angle A=25°$.

5.72°

11.3.1 多边形

1.B　2.B

3.图略.

4.C

11.3.2 多边形的内角和

第 1 课时

1.C　2.C

3.解:(1)∵四边形的内角和为$(4-2)\times180°=360°$,

$\therefore 2x°+140°+90°=360°$.

解得 x=65.

(2)∵五边形的内角和为$(5-2)\times180°=540°$,

$\therefore 3x°+120°+150°+90°=540°$.

解得 x=60.

4.106°

第 2 课时

1.B

2.解:(1)∵AE∥CD,

$\therefore\angle D+\angle E=180°$.

∵五边形 ABCDE 中,$\angle A=100°$,$\angle B=120°$,

$\therefore\angle C=(5-2)\times180°-180°-100°-120°=140°$.

(2)五边形 ABCDE 的外角和是 360°.

3 版

一、选择题

1~3.CBB　4~6.DDC

二、填空题

7.1800°　8.160

9.36°

10.180°或 360°或 540°

11.38°

12.$\frac{1}{2}\alpha+10°$或$\frac{1}{2}\alpha-10°$

三、

13.解:设这个正多边形是 n 边形.

则 $180°\times(n-2)=720°+360°$.

解得 n=8.

$(720°+360°)\div8=135°$.

答:此正多边形的边数是 8,每一个内角的度数是 135°.

14.解:∵$\angle A=40°$,$\angle ABD=38°$,

$\therefore\angle BDC=\angle A+\angle ABD=40°+38°=78°$.

∵CE 平分∠ACB,

$\therefore\angle ACE=\frac{1}{2}\angle ACB=\frac{1}{2}\times80°=40°$.

$\therefore\angle BEC=\angle EDC+\angle DCE=78°+40°=118°$.

15.解:∵五边形 ABCDE 是正五边形,

$\therefore CD=DE=AE$,$\angle AED=\angle CDE=\frac{(5-2)\times180°}{5}=108°$.

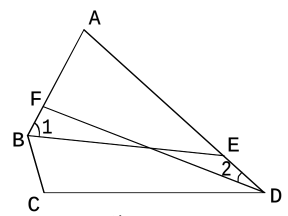
$\therefore\angle ADE=\angle CED=\frac{180°-108°}{2}=36°$.

$\therefore\angle CFD=\angle ADE+\angle CED=36°+36°=72°$.

16.解:(1)∵在四边形 ABCD 中,$\angle A=75°$,$\angle C=105°$,

$\therefore\angle ABC+\angle ADC=360°-75°-105°=180°$.

(2)如图,



(第 16 题图)

∵BE 平分∠ABC,DF 平分∠ADC,

$\therefore\angle1=\frac{1}{2}\angle ABC$,$\angle2=\frac{1}{2}\angle ADC$.

$\therefore\angle1+\angle2=\frac{1}{2}(\angle ABC+\angle ADC)=90°$.

由三角形外角的性质可得,

$\angle BED=\angle1+\angle A$,$\angle BFD=\angle2+\angle A$.

$\therefore\angle BED+\angle BFD=\angle1+\angle A+\angle2+\angle A=\angle1+\angle2+2\angle A=90°+150°=240°$.

17.解:(1)∵A_1B 是∠ABC 的平分线,A_1C 是∠ACD 的平分线,

$\therefore\angle A_1BC=\frac{1}{2}\angle ABC$,$\angle A_1CD=\frac{1}{2}\angle ACD$.

又∵$\angle ACD=\angle A+\angle ABC$,$\angle A_1CD=\angle A_1BC+\angle A_1$,

$\therefore\frac{1}{2}(\angle A+\angle ABC)=\frac{1}{2}\angle ABC+\angle A_1$.

$\therefore\angle A_1=\frac{1}{2}\angle A$.

(2)由(1)的方法可得$\angle A_2=\frac{1}{2}\angle A_1$.

$\because\angle A_2=16°$,

$\therefore\angle A_1=2\angle A_2=32°$.

$\therefore\angle A=2\angle A_1=64°$.

四、

18.解:(1)180°.

(2)∵AO,BO,CO,DO 分别是四边形 ABCD 的四个内角的平分线,

$\therefore\angle OAB=\frac{1}{2}\angle DAB$,$\angle OBA=\frac{1}{2}\angle CBA$,$\angle OCD=\frac{1}{2}\angle BCD$,$\angle ODC=\frac{1}{2}\angle ADC$.

$\therefore\angle OAB+\angle OBA+\angle OCD+\angle ODC=\frac{1}{2}\times360°=180°$.

在△OAB 中,$\angle OAB+\angle OBA=180°-\angle AOB$,

在△OCD 中,$\angle OCD+\angle ODC=180°-\angle COD$,

$\therefore180°-\angle AOB+180°-\angle COD=180°$.

$\therefore\angle AOB+\angle COD=180°$.

$\because\angle AOB=110°$,

$\therefore\angle COD=180°-110°=70°$.

第 3 期

2~3 版

一、选择题

1~3.CDC　4~6.BBA

二、填空题

7.三角形的稳定性

8.27

9.20　10.84°

11.22.5°　12.36°或 72°或 96°

三、

13.解:(1)∵$|a-1|+(b-3)^2=0$,且$|a-1|\geqslant0$,$(b-3)^2\geqslant0$,

$\therefore a-1=0$,$b-3=0$.

$\therefore a=1$,$b=3$.

$\because b-a<c<b+a$,

$\therefore 2<c<4$.

(2)根据题意,得$(n-2)\times180°=360°+540°$.解得 n=7.

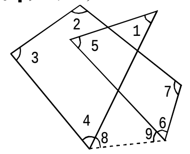
14.解:∵$\angle ADE=125°$,

$\therefore\angle ADC=55°$.

∵$\angle A=80°$,$\angle C=75°$,四边形的内角和为 360°,

$\therefore\angle B=360°-\angle A-\angle C-\angle ADC=360°-80°-75°-55°=150°$.

15.解:如图,



(第 15 题图)

由三角形内角和定理,得

$\angle1+\angle5=\angle8+\angle9$.

$\therefore\angle1+\angle2+\angle3+\angle4+\angle5+\angle6+\angle7=\angle1+\angle5+\angle2+\angle3+\angle4+\angle6+\angle7=\angle8+\angle9+\angle2+\angle3+\angle4+\angle6+\angle7=180°\times(5-2)=540°$.

16.解:∵DE∥BC,

$\therefore\angle ABC=\angle AED=55°$.

在△ABC 中,$\angle A=180°-\angle ABC-\angle C=180°-55°-52°=73°$.

∵BD 为 AC 边上的高,

∴△ADB 为直角三角形.

$\therefore\angle ABD=90°-\angle A=90°-73°=17°$.

17.解:在△ABC 中,$\angle ACB=80°$,$\angle B=24°$,

$\therefore\angle BAC=180°-\angle ACB-\angle B=76°$.

∵AD 平分∠BAC,

$\therefore\angle CAD=\frac{1}{2}\angle BAC=38°$.

在△ACD 中,$\angle ACD=80°$,$\angle CAD=38°$,

$\therefore\angle ADC=180°-\angle ACD-\angle CAD=62°$.

$\therefore\angle PDE=\angle ADC=62°$.

∵PE⊥BC 于 E,

$\therefore\angle PED=90°$.

$\therefore\angle P=180°-\angle PDE-\angle PED=28°$.

四、

18.解:(1)△ABC 是“三倍角三角形”.理由如下:

∵$\angle A=35°$,$\angle B=40°$,

$\therefore\angle C=180°-35°-40°=105°=35°\times3$.

∴△ABC 是“三倍角三角形”.

(2)∵$\angle B=60°$,

$\therefore\angle A+\angle C=120°$.

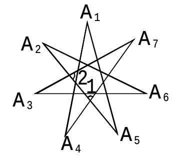
设最小的角为 x,

①当 60°=3x 时,x=20°.

②当 x+3x=120°时,x=30°.

答:△ABC 中最小内角为 20°或30°.

19.解:(1)180°.



(第 19 题图)

(2)如图,

模型结论得,$\angle1=\angle A_1+\angle A_4+\angle A_5$,$\angle2=\angle A_2+\angle A_3+\angle A_6$,

$\because\angle1+\angle2+\angle A_7=180°$,

$\therefore\angle A_1+\angle A_2+\angle A_3+\angle A_4+\angle A_5+\angle A_6+\angle A_7=180°$.

20.解:(1)②.

(2)①$16-(2x+2)>2x+2-(2x-6)$,

解得 x<3.

∵2x-6>0,解得 x>3.

故不合题意,舍去.

②$2x+2>16>2x-6$,

解得 7<x<11.

$2x+2-16>16-(2x-6)$,解得 x>9.

∴9<x<11.

∵x 为整数,

∴x=10.

经检验,当 x=10 时,三边长为 22,16,14 可构成三角形.

③2x-6>16,解得 x>11.

$2x+2-(2x-6)>2x-6-16$,

解得 x<15.

∴11<x<15.

∵x 为整数,

∴x=12 或 13 或 14.

经检验,当 x=12 时,三边长为 18,16,26;

当 x=13 时,三边长为 20,16,28;

当 x=14 时,三边长为 22,16,30.

都可以构成三角形.

综上所述,x 的整数值为 10 或 12 或 13 或 14.

五、

21.解:(1)证明:作射线 AO.

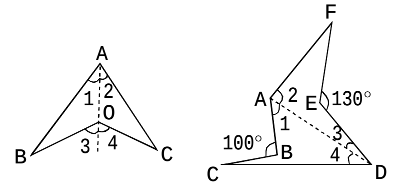
∵∠3 是△ABO 的外角,

$\therefore\angle1+\angle B=\angle3$.①

∵∠4 是△AOC 的外角,

$\therefore\angle2+\angle C=\angle4$.②

①+②,得$\angle1+\angle B+\angle2+\angle C=\angle3+\angle4$,即$\angle BOC=\angle BAC+\angle B+\angle C$.



(第 21 题图)

(2)连接 AD.由(1)可得,

$\angle F+\angle2+\angle3=\angle DEF$,③

$\angle1+\angle4+\angle C=\angle ABC$.④

③+④,得$\angle F+\angle2+\angle3+\angle1+\angle4+\angle C=\angle DEF+\angle ABC=130°+100°=230°$,

即$\angle BAF+\angle C+\angle D+\angle F=230°$.

22.解:(1)证明:由“对顶三角形”可得,$\angle OAB+\angle B=\angle C+\angle D$,

$\therefore\angle OAB-\angle C=\angle D-\angle B$.

$\because\angle EAO=\angle C$,$\angle D=2\angle B$,

$\therefore\angle OAB-\angle EAO=\angle B$,

即$\angle EAB=\angle B$.

(2)由题意得,$\angle ECD-\angle DBE=20°$.

由△BOD 和△COE 是“对顶三角形”得,$\angle DBE+\angle BDO=\angle ECD+\angle OEC$.

$\therefore\angle BDO-\angle OEC=\angle ECD-\angle DBE=20°$.

$\because\angle BOD=\angle A$,$\angle BOD+\angle DOE=180°$,

$\therefore\angle A+\angle DOE=180°$.

$\therefore\angle ADO+\angle AEO=180°$.

$\because\angle AEO+\angle OEC=\angle BDO+\angle ADO=180°$,

$\therefore\angle BDO=\angle AEO$.

$\therefore\angle BDO+\angle OEC=180°$.

$\because\angle BDO-\angle OEC=20°$,

解得$\angle BDO=100°$.

六、

23.解:(1)∵$\angle ABC=80°$,

$\therefore\angle ABE=180°-80°=100°$.

∵BF 平分∠ABE,

$\therefore\angle ABF=\angle EBF=50°$.

∵BF∥CD,

$\therefore\angle DCB=\angle EBF=50°$.

(2)∵CF 平分∠BCD,BF 平分∠ABE,

$\therefore\angle BCF=\angle DCF=\frac{1}{2}\angle BCD$,$\angle EBF=\angle ABF=\frac{1}{2}\angle ABE$.

$\because\angle A+\angle D+\angle ABC+\angle BCD=(4-2)\times180°=360°$,

$\therefore\angle ABC+\angle BCD=360°-105°-125°=130°$.

$\therefore180°-2\angle EBF+2\angle BCF=130°$.

$\because\angle EBF=\angle F+\angle BCF$,

$\therefore180°-2(\angle F+\angle BCF)+2\angle BCF=130°$.

$\therefore2\angle F=50°$.

$\therefore\angle F=25°$.

(3)$\angle F=\frac{1}{2}(\angle A+\angle D-180°)$.

理由:

$\because\angle A+\angle D+\angle ABC+\angle BCD=360°$,$\angle ABC=180°-\angle ABE$,$\angle ABE=2\angle EBF$,$\angle BCD=2\angle BCF$,$\angle EBF=\angle F+\angle BCF$,

$\therefore\angle A+\angle D+180°-\angle ABE+2\angle BCF=360°$.

$\therefore\angle A+\angle D+180°-2\angle EBF+2\angle BCF=360°$.

$\therefore\angle A+\angle D-2\angle EBF+2\angle BCF=180°$.

$\therefore\angle A+\angle D-2(\angle F+\angle BCF)+2\angle BCF=180°$,

即$2\angle F=\angle A+\angle D-180°$.

$\therefore\angle F=\frac{1}{2}(\angle A+\angle D-180°)$.